

HORACE

Cutting things out of the over-crowded curriculum presents our only chance for getting students to go deeper, think harder, push past complacency to the habits of mind Essential schools hold dear. But what goes and what stays? And who decides?

BY KATHLEEN CUSHMAN

Less Is More: The Secret of Being Essential

PRETTY MUCH EVERYBODY agrees: "Less Is More" is the toughest of the Coalition's Nine Common Principles to explain and to live by. What does it mean? (An array of possibilities worthy of an old-style multiple-choice test springs all too easily to mind—reading fewer books, spending less time in school, perhaps even doing less homework?) Does it advise teachers to spend less time on some things and more on others? If so, what goes and what increases—and what effect do those changes have on student achievement?

Merely because the maxim is so catchy, people are apt to use "Less Is More" to serve whatever purposes they like, including as a deliberately misleading attack on Essential School ideas. In fact, however, the second of TheodoreSizer's founding precepts is among the most closely reasoned and intellectually rigorous of the nine—and by far the most difficult and demanding to put into practice. It asks schools to limit and simplify their goals, so every student might master a limited number of *essential* skills and areas of knowledge, rather than race to cover broader content in conventionally defined "subjects." And it asks them to redesign their academic offerings so they will center *more* around "the intellectual and imaginative powers and competencies students need."

Simple as it seems, when teach-

ers put it into practice "Less Is More" affects virtually every aspect of schooling, from curriculum to pedagogy, from teachers' tasks to student schedules. Those Essential schools that have taken it most seriously describe dramatic changes—in school structure, in political and educational discourse, and in the levels of student achievement—since they have taken on this Common Principle.

Less 'Stuff,' More Thought

"Serious use of the mind takes time," Ted Sizer argues. "If you have really high intellectual standards for kids, the curriculum overloaded with stuff has to give way." To write well requires painstaking revision, he notes, just as to read deeply requires the time to go over text closely again and again. "Practicing any art or any science means circling around a subject, trying this and trying that, asking questions that simply cannot be answered in a trivial way."

This common-sensical observation holds true in extensive research findings about how humans learn. In the last few decades cognitive theorists have firmly established that we come to know things not by simply memorizing or accumulating facts, but by *thinking things through*. This is an active process; it puts information into a meaningful context and asks us to struggle with its complexities and contradictions.

What Defines a Good Thinker?

At the heart of good thinking, David Perkins suggests in his 1992 book *Smart Schools*, is the "thinking disposition"—an inclination to learn that encompasses the abilities or "know-how" we want children to acquire. Good teachers model, cultivate, point out, and reward these dispositions, he says, in everything from classroom discussions to assessment activities. Perkins and his colleagues Eileen Jay and Shari Tishman offer the following model of the thinking dispositions:

1. The disposition to be broad and adventurous
2. The disposition toward sustained intellectual curiosity.
3. The disposition to clarify and seek understanding.
4. The disposition to be playful and strategic.
5. The disposition to be intellectually careful.
6. The disposition to seek and evaluate reasons.
7. The disposition to be metacognitive [to think about thinking and learning].

When the fruit is there—when students are standing up in front of people in the community and being real contributors—then 'Less Is More' falls into place and makes sense."

"Part of the tension comes from how you report things to parents," observes National Re:Learning Faculty member Simon Hole, who teaches fourth-graders at the Narragansett Pier School in Rhode Island. "In elementary school just as in high school, people get very anxious about covering skill work—in this case things like spelling and arithmetic facts. If we neglect the higher order skills, though, kids end up at nine years old already having Right Answer Compulsion. That's deadly."

Instead, Hole says, his teaching team pushes students to express opinions, back them with evidence, and connect their understanding with other things they know.

"When I'm working with staff from other schools, I ask people to suspend their disbelief," he says. "Pick one thing about which you all can say, 'Kids need more of this'—like asking good questions—then really zero in on that, and let everything you do push toward it. That doesn't mean we don't value other things; we know enough to fold skills like spelling and computation into top-shelf projects. But kids are in school to learn how to think!"

Still, "nowhere on the report card is there a line that says 'Critical Thinking,'" Hole says ruefully. "We've begun to work with parents on that, getting away from assigning grades and toward new rubrics." A better report card, he suggests, would let parents know how the child's writing looks, perhaps by comparing it against a standard or by displaying progress in graphs.

The Habit of Thinking

If we really believe, as Simon Hole says, that children are in school to learn to think, then "Less Is More" becomes a bald necessity. To nurture good habits of mind, Ted Sizer argues, schools must accept their responsibility to teach facts—the "stuff" of knowledge—in context, then to provide repeated and meaningful ways for students to practice using them. A youngster learns the Bill of Rights; we ask him to apply it to past, present, and hypothetical situations. A student learns that John Milton was blind; we ask her to show how that illuminate his poetry. Through time-consuming activities like these, students think their way to learning. What they retain—the "residue" of their school years—is then not the stuff of Trivial Pursuit, Sizer says, but the mixture of awareness and logic that characterizes the people we most admire.

More, Sizer insists, we must reinforce such habits by building

them into the machinery of assessment. "Our testing systems value the immediate," he says. "The 30-minute writing sample in the SAT sends out exactly the wrong message; none of us wants to be judged on the first draft of something we've only had 30 minutes to write about."

