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HORACE

What's Essential? Integrating the Curriculum in Essential Schools

When high schools focus on what thinking skills they want graduates to have, getting there becomes the whole point of the curriculum. Subject-area boundaries take a back seat to essential questions, and to answer them students and teachers muster resources from all sides.

BY KATHLEEN CUSHMAN

ASK A HIGH SCHOOL CLASS A question about something that really matters—say, whether to extend the school year through the summer, or whether Elvis just possibly could be alive, or who's going to win the championship—and watch the controversy that breaks loose. Kids you thought had been asleep for the last two months suddenly come alive, spouting evidence from the media, from their own experience, from arcane sources you never knew existed. They rip arguments and counter-arguments to shreds with the sophistication of trial attorneys; they cite precedents as shrewdly as any politician. Hey, you think, who says kids don't use their minds? Why can't all this energetic discourse go into schoolwork too?

It can, an increasing number of educators argue. But it will happen only if a school community decides to make it—if together its members identify the intellectual behavior they want to see in their graduates and then shape every classroom decision, every student task, and every assessment with that in mind. And if you start, as one new Essential school did, by asking "What do grown people need to know in order to do their jobs well?" you're not likely to come up with answers that fit easily into the conventional high school course of study. Instead, you're suddenly mired in the real world, filled with all its complex connections. You're running a public health clinic in the middle of a flu epidemic, juggling biology and economics and social science. You're trying to decide where to put your community's toxic waste, calling on chemistry and political process and persuasive rhetoric. You're fighting out whether to extend the school year in a tight economic climate. All at once, distinctions between the disciplines take a back seat to the compelling questions that cannot be answered without competence in several subject areas.

"If you start with the idea that kids will need to figure out complex problems on their own someday," says Paula Evans, who heads the National Re:Learning Faculty of the Coalition of Essential Schools, "you care less about discrete areas of knowledge. You care more about kids' ability to synthesize, analyze, make solid intellectual connections. If you decide to *assess* them on the basis of doing that, you'll have to focus on questions around which they can practice those skills. And once you've got those things in place—your goals, your assessment, and your essential questions—the entire curriculum should flow naturally from that point."

The curriculum that achieves such an integration—one that centers more on rigorous habits of mind than on a fruitless quest for coverage in an age of information overload, and that applies those habits to content across disciplinary lines—forms the intellectual backbone of Essential school reform. Stripping down curriculum,

What Should Students Know and Be Able to Do? One School's Requirements

Before graduating from Catalina Foothills High School in Tucson, Arizona students will have to synthesize and personalize their achievement in three broad areas. They must demonstrate their depth of understanding and knowledge, and the ability to apply skills to projects of their own design that make connections among the disciplines.

Graduation Competencies

1. Application of systems thinking to current problems. Drawing on their subject area experiences for problems that may or may not cross disciplinary lines (an environmental problem, say, or an artistic creation), students use diverse material and resources (including technology) to analyze the problem, its context, and aspects of its interdependence from many perspectives. They must project possible outcomes for the problem based on their research, and then justify their choice of the optimum response. Their final presentation must also incorporate reflection on the process of working through the problem. *Example:* A careful analysis of the current situation in Somalia.

2. Personal challenge. Students will demonstrate a sustained, intensive effort to achieve a personally established and significant goal (academic, personal, or physical). They present a log of their efforts and assess their own challenges, efforts, and outcomes. *Example:* A student of German extraction learns the language (not taught at the school) and investigates her family history.

3. Making connections. Working in teams, students select concepts that interest them from different areas of study, analyze them, and search for logical connections between them. Their presentation should persuade an audience of the value of the connections, and also analyze the interdependence of the team effort. *Example:* Take the musical problems in a jazz composition and relate them to the historical development of the jazz form.

Subject Competencies

To graduate, students must also demonstrate competency in the individual subject areas listed below. The school's handout elaborates on each requirement and delineates specific assessment criteria for each. (For example, the first listing under science adds, "Students will be assessed on their ability to apply key information and concepts to various situations, analyze cause and effect, and communicate these findings.")

