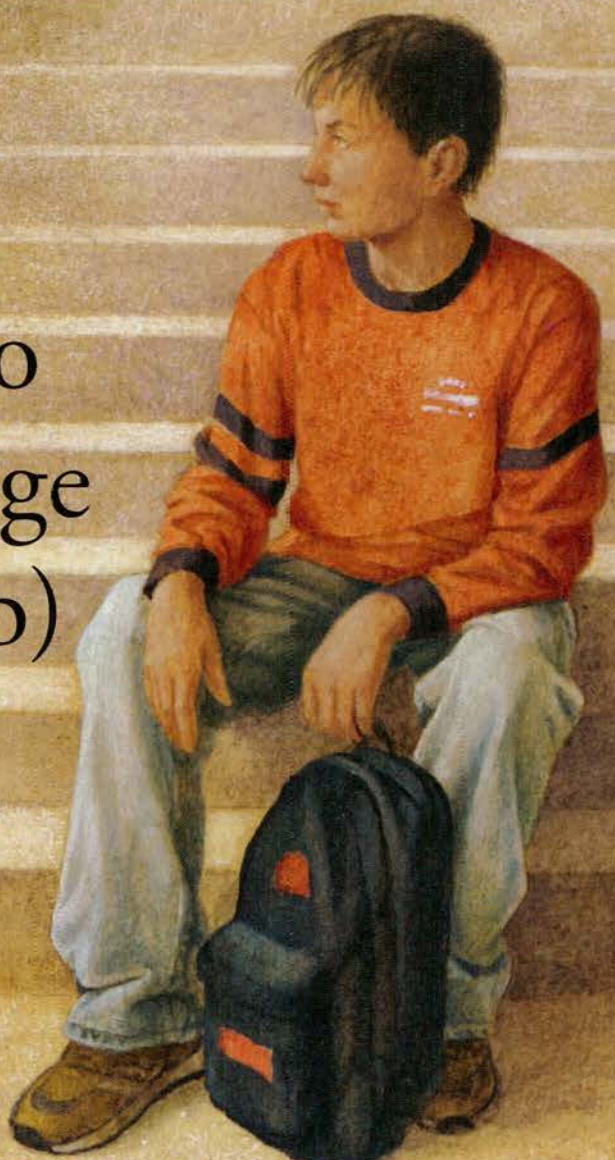
AMERICAN
Educator

It's Time To Tell the Kids: If You Don't Do Well in High School, You Won't Do Well in College (or on the Job)



AMERICAN FEDERATION
OF TEACHERS
SPRING 2004

THERE'S NOT ENOUGH ART IN OUR SCHOOLS.

NO WONDER PEOPLE SAY "GESUNDHEIT" WHEN YOU SAY

"TCHAIKOVSKY."

If one were to make a quick list of the world's favorite composers, despite his relatively recent vintage (he's only been dead for a century) Peter Ilyich Tchaikovsky would certainly make the list. After all, he composed *Swan Lake*, which is perhaps the most famous ballet of all time. And there certainly can't be more than a handful of ballet companies that don't stage a production of *The Nutcracker* every Christmas.

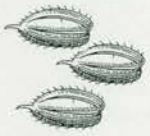


Fig. 1. Pollen. Causes watery eyes. Much like Tchaikovsky's composition "Romeo and Juliet."

And why not? Indeed, this great Romantic composer should be so immortalized. As a young man, he quit a secure government job — at enormous risk and against his father's advice — in order to pursue a career in music. His mild temperament combined with his tendency to work too hard left him with terrible insomnia, debilitating headaches and hallucinations. On top of that, Tchaikovsky's composition teacher never liked his work, even after he became world-famous.

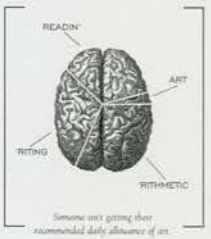
Setbacks such as these could have finished a lesser man. Instead, they informed his work,

Among the many setbacks Peter Ilyich Tchaikovsky endured: a disapproving family, a loveless marriage, a blind barber.

which remains some of the best loved in history. Yet some children still confuse Tchaikovsky with a nasal spasm.

BLESS YOU, MR. T.

No sensible parent would ever say that arts education isn't important to their child's well-being. Quite the opposite, in fact; when asked, a majority of parents believe the arts are an integral part. They know painting and dance and music and drama help foster analytical thinking, improve overall academic performance, promote a healthy sense of individuality and bolster self-confidence. Not to mention, of course, the obvious creative outlet they provide young minds.



Someone isn't getting their recommended daily allowance of art.

Given all of this, what responsible parent would ever think it's a good idea that their kids spend more time waiting in line in the cafeteria each week than they do in arts classes?

IS THIS SWAN LAKE'S SWAN SONG?

If you think the declining standards in schools today are just the price of doing business, then do nothing. If, on the other hand, you feel this is unacceptable and disadvantageous to your child's welfare, you need to speak up and demand his or her fair share of the arts. To find out how or for more information about all the benefits of arts education, please visit us on the web at AmericansForTheArts.org. Or else the life's work of Peter Ilyich Tchaikovsky may end up seeming like just another casualty of allergy season.

ART. ASK FOR MORE.

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Cover illustrated by Sonja Lamut

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LETTERS

Preventing Disruptive Behavior: How Far To Go

I commend the Winter 2003/2004 issue of *American Educator*. I have always felt this magazine delivered useful, quality information. This winter's issue went beyond that. When I first started reading "Heading Off Disruptive Behavior," I was skeptical. However, I soon found that it offered practical, workable solutions to antisocial behavior in the classroom.

You cannot imagine my surprise when I read the next article, "How Disruptive Students Escalate Hostility and Disorder—and How Teachers Can Avoid It." This article is a gold mine of information and even more valuable because its ideas can be implemented immediately. In more than 30 years of teaching, I acquired many of the techniques suggested in the article through trial and error. How much easier it would have been for me (and my students) if this information had been available to me earlier. Teachers need an arsenal of successful methods for dealing with all students, including those who are antisocial and disruptive. This process can take years. What a valuable shortcut the information in this article provides.

In the past, I have often wondered about information provided by researchers in ivory towers. These two articles blasted through my skepticism. It is evident that the authors have dealt with actual teachers and students in authentic classroom settings. Very seldom have I been able to say this about articles on teaching methods.

—PATRICIA CHARWAT
Horseheads High School
Horseheads, N.Y.

The articles on classroom discipline were fabulous. It made me so sad to think that I didn't have that kind of help when I was a teacher; I mostly got blamed for being weak in "classroom management skills."

—RISA HIRSCH EHRLICH
New York, N.Y.

Thank you for featuring articles on preventing students' at-risk behavior. School mental health professionals, such as school psychologists, school social workers, and counselors have been aware of this kind of research and the programs you cited. I hope your articles spur school staff to seek out these fellow school employees and involve them in the efforts described. Thank you for fostering new roles for some of us who work in schools.

—ROSARIO C. PESCE, PH.D., NCSP
Morton East High School
Cicero, Ill.

Instead of promoting zero tolerance for verbal abuse and placing the blame squarely on the shoulders of rude students, indifferent parents, and administrators who do not offer adequate support, your "experts" encourage us to try various coddling "strategies." Why should we expend our precious time and energy with drawn out psychological maneuvers when we shouldn't have to accept such behavior in the first place? Most teachers in so-called "hard to staff" schools will tell you that the few disruptive students who are permitted to treat us with disrespect and hostility on a daily basis sap us of our energy, diminish our creativity, and put even the most enthusiastic of us in survival mode.

—NAME WITHHELD BY REQUEST
Santa Paula, Calif.

Public school teaching is the only profession in America in which practitioners have to put up with disruptive individuals while continuing to perform the initially assigned task. Doctors don't have to; the meter reader doesn't have to; I'm sure that the authors of this article don't. Some jobs require dealing with disruptive individuals in the course of their job—crisis intervention workers, for example. But these people are not *also* expected to do a different job while dealing with the disruptions. The author seems to believe that a teacher is supposed to smoothly handle acting out individuals who may be carrying a significant psychiatric diagnosis—and continue teaching his or her class!

—DON BYRD
Pawtucket, R.I.

Increasing the Prestige of Teaching

As a former dissatisfied teacher, I enthusiastically applaud Matthew Miller's article "Teaching Poor Students: How To Make It a Prestigious, Desirable Career" (Winter 2003/2004). Teaching is the noblest and most important profession of all. Sadly, many truly champion teachers are cornered within the limits imposed by their unrealistically low salaries and the frustration of working with less-than-qualified colleagues.

As Miller writes, many teachers sacrifice much to do the job they love—they work for a pittance in unsafe neighborhoods with large classes and insufficient supplies. Every day represents new struggles and challenges, such as making it safely through the neighborhood streets and the school halls and dealing frequently with low-functioning or disruptive students from a variety of troubled backgrounds. These teachers carry on quietly—without acknowledgement or appreciation—for the love of their profession and with enthusiasm for the futures of their students. What a shame that these heroes' tremendous efforts do not receive the rewards, in terms of money and prestige, that they truly earn!

And, what an injustice that their work is so often shadowed by the incompetence of others. Unfortunately, every school, not just the poor, employs these others for lack of better candidates—teachers who possess the paper qualifications but lack the heart that would deem them truly worthy.

Wouldn't it be wonderful if the title of "teacher" immediately conjured images among the general populace of intelligence and dedication instead of the much more common (and convoluted) thoughts of summers off and an 8 A.M. to 3 P.M. workday? Hopefully, such reforms as those Miller mentions could increase the prestige of this misunderstood profession and, ideally, propel teaching into the realm of respectable careers where it truly deserves to be.

—L. LYNNEM
Arlington Heights, Ill.

Let us know what you think!
Please send letters to the editor via e-mail to ***amered@aft.org*** *or by mail to* American Educator, *555 New Jersey Ave. N.W., Washington, DC 20001. Letters to the editor that are selected for publication may be edited for style, clarity, and length.*

I read with great interest Matthew Miller's article on raising teacher salaries in urban districts. While he makes a strong case, there are two major points that he fails to consider. First, he ignores the likely reaction of the suburban districts to an increase in urban teachers' pay. Many suburban districts take great pride in the quality of their school systems and would not sit idly by while bright young teachers are lured into the cities by higher salaries. It is likely that they would draw upon their strong tax bases (precisely what is missing from urban districts) to increase the pay for their own teachers. Thus, while urban districts would still begin to pay a decent professional wage under Miller's plan, they would face the same problem of competing with even higher salaries in the suburbs.

Second, Miller fails to give enough attention to the problem of job quality. Not every young teacher who leaves an urban school district does so for monetary gain. Indeed, many leave for private and charter schools, which often pay even less than urban districts. The problem is not simply that teachers aren't paid enough for working hard in city schools. Rather, in many urban districts, the job demands of a new teacher are so great that no amount of money is sufficient to compensate for it. Teachers with emergency certifications who have never set foot in a classroom are expected to deal with the same full schedule of overcrowded classes and troubled students as veterans of 20 years. If a first-year teacher could teach, say, three periods a day instead of six, and then spend the rest of the day observing other classes, consulting with a mentor teacher, or completing certification requirements, the job stress level would be greatly reduced. A plan like this would require urban schools to have more teachers, but it would also presumably reduce the number that leave due to early burnout.

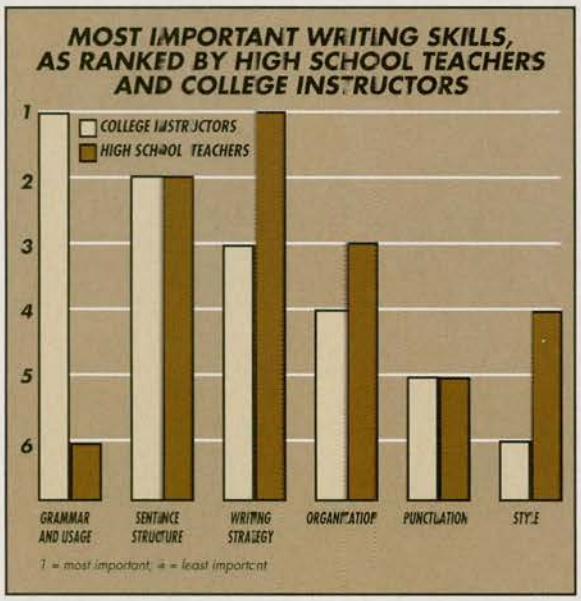
There is no denying that teachers are underpaid, especially in urban districts. However, without improving the experience of new teachers, Miller's plan will only make teaching more prestigious, not more desirable.