Unless we restructure schools deliberately to support these thoughtful habits, some critics contend, we give out the cynical message that education has become merely a vocational pursuit, designed solely to train children for the marketplace of the next century. Posed against this is the purist model held by those who yearn to "transmit" a fixed and isolated tradition to the young just as one passes on the family farm, argues Benjamin Barber, a professor of political scientist at Rutgers University. Alan Bloom (*The Closing of the American Mind*) represents the purist, Barber says; Christopher Whittle, with his advertising-drenched "curriculum," the vocationalist. In his book *An Aristocracy of Everyone*, Barber wryly proposes a multiple-choice test for "what our 47-year-olds know," arguing that our society gives a host of implicit signals to the young about what things we value most.

"Book publishers are financially rewarded today for publishing (a) cookbooks (b) cat books (c) how-to books (d) popular potboilers (e) critical editions of Immanuel Kant's early writings," one typical test item reads. "For extra credit," the list concludes, "name the ten living poets who most influenced your life, and recite a favorite stanza. Well, then, never mind the stanza, just name the poets. Okay, not ten, just five. Two? So, who's your favorite running back?"

"As soon as you define standards in terms of intellectual rigor rather than in precocity in rattling off facts," says Ted Sizer, "your coverage shrinks. Let teachers decide together how that plays out with each group of kids. Let them display the work that follows. Let serious knowledge be used well." *Quod erat demonstrandum*. Less is more. □

Getting Students to Do More with Less: One Teacher Whittles Down her Humanities Curriculum

by Carol Lacerenza-Bjork, National Re:Learning Faculty member

At West Hill High School in Stamford, Connecticut, English teacher Carol Lacerenza-Bjork and her ninth-grade students developed a curriculum that would achieve their objectives by giving more attention to fewer required texts. Here is her account of how that year-long course took shape, as they planned backwards from the outcomes they aimed for:

DEFINING THE OUTCOMES

First, outcomes were explicit and focused:

- Students will demonstrate that they can apply interpretations and analyses of literature, film, journalistic nonfiction, and essays to contemporary issues and thinking in order to construct meaning that will prepare them to solve problems now and in the future.
- Students will demonstrate that they can articulate and defend a position in a variety of mediums, in the oral, written, and visual domains, developed from data individually and collectively obtained and studied, related to questions about the human condition.
- Students will demonstrate their skills in problem-solving and focused study both in groups and individually. In connection with this, students will demonstrate their ability to sort and prioritize information in order to use it to construct knowledge.
- Students will demonstrate that they understand the value of collaboration, cooperation, and self-governance.

THE FINAL ASSESSMENTS

Next, the kind and number of final assessments of student work were narrowed and few, while the number of assessment tasks throughout the year were varied and many, depending on the individual "need for practice." The final assessment vehicles were assigned, as follows:

WRITING

One paper, in response to an essential question of the student's choice, that 1) examines multiple perspectives on the question, problems and additional questions it raises and 2) focuses on the student's position about how the question and its possible answers and solutions (or lack thereof) affect individuals and society.

RHETORIC

One formal presentation in which the student

- 1) describes how his or her question is formulated and focused, and why it is important to study,
- 2) shares the evidence he or she has collected in order to develop a position, and
- 3) articulates his or her position, using visuals, as appropriate.

DISCOURSE

One seminar, organized, researched and led with two other students who will be released from four class days during the year to do whatever group preparation is necessary before facilitating the seminar.

HOW WE MANAGED LEARNING

INDEPENDENT AND GROUP WORK

Throughout the year students used class readings, independent reading, active listening and group and individual research to complete assessment tasks related to, and that would prepare them for, their final assessments. They could essentially choose whatever they wished to pursue that end, so that the content was varied and individualized, but the application of the knowledge was structured by the outcomes and assessments.

CLASSWORK

To provide students with the learning skills they needed in order to reach the outcomes, we as a team (teacher and students) decided to focus on a question of importance to them at the time: Can we predict by the nature, actions and influence of a leader (or leadership), what the behaviors of a society will be? Or do the behaviors of a society shape in predictable, patterned ways what kind of leader or leadership will emerge?

From an extensive curriculum list of readings, we decided that we could best focus on this question if we narrowed our work to a study of several "classics" and several contemporary works. We chose *Oedipus the King*, *Antigone*, *Animal Farm*, *1984*, *Julius Caesar*, *The Autobiography of Malcolm X*, and *Lean on Me*.

continued on next page

Doing More with Less in a Humanities Curriculum

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In response to these, students engaged in many kinds of seminar discussions, maintained reader response journals, developed an annotated bibliography that included these and other related works introduced in response to ongoing questions, and articulated a conception of

- 1) the numbers and kinds of leaders and leadership styles,
- 2) types and forms of government,
- 3) the concepts of "static" behavior, movements, reforms, and revolutions, and
- 4) how these are viewed through various lenses (literary, historical, journalistic, artistic, etc.).

SEMINARS

In the first semester, we decided on seminar texts as a group. In those we examined poetry, short stories, essays, nonfiction, and excerpts from ancient and contemporary philosophers. During the second semester, small student groups selected readings.