Science
Conceptual and systemic understanding of the human organism
Conceptual understanding of principles and theories of energy
Expertise in a specialized field of science
Science, technology, and society
Science skills
Experimental design

Physical Education and Health
Critical health issues
Personalized fitness plan
Individual and team activities

Mathematics
Mathematical procedures
Conceptual understanding of math content
Use of mathematics to synthesize and communicate information
Recognition or creation of multiple representations of mathematical ideas
Problem-solving
Value and awareness of how mathematics brings order to our world

The Arts
Artistic analysis, *or*
Performance and reflective evaluation, *or*
Original work

History and Social Studies
Historical investigation
Analysis of current issues
Translating understanding into service or action
Cultural analysis
Synthesis of self
Functional citizenship literacy

English
Use of oral language in group tasks
Personal response to literature
Analysis of literature
Reading enrichment
Narrative and expository writing
Academic writing
Workplace writing
Oral presentation

Foreign Language
Intermediate-level reading, writing, speaking, and listening in commonly taught languages, *or*
Novice-level skills in less commonly taught languages

Computer Literacy and Information Literacy
Technological literacy
Information literacy

in fact, gave rise to the very moniker of Essential Schools, and to the Coalition's curricular motto, "Less Is More."

Middle schools, closer to the younger grades where teachers commonly cross subject areas, have led the way over the last decade in shaping curriculum around themes and problems. As early adolescents try to make sense of the personal issues that absorb them, they readily engage with themes like "Living in the Future" that link their concerns to the larger world through areas like science, social studies, and health.

But in high schools, which traditionally reflect the subject-area domains of universities, integrating the curriculum threatens the very structure of the school. Accustomed to the rationales of higher education—it wasn't social scientists, after all, who landed people on the moon—many teachers balk at the thought of treading on others' intellectual turf, or losing the prestige that accompanies being a "specialist," not a "generalist." Some worry that integrated courses will not probe deeply or rigorously enough into their disciplines. And few willingly trade the autonomy of their own course plans for some trendy and difficult notion of curriculum integration that may or may not work.

Practical objections tangle the issue further at the high school level. If almost every subject plays a part in answering a question, for example, which gets the credit and who gives the grade? When do students move on to the next class period? What if an important subject gets short shrift in the design or execution of the project? And when are kids going to learn the mass of gritty detail that will show up well on those all-important standardized tests?

In the face of such obstacles, though, stands undeniable classroom evidence from Coalition member schools: given a problem compelling enough to them—usually one rooted in the real world, and therefore crossing disciplinary lines—otherwise docile or unmotivated students

will catch fire and start to learn. Moved to give them all the intellectual tools they need, more and more Essential schools have begun to take small and large steps toward an integrated curriculum. At the very least, teachers are reaching out to make explicit links among the disciplines. At their boldest, they are reinventing the very way they approach schooling itself.

Start with the Outcomes

The word "curriculum" defines a course of study—ideally one that runs through students' entire schooling years, teaching them the intellectual habits valued by their school community. "It is the stuff around which school days are structured and learning is measured," writes CES senior researcher Rick Lear in his forthcoming paper, "Curriculum and Essential Schools." But too often, he observes, "curriculum is also what, when we're out of school, we remember hardly at all." Students acquire not a useful set of competencies but a random collection of facts, dissociated from each other in time and purpose and meaning.

The integrated curriculum rests on the premise that mastering thinking skills, not mere information, is the object of a high school curriculum. Perhaps at the university and postgraduate level, its advocates say, students will need to focus more narrowly on a single domain such as biological research or theoretical physics. But high school must provide a more general education—teaching students to gather and analyze information; to speak and write clearly; to make connections between past, present, and future events; to solve problems; and to work cooperatively with other people. Moreover, they should be able to transfer such skills between one domain and another—applying the rules of evidence as readily, say, to a court case, a scientific experiment, and a newspaper editorial.

With this in mind, legislatures and state boards of education from Pennsylvania to Minnesota, Kentucky to California have begun to articulate their goals in new policies that would replace conventional Carnegie unit-counting with "exit outcomes" high school graduates must meet. Such outcome requirements appeal to several constituencies; they hold schools accountable for student success, while also granting them the freedom to meet the goals by any means they can. (Resistance comes chiefly from the religious right, which holds that inquiry is not a proper focus for young minds.) And they apply equally to students at every ability level, asking schools to become more democratic and inclusive as the face of our student population changes.