—NICHOLAS SPICHER
Baltimore, Md.

Matthew Miller makes an argument for raising teacher pay. He realizes teachers are underpaid, that history and inflation have been unkind to us, and our base salaries need to be raised. He asserts physics teachers should be paid what the open market would offer. Teaching as a career should be financially competitive with industry. I ap-

(Continued on page 42)

NOTEBOOK



Don't Forget Grammar!

There's a big disconnect between what students think is necessary for college and what colleges think—a topic discussed extensively in this *American Educator*. A survey from ACT shows there's also a big disconnect between high school teachers and college professors on the importance of ... grammar. The 2003 ACT National Curriculum Survey includes responses from middle school teachers, high school teachers, and entry-level college course instructors. Respondents agree that English proficiency is vital to students' achievement. But, there is a great divide between those respondents when ranking the importance of six English skills: grammar and usage, organization, punctuation, sentence structure, style, and writing strategy. As the chart above shows, high school teachers rank grammar and usage skills as the least important, while college teachers rank them as the most important English skills.

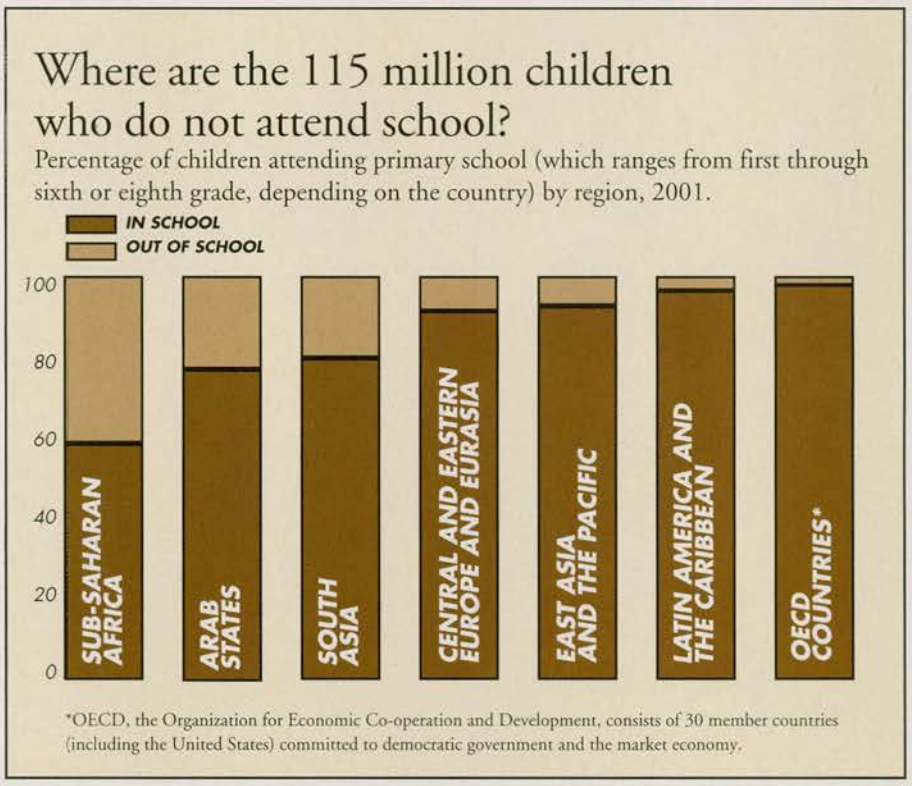
Not surprisingly, what high school teachers consider important affects what they teach: While only 69 percent of high school teachers taught grammar and usage, the other five English skills were taught by 83 to 96 percent of high school teachers. For more information about the 2003 ACT National Curriculum Survey, visit **www.act.org/activity/winter2004/survey.html**.

Basic Education: A Priority That Saves Lives

Of the 680 million elementary school-age children in the developing world, 115 million of them do not attend school—and three-fifths of those children are girls. A new report by the Basic Education Coalition called *Teach a Child, Transform a Nation* opens with these startling statistics. It goes on to document the desperate need to expand basic education—which ought to span early childhood through early secondary schooling—throughout the developing world (meaning countries that have high rates of poverty and low levels of industrialization and economic productivity). It also explains the benefits of even a few years of schooling. Here are some more of the findings:

- Compared to children whose mothers have attained secondary (or higher) education, children whose mothers have no education are *more than twice* as likely to die or be malnourished.
- Attending school reduces the chances that a child will be drawn into abusive and dangerous work. As secondary education enrollments rise, the percentage of 10- to 14-year-olds in the workforce decreases.
- In the developing world, 25 percent of adults are illiterate—that's 879 million people.
- On average, a farmer with just four years of education is 8.7 percent more productive than one with no education. And among the labor force in general, each additional year of education increases individual output by four to seven percent.

Governments in developing countries



are becoming more aware of these data, but increasing access to basic education is a struggle. Kenya, for example, eliminated primary school fees in 2003, only to be overwhelmed by the new students. When 1.5 million previously out-of-school children enrolled, class sizes swelled from 40 to 120. But there are reasons to be hopeful: Between 1990 and 1999, nearly 90 million additional children enrolled in school. At the same time, worldwide illiteracy rates fell about four percent. To read the full report, go to **www.basiced.org/otherdocs/teach_a_child_as_printed.pdf**.

© LOUISE GUBB/CORBIS SABA

Students use drums as desks at the Ipusukilo Community School in Zambia.

History Contests Help Students Hone Research, Writing, and Speaking Skills

As the school year progresses, motivating students to do their best can be a challenge. Next year, consider a national competition to keep your students engaged, focused, and willing to work hard. From individual projects to contests for the whole class, exciting challenges for students abound:

American Legion High School Oratorical Contest
An Extra Challenge for Independent Students
In the American Legion Oratorical Contest, students in grades 9 to 12 compete to demonstrate their knowledge of the Constitution and the rights and privileges of citizenship in the United States, as well as their ability to speak clearly and intelligently. Students deliver a prepared speech of eight to 10 minutes and then have five minutes to collect their thoughts to speak for three to five minutes on a randomly selected topic related to the Constitution.

Qualifying competitions are held at the local and state levels, where they are organized, respectively, by local posts and department (state) headquarters of the American Legion. One contestant per state advances to the national level and automatically receives a $1,500 college scholarship. Travel and lodging expenses for attending the national competition in Indianapolis (with a chaperone) are paid for by the American Legion. After the quarter- and semi-finals, three finalists compete for awards ranging from $14,000 to $18,000. For more information, go to **www.legion.org/?section=prog_evt&subsection=evt_oratorical&content=evt_oratorical** or call your state's American Legion headquarters.

Profile in Courage
Add Outside Judging to the Regular, Short-Essay Assignment
For the John F. Kennedy Profile in Courage Essay Contest, high school students around the nation submit 700- to 1,000-word essays to the Kennedy Library in Boston on an individual who exemplifies political courage. These essays pass through three phases of judging that focus on originality, depth of critical analysis, and clarity. Judges include graduate students, teachers, heads of Massachusetts' Democratic and Republican parties, as well as the Profile in Courage Award Committee. The first-place winner is awarded $3,000 and a $500 JFK Public Service grant for his or her school. The second-place winner receives $1,000. This essay contest is a companion to the annual Profile in Courage Award, which honors elected officials. Winning essays offer persuasive evidence that the chosen subject displayed extraordinary political courage; they also inspire readers to emulate the elected officials, past or present, who have tried to make a difference in the world. More information, including winning essays from the past seven years and curriculum ideas on the Profile in Courage, is available at **www.jfkcontest.org**.

We the People: The Citizen and the Constitution
Turn Your Class into a Congressional Hearing
We the People: The Citizen and the Constitution, sponsored by the Center for Civic Education, is an instructional program and national competition for high school students in which a whole class simulates a congressional hearing. Students must present statements and defend their positions on historical and/or contemporary issues while judges pose as congressional committee members. This three-tiered contest proceeds from the congressional district level to the statewide hearings and culminates in the spring in Washington, D.C., for a three-day national competition. There is no purse—students compete "for the glory."

In addition to the high school competition, there are We the People courses for upper-elementary and middle school students that culminate in non-competitive congressional hearings. At each level, the Center for Civic Education offers curricula, textbooks, and professional development to support teachers. For more information see **www.civiced.org/wethepeople.php?link=intro**.

FOR BETTER, FOR WORSE

STANDARDS AND ACCOUNTABILITY

Standards and accountability are here—for better, for worse. Better, because student performance is now transparent, meaning that school systems can no longer ignore inadequate achievement—especially among our most vulnerable children and in our most distressed schools. Worse, because implementation is often crude and sometimes it even discourages good practice. In this space, we'll take a regular look at what's better, what's worse—and what should be repaired—as a result of the movement toward standards and accountability.

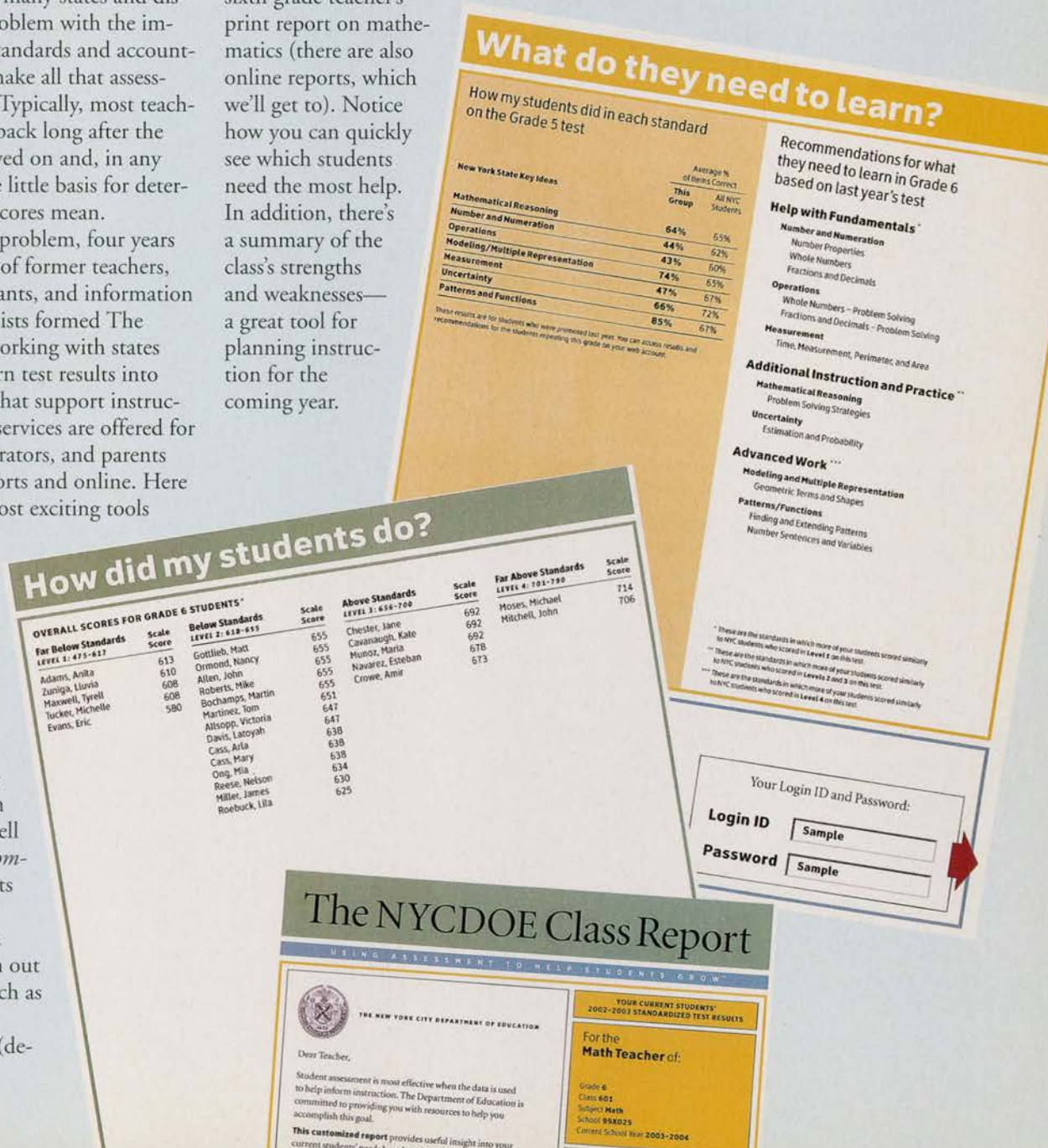
Making Student Assessment Data Useful

With the annual tests now required by the No Child Left Behind Act (NCLB), as well as the tests many states and districts have, one problem with the implementation of standards and accountability is how to make all that assessment data useful. Typically, most teachers get test scores back long after the students have moved on and, in any case, teachers have little basis for determining what the scores mean.