LITERARY GROUPS

Small groups of students selected the contemporary literature we eliminated from the classwork

described above. These works included (but were not limited to) *The Old Man and the Sea*, *Catcher in the Rye*, *The Chocolate War*, *All Quiet on the Western Front*, *A Separate Peace*, *Of Mice and Men*, *The Day No Pigs Would Die*.

In the literary groups students worked together toward an understanding of an author's position and the work's themes as articulated through the characters, plot, setting and conflicts. They then compared and contrasted these with the works read as a whole class, and applied interpretation strategies to the class and independent work they were doing.

By using skills and a limited number of texts as the unifier to move toward the outcomes, and by reconstructing the ways in which students had opportunities to acquire knowledge through the texts, less became more. The curriculum allowed students to focus on developing problem-solving skills, critical thinking skills, sophisticated modes of expression, and collaborative skills using a common base of knowledge. Students were then freed to apply those skills to individual learning strands that were exploratory, meditative, and "deep" rather than remaining fixed in a more superficial exposure to skills and knowledge.



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Coalition of Essential Schools
Box 1969, Brown University
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When we use information to serve our real needs in this way, research shows, we remember it.

Harvard University researcher David Perkins calls this "generative knowledge"—it "does not just sit there but functions richly in people's lives to help them understand and deal with the world," he notes in his 1992 book *Smart Schools: From Training Memories to Educating Minds*. Learning is a consequence of thinking, he asserts, not the other way around. If we want students to retain, understand, and actively use what we teach them, our schools must provide "experiences in which learners think about and think with what they are learning."

In Essential school classrooms, this belief often shows up in the form of another Coalition metaphor, that of "student as worker, teacher as coach." Kids work actively on richly conceived projects that mean something to them. Their assessments often put them on the spot, asking them to demonstrate and use what they know before an audience,

or apply it in a real-world context. (David Perkins calls these "understanding performances," or "performances of understanding.")

Do students learn more this way than they would in a "back-to-basics" classroom that concentrates on covering the textbook before the year is over? Research results show overwhelmingly that knowledge acquired in conventional classrooms is short-lived and heartbreakingly fragile. (One way to see this, assessment researcher Grant Wiggins suggests, is to ask kids to take any final exam again, one year later.) Students may answer correctly on a short-answer quiz but not recall the same information in another, more authentic context. They often can repeat facts they have "learned," but cannot interpret or explain them. (Many Harvard graduates in a recent survey, for example, could not explain why it is hot in the summer and cold in the winter.) They learn the "right answers" by rote, but they can't connect them with real phenomena in the world around them. So busy memorizing the textbook causes of the Civil War, they can't see past the next day's test to make comparisons with modern-day Russia or Yugoslavia.

Deciding What to Cut

But you can't expect to address this kind of question in depth and still get to the Civil War by Christmas—which is why "Less Is More" simultaneously threatens the classroom habits of teachers, the expectations of parents and testmakers, and the existing structure of schools more than does any other Essential School principle. (Its practice does not, however, bring down student performance on measures like the SATs, or hurt kids' chances of college admissions; colleges, in fact, are crying out for this kind of thoughtful high school work. See *HORACE*, Vol. 10, No. 5, May 1994). In the hubbub of standard-setting that has swept the nation lately, the National Council of Teachers of

Mathematics has addressed this issue squarely, taking on the crucial task of identifying priorities for both content and skills from the dizzying array math students face in the traditional course of study. (See page 3.) The NCTM's published standards have helped clarify what a "thinking curriculum" looks like in practice. And they have given Essential school math teachers like National Re:Learning Faculty member Daniel Venables a leg up as they struggle to cut inessentials from the revered traditional syllabus.

"When we sat down to decide what we wanted students to put in their math portfolios, we had the NCTM standards in one hand," Venables says. With his colleagues at Heathwood Hall Episcopal School in Columbia, South Carolina, he worked first to define what they wanted to see more of in student work. The group then accepted as inevitable the coverage cuts that followed. (See page 4 for a description of the portfolio.)

"In some ways, the More decides the Less," Venables says. "If we really value that kids connect math to real-world situations, we had to ask, why did we spend so much time teaching antiquated skills like solving quadratics by factoring? In the real world of mathematical modeling, very few quadratics are factorable; except in contrived situations, the numbers just don't lend themselves." Now Heathwood teachers spend more time using the quadratic equation to describe actual phenomena—like bridge-building, car insurance calculations, target practice, or even football.

Teaching Algebra 2 students to fit curves to raw data offers another way to achieve such "generative knowledge," Venables says. "You could mathematically analyze data from a science or social studies class—how fast a rumor spreads through the school would be a great little project!—and try to find the exponential curve that describes it. It dovetails with statistics, too—they



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Editor:
Kathleen Cushman
Managing Editor:
Susan Fisher

What Counts Less, What Counts More: Math Teachers Set New Priorities

from the National Council of Teachers of Mathematics' Standards

CHANGES IN CONTENT AND EMPHASES IN GRADES 9-12

Topics to Receive Increased Attention

ALGEBRA

- The use of real-world problems to motivate and apply theory
- The use of computer utilities to develop conceptual understanding
- Computer-based methods such as successive approximations and graphing utilities for solving equations and inequalities
- The structure of number systems
- Matrices and their applications