In states that have articulated such outcomes, this process takes place again on the individual schoolhouse level. Faculties often begin a restructuring effort by reflecting on their own vision of what a graduate ought to know and be able to do. They imagine how such mastery might be exhibited—both upon graduation and at various steps along the way—and they hash out how to assess it objectively. Planning backwards from their final goals, they begin to take steps to instill in students the habits they expect to take hold by graduation. The true "integrated curriculum" spans every course and lesson, in a purposeful, whole-school vision of what students should know and be able to do.

The Study of Markets Links English and Social Studies

Rochester's School Without Walls offers a course that centers on the impact of rapidly emerging markets on people's lives. Since resources are limited and wants are unlimited, the course description asks, how does scarcity drive choices and tradeoffs? How, why, when, and where are markets created, demand and supply regulated, and economic and social costs considered? How do international markets affect us and others? Students create a viable market project and present independent research reports. The course integrates mathematical concepts, geography, and the study of other cultures; classic readings across the disciplines include *The Wealth of Nations, The Grapes of Wrath, The Jungle, Life in a Turkish Village, Silent Spring, The Zero Sum Society, Animal Farm,* and *The Hidden Persuaders.* Other sources include newspapers and periodicals, interviews and field trips to museums and other community sites, internships, and guest speakers.

What's "Integrated"?

When teachers first start to look for ways to link course content to a broader context, they often refer to "integrating" their course "across disciplines." Or they might line up "interdisciplinary" courses that explore common themes or time periods. A dizzying array of labels—from "trans-" or "cross-" or "multidisciplinary" to "fused" or "nested" or "networked" or "webbed" curricula—makes navigating the terminology a treacherous affair.

At the heart of any quarrel over what's really integrated, though, lies a genuine concern that small steps

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toward linking subject matter will substitute for and defuse the bigger, harder changes Essential schools require. "Once you do that linking game, it's a swamp," says Paula Evans. "We've been linking courses for 25 years already; integrating curriculum is much more complicated than that. The forces against you are so tremendous that schools won't move on to truly integrate if they start that way."

Still, many Coalition member schools do begin with small and cautious gestures, preferring to establish the precedent of teachers working together before asking them to rethink their school completely. Adopting common themes or aligning parallel courses can be done either separately or in teams, so it does not necessarily disrupt the existing schedule or system while giving students a sense that their coursework is part of a bigger picture. One step beyond that approach actually combines the content of two or more courses—in an American Studies course, for example, linking history, literature, government, and the arts. (This might be done either by team-teaching or by one teacher taking responsibility for the whole, thus substantially reducing the overall number of students he or she teaches.)

But such efforts only dip their toes in the waters of meaningful change, Lear and Evans argue. Instead, teachers must arrive at new understandings altogether—not only about the disciplines themselves, with all their messy overlaps, but about the pedagogies and the teamwork skills that help people learn to make connections among the subject areas. Such far-reaching changes require time, support, practice, and money—the very scarce resources that make the easier path the one more traveled, even if it does not prove more effective.

When teachers agree to organize the curriculum around mastering thinking skills *through* exploring substantive content, the curriculum opens into true integration. Every course, whether taught separately or teamed, might plumb its subject matter in any way that illuminates it—teaching analysis, for example, or predictive skills, or argument from evidence, or whatever the desired habits in students may be. What will link the courses is not necessarily a time period (like the Renaissance) or a theme (like "the American Dream") but their emphasis on related concepts and techniques through every problem that comes up. Even desired behaviors—like consensus-building, or cooperative learning, or solid study habits—can form part of the "metacurriculum" that transcends subject areas.

At Catalina Foothills High School in Tucson, Arizona, for example, Jen Prileson has devised a unit that divides her ninth-grade science class into groups of three or four students to run their own public health "clinics," seeing "patients" whose profiles and complaints arrive daily via a central computer. (One student directs the clinic, one is the physician, one the nurse, and one the lab technician; all see different cases, but if someone is absent the others must fill in.) Prepared by readings and a number of lab and computer activities, each group draws up disease information charts, makes diagnoses (analyzing actual slides and X-rays), recommends treatments, and keeps records on patients, who keep showing up until their problems are solved. Among other things,

Students as Scientists: Curriculum that Collaborates with the Community

All through a cold December night last year two high school students from Santa Rosa, California set traps for rodents in a 365-acre marine reserve over 20 miles from their homes. As part of their science class at Piner High School, they were collecting data for a project on feral cat activity, working not only with their regular science teacher but with a mentor from the University of California's Bodega Marine Laboratory.