To address this problem, four years ago a small group of former teachers, education consultants, and information technology specialists formed The Grow Network, working with states and districts to turn test results into customized tools that support instruction. A variety of services are offered for teachers, administrators, and parents through print reports and online. Here are a few of the most exciting tools for teachers.

Easy to Read Test Results for Your *Incoming* Class

You read it right: Assessment results can be delivered in the summer that tell you how your *incoming* class of students performed on the spring tests—both overall and broken out in various ways such as state standards or NCLB categories (depending on the needs of the state or district). Below are sample pages from a sixth grade teacher's print report on mathematics (there are also online reports, which we'll get to). Notice how you can quickly see which students need the most help. In addition, there's a summary of the class's strengths and weaknesses—a great tool for planning instruction for the coming year.



What do they need to learn?

How my students did in each standard on the Grade 5 test

New York State Key Ideas	Average % of Items Correct: This Group	All NYC Students
Mathematical Reasoning		
Number and Numeration	64%	65%
Operations	44%	62%
Modeling/Multiple Representation	43%	60%
Measurement	74%	65%
Uncertainty	47%	67%
Patterns and Functions	66%	72%
	85%	67%

These results are for students who were promoted last year. You can access results and recommendations for the students repeating this grade on your web account.

Recommendations for what they need to learn in Grade 6 based on last year's test

Help with Fundamentals*
- **Number and Numeration**
  - Number Properties
  - Whole Numbers
  - Fractions and Decimals
- **Operations**
  - Whole Numbers – Problem Solving
  - Fractions and Decimals – Problem Solving
- **Measurement**
  - Time, Measurement, Perimeter, and Area

Additional Instruction and Practice**
- **Mathematical Reasoning**
  - Problem Solving Strategies
- **Uncertainty**
  - Estimation and Probability

Advanced Work***
- **Modeling and Multiple Representation**
  - Geometric Terms and Shapes
- **Patterns/Functions**
  - Finding and Extending Patterns
  - Number Sentences and Variables

* These are the standards in which more of your students scored similarly to NYC students who scored in **Level 1** on this test.
** These are the standards in which more of your students scored similarly to NYC students who scored in **Levels 2 and 3** on this test.
*** These are the standards in which more of your students scored similarly to NYC students who scored in **Level 4** on this test.

How did my students do?

OVERALL SCORES FOR GRADE 6 STUDENTS*

Far Below Standards LEVEL 1: 475-617	Scale Score	Below Standards LEVEL 2: 618-655	Scale Score	Above Standards LEVEL 3: 656-700	Scale Score	Far Above Standards LEVEL 4: 701-790	Scale Score
Adams, Anita	613	Gottlieb, Matt	655	Chester, Jane	692	Moses, Michael	714
Zuniga, Lluvia	610	Ormond, Nancy	655	Cavanaugh, Kate	692	Mitchell, John	706
Maxwell, Tyrell	608	Allen, John	655	Munoz, Maria	678		
Tucker, Michelle	608	Roberts, Mike	655	Navarez, Esteban	673		
Evans, Eric	580	Bochamps, Martin	651	Crowe, Amir			
		Martinez, Tom	647				
		Allsopp, Victoria	647				
		Davis, Latoyah	638				
		Cass, Arla	638				
		Cass, Mary	638				
		Ong, Mia	634				
		Reese, Nelson	630				
		Miller, James	625				
		Roebuck, Lila					

Your Login ID and Password:

Login ID: Sample

Password: Sample

The NYCDOE Class Report

USING ASSESSMENT TO HELP STUDENTS GROW

THE NEW YORK CITY DEPARTMENT OF EDUCATION

Dear Teacher,

Student assessment is most effective when the data is used to help inform instruction. The Department of Education is committed to providing you with resources to help you accomplish this goal.

This customized report provides useful insight into your current students' [illegible]

YOUR CURRENT STUDENTS' 2002-2003 STANDARDIZED TEST RESULTS

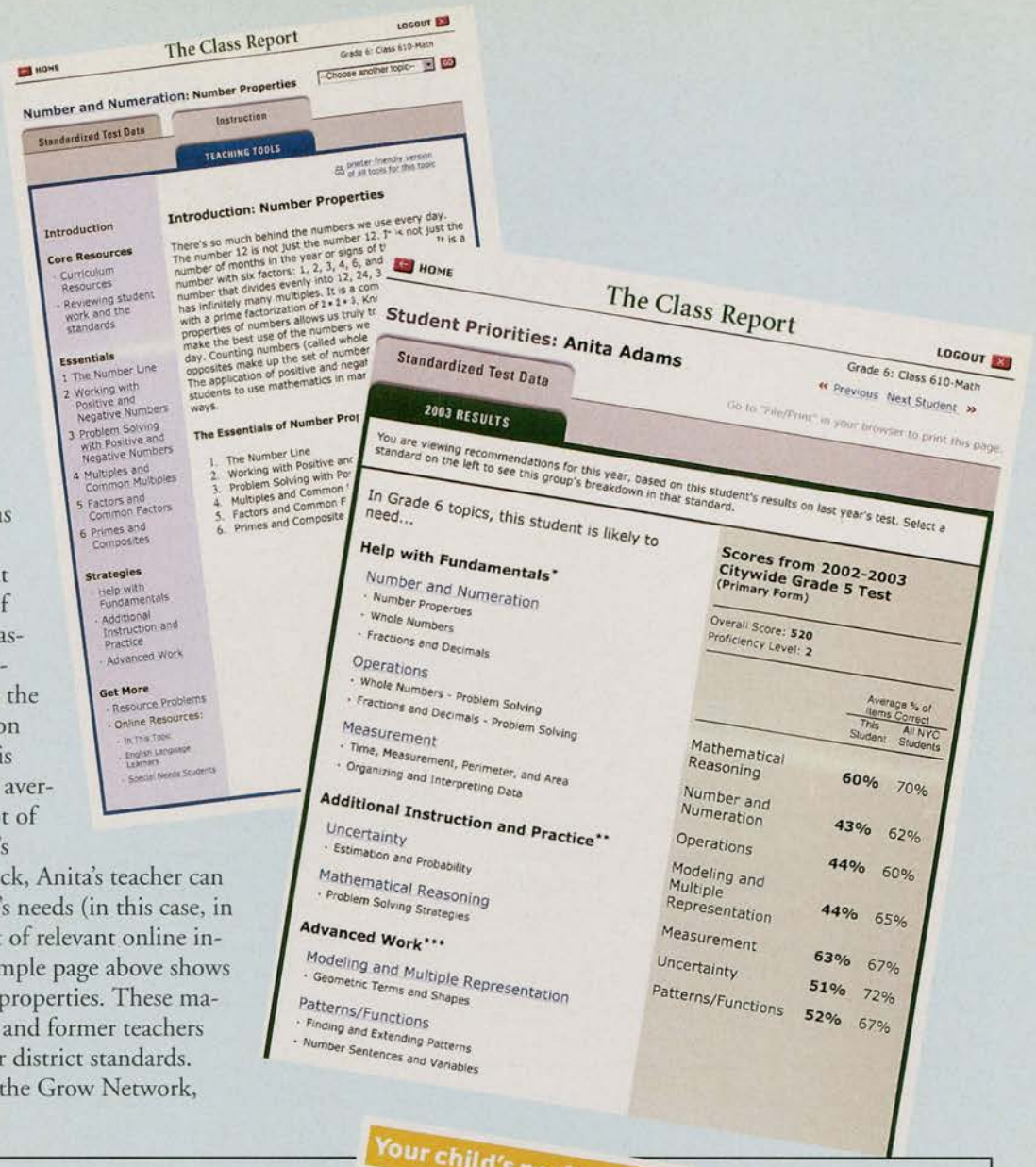
For the **Math Teacher** of:

Grade **6**
Class **601**
Subject **Math**
School **99X025**
Current School Year **2003-2004**

Analysis of Each Student's Strengths and Weaknesses

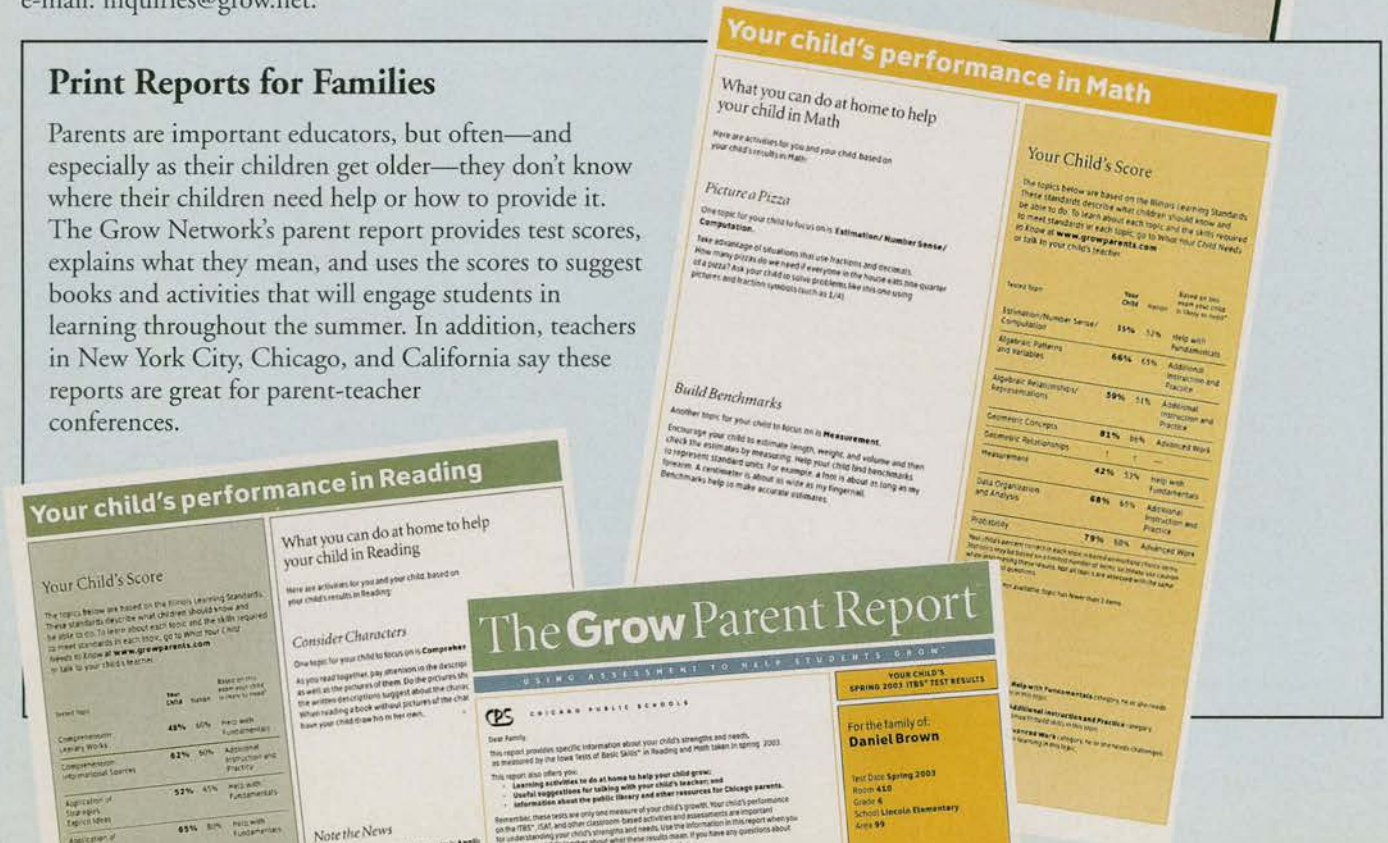
The print report helps you get to know your incoming class as a whole, but as a teacher, you've got to deal with each individual's strengths and weaknesses. Using the Grow Network's Web site, you can examine each student's skills in detail. The sample page on the far right shows how Anita Adams (the first student under "Far Below Standards" in the print report) did on each section of her fifth-grade mathematics assessment and how her performance compares to others in the school district. Anita's score on "Number and Numeration" is much lower than the district average; obviously, she needs a lot of extra help in this topic if she's going to catch up. With a click, Anita's teacher can move from identifying Anita's needs (in this case, in "number properties") to a set of relevant online instructional materials. The sample page above shows the introduction to number properties. These materials are written by current and former teachers and are based on state and/or district standards.