GEOMETRY

- Integration across topics at all grade levels
- Coordinate and transformation approaches
- The development of short sequences of theorems
- Deductive arguments expressed orally and in sentence or paragraph form
- Computer-based explorations of 2-D and 3-D figures
- Three-dimensional geometry
- Real-world applications and modeling

TRIGONOMETRY

- The use of appropriate scientific calculators
- Realistic applications and modeling
- Connections among the right triangle ratios, trigonometric functions, and circular functions
- The use of graphing utilities for solving equations and inequalities

FUNCTIONS

- Integration across topics at all grade levels
- The connections among a problem situation, its model as a function in symbolic form, and the graph of that function
- Function equations expressed in standardized form as checks on the reasonableness of graphs produced by graphing utilities
- Functions constructed as models of real-world problems

STATISTICS • PROBABILITY • DISCRETE MATH

Topics to Receive Decreased Attention

ALGEBRA

- Word problems by type, such as coin, digit, and work
- The simplification of radical expressions
- The use of factoring to solve equations and to simplify rational expressions
- Operations with rational expressions
- Paper-and-pencil graphing of equations by point plotting
- Logarithm calculations using tables and interpolation
- The solution of systems of equations using determinants
- Conic sections

GEOMETRY

- Euclidean geometry as a complete axiomatic system
- Proofs of incidence and 'between-ness' theorems
- Geometry from a synthetic viewpoint
- Two-column proofs
- Inscribed and circumscribed polygons
- Theorems for circles involving segment ratios
- Analytic geometry as a separate course

TRIGONOMETRY

- The verification of complex identities
- Numerical applications of sum, difference, double-angle, and half-angle identities
- Calculations using tables and interpolation
- Paper-and-pencil solutions of trigonometric equations

FUNCTIONS

- Paper-and pencil evaluation of functions
- The graphing of functions by hand using tables of values
- Formulas given as models of real-world problems
- The expression of function equations in standardized form in order to graph them
- Treatment as a separate course

CHANGES IN INSTRUCTIONAL PRACTICE IN GRADES 9-12 MATH

Increased Attention to:

- The active involvement of students in constructing and applying mathematical ideas
- Problem solving as a means as well as a goal of instruction
- Questioning techniques that promote student interaction
- The use of a variety of instructional formats (small groups, individual explorations, peer instruction, class discussions, project work)
- The use of calculators and computers as tools for learning and doing mathematics
- Student communication of mathematical ideas orally and in writing
- The establishment and application of the interrelatedness of mathematical topics

- The systematic maintenance of student learnings and embedding review in the context of new topics and problem situations
- The assessment of learning as an integral part of instruction

Decreased Attention to:

- Teacher and text as exclusive sources of knowledge
- Rote memorization of facts and procedures
- Extended periods of individual seatwork practicing routine tasks
- Instruction by teacher exposition
- Paper-and-pencil manipulative skill work
- The relegation of testing to an adjunct role with the sole purpose of assigning grades

What Goes Into a Mathematics Portfolio?

One Team Decides What Counts Most

The most effective way to put "Less Is More" into practice, a math team at Heathwood Hall Episcopal School in Columbia, South Carolina decided, was to decide together what should go into the mathematics portfolios of their algebra and geometry students. Using the guidelines of the National Council of Teachers of Mathematics (see page 3), Daniel Venables, Amelia Haviland, Allison Venables, and Carlo Haigler made up the following instruction sheet for students compiling their portfolios. (For a complete evaluation form encompassing each category, contact Daniel Venables at 803-343-0425.)

POINTS OF FOCUS

Your math portfolio will focus on the following:

- Problem Solving (developing and executing strategies)
- Connections (relating math to other subjects)
- Mathematical Communications (reading and writing in mathematics)
- Technology (using computers & graphing calculators)
- Teamwork (working cooperatively with others toward a common goal)
- Growth Over Time (learning from your mistakes)
- Mathematical Disposition (developing healthy attitudes about the subject)

Overview. For each of the first three quarters your portfolio will contain five entries. (The fourth quarter substitutes a mini-exhibition for portfolio work.) Two of these (entries #4 and #5) will not vary; the other three (called "floating" entries) will vary from one quarter to the next. You will have five types of "floating" entries to choose from; all five are to be completed by the end of the third quarter. Individual entries will be assigned due dates throughout the quarter, and your teacher may collect and grade entries anytime after the specified due dates. Approximately every other double period, you will have class time to work on your portfolios, with your teacher as coach. Producing quality portfolio work is a requirement to receive credit for this course, and counts for 20 percent of your quarter grade.

"FLOATING" ENTRIES

Non-Routine Problem or Puzzle. These problems or puzzles require you to combine or invent problem-solving strategies that are different from textbook procedures in order to solve them. They may or may not be related to topics studied in class. A detailed solution, complete with sources, will be submitted.

Application. This entry will demonstrate an authentic use of mathematics in another subject area, including the fine arts. Math concepts, principles, and procedures will be

employed in a well-grounded, real-world context. Some aspect of this entry will explain the math content, the content from the other subject, and the connection between the two.