The course is part of an innovative three-year program called "The Science School," offering accelerated and specialized instruction in science, math, technology, English, and social studies to some 150 students at this 1500-student Coalition member school. To personalize its curriculum, Piner is organizing itself into several such "learning communities," each with its own integrated curricular focus and each with the freedom to structure its own time and resources. The Science School curriculum centers around local community problems and resources, requiring each student to complete a year-long project as part of a research team mentored by area science professionals.

The projects grow out of the mentor professionals' own needs, ranging from a team that monitors the water chemistry and biology of the city's urban streams to a sports medicine group exploring anatomy and physiology through kinesiology and conditioning. Many carry college credit at the University of California. Mentors are usually paid by their own employers as a donation to the school, and most put in many extra hours of their own time.

These are demanding, honors-level courses in a school not previously known for academic excellence; they require a level of commitment from students and their parents that would be unusual in any high school. Field research for the feral cat project, for example, entails regular 50-mile round trips to the research site and physically demanding, often tedious outdoor work. Students must work comfortably with adults and up to ten other students, and because they are part of a professional research project they must be precise, meticulous, self-motivated, and responsible in its execution.

Each student maintains an ongoing portfolio of the progress of her work, complete with abstracts, evidence, and analysis of group and individual work. "I hope some day [the work we do on the Bodega Marine Reserve feral cats] to be as good as publishable," one student researcher wrote in her final report, "and believe me, I am going to try my hardest."

each clinic must write a mission statement, allocate funds for preventive care, and defend its decisions to a teacher-evaluator who drops in without notice. The grade is based on these evaluations, on how well the patients do, and on how successfully the team works together. "We had a flu epidemic moving from one area of the country to another," Prileson says. "One clinic had 48 flu patients and another nearby had only 15, because they had allocated more money for vaccines beforehand."

Prileson's clinics teach plenty of biology. "The kids learned a lot more about bacteria, parasites, viruses, and disease transmission because the final event gave them a reason to learn this stuff," she says. But students also debated public health policies and costs along with important social issues, and they began to experience the links between these things. At the same time, Prileson tailors the level of problem to each student's needs, directing the most sophisticated medical scenarios to those requiring extra challenge but supplying opportunities for everyone to stretch their minds. "To be successful the kids really had to discuss content with each other," she says. "We had special ed kids making good leaps of thought while trying to figure out why a patient would come in displaying certain symptoms, or how the patient's family should handle the problem—really digging into their own experience."

The Politics of Integration

When the thinking skills "metacurriculum" dominates the subject-area curriculum, must a school abandon disciplinary distinctions altogether? A number of Coalition member schools do, dividing the school day into two long blocks for "Humanities" and "Math and Science" that embrace related subjects as they explore essential questions. But Catalina Foothills, despite being a new school with broad leeway to articulate student competency goals, encountered community resistance to that step. Instead, the school left disciplinary lines in place, but set goals within each subject that made clear connections in thinking skills between the disciplines. Under "mathematics," for instance, one competency goal calls for students to use math to synthesize and communicate information. (See sidebar, page 3.)

The political and bureaucratic realities of teaching also raise practical obstacles to the completely integrated curriculum. Unless teams of teachers join to present a course, for example, the issue of teaching credentials might derail an interdisciplinary offering; or a teacher might not feel adequately prepared to teach outside his or her certification area. If teams are assembled, the skills to work together may not yet exist; teachers trained in solo practice need time and training to navigate those waters. Finally, some teachers may protest that the more satisfying and challenging aspects of their content area lose out when questions skewed toward other subjects drive the curriculum. "I don't consider it challenging material," says one math teacher, "to be asked to add up survey figures and make charts in somebody's social studies project."

Coalition schools wrestle with these problems in widely different ways. Some start with common planning time, but let each teacher choose the degree of emphasis on interdisciplinary areas. Sometimes a whole course is integrated across disciplines; other teachers will invite a colleague to collaborate only on a certain unit.