For more information on the Grow Network, e-mail: inquiries@grow.net.



Print Reports for Families

Parents are important educators, but often—and especially as their children get older—they don't know where their children need help or how to provide it. The Grow Network's parent report provides test scores, explains what they mean, and uses the scores to suggest books and activities that will engage students in learning throughout the summer. In addition, teachers in New York City, Chicago, and California say these reports are great for parent-teacher conferences.



It's Time To Tell the Kids: If You Don't Do Well in High School, You Won't Do Well in College (or on the Job)

By James E. Rosenbaum

Every year I ask my college class how many students have seen a high school teacher cry, and most students raise their hands. When I ask what provoked the crying, most stories are about teachers who threaten to give students bad grades and students who do not care. When I ask my colleagues the same question about their high school teachers from one or two generations ago, virtually none can recall such tears. This is not a systematic survey, but it suggests a big change.

Today, nearly all high school seniors believe that they are going to college—and that bad grades won't stop them. They are right: With the dramatic increase in open admissions colleges, it is true that they can go.

But as I report in my recent book *Beyond College for All,* students who perform poorly in high school probably won't graduate from college—many won't even make it beyond remedial courses. High enrollment rates and low graduation rates are well-known facts of life in most open admissions and less selective colleges (both two- and four-year). The tight connection between high school preparation (in terms of both the rigor of courses taken and grades received) and college completion are well known to statisticians, researchers, and policymakers who follow such matters.

But research suggests that students still do not understand this connection. Consider the following: Seventy-one percent of the class of 1982 planned to get a college degree. Ten years later, 63.9 percent of those with A averages had attained an A.A. degree or higher, but only 13.9 percent of those with C averages (or lower) had done so (Rosenbaum, 1998, 2001). (In a more recent cohort [the class of 1992], students with C averages or lower fared a little better; 20.9 percent attained an A.A. degree or higher within eight years of graduating from high school [Rosenbaum and Gordon-McKeon, 2003]). As of 1992, 84 percent of high school seniors planned to get a college degree (NELS, 1992); but data from the high school classes of 1972, 1982, and 1992 tell us that *only 45 to 49 percent of students who enter college and earn more than 10 credits actually earn a bachelor's degree*—many even fail to earn 10 credits (Adelman, 2004). For students with high school averages of C or lower, *the chances that they will earn even one college credit are less than 50-50* (Rosenbaum, 2001). Do your students know that? Do your colleagues? Did you know that?

Despite the availability of open admissions institutions and increased student aspirations for college degrees—factors that increase college *enrollment*—the easiest-to-use predictor of a student's likelihood of *graduating* from a two- or four-year college is still his or her high school grade point average.* Although any single grade is imperfect, when averaged over a high school career, the grade point average is an excellent predictor of how a student will do in college. This has always been true and there is no reason to expect it to change. Unfortunately, our well-intentioned efforts to encourage all students to go to college regardless of their grades inadvertently gives them the impression that high school grades don't matter.

In this article, we will look at the facts, indeed the tragedy, behind the façade of widespread college entry—and at what we can do to change the picture, either by increasing the odds that college enrollment will lead to college gradua-

* Grade point average is the easiest-to-use predictor of college success. Research by Clifford Adelman (1999), however, shows that the intensity and quality of one's high school curriculum is actually an even more powerful predictor. But since course content and teacher expectations vary widely from school to school, making use of this indicator can be difficult. Nonetheless, the gist of both Adelman's and my research is clear: College-bound students should take the most difficult courses possible and work hard to earn the highest grades possible. To read more about Adelman's findings, see the sidebar on page 14.

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tion or by helping students find more productive, successful post-high school paths.

New Dreams, New Misconceptions

The past 40 years brought three radical social transformations that together have dramatically increased the percentage of students who want to attend college. First, the earnings advantage of college graduates has grown (Grubb, 1996). Second, college—especially community college (a minor factor in the prior generation)—has become much more accessible. In the past four decades, while enrollments at four-year colleges doubled, enrollments increased five-fold at community colleges (NCES, 1999). Third, and perhaps most remarkably, virtually all community colleges adopted a revolutionary policy of open admissions. Unlike many four-year colleges, virtually all two-year colleges opened their doors to admit all interested high school graduates, regardless of students' prior academic achievement. Even high school graduates with barely passing grades are routinely welcomed because almost all two-year colleges offer a wide array of remedial courses. Indeed, in many cases, students do not even have to be high school graduates because most two-year colleges offer these students access to some non-credit courses, including GED courses.

These three transformations have dramatically altered the rules of college attendance and given students remarkable new opportunities. However, as with all revolutions, there are also unintended consequences. The revolutions spawned a set of myths—we'll call them misconceptions—that combined to send a message to students: Don't worry about high school grades or effort; you can still go to college and do fine. This message has not been sent to high achievers aiming for prestigious colleges, where grades and scores matter—and the students headed there know it. But it is the message that students who know little about college have received—particularly those whose parents did not go to college. These students (and their parents) are being misled with disastrous consequences. Their motivation to work hard in high school is sapped; their time to prepare for college is wasted; their college savings are eaten up by remedial courses that they could have taken for free in high school; and their chances of earning a college degree are greatly diminished. Further, the effect on many colleges has been to alter their mission and lower their standards.

This article reviews some of the misconceptions spawned by these three revolutions and rebuts them—and considers how schools can mitigate the terrible impact these misconceptions are having on individual students and, inevitably, on the overall school environment.

Misconception 1: College success is not linked to high school preparation.

A national survey (NELS, 1992) found that 84 percent of high school seniors in the class of 1992 planned to get a two- or four-year college degree. Even students with bad grades, low test scores, and poor high-school attendance planned to complete a college degree. Attaining a college degree can be difficult even for students who have worked hard and done well in high school; for those who haven't, it is nearly impossible. Look at the table below on grades and college completion for the class of 1982. On average, 37.7 percent of seniors with college plans earned a two-year or higher degree. But low high school grades cut students' chances markedly—only 13.9 percent of seniors with averages of C or lower completed college. For this 13.9 percent, open admissions at community colleges provided an extremely helpful second chance. However, for the vast majority of students, the other 86 percent, their second chance was only another experience of failure. Shouldn't we tell the students: If you want to graduate from college, exert the effort and get good grades in high school?

In the class of 1982, 86 percent of college-bound students with poor grades didn't graduate from college.

Average high school grades	As	Bs	Cs or lower	All
Percentage attaining A.A. or higher	63.9	37.1	13.9	37.7
Percentage not attaining any degree	36.1	62.9	86.1	62.3

Seniors with college plans (A.A. or higher) who complete an A.A. degree or higher within 10 years of high school graduation.

Source: *Beyond College for All;* High School and Beyond data.

Misconception 2: College plans lead to increased school effort.

It is often assumed that planning to go to college makes students more motivated, giving them reason to work hard in high school. Unfortunately, this is often not the case. For many decades, work-bound students believed that high school achievement would not influence their future careers (Stinchcombe, 1965), but now many college-bound students also hold this belief. In a survey of over 2,000 seniors in 12 urban and suburban high schools, researchers found that almost 40 percent of college-bound students believed that school effort had little relevance for their future careers (Rosenbaum, 1998; cf. Steinberg, 1996).

Misconception 3: High school homework doesn't matter for college success.

Since open admissions policies allow everyone to enter college, no matter how poorly they do in high school, some students report that they can wait until college to exert academic effort. But research shows that effort during high school is absolutely essential. Take homework, for example: Students doing no homework end up with 1.2 years less education and 19 percent lower earnings than average. Students doing 15 hours or more a week of homework attain almost 1.5 more

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FOR POSTING AND DISTRIBUTING TO STUDENTS

What You Need To Do in High School If You Want To Graduate from College

Let's start by getting the cold, hard truth out in the open: Less than 40 percent of students who plan to go to college actually earn a two- or four-year degree within 10 years of graduating from high school (Rosenbaum, 2001). Do you know what it takes to succeed in college? The simple answer is that if you take hard classes, do all of your homework, and get good grades in high school, you will be ready.

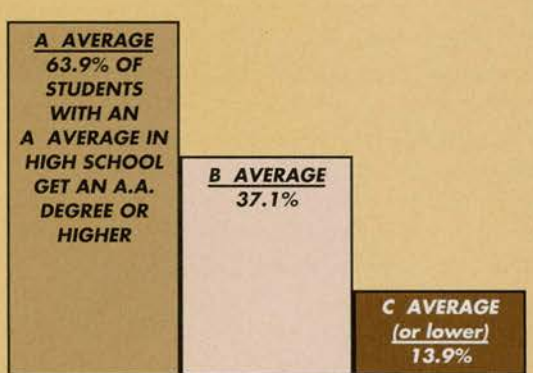
1. GRADES MATTER. Your high school grade point average is a great predictor of whether or not you will earn a college degree. Take a look at the chart (below left). Less than 14 percent of students with C averages or lower in high school earned a two- or four-year college degree. Even worse, 52 percent of college students who had a C average (or lower) in high school didn't earn even one college credit! What are they doing while they are "in college"? They are spending time and money on remedial classes that repeat high school work and earn no college credit.

2. HOMEWORK MATTERS. Homework might seem like a waste of time, but it teaches you content, time-management, and discipline—all of which you'll need in college. Forty-four percent of high school seniors do less than three hours of homework in a week; only 14 percent of seniors do more than 10 hours. But homework time strongly predicts college success: Over half the students who do more than 10 hours of homework a week will get a four-year college degree; only about 16 percent of those doing less than three hours of homework a week will earn a bachelor's degree.

3. MATH COURSES MATTER. The further you go in math in high school, the better your chances of earning a college degree. Look closely at the chart (below right). Completing Algebra II (or a higher course) is a huge help in earning a college degree. And if you really want a bachelor's degree, you better go as high as you can in math while you're still in high school.

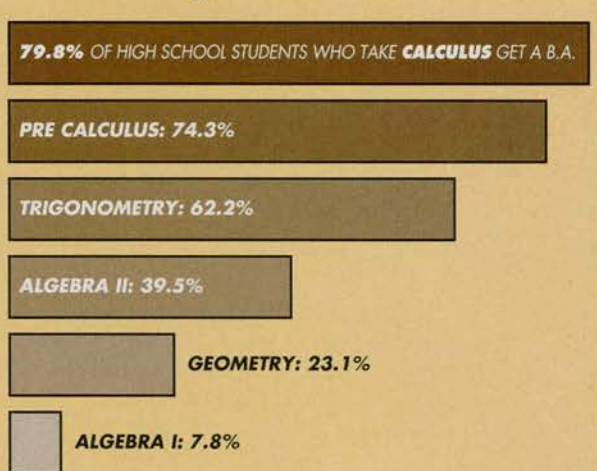
Even if you don't go to college, your high school grade point average is still important because it predicts future income. High-school grades do not predict income right after high school, but they do strongly predict long-term income. If you don't go to college, an increase of one letter grade (from C to B) in your high school grade-point average typically increases income by 13 percent by age 28! (Compared to people who haven't gone to college, a four year degree typically increases income by about 14 percent.) So even if you don't go to college, improving your high school grades from Cs to Bs improves the chances that you will be able to support a family.

Earning a two-year college degree or higher depends a lot on what your high school GPA is.



Percentage of twelfth-graders who say they are going to college who have actually earned a two- or four-year degree10 years after high school.

Getting a four-year college degree depends a lot on how far you go in high school math.



Percentage of high school graduates earning a B.A. by highest level math course taken in high school.

Sources: James Rosenbaum (2001) Beyond College for All*; Clifford Adelman (1999)* Answers in the Toolbox.

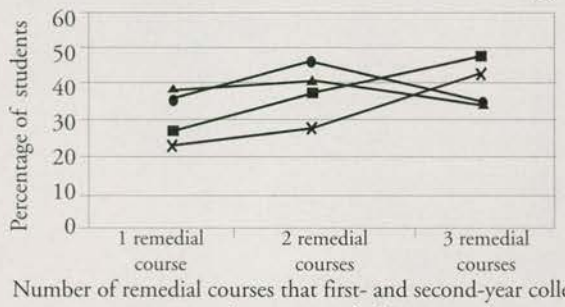
years of education and attain 16 percent higher earnings than average. This 2.7-year spread in educational attainment and 35 percent spread in earnings are both extremely large (especially considering that these outcomes are associated with variation in self-reported homework time in high school).