Mathematics in Historical Context. This entry requires researching and summarizing in your own words either 1) a biography of a famous mathematician, 2) the mathematics of a particular non-Western culture, or 3) the evolution of mathematical ideas in some branch of mathematics. Sources must be cited.

Math Lab. This entry is an inductive search for an answer to a question of yours, a guided exploration leading to a generalization, a concept, or a mathematical relationship between variables. This will require conjecturing, gathering data, examining models, viewing examples and counter-examples, and drawing conclusions based on your evidence. A report of your process and your findings is required. (All students work on their math labs during a week set aside for this entry.)

Reading and Writing. You will read a math-related essay, then explain what you read by writing about it in your own words. Use examples from the reading and at least one example of your own, or make some original connection from this topic to some other topic.

"FIXED" ENTRIES

Progress Entry. With each portfolio submission, all tests and quizzes taken to date will be submitted in chronological order with corrections. Complete all test and quiz corrections on separate paper, including a detailed, revised (and, hopefully, accurate) solution to any problem in which full credit was not awarded. Questions (with problem numbers) must also be written out.

Contents Entry. This entry should be placed first in the portfolio. It must include 1) a table of contents; 2) a scatter-diagram depicting entry types and methods; 3) a letter to the reader addressing why you chose these topics, what you enjoyed learning, what difficulties arose, and your reflections about the collection of entries; and 4) a work log sheet detailing the tasks along with the dates you worked on each.

METHOD TYPES

As you complete your entries each quarter, you must also vary your methods, using all the following methods by the end of the third quarter: 1) Making use of math-related software (or a graphing calculator); 2) Constructing physical models or manipulatives; 3) Working without peers (individual entry); and 4) Working with peers (group or pair entry). Using your scatter-diagram, keep track of your method for each entry.

could sample how many kids know the rumor and use statistics to find the curve that best fits the data."

Other assessments also require Heathwood math students to apply knowledge to new situations. Ninth-graders, for example, start the year by visiting the site of a simulated car crash on the long approach road to Heathwood's 133-acre campus near South Carolina's interstate highway. In pairs they measure skid marks, mark where the "bodies" fell, collect forensic data; then, through a series of labs, demonstrations, and calculations, they deduce the facts of the case. "It was one of those 'Aha!' experiences for my ninth-grade son," says Middle School principal Jane Ness. "He could have learned 25 formulas and still never been able to explain it the way he did."

Outwards from the Basics

But isn't there some value to giving students a broad general knowledge base—the kind of superficial familiarity with everything from the *Iliad* to the theory of relativity for which E. D. Hirsch argues in his popular book *Cultural Literacy*? When we cut down our crowded syllabi, don't we cheat students of their future as educated citizens? If that were the way people learn, David Perkins answers, perhaps so. In fact, though, students are much more likely to pursue a broad range of intellectual interests once they delve into a subject deeply enough to be genuinely aroused by the web of information that relates to it.

National Re:Learning Faculty member Carol Lacerenza-Bjork realized this vividly when she decided to limit the number of required texts for her English students at West Hill High School in Stamford, Connecticut. "I figure it's on nobody's list of outcomes to have the kids read as many things superficially as possible," she says. "So even though we had at least 30 books to cover on the tenth-grade readings shelf, we cut the titles the whole class would read

'I figure it's on nobody's list of outcomes to have the kids read as many things superficially as possible,' one English teacher says.

together down to five." Because of an upheaval in their school's leadership, she says, her students were fascinated with how leadership styles could affect their own lives; they decided to explore the issue through reading Sophocles' *Antigone* and *Oedipus Rex*, George Orwell's 1984 and *Animal Farm*, and Shakespeare's *Julius Caesar*. In written position papers, in oral presentations, and in seminars throughout the year they plumbed these texts together and on their own, each making new connections with outside texts as each discovered and pursued new questions from close reading. (See pages 11 and 12 for a course description.)

"It didn't even matter that the texts were somewhat traditional and Eurocentric," Lacerenza-Bjork says. "They became a catalyst for further investigation; the students could see clearly that any piece of literature raises unlimited questions. Sophocles believed, for example,

that whoever is popular and has money controls the power; we tested that idea against contemporary readings. Somebody used Hitler as an example, going out and reading a dozen other sources for her evidence. Somebody else took off from *Antigone* to look at the question of whether female leadership styles are different. Nobody felt confined to what the teacher wanted them to read, or to what could be accomplished between September and June. Even for my reluctant readers, reading became a profound and pleasant experience—and nobody was walking around with *Cliff's Notes*."

Sometimes "Less Is More" translates into allowing a student to follow some intellectual passion even if it displaces other academic tasks. Ted Sizer recalls a history student who had the lead role of Job in Archibald MacLeish's play *J. B.* "Even his classmates could see something really getting to the marrow of his bones," he says. "He was delving into something of real consequence, and it gave him a sense of the world that will stay with him forever." He pauses reflectively. "That's a big More."