"People tended at the start to force themselves into combining

Linking High School Science and Humanities: A Four-Year Plan

At Oceana High School in Pacifica, California, ninth and tenth graders all take a two-year required science program linking major concepts in physics, chemistry, earth science, and life science, and corresponding with the school's humanities curricula. "Patterns of Evolution and Change," the first-year science course, connects with Humanities curriculum for the same year: "Patterns of Cultures." In the second year "Science through All Time," connects with the humanities theme, "How Do People Govern Themselves?"

In their third year, Oceana students investigate scientific principles in physics, chemistry, earth science and life science, asking the unifying question, "How has the scientific community contributed to the American dream?" At the same time their humanities course explores the American dream through political and social history and literature. Finally, in the fourth year the theme of "Power and the Good Life" links both science and humanities curricula, and students who have shown a consistent interest in science and math may focus on specialized areas of research and investigation.

At each level, Oceana has articulated specific objectives of which students must demonstrate mastery by the time they complete the course. These include traditional scientific skills: laboratory methods, measurements, the recording of scientific data, and the like. But other, less traditional objectives are also listed: they must be able to communicate scientific knowledge clearly in writing and speaking, for instance; they must be aware of ethical issues in science and technology; they must be able to evaluate the methods used in a scientific research study and the accuracy and sources of error in its conclusions. And sprinkled among the objectives are surprisingly concrete and everyday goals: students must make an invention, explain how an airplane and a photocopy machine work, use a computer spreadsheet. All along, the objectives themselves blur the lines between the disciplines; one of the fourth-year science objectives requires students to understand how governments use technology to become powerful and maintain or restore power and order.

Meadows or Malls? Applying Math Skills to Community Problems

How should River City use three pieces of newly acquired land; a closed-down military base, a 300-acre farm, and a mine? Residents are split between development and recreational advocates—and their final choices minimize cost to the city. Students at Boston's Fenway Middle College, a CES member school, will soon be working out the answers as they learn to combine mathematics with governmental know-how.

The pilot Interactive Mathematics Program, developed at the University of California's Lawrence Hall of Science and San Francisco State University, poses just such open-ended problems in a high school curriculum with regional centers in three states. Funded by the National Science Foundation, it aims to replace the traditional year-by-year progression (algebra-geometry-algebra 2-trig-precalculus) with one that uses substantial, complex applications to emphasize concepts and connections among these branches.

The "meadows or malls" dilemma, for instance, can be expressed using a system of linear inequalities, which lends itself to a solution by means of linear programming (a topic introduced in the second-year curriculum). A key step is to find various points of intersection of the graphs of corresponding equations, which in turn leads to the need to solve systems of linear equations. To solve the problem students use inexpensive graphing calculators, which allow a stronger intuitive understanding of how the linear programming model works. Along the way they must also wrestle with the dilemmas governments face as they calculate the costs and benefits of improving the land for various kinds of use.

IMP aims to broaden the scope of who takes challenging math courses, expand and enrich their content, and replace traditional pedagogy with investigations, projects, and new technology. The goal is to teach students to use mathematics in a meaningful context, IMP argues, and to assess them on that basis.

disciplines," says Anthony Conelli, a coordinator at New York City's Satellite Academy, where part of the day is blocked off for integrated courses centered on compelling questions. "We used to ask, 'How can we put a math or science component in this?'" Later, Conelli says, teachers looked instead at whatever was appropriate for having a good understanding of a particular habit or issue. Ideally, as teachers locate examples that can inspire this—rich, complex, and meaningful to the world students occupy—they both fully exploit their own area of knowledge and present issues in their broader context as well.

The structure of the conventional school day and year does little to encourage the integrated curriculum. Even to block history and English classes back-to-back across an entire grade creates major scheduling problems; so does giving teachers adequate and regular time for common planning. To work out the details of a new course—especially one that questions the very underpinnings of the traditional curriculum—takes substantial professional development time, and the money and resources to support it.

Many Coalition members serious about integrating their curricula have taken bold steps to restructure their schools to address these obstacles. In particular, breaking a large school into smaller autonomous learning communities—often called "charter schools" or "houses"—has proved helpful. A group of perhaps 200 students and eight teachers can design a schedule that keeps the same students and teachers working together throughout the day, often simultaneously lowering the student load and encouraging teachers to integrate their courses.