Misconception 4: Going to college means taking college-level classes.

If you are taking classes in a college, are you taking college classes? Not necessarily. Many "college students" are actually in remedial courses—high school-level classes (or even lower) that give no college credits (Deil-Amen and Rosenbaum, 2002). The best estimates of the extent of remedial education come from careful analyses of college transcripts from national samples of students in the classes of 1982 and 1992. From 1982 to 1992 there has been substantial improvement in the need for remediation *among students entering four-year colleges*. Forty-four percent of those from the class of 1982, but only 25 percent from the class of 1992 (still too many), took at least one remedial course. Unfortunately, there has not been a similar improvement *among students entering two-year colleges*. Sixty-three percent of those from the class of 1982, and 61 percent from the class of 1992, took at least one remedial course (Adelman, 2004). A more recent survey in two urban community colleges found that 25 percent of students were taking three or more remedial courses (Deil-Amen and Rosenbaum, 2002).

Moreover, in an effort to reduce students' feelings of inferiority, college advisors often downplay the fact that courses are remedial. As a result, *many students do not even realize the nature of their coursework*. In one research survey, students were given a list of the colleges' remedial courses, asked which ones they had taken and whether the courses counted toward a degree. From interviews with administrators, the researchers knew that none of these courses counted toward a degree. Unfortunately, most students did not (see chart below). Among first-year students taking three remedial courses, 36 percent reported that these courses counted, and another 48 percent were not sure. Even among second-year students taking three remedial courses, 36 percent believed the courses counted for college credit and 44 percent were unsure (Deil-Amen and Rosenbaum, 2002).

Many college students in remedial courses believe the courses count toward a degree.



Number of remedial courses that first- and second-year college students are enrolled in

- 1st year students who wrongly believe that remedial courses count
- 1st year students who are not sure
- 2nd year students who wrongly believe that remedial courses count
- 2nd year students who are not sure

Misconception 5: Going to college for a two- or four-year degree takes two or four years.

How long does a two-year associate's degree take? If you think the answer is obvious, you are wrong. At one community college, a top administrator confided that because of remedial needs, a "two-year associates degree" takes full-time students an *average* of 3.5 years to complete. Statistics like this are not widely known—with three serious implications. First, since the remedial courses often carry no credit, students who plan for two-year or four-year degrees discover that they cannot complete their degrees in the time they have scheduled or within the budget they have planned. Second, their failure to collect credits is exacerbated by the "secret" nature of the remedial courses; discovering after 1.5 years that you are still two years away from a two-year degree is not only demoralizing, but may present virtually insurmountable time and budget problems. Third, high school students heading toward college do not understand college remedial placements. They know that their older peers who graduated high school with poor grades went on to college—and they assume they can, as well. But most high school students probably do not realize that these "college students" are not accumulating college credits and are unlikely to graduate. This partial picture may encourage lax academic effort and college-for-all fantasies on the part of many high school students—maybe even on the part of school faculty. (These fantasies are fed by high school administrators who boast about the high percentage of students they send to college—but neglect to mention how few graduate. More on this later.)

Misconception 6: School counselors should not offer discouraging words about the hard work necessary for college success.

Given the widespread public belief in the misconceptions above, counselors rarely discourage college plans or suggest alternatives. A recent study in eight diverse urban and suburban high schools found that even if students had poor grades, school counselors did not dissuade them from attending college, *nor did they warn students when they had poor chances of college success* (Krei and Rosenbaum, 2001; Rosenbaum, Miller, and Krei, 1997). National data suggest that these practices are widespread. While only 32 percent of a national survey of seniors in 1982 indicated that their counselors urged them to go to college, 10 years later, fully 66 percent of seniors made the same statement (Boesel, 2001; Gray, 1996). Indeed, 57 percent of seniors in the bottom half of the academic rankings reported that counselors urged them to attend college.

In interviews we conducted with counselors, it was clear that counselors who do wish to warn students that they are unprepared for college believe that they lack the authority to do so (Rosenbaum et al., 1997). As one counselor said, "Who am I to burst their bubble?" At the same time, counselors report that when they warn students that they are unprepared for college, parents complain, and principals support the parents. Counselors are not sure they have the authority to be candid and to report that students are not well prepared for college. The following example, though just an

All Good Jobs Don't Require a College Degree...

But getting a good job without a college degree depends a lot on high school effort—and the support a high school provides.

Encouraging students to attend college despite their poor academic preparation is a practice based in part on the premise that all decent jobs require a college education. Although average earnings are higher for those with college degrees (Carnevale and Desrochers, 2002), it is easy to misread these numbers.

First, these averages conceal much variation. College degrees do not always have payoffs. And, college degrees are not required to enter many rewarding jobs, including construction trades, clerical and administrative support, auto and airplane mechanics, printing, graphics, financial services, and many government and social services. Union electricians, machinists, tool and die makers, and sheet-metal workers, for instance, have high-demand skills, excellent benefits, good working conditions, and annual salaries that often exceed $45,000 by age 28 (and are much higher with overtime).

Second, researchers who analyze jobs and talk to employers find that while today's typical job requires higher skills than in the past (when many jobs required only physical strength), the skills required for these jobs are strong high school-level skills—math, reading, and writing at a ninth-grade level (Murnane and Levy, 1996), not college-level skills. Similarly, new research on the skills needed for many good jobs (meaning those that pay enough to support a family and have the potential for advancement) are also high school-level skills, such as four years of English and mathematics through Algebra II (American Diploma Project, 2004). Unfortunately. over 40 percent of high-school seniors lack ninth-grade math skills and 60 percent lack ninth-grade reading skills (Murnane and Levy, 1996). So students do not need to go to college to get a good job, but they do need to master high school-level skills. Research shows that greater mastery of these skills in high school leads to higher earnings over time: For youth who get no college degree, a rise of one letter grade in their high school grade point average (from C to B) is associated with a 13 percent earnings gain at age 28! That's almost as much as the pay differential associated with a bachelor's degree, which is just over 14 percent more than students without a college degree (Miller, 1998; Rosenbaum, 2001). Solid high school skills prepare students for entry-level positions and keep the door to promotions open (Rosenbaum, 2001).

Third, employers report that for many jobs, non-academic skills (like timeliness, diligence, and social competence) are key (Shapiro and Iannozzi, 1999). Analyses of a national survey indicate that students' educational attainment and earnings nine years after graduating from high school are significantly related to their non-cognitive behaviors in high school—sociability, discipline, leadership, homework time, and attendance—even after controlling for background characteristics and academic achievement (Rosenbaum, 2001). High schools can provide these skills just as well as colleges can.

Fourth, for some low-achieving high school students, getting a good job after high school can be more lucrative than trying to earn a college degree. As we saw in the main article, only about 14 percent of students with C averages or lower in high school earn a college degree (B.A. or A.A.). Of these low-GPA high school students, those who do complete a B.A. will typically earn 4.3 percent more than students without a college degree—but this is less than one-third the extra earnings that the typical college graduate enjoys. Those with low high school GPAs who earn an A.A. *will typically earn 7.2 percent less than high school graduates with no college degree* (Rosenbaum, 2001).

So the vast majority of students who don't do well in high school would be better off, in terms of future income, finding a good job than going to college. But their ability to find out about these jobs, prepare for them, and get placed in them depends a lot on the support they get from their high school. Indeed, vocational teachers report that they *are* able to help students get jobs, even students from disadvantaged backgrounds or with disabilities. They can accomplish this because they provide employers with trusted recommendations about students' social skills and work habits.

Currently, about 9 percent of work-bound high school graduates get jobs after graduation through school-based job placement (mostly from vocational teachers). These students have 17 percent higher earnings by age 28 than students who find their own jobs after high school (Rosenbaum, 2001). Moreover, school-based job placement helps more blacks and females than white males (Rosenbaum 2001), so it helps students who normally have the greatest difficulties in the labor market.

The true lesson of the new labor market is this: For many of the skilled jobs in the new economy, what students really need is to acquire good work habits and solid high school-level skills. But, employers argue that they cannot trust that the high school diploma certifies knowledge of these high school-level skills. As a result, employers report using *college* degrees to signal that applicants possess *high school* skills. If, instead, the high schools provided trusted signals of high school competencies, the pressure to send all students to college could diminish. And let's not forget that high schools can do a lot to help their non-college bound youth find productive jobs and lead fulfilling lives.

— J.R.

anecdote, offers some sense of the pressures that counselors feel. A student with an IQ of 70 wanted to be a doctor, and although the counselor tried to explain the difficulties this student would face, he ultimately advised the student to attend "a two-year college first and see how it goes."

Clearly, some counselors do not feel free to give their professional opinions. If they are too candid, they can be accused of "low expectations," even if their concerns arise from students' school records. When counselors fear they may have to pay for honestly explaining students' future options, they back away from doing so. They not only yield to parents' wishes, but they sometimes change their initial advice to avoid trouble. Many counselors report that they advise students with D-averages to attend a community college and later transfer to a four-year college. One student with a D-average wanted to apply to Harvard, so his counselor suggested that he could begin at community college and then look to transfer to Harvard after two years. The college-for-all mentality is a perfect way to avoid unpleasant issues that are likely to arise as students make plans for the future.

In the past, counselors often acted as "gatekeepers," advising low-achieving students on alternatives to college (Cicourel and Kitsuse, 1963; Rosenbaum, 1976), including providing advice about which non-college training options could lead to well-paid, respected occupations and even using their contacts to place non-college-bound students

High School Preparation Is the Best Predictor of College Graduation

What increases students' chances of earning a bachelor's degree? According to a widely-acclaimed study of over 10,000 students, the high school curriculum is key. Called *Answers in the Tool Box*, this study by U.S. Department of Education researcher Clifford Adelman examined more than 20 variables—including high school courses, educational aspirations, race, socioeconomic status (SES), on-time versus late high school graduation, and parenthood prior to age 22—to determine what really influenced the college completion rates of these students.

In Adelman's study, about 40 percent of students attended a four-year college and about 25 percent earned a bachelor's degree. What were the main differences between those who did and did not graduate? Socioeconomic status had some impact (but it was minimal after the first year of college), and race did not have a statistically significant impact at all. Much more important than either SES or race was the students' academic preparation for college (which Adelman defined as students' high school courses, scores on a short SAT-type test, and GPA/class rank).

Adelman's study clearly shows that for students of all backgrounds, tackling a tough curriculum in high school is the best way to maximize their chances of earning a B.A. Here are a few more findings to note:

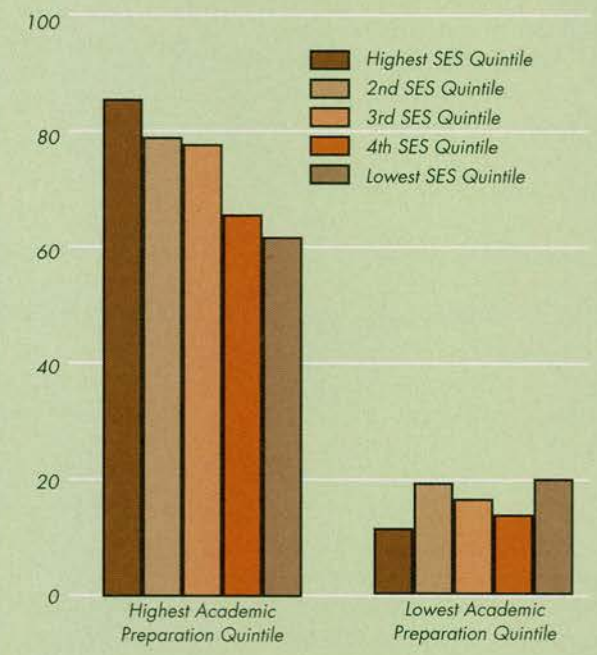
- Of all the high school indicators of academic preparation, the one that is the strongest is taking rigorous and intense courses in high school.
- Taking rigorous and intense high school courses has a greater impact on African-American and Latino students than on white students.
- Of all the high school courses, the highest level of mathematics taken is the most important for college success. The odds that a student who enters college will complete a bachelor's degree more than doubles if that student completed a mathematics course beyond Algebra II (e.g., trigonometry or pre-calculus) while in high school.