Andrew Early, a student at Thayer High School with a lackluster record in most required classes, nonetheless has such a prodigious technological aptitude that the school relies on him to solve

Questions to Shape a School's Curriculum

Central Park East Secondary School in New York uses these overarching questions to focus attention on habits of mind in every class and every subject:

- ✓ From whose viewpoint are we seeing or reading or hearing? From what angle or perspective?
- ✓ How do we know when we know? What's the evidence, and how reliable is it?
- ✓ How are things, events, or people connected to each other? What is the cause and what is the effect? How do they fit together?
- ✓ What's new and what's old? Have we run across this idea before?
- ✓ So what? Why does it matter? What does it all mean?

myriad high-level problems with their computers and video components. "From his classwork you would have thought Andy had little ability in reading comprehension and analysis," former principal Dennis Littky observed. "But he could wade through the obscurities of a legal document on software copyright and extract exactly what he needed to know. The skills grew out of and along with his true curiosity and passion."

Teaching Less Demands More

Like many other Essential schools, Thayer allows teachers latitude in designing their courses as long as students demonstrate their competence before graduation in nineteen "skill areas" ranging from communication to citizenry. Yet as in many schools, this threatens some teachers'

sense of who should assess various skills. "Should science teachers be assessing the skills of reading or writing? Should the social studies department be assessing whether a student applies mathematics? I think so!" Thayer teacher Rick Durkee says. "But quite a few teachers want to reduce our list to generic skills like 'organization,' 'cooperation,' and 'independent learning.'"

To commit to the role of generalist, indeed, demands much more of teachers who often have insufficient time even to prepare adequately in one subject. At Crefeld School in Philadelphia, teachers addressed this dilemma by designing a three-year curriculum cycle in which all students in grades seven through twelve study the same area in humanities and science every year. "Last year all our humanities classes studied a common theme in ancient

civilizations; this year everyone does Western Civ; next year is American studies," headmaster Michael Patron says. "When you focus the attention of so many adults and students on the same theme at once, everyone contributes the resources they have to the task. Even math and science teachers, and others not directly involved in the project, might try to focus something around the theme. And because individual teachers don't have four or five preps for different subject matters, they can go more deeply into both content and pedagogy."

When Tucson's Catalina Foothills High School planned its curriculum, says science teacher Ted Hall, "we created science courses such as 'The Human Organism' and 'Energy,' to integrate biology, chemistry, and physics and not be stuck with covering everything in those

What's Worth Memorizing? An Exhibition that Combines Performance with Memory

As a part of your final Exhibition, you must show yourself and us that you can do the following, from memory:

1. Recite a poem or song or story that is special to your family or community.
2. Draw a map of the world, freehand (conventional Mercator projection), and be prepared to place properly on your map at least twelve of fifteen members of the United Nations that we shall randomly select for you.
3. Draw a map of the United States, freehand, and accurately position on your map at least twelve of fifteen states that we will select for you at random.
4. Identify and answer questions about the current United States president and vice president, this state's two United States senators, the representative from your district, your state representative and senator, and the mayor of this city.
5. Recite for us from memory a speech from history or literature that you find compelling and that we agree is appropriate for this exercise.
6. Present a time line since 1750 that you have assembled over the last several years and be prepared to answer questions about any event that appears on it.
7. Be prepared to identify five birds, insects, trees, mammals, flowers, and plants from our immediate local environment.
8. At a time mutually agreed on, we shall give you a text or an analogous "problem" (such as a machine to disassemble and reassemble) and three days in which to memorize or master it. We will ask you then to show

us how well you have done this exercise.

9. Be prepared to reflect with us on how you completed this memory task—that is, how you best "learned" to memorize.

This exhibition demonstrates that the student has skill in memorizing and that she is aware of basic facts that will serve her well.

It allows for a time trial, which implies that the student is sufficiently prepared in memory work to meet a reasonable deadline.

In several areas, it allows for student and faculty choice, thus providing opportunities for the faculty to match the exercises with a student's interests and capabilities.

It provides—if the teacher wisely chooses to use it—a springboard to the discussion of important matters—the politics or physical geography of southern Africa illuminated by national boundaries, or the meaning of "family" as expressed in a poem.

It indicates the importance of knowing some things well enough to commit them to memory, and the joy of reciting them.

It provides students with the confidence that arises from memorizing something of consequence.

From Theodore R.Sizer,
Horace's School: Redesigning the American High School
(Houghton Mifflin, 1992)

traditional subjects. We did the same thing with math, putting algebra and geometry together. For the purposes of getting the number of students per teacher down, curriculum needs to be integrated and teachers have to teach in more different areas. Despite the constraints of budgets, teachers should have no more than two or three classes in a day if they are to go really deeply."

What About Electives?

The crunch comes for many schools when they try to figure out how a philosophy that "Less Is More" can accommodate the many elective courses, from foreign languages to the arts, that have traditionally defined the good comprehensive high school. In *Horace's School*, Ted Sizer proposes a curriculum organized into these three areas:

- math and science (including technology, health, and physical education);
- the arts (including literature in both our own and foreign languages), and with special responsibility for the schoolwide obligation to coach students in "expression"; and
- history and philosophy, comprising history (and the allied social science disciplines that place it in a geographic, political, cultural, and economic context) and the exploration of principles as they relate not only to historical governance but to decisionmaking both in school and in personal matters.

The intersection of all three areas, Sizer suggests, constitutes a fourth area of Inquiry and Expression, for which all faculty take responsibility—teaching them not in a vacuum, but embedded in subjects of substantive importance. The arts, for example, "are not only important because of what they represent," argues Stanford University's Elliot Eisner. "They are important because of the ways in which they engage and develop human intellectual ability . . . to

judge, to assess, to experience a range of meanings that exceed what we are able to say in words."