This differs from the problematic "school-within-a-school" concept largely in that it excludes no one; everybody within the larger school belongs to one such smaller unit. California's Piner High School has instituted two such charter schools, each with its own intellectual focus or theme; the whole school plans to adopt the new structure soon.

At Pennsylvania's Bellefonte Area Senior High School, the move toward integrating the curriculum began modestly, with a double-period twice-weekly humanities course for seniors, and evolved into a more ambitious Senior Institute that will begin phasing in next year. "We're planning related thematic units that integrate science, literature and language arts, music and art, humanities and social studies," says Susan Robb, the Re:Learning coordinator for the school. "A big part of the program involves community service learning and on-the-job internships." The prospectus for the Senior Institute looks like a diagram of the ideal integrated curriculum's links between skills and content. Starting by listing "essential skills" (such as "justify two sides of an issue") as goals, it poses the question "How do we learn?", then explores the "learning processes" (experience, discovery, reflection, and communication) through four broad subject areas.

Assessing Student Performance

All areas of Bellefonte's Senior Institute diagram point to the culminating "performance assessment"—and assessment is the prime mover, Coalition people argue, of the true integrated curriculum. "The point of integrating curriculum is not for its own sake," argues Paula Evans. "It must serve the larger scheme of things—the school's fundamental goals and how it is going to assess them." The final performance, then, is not the natural and authentic *extension* of the course; rather it is the other way around.

Does a school want its graduates to understand how political conflicts emerge and how they can be resolved? Then require a graduating forum in which students demonstrate that understanding—say, by analyzing the current situation in Somalia and the U.S. troop presence there. To

prepare for that requirement, a junior history course could mine the Civil War era for insights into conflict resolution, asking students continually to practice transferring those insights into new situations.

Every curricular decision, the Coalition argues, should flow from such concrete visions of what a school's graduates should know and be able to do. If ultimately students must explain a concept to another person, must give it voice in a new way (through an artistic performance, for instance), must make comparisons and analogies across subject areas, must solve a new problem using its principles, they will need to practice these skills in every course and be tested on them continually from their first weeks in high school.

Such "performance assessments" are not easily quantified; they require a disconcerting, sometimes messy system of portfolios and other anecdotal measurements that makes comparison difficult and disrupts the status quo. Coming up with a test that truly measures understanding across subject areas is especially hard for high school teachers used to directing coursework toward standard subject-area achievement tests. Increasingly, though, subject-area associations are pushing for more integrated assessment tools. The "new math standards" of the National Council of Teachers of Mathematics call for real-life applications and transfer of knowledge across boundaries; and Project 2061 of the American Association for the Advancement of Science seeks to integrate math, science, and technology instruction in similar ways. Even the Educational Testing Service's standardized tests have begun asking students to make links and integrate content and skills mastery. (Students don't seem to suffer from integrated curricula even according to old-style criteria; over 80 normative or comparative studies show they perform as well or better on standardized tests, according to the National Association for Core Curriculum.)

When coursework is assessed, problems like the examples presented in this issue prove to challenge students at every achievement level. "A student without a sophisticated math background can contribute to solving these same problems alongside a more advanced student, but through a different avenue," says CES National Re:Learning Faculty member Jude Pelchat. "Likewise, some projects provide a window for sophisticated math that might not otherwise be included in the curriculum."

If the criteria for performance assessments are clear, they should honor each student's learning style and type of intelligence while pushing each to meet high thinking standards. Just as planning sessions for integrated curriculum begin by envisioning what graduates should be like, the best course planning sessions seek out a significant and complex demonstration for course's end—one that requires continual practice of the desired thinking skills but can accommodate different backgrounds and individual strengths.

The Evolving Curriculum

The integrated curriculum, clearly, does not spring fully grown from the head of a planning committee. "You need discussions about how to work together, how to resolve problems, who's assuming what responsibilities within the group," says Anthony Conelli, who is writing a doctoral dissertation on the process of integrating the curriculum. "And you need to continually return to the question of why you're doing this

"Whose America Is It?"