Adelman's study has many more interesting findings. To read *Answers in the Tool Box*, go to **www.ed.gov/pubs/Toolbox/index.html**.

— *Editors*

Academically well-prepared students are likely to graduate from college regardless of their social background. Unprepared students of all backgrounds are not likely to do so.

The graph below breaks students into quintiles based on their level of academic preparation and their socioeconomic status (SES). As you can see, among the lowest SES students, a bachelor's degree was earned by 62 percent of those who were well prepared, but only 21 percent of those who were not. Similarly, among the highest SES students, 86 percent of those who were well prepared—but only 13 percent of those who were not—earned a bachelor's degree.



Percentage of students who graduated from a four-year college by socioeconomic status (SES) and academic preparation.

into respectable jobs. (For more information on the importance of high school for the non-college bound, see p. 13.)

If heavy-handed gatekeeping by counselors has indeed become less common, no one will grieve its loss; only two generations ago, counselors often had a decisive, sometimes secretive, impact on which colleges students would apply and go to. But if counselors are not giving students the information they need about the requirements for completing college, then many students may be aimlessly drifting through high school and community colleges without any notion of what requirements they will have to meet to earn a degree. In that case, gatekeeping has not ended, it has only been deferred, and many students will haplessly find themselves failing out of college without any forewarning of what is happening. Today, many students are making college plans that are not likely to be realized. Parents, administrators, counselors, and teachers must work together to understand the connection between high school effort and college success—and to convey this reality to students. It should go without saying that counselors can't take on this countercultural mission on their own. In the next article, high school staff can see what students need to know to be prepared for college; for distribution to students, a college fact sheet is on page 11.

The New Rules of the Game

Beyond the negative effect that the college-for-all push has on individual students, there is the broader negative effect it has on high schools' academic climate. Seeing that college access is guaranteed, some students believe that they can challenge teachers' authority and suffer no penalty; some teachers may respond to their diminished authority by leaving the profession or by reducing their demands on students (Sedlak et al., 1986). While these changes have their greatest impact on low-achieving students, even high-achieving students will be in classes where teachers' authority is questioned, and such students may wonder if they could prepare for college with less effort.

Those looking for justice may see it in the finding that unmotivated students will end up worse off—stuck with remedial classes, fewer college credits and degrees, and lower earnings. But this is not a happy ending. Students waste their high school years, disrupt high school for others, drag down the standards in high school, and force colleges to provide high school courses as an increasingly larger segment of their curriculum.

How can we improve the situation? Since the playing field has drastically changed in the world of higher education, new "rules of the game" have arisen. New high school practices must be established to match them. These new rules of college can be summarized succinctly:

- All students can plan to get a college degree; but if they are unprepared, they must be willing to repeat high school courses in college, spending the extra time, money, and effort in non-credit, remedial courses.
- All students can attend college, but low-achieving students should be warned about remedial courses and their own unlikely prospects for graduation.
- College completion, as opposed to enrollment, requires increased high school effort. If students delay their academic effort until they get to college, the delay will make degree completion take longer, cost more, and be less likely.
- Policies to improve students' preparation for college do not remove a school's obligation to provide students with information about their college prospects.
- Students whose college prospects are dim should be provided good information about alternatives to college that can lead to a successful employment life. These students can also be informed about opportunities to attend college later in life.

School staff could play a critical role in providing information and resources to help students make choices that will support their own long-term goals before it is too late. Unfortunately, it seems that students are not getting this information, nor is there a clear mandate for high school counselors or teachers (or, for that matter, administrators) to give this advice. How could a better job be done in this area?

1) High schools should monitor and publicize the academic preparation and college completion rates of their college-bound graduates. It is common practice for high schools to trumpet the percentage of kids they send on to college—as if this were the major indicator of a high school's success. Instead of focusing on just the number of seniors who go to college, high school administrators should monitor their graduates' preparation for college-credit classes (through, for example, achievement test scores and success in the first year of college) and brag about that: College preparation, not college attendance, is the real achievement. They should also inform students about degree completion rates for prior graduates (by showing the percentage of students who earn college degrees broken down by grade point average, for example). In addition, high schools should provide information about various local colleges, including degree-completion rates and the average number of years students took to complete their degrees.

2) High schools should require students aiming for college to take modified college placement exams. Society needs to give students clear information about the achievement prerequisites for college courses. Since colleges already give tests to assess whether incoming freshmen are assigned to credit or remedial classes, one solution is relatively straightforward: These tests could be modified and given to high school students to tell them whether they are *ready* for college-level work. If colleges do not want to prepare a new test, they could recommend an existing one or simply give high schools the previous year's freshman placement exams. These exams could be given to high school seniors, and a modified exam could be given to high school sophomores, to tell them whether they are making satisfactory progress toward college. If not, students must improve their achievement, revise their goals, or accept the fact that they will have to take remedial courses in college.

Having high school students take college placement exams may appear unnecessary since more and more states

(Continued on page 41)

What Does It Mean To Be Prepared for College?

(or for Jobs in the High-Growth, High-Performance Workplace)

As James Rosenbaum notes, there are currently good jobs with which one can support a family (such as in construction trades, clerical and administrative support, graphics, and many government and social services jobs) that students with strong high school records and no college degree can enter. But students who want to succeed in college or who want to enter the growing high-performance job sector—or who want to keep their options as broad as possible—must reach an academic level that is higher than what is typically required for a high school diploma. But how high? What does the level of achievement they must strive for look like? A new report by the American Diploma Project (ADP) tries to answer these questions.

Called Ready or Not: Creating a High School Diploma That Counts, *this new report establishes English and mathematics benchmarks that explain what high school students need to be prepared for college or good jobs in the high-performance workplace; offers examples of college coursework and workplace tasks that draw upon the benchmarks; and recommends helpful policies that should be adopted by states, postsecondary institutions, the federal government, and business leaders. Here, we provide excerpts adapted from the report, especially from its sections on benchmarks and postsecondary assignments.*

—*EDITORS*

Staggeringly high college dropout rates suggest that the high school diploma does not in itself signal readiness for college. What does readiness for college require? And what does it mean to be "ready" to enter the high-performance workplace that increasingly will be the source of the most promising jobs for high school graduates? To answer these questions, ADP has worked closely with K-12, postsecondary, and business leaders in five partner states (Indiana, Kentucky, Massachusetts, Nevada, and Texas) for the past two years to identify the English and mathematics knowledge and skills needed for success in both college and such workplaces. We first asked leading economists to examine market projections for the most promising jobs—those that pay enough to support a small family and that provide real potential for career advancement in industries such as healthcare, high-tech manufacturing, information technology, and telecommunications—and to pinpoint the academic knowledge and skills required for success in those occupations. We also worked closely with two- and four-year postsecondary leaders in partner states to determine prerequisite English and mathematics knowledge and skills required for success in entry-level, credit-bearing college courses.

The resulting benchmarks are ambitious, reflecting an unprecedented convergence in what these employers and postsecondary faculty need from new employees and entering freshmen. In math, they contain content typically taught in high school courses like Algebra I, Algebra II, Geometry, and Data Analysis and Statistics. In English, they demand strong oral and written communication skills that are staples in college classrooms and high-performance workplaces. They also describe analytical and research skills currently associated only with advanced and honors courses in high school, but which our employers and postsecondary faculty told us are required skills for students who want to succeed in college and the high-performance workplace.

The benchmarks also attempt to indicate the rigor of the expectations by providing examples of the kinds of reading

The American Diploma Project is a partnership of Achieve, Inc., The Education Trust, and the Thomas B. Fordham Foundation. To read the full report, go to ***www.achieve.org****.*

ILLUSTRATED BY SONJA LAMUT

and mathematical problems the benchmarks are meant to describe. In English, for example, it is not enough to ask high school students to analyze texts. According to our employers and postsecondary faculty, students should study particular kinds of *rigorous* texts. For this reason, the ADP English benchmarks are to be used in coordination with the reading lists developed by two ADP partner states, Indiana (excerpts shown, opposite page) and Massachusetts. These lists not only define the quality and complexity of reading expected of all high school graduates, but also suggest a common "cultural literacy," including representative works of various cultures both within and beyond the United States. In math, however, rigor is illustrated differently by embedding sample problems within the benchmarks themselves to illustrate the quality and complexity of the corresponding mathematics benchmarks.

What makes the ADP benchmarks unique is that they are accompanied by actual examples of the kinds of workplace tasks and postsecondary assignments that high school graduates will confront. It is important to note that the tasks and assignments are *not* meant to describe the quality and complexity of *high school* assignments. Although they may be used in the future to inform the development of high school lessons, the tasks and assignments are designed simply to illustrate the intellectual rigor of real-world environments beyond high school and the applicability of the ADP benchmarks in postsecondary and workplace settings. These benchmarks can also be used to assess the adequacy of the high school curriculum and to map back through earlier grades to refine state standards and assessments in English and math.

English Benchmarks

The ADP college and workplace readiness benchmarks for English are organized into eight strands: Language; Communication; Writing; Research; Logic; Informational Text; Media; and Literature. Shown in these excerpts are all of the language, research, and literature benchmarks, plus about half of the communication benchmarks.

Language

Writers and speakers are taken seriously when their vocabulary is sophisticated and their sentences are free of grammatical errors. Without fail, employers and college faculty cite correct grammar, usage, punctuation, capitalization, and spelling as absolutely essential to success in classrooms and workplaces beyond high school. Whether presenting a marketing concept to a team of colleagues or clients or presenting an interpretation of a secondary source in a college seminar, students and employees will need facility with these fundamental skills for the successful exchange of ideas and information.

Benchmarks. The high school graduate can:

1. Demonstrate control of standard English through the use of grammar, punctuation, capitalization, and spelling.

2. Use general and specialized dictionaries, thesauruses, and glossaries (print and electronic) to determine the definition, pronunciation, etymology, spelling, and usage of words.

3. Use roots, affixes, and cognates to determine the meaning of unfamiliar words.

4. Use context to determine the meaning of unfamiliar words.

5. Identify the meaning of common idioms, as well as literary, classical, and biblical allusions; use them in oral and written communication.

6. Recognize nuances in the meanings of words; choose words precisely to enhance communication.

7. Comprehend and communicate quantitative, technical, and mathematical information.

Communication

Employers and college professors cite strong oral communication skills as being so essential to success that they insist schools should emphasize them, simultaneously with the transmittal of other academic knowledge. Success in credit-bearing college coursework, whether in the humanities, sciences, or social sciences, depends heavily on effective communication about the concepts and detailed information contained within readings, lectures, and class discussions. Success in the workplace, whatever the profession, is also heavily dependent on one's ability to listen attentively to colleagues or customers and to express ideas clearly and persuasively.

Benchmarks. The high school graduate can:

1. Give and follow spoken instructions to perform specific tasks, to answer questions, or to solve problems.

2. Summarize information presented orally by others.

3. Paraphrase information presented orally by others.

4. Identify the thesis of a speech and determine the essential elements that elaborate it.

5. Analyze the ways in which the style and structure of a speech support or confound its meaning or purpose.

6. Make oral presentations that:

- exhibit a logical structure appropriate to the audience, context, and purpose;
- group related ideas and maintain a consistent focus;
- include smooth transitions;
- support judgments with sound evidence and well-chosen details;
- make skillful use of rhetorical devices;
- provide a coherent conclusion; and
- employ proper eye contact, speaking rate, volume, enunciation, inflection, and gestures to communicate ideas effectively.

Samples from Indiana's Reading List for Grades 9-12

The following samples provide a taste of the quality and complexity of the suggested reading materials. The full list includes classic and contemporary fiction; historical fiction; science fiction and fantasy; folklore, fairytales, and mythology; poetry; short stories; drama; essays and speeches; science, social studies, and mathematics nonfiction; biography and autobiography; magazines and newspapers; reference tools; and informational, technical, and practical documents.

Fiction: Classic and Contemporary

The Abduction, Newth, Mette and Nunnally, Tiina

The Adventures of Augie March, Bellow, Saul

The Adventures of Huckleberry Finn, Twain, Mark

The Age of Innocence, Wharton, Edith

Animal Farm, Orwell, George

The Assistant, Malamud, Bernard

Autobiography of Miss Jane Pittman, Gaines, Ernest J.

The Bean Trees, Kingsolver, Barbara

Billy Budd, Melville, Herman

Bless Me, Ultima, Anaya, Rudolfo

Buried Onions, Soto, Gary

Catcher in the Rye, Salinger, J.D.