To facilitate this, Sizer proposes, the first days of every school quarter should intensively focus on these "common" matters of inquiry and expression—reading and writing, communicating verbally and otherwise, organizing and analyzing ideas, reflection, study skills. All faculty should be held accountable for teaching them, and all culminating exhibitions would include exercises that call for their command.

Do students actually learn content when not made to take a course exclusively in a given subject? The Crefeld School makes sure they do, by requiring every senior to pass (with a 90 percent grade) twelve brief competency tests on topics the school considers crucial to success in the world after high school. Some of the tests emphasize academics—world geography, U.S. government and the Constitution, and essential facts in science and math. Some reflect mastery of intellectual skills—for example, one asks students to read an assigned scientific research article and write an analysis of the experimental method used by the researchers. Some test the student's understanding of practical affairs and their consequences: nutrition, substance abuse, sex.

"My favorite is on home medical care," Patron says. "We ask students to stock a medicine cabinet with the ten items they consider most important, and explain why. Then we give them three scenarios of home health care emergencies and they must describe in writing how to apply first aid using their ten items."

Since Crefeld does not require a course in health, how do students prepare for this graduation requirement? "On their own," Patron says. "We have health texts they can look through; we have regular assemblies on health-related matters; teachers may offer review sessions on particular topics after school." The general content of the tests is no secret; kids

THE ART OF
remembering is the art of thinking; . . . when we wish to fix a new thing in either our own mind or a pupil's, our conscious effort should not be so much to impress and retain it as to connect it with something else already there. The connecting is the thinking; and if we attend clearly to the connection, the connected thing will certainly be likely to remain within recall.

WILLIAM JAMES (1888)
from *Talks to Teachers*
on *Psychology*

may take them for practice before the senior year. But "the burden is definitely on the student," Patron observes, "to do the research and prepare herself."

Further encouraging evidence for the efficacy of cutting back comes from Heathwood Hall, which has deepened the content in all courses by de-emphasizing coverage merely for its own sake. Not only do Heathwood's top students remain challenged, Upper School principal Lark Palma says, but those who previously achieved at lower levels are now accomplishing much more.

"We eliminated all but one of our six Advanced Placement courses," says Palma. "But we still encourage anyone who wants to take the AP exams." Twice as many students as before now take the rigorous exams, and just as many—fully 91 percent in 1993—score a "3" or better.

Houston's Westbury High School has shown a steady increase

Topics that Generate Understanding

In his 1992 book *Smart Schools: From Training Memories to Educating Minds*, David Perkins suggests reorganizing the curriculum around "generative topics" that provoke what he calls "understanding performances," which not only demonstrate a student's understanding but also advance it by encompassing new situations. With his Harvard University colleagues Howard Gardner and Vito Perrone, he devised several standards for such topics: They should be *central* to a subject matter or curriculum; they should be *accessible* and inviting to teachers and students, not "sparse or arcane"; and they should be *rich*, encouraging extrapolation and connection making. The three researchers came up with the following "good bets" as examples:

NATURAL SCIENCES

Evolution, focusing on the mechanism of natural selection in biology and on its wide applicability to other settings, like pop music, fashion, the evolution of ideas. The origin and fate of the universe, focusing qualitatively on "cosmic" questions, as in Stephen Hawking's *A Brief History of Time*. The periodic table, focusing on the dizzying number of elements identified by early investigators and the challenge of making order out of the chaos. The question "What is real?" in science, pointing up how scientists are forever inventing entities (quarks, atoms, black holes) that we can never straightforwardly see but as evidence accumulates, come to think of as real.

SOCIAL STUDIES

Nationalism and internationalism, focusing on the causal role of nationalistic sentiment (often cultivated by leaders for their own purposes), as in Hitler's Germany, in world history, and in the prevailing foreign policy attitudes in America today. Revolution and evolution, asking whether cataclysmic revolutions are necessary or evolutionary mechanisms will serve. Origins of government, asking where, when, and why different forms of government emerged. The question "What is real?" in history, pointing up how events can look very different to different participants and interpreters.

MATHEMATICS

Zero, focusing on the problems of practical arithmetic that this great invention resolved. Proof, focusing on the different ways of establishing something as "true" and their advantages and disadvantages. Probability and prediction, highlighting the ubiquitous need for simple probabilistic reasoning in everyday life. The question "What is real?" in mathematics, emphasizing that mathematics is an invention and that many mathematical things initially were not considered real (for instance, negative numbers, zero, and even the number one).

LITERATURE

Allegory and fable, juxtaposing classic and modern examples and asking whether the form has changed or remains essentially the same. Biography and autobiography, contrasting how these forms reveal and conceal "the true person." Form and the liberation from form, examining what authors have apparently gained from sometimes embracing and sometimes rejecting certain forms (the dramatic unities, the sonnet). The question "What is real?" in literature, exploring the many senses of realism and how we can learn about real life through fiction.