At Fenway Middle College, a Boston alternative high school, the humanities course "Whose America Is It?" explores American society from pre-Columbian North America to the present from the point of view of the common person, using sources and approaches from history, literature, sociology, psychology, political science, and the fine arts. Students probe three periods—the discovery of America; the Industrial Revolution, and the Great Depression—to relate their challenges and struggles to the problems contemporary America faces. Sample questions for presentations include:

- Use microfilmed pages of the New York Times stock index to follow the stock of three actual companies through 1929-30. Using several graphs and charts, explain their growth or decline. Be prepared to explain how the stock market functions, and how or whether its collapse "caused" the Great Depression.
- Is territoriality an instinctive or a learned behavior? Support with specific examples from history, our readings, and your own experience.
- Explain the differences between two Native American tribes with respect to their systems of government, legal structures, religious practices, relations with other tribes, ideas about property and gender roles.
- With drawings, diagrams, or photos, compare the principles of steam power versus water power. Which are more effective in given situations? Which can do more work? What are the limitations of each?
- Using drawing and diagrams, explain the scientific principles that allowed a particular invention or a scientific innovation to "revolutionize" an industry. Then be prepared to discuss the effects of that invention on how or where people lived, worked, shopped, etc.
- Draw on scientific resources to explain what farming practices contributed to the "Dustbowl," and how might that have been prevented. Which plants can grow in such dry soil, and what biological characteristics allow this? How can such considerations be of use today?

topic—what your goal is, and how each part plays into that goal. Don't assume anything."

The task requires, in fact, that teachers question the most fundamental assumptions of their trade—replacing the emphasis on coverage with much more ambitious goals, establishing new norms of scholarship and performance, and retooling the entire structure of school to make that possible. Involving the entire school community in that herculean effort may be the critical factor in Essential schools' success—a final, difficult, and public "performance assessment" for school people that will demand every ounce of their political and intellectual courage.

"What keeps us alive in our third year of trying this," says Natalie Hiller, co-coordinator of an integrated charter school within Philadelphia's inner-city Simon Gratz High School, "is that we've seen the difference start to happen. As resistant as kids were when we started out, that's how ecstatic they are in the end. 'We never knew we were capable of doing this kind of work,' they tell us, 'and now we know.' We hang onto that and push our agenda, clamoring for places to burst through." ❑

For More Information on Integrated Curriculum

James Beane, *Affect in the Curriculum: Toward Democracy, Dignity, and Diversity.* New York: Teachers College Press, 1990. Focuses on integrated curriculum in the middle school years.

Howard Gardner, *The Unschooled Mind.* New York: Basic Books, 1992. A partner with CES in the Atlas project and a leading theorist on assessment and "multiple intelligences."

Heidi Hayes Jacobs, ed., *Interdisciplinary Curriculum: Design and Implementation.* Alexandria, VA: ASCD, 1989. A pithy short handbook on integrated curriculum; the author is professor of Education at Teachers College, Columbia University.

Susan Kovalik, *Integrated Thematic Instruction* (book and tapes). Oak Creek, AZ: Books for Educators, 1993 (tel. 602-284-2389).

Rick Lear, "Curriculum and Essential Schools." Providence, RI: Coalition of Essential Schools, 1993. The theory and substance of integrated curriculum from the Essential School standpoint.

National Association for Core Curriculum, *Bibliography of Research on the Effectiveness of Block-Time, Core, and Interdisciplinary Team Teaching Programs.* Kent, OH: NACC, 1984.

L. B. Resnick and L. E. Klopfer, "Toward the Thinking Curriculum: An Overview," in 1989 ASCD Yearbook. Alexandria, VA: Association for Supervision and Curriculum Development.

Some additional curriculum sources

Interactive Math Program, 6400 Hollis St. Suite 5, Emeryville, CA 94608 (tel. 510-658-6400). Linda Witnov, outreach coordinator. Integrates mathematics curricula into a broader context.

Foxfire Teacher Outreach, P.O. Box B., Rabun Gap, GA 30568 (tel. 706-746-5318). Hands-on student projects in the community and classroom characterize this integrated learning approach.

Boston Area Educators for Social Responsibility, 11 Garden Street, Cambridge, MA 02138 (617-492-8820) produces integrated curricula in math, science, and the humanities with a focus on social and ethical issues.

Technical and Educational Resource Consultancy (TERC), a Cambridge, MA group (617-547-0430) producing integrated science and math curricula.

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