Ceremony, Silko, Leslie Marmon

The Contender, Lipsyte, Robert

Crime and Punishment, Dostoyevsky, Fyodor

Science Fiction/Fantasy

1984, Orwell, George

2001: A Space Odyssey, Clarke, Arthur C.

Brave New World, Huxley, Aldous

Fahrenheit 451, Bradbury, Ray

Foundation, Asimov, Issac

The Lord of the Rings, Tolkien, J. R.R.

The Martian Chronicles, Bradbury, Ray

The War of the Worlds, Wells, H.G.

Watership Down, Adams, Richard

Biography/Autobiography

Growing Up, Baker, Russell

Alexander Graham Bell: Making Connections, Pasachoff, Naomi

John Wilkes Booth: A Sister's Memoir, Clarke, Asia Booth

Out of Darkness: The Story of Louis Braille, Freedman, Russell

The Childhood Story of Christy Brown [previously *My Left Foot*], Brown, Christy

Madame Curie, Curie, Eve

Narrative of the Life of Frederick Douglass, Douglass, Frederick

Barrio Boy, Galarza, Ernesto

Gandhi, Great Soul, Severance, John

A Mathematician's Apology, Hardy, G.H.

Research*

Research requires the ability to frame, analyze, and solve problems, while building on the ideas and contributions of others. As future college students or employees, students will be asked to hone these essential skills with increasing sophistication. Credit-bearing coursework in colleges and universities will require students to identify areas for research, narrow those topics, and adjust research methodology as necessary. College students will be asked to consider various interpretations of both primary and secondary resources as they develop and defend their own conclusions. Thorough research is the foundation of the free exchange of ideas in a postsecondary academic environment. Similarly, in the workplace, employers depend heavily on employees to evaluate the credibility of existing research to establish, reject, or refine products and services.

Benchmarks. The high school graduate can:

1. Define and narrow a problem or research topic.

2. Gather relevant information from a variety of print and electronic sources, as well as from direct observation, interviews, and surveys.

3. Make distinctions about the credibility, reliability, consistency, strengths, and limitations of resources, including information gathered from Web sites.

4. Report findings within prescribed time and/or length requirements, as appropriate.

5. Write an extended research essay (approximately six to 10 pages), building on primary and secondary sources, that:

- marshals evidence in support of a clear thesis statement and related claims;
- paraphrases and summarizes with accuracy and fidelity the range of arguments and evidence supporting or refuting the thesis, as appropriate; and
- cites sources correctly and documents quotations, paraphrases, and other information using a standard format.

Literature

High school graduates today need to be well read to succeed in college, in careers, and as citizens in our democratic society. Whether navigating the editorial pages of a local newspaper or communicating ideas to fellow colleagues or classmates, high-school graduates who have been asked to analyze a variety of rich literature will be well prepared. Among the benefits of reading literature and carefully analyzing significant works from the literary heritage of both English and other languages is the appreciation of our common humanity. Regular practice in identifying and analyzing the aesthetic and expressive elements of literature also improves the quality of all kinds of student writing. Practice in providing evidence from literary works to support an interpretation fosters the skill of reading any text closely and teaches students to think, speak, and write logically and coherently—priority skills identified by employers and postsecondary faculty. Employers report that employees who have considered the moral dilemmas encountered by literary characters are better able to tolerate ambiguity and nurture problem-solving skills in the workplace. Postsecondary faculty from a wide variety of disciplines note that the skills required by

* These skills, although critical to the study of English, are also necessary to the study of many academic subjects. Therefore, the study and reinforcement of these skills should not be confined to the English classroom or coursework.

Sample Postsecondary Midterm Exam in Introductory English

Tests in first-year English courses often require students to identify excerpts from course readings and to explain their significance. To perform well on this midterm exam from Western Nevada Community College, an open admissions institution in Carson City, Nev., students must have a solid understanding of the themes and literary techniques employed in a broad selection of short stories and poems. Students must also be able to describe how the works relate to one another. To do well on this exam, students must bring with them from high school a strong background in writing and analyzing literature; specifically, they must be completely comfortable with language benchmarks 1 and 6, as well as literature benchmarks, 1, 3, 4, and 5, and benchmarks from the other strands such as writing and logic. The readings for this exam are all from *The Norton Introduction to Literature* (shorter eighth edition edited by Jerome Beaty, Alison Booth, J. Paul Hunter, and Kelly J. Mays) and were written by authors such as Ernest Hemingway, Edgar Allan Poe, Anton Chekhov, and Elizabeth B. Browning. About half of the exam is shown here.

Part one: Fiction
Explain the significance of each excerpt, especially the section in bold, as it relates to each story's theme (NOT PLOT) or to the story's main character.

1. "Jupiter was an anomaly. His retrieving instincts and **his high spirits were out of place** in Shady Hill.... Jupiter went where he pleased, ransacking...." ("The Country Husband")

2. "I replied to the yells of him who clamoured. I **re-echoed, I aided, I surpassed them in volume** and in strength. I did this, and the clamourer grew still." ("The Cask of Amontillado")

3. "Her poems are always cool and intellectual; **that is their form, which is contradicted or supported by** a gravely sensuous texture." ("Our Friend Judith")

Part two: Poetry
Explain the significance of the excerpted lines, focusing especially on the words that are in bold type.

1. "Back from the hospital, his mind rattling/Like the suitcase, swinging from his hand,/That contains **shaving cream, a piggy bank,/A book he sometimes pretends to read."** ("Alzheimer's," p. 637)

2. "My mother, after a life/of it, says, 'This is the last straw.'/**And it is. We're all clutching."** ("You Didn't Fit," p. 635)

Part three: Essay question
Refer to stories we have read ("How," "Hills Like White Elephants," "No One's a Mystery," "The Country Husband," and "Our Friend Judith") as well as several poems ("The Tally Stick," "love poem," "Wedding-Ring," and "What lips my lips have kissed, and where, and why" or any other 20th-century poem we have read) and write an essay on the following topic:

The nature of love and marriage (these are TWO topics), as depicted in 20th-century fiction and poetry, IS or IS NOT consistent. (Choose whichever point of view you think you can best defend by using the above stories and poems as your "support.") You will first have to identify WHAT IS the nature of love and the nature of marriage and state each definition. You also need to explain how you understand the term "is consistent" or "is not consistent."

thorough literary analysis are applicable in a range of other humanities, science, and social science disciplines.

Benchmarks. The high school graduate can:

1. Demonstrate knowledge of 18th- and 19th-century foundational works of American literature.

2. Analyze foundational U.S. documents for their historical and literary significance (for example, The Declaration of Independence, the Preamble to the U.S. Constitution, Abraham Lincoln's "Gettysburg Address," Martin Luther King's "Letter from Birmingham Jail").

3. Interpret significant works from various forms of literature: poetry, novel, biography, short story, essay, and dramatic literature; use understanding of genre characteristics to make deeper and subtler interpretations of the meaning of the text.

4. Analyze the setting, plot, theme, characterization, and narration of classic and contemporary short stories and novels.

5. Demonstrate knowledge of metrics, rhyme scheme, rhythm, alliteration, and other conventions of verse in poetry.

6. Identify how elements of dramatic literature (for example, dramatic irony, soliloquy, stage direction, and dialogue) articulate a playwright's vision.

7. Analyze works of literature for what they suggest about the historical period in which they were written.

8. Analyze the moral dilemmas in works of literature, as revealed by characters' motivation and behavior.

9. Identify and explain the themes found in a single literary work; analyze the ways in which similar themes and ideas are developed in more than one literary work.

Mathematics Benchmarks

The ADP mathematics benchmarks are organized into four strands: Number Sense and Numerical Operations; Algebra; Geometry; and Data Interpretation, Statistics, and Probability. In addition, because the study of mathematics is an exercise in reasoning, the report lists a set of critical reasoning skills that are woven throughout the four strands. These include checking for errors and reasonableness of solutions, distinguishing between relevant and irrelevant information, and making judgments about which operations and procedures to apply in order to solve a particular problem. Shown here are

the algebra benchmarks that all students should master. In the full report there are additional higher-level algebra benchmarks that are required for students who plan to take calculus in college, a requisite for mathematics and many mathematics-intensive majors. To make it easy for readers to refer back and forth between the full report and this excerpt, we have preserved ADP's original numbering system.

Algebra

Mathematicians regularly identify sources of change, distinguish patterns in that change, and seek multiple representations—verbal, symbolic, numeric, and graphic—to express what transpires. The language of algebra provides a means of operating with these concepts at an abstract level and extending specific examples to broad generalizations. Predicting savings based on a rate of interest, projecting business revenues, knowing how costs will increase as the square footage of a building increases, and estimating future world populations based on known population growth rates are all possible once a pattern has been identified. Such relationships can be described in terms of what has changed and how it has changed.

Benchmarks. The high school graduate can:

1. Perform basic operations on algebraic expressions fluently and accurately:

1.1. Understand the properties of integer exponents and roots and apply these properties to simplify algebraic expressions.

Example: Simplify the expression

$$\left(\frac{a}{b}\right)^m \cdot c^{2m} \text{ to obtain either } \frac{(ac^2)^m}{b^m} \text{ or } \left(\frac{ac^2}{b}\right)^m.$$

1.3. Add, subtract, and multiply polynomials; divide a polynomial by a low-degree polynomial.

Example: Divide $x^3 - 8$ by $x - 2$ to obtain $x^2 + 2x + 4$; divide $x^4 - 5x^3 - 2x$ by x^2 to obtain $x^2 - 5x - \frac{2}{x}$.

1.4. Factor polynomials by removing the greatest common factor; factor quadratic polynomials.

1.5. Add, subtract, multiply, divide, and simplify rational expressions.

Example: Express $\frac{1}{x} + \frac{1}{y}$ as a single fraction to obtain $\frac{x+y}{xy}$.

1.6. Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.

2. Understand functions, their representations, and their properties:

2.1. Recognize whether a relationship given in symbolic or graphical form is a function.

2.3. Understand functional notation and evaluate a function at a specified point in its domain.

3. Apply basic algebraic operations to solve equations and inequalities:

3.1. Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.

Example: A pipe is to be cut to a length of 5 meters accurate to within a tenth of a centimeter. Recognize that an acceptable length x (in meters) of the pipes satisfies the inequality $|x-5| \leq 0.001$.

3.2. Solve an equation involving several variables for one variable in terms of the others.

Example: If C represents the temperature in degrees Celsius and F represents the temperature in degrees Fahrenheit, then $C = \frac{5}{9}(F - 32)$. Solve this equation for F to obtain $F = \frac{9}{5}C + 32$.

3.3. Solve systems of two linear equations in two variables.

3.5. Solve quadratic equations in one variable.

Example: Solve $x^2 - x - 6 = 0$ by recognizing that $x^2 - x - 6 = (x - 3)(x + 2)$ can be factored to obtain the two solutions $x = 3$ and $x = -2$.

4. Graph a variety of equations and inequalities in two variables, demonstrate understanding of the relationships between the algebraic properties of an equation and the geometric properties of its graph, and interpret a graph:

4.1. Graph a linear equation and demonstrate that it has a constant rate of change.

4.2. Understand the relationship between the coefficients of a linear equation and the slope and x- and y-intercepts of its graph.

4.3. Understand the relationship between a solution of a system of two linear equations in two variables and the graphs of the corresponding lines.

4.4. Graph the solution set of a linear inequality and identify whether the solution set is an open or a closed half-plane; graph the solution set of a system of two or three linear inequalities.

Example: Graph the solution set of the system of linear inequalities:

$$2x + y \leq 4$$
$$x \geq 1.$$

4.5. Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph.

4.7. Graph exponential functions and identify their key characteristics.

(Continued on page 40)

Education in Wonderland

Outdoor Classrooms and Rich Murals Make Learning a Delightful Adventure

By Roberta Fallon

Marian Wright Edelman, founder and president of the Children's Defense Fund, once said, "Education is for improving the lives of others and for leaving your community and world better than you found it." Thanks to a group of hard-working teenagers and the support of the Mural Arts Program, these words now grace the entrance to William McKinley Elementary School, inspiring students every morning as they head to class. Located in north Philadelphia, just last year McKinley was surrounded by the debris of urban poverty—litter mixed with the remains of the local drug trade made outdoor projects and lessons difficult at best. But today the school is bathed in beautiful—and educational—murals. And best of all, it's flanked by two "outdoor classrooms"—one for mathematics and science, the other for humanities. At first glance, these "classrooms" look like sculpture gardens at a museum of modern art. But take a closer look. Each piece, from the pine and maple trees planted to illustrate the differences between evergreen and deciduous to the globe that students can write on to play geography games, is designed for teaching and learning. There are quiet spaces for reading, picnic tables for group discussions, a butterfly-attracting bush, clustered clocks for younger students to practice telling time and for older students to comprehend time zones, a mural to explain the revolution of the planets, and even an alphabet-odometer for generating words.

Four years ago, Shari Hersh and Jane Golden, both with Mural Arts, created a program called the Mural Service Corps for Philadelphia teenagers who love art; it's like a peace corps of young muralists. Over time, Hersh and Golden realized that murals would have a greater impact on their neighborhoods if the lots in front of them were also improved, so they expanded the teens' work to include landscaping with three-dimensional artwork. Last year, Hersh and Golden were inspired to transform McKinley after meeting with the energetic principal, Debora Borges-Carrera, the teachers, and the students—all of whom were involved in designing the murals and outdoor classrooms. McKinley is a small school, just 350 students, but it ranges from pre-kindergarten to seventh grade (and is adding eighth grade next year)—developing educational environments that would be stimulating for such a range of students would be quite a challenge. Hersh hired sculptor Jennie Shanker, muralist Shira Walinsky, and City Play's landscape architect/early childhood educator Anna Forrester. Along with 14 high school students, they braved the summer heat to paint, weld, and sweat their way to the stunning results you see on the next five pages.

Roberta Fallon is a Philadelphia artist who writes about art for Philadelphia Weekly, *and for the online magazines* Artnet *and* Roberta Fallon and Libby Rosof's artblog. *The project shown here is part of the school district's Campus Park initiative. Project partners included City Play, the Pennsylvania Horticultural Society/Philadelphia Green, and the Philadelphia Eagles Youth Partnership. Additional support came from Mayor Street's Neighborhood Transformation Initiative.*

Right: McKinley Elementary students enjoy the sunshine while they read in pairs. Soon they will return to these boulders for a geology lesson. The boulders are all from the Pennsylvania region: One group of the boulders is rounded from tumbling in the Delaware River; another consists of fossils from the coal country; and another has bluestone (the rock used in buildings) and marks from being quarried.

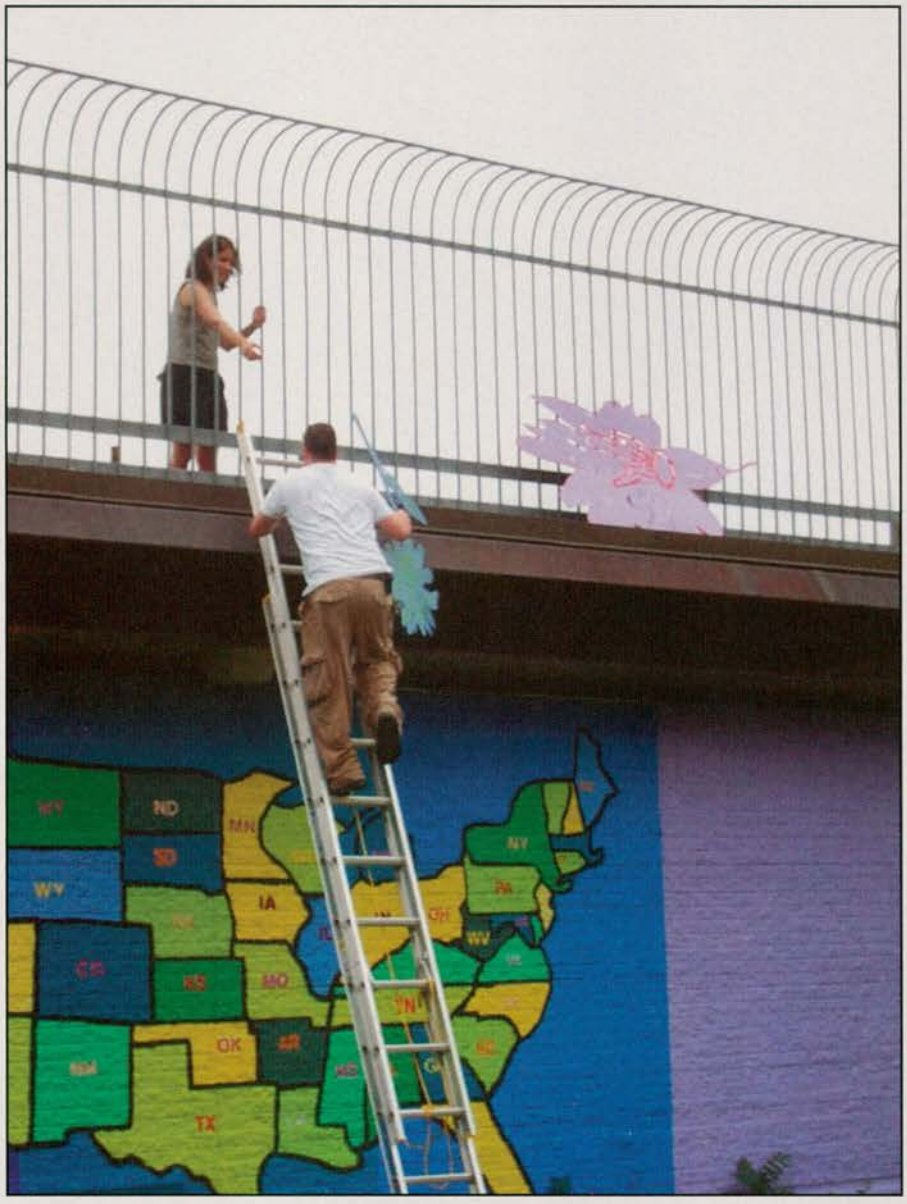


PHOTO COURTESY OF JESSICA SPEISER

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The Mural Service Corps is a year-round arts education and community service program for youth ages 14 to 18. In the fall and winter, they become immersed in the mural-making process by learning how to respond to community requests, select sites and designs, and work with community organizations as they paint small indoor murals. In the spring and summer, they take on larger projects—complete with landscaping, sculpture, and murals. For McKinley Elementary, the teens also tackled metal work to adorn the school with steel flowers, particularly the fences that surround the outdoor classrooms. Each teenager created a flower (above right) from start to finish, including drawing the flower and cutting, bending, and welding the steel. As an added bonus, they used the sculpture lab in the University of the Arts; it was the first time these young people had been on a college campus.

Right: McKinley is in North Philadelphia's Kensington section, a mostly Latino community. Teaching aids like this mural encourage vocabulary growth in both Spanish and English.


D
DANZA
DANCE
E
EGG
HUEVO
F
FLOR
FLOV
V
VOLCÁN
VOLCANO
X

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Above: The teachers and artists "decided to leave the names of the continents and oceans off of the globe so that the kids can put the names on," explains Principal Debora Borges-Carrera. This allows the children to begin cultivating their own mental maps of the world.

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Left: Children happily play a subtraction game as they jump around on this enormous "hundreds chart" made of concrete paving stones engraved with numbers. Elementary school teachers often use a poster-size hundreds chart to help their students visualize patterns, multiples, and other basics of number theory.

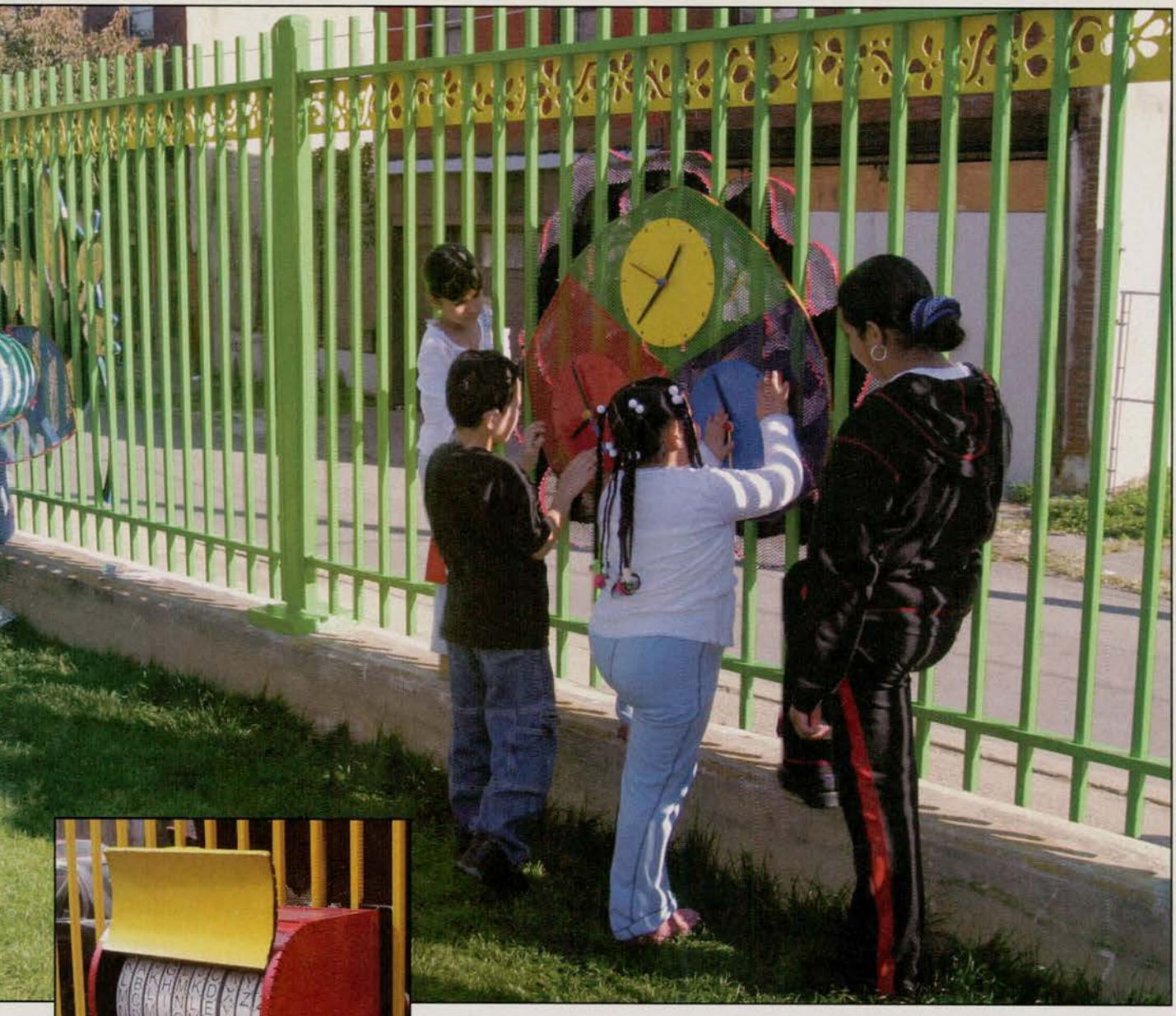

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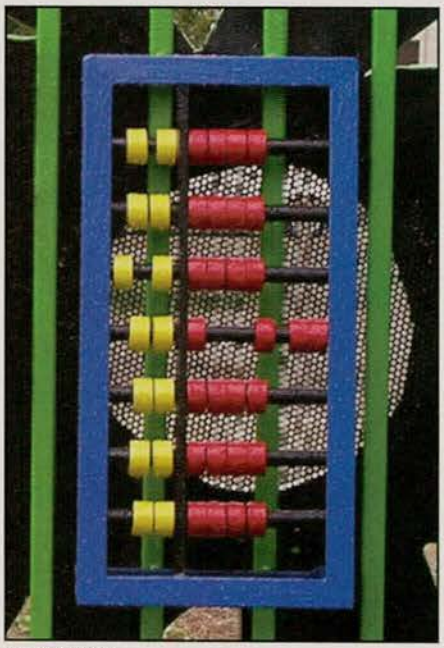
PHOTO COURTESY OF JENNIE SHANKER

Above: This teaching aid allows students to use large motor skills as they spin the letters of the alphabet to generate words and even short sentences. The high-level language play can take place in English or Spanish.

Teachers use the outdoor math and science classroom for a variety of small-group lessons. The educational materials cover earth science, botany, elementary mathematics, geography, and astronomy. Since the plantings attract birds, butterflies, and other wildlife, the space can also be used for impromptu entomology and zoology lessons.