From David Perkins,
Smart Schools: From Training Memories to Educating Minds
(New York: Free Press, 1992)

in student achievement test scores since the school decided to steer ninth- and tenth-graders away from all elective courses. Teachers who previously taught vocational or business courses in the 2,400-student school now work as full members of academic teams, teaching computer skills or coaching students in hands-on activities that relate to their portfolios and exhibitions.

In Westbury's science department, several teachers are working with the help of a Rice University team to merge physical science, biology, and health into an integrated two-year course. "We laid the groundwork by having teachers who had always taught biology pick up one section of physical science last year," says Westbury Dean of Instruction Karen Owen. "It surprised them how many common threads they found."

And because all faculty members serve as advisers on cross-disciplinary senior research projects, every department has looked closely at ways they can teach toward the school's across-the-board standards: problem-solving, communication, self-discipline, citizenship, and creativity. "We all agreed to assess those skills no matter what subject we're teaching," says Owen.

Teaching for Understanding

Once teachers begin to value depth over coverage, they find that old classroom practices serve them less well. Although a lecture now and then can set the necessary context for discussion, they say, Essential school teachers turn more often to techniques like cooperative learning or Socratic seminars to get kids deeper into their subject areas.

At Chicago's Sullivan High School, a Coalition member that serves a student population reflecting that city's ethnic mix, the entire faculty and ancillary staff have been trained to lead Socratic seminars. Every student in the school participates in weekly seminars in English and history classes, monthly semi-

nars in science, and occasional ones in subjects like math and languages. In addition, the school holds quarterly "all-school seminars," monthly before-school enrichment seminars, and frequent special-topic seminars.

Science teachers, for example, use unedited texts from Aristotle and Galileo as well as from contemporaries like Richard Feynman and Isaac Asimov to conduct seminars with mixed groups of up to 30 students representing every achievement level. When kids find the text rough going, they work individually with reading aides until they have mastered the content well enough to contribute. To watch a room full of Sullivan students defend and explain to each other their understanding of difficult or controversial texts leaves even skeptics impressed with the power of the Socratic approach.

"The topics that scare off teachers because they seem too hard are often the very ones that interest students most," says Robert Brazil, who brought the technique to Sullivan as principal in 1983.

But seminars alone will not deepen understanding, teachers say; they must be linked with writing assignments that draw on the text and make use of the ideas raised in class. And they require teachers to take on the challenge of preparing the kind of cogent questions that launch effective discussions.

Concentrating on "fact" questions in a seminar, for example, will fail to yield rich discourse. What works best, practitioners say, are interpretive questions for which the text may support several possible answers—and which lead to a cluster of other questions. Later, evaluative questions provoke students to express opinions that draw on their personal experience for support.

"This is not just a different form of pedagogy," says Dennis Gray, who has trained teachers all across the country to lead Socratic seminars. "It's a new way of being, of relating to the text, the curriculum, students, yourself, and other staff."

And it demands substantial time—not only for the discussion itself, which takes longer than the typical 45-minute period, but for students and teachers both to critique the process afterwards.

That reflective process, Ted Sizer observes, goes a long way toward the goal of student learning. "If you understand *how* you learn, you can then learn more," he says. "One of my favorite teachers, for instance, asks her history students to write a paper on 'My History with History.' After all, good athletic coaches videotape their players to let them observe what they're doing and change whatever moves are clearly not effective."

Here too, Sizer points out, "it takes time to step back—to say, 'Why did you write that way, calculate that way, say what you did about that experiment?' It takes schools that make sure the answer is not 'I didn't have time to make it better.'" The math department at Heathwood Hall, Daniel Venables comments, took a relatively simple but powerful step when it required students to include in their portfolios corrected work sheets for all questions missed on quizzes and tests. "It was amazing how often we had let them just tuck the wrong answers into their books and move on," he says.

Getting Parents on Board

When parents and the community can see real differences in students' attitudes toward learning, initial suspicions about a "Less Is More" philosophy turn to admiration. Schools must lay the groundwork for this by working out their goals early on with all key stakeholders, says Susan Robb, who coordinates the Essential School program at Pennsylvania's Bellefonte High School. Before the school launched its interdisciplinary Senior Institute, she says, "we got together with parents, students, teachers, board members, and administrators and identified ten 'essential skills'—the kind of

skills that if you can do them, you can do anything."

The seniors in the Institute spend a four-period block daily with a cross-disciplinary team of science, English, and art teachers, exploring a theme such as this year's "How Do We Grow?" In a year-long exhibition project, small groups focus on one or another aspect of the theme (for example, population growth). Finally—and Robb emphasizes how crucial this is—they explore their topic through a variety of activities that take them into the larger world. Tutoring elementary school children weekly in literacy, analyzing paintings at the Philadelphia Art Museum, working and observing in local professional offices, they begin to relate their learning skills to real-world endeavors.

"When you move to less coverage and more depth and focus, you've got to make that *apply* in real ways," Robb says. "That's how it becomes real and justifiable to the community, to parents, and to kids."

OF COURSE, intellectual learning includes the amassing and retention of information. But information is an undigested burden unless it is understood And understanding, comprehension, means that the various parts of the information acquired are grasped in their relations to one another—a result that is attained only when acquisition is accompanied by constant reflection upon the meaning of what is studied.

JOHN DEWEY
from *How We Think* (1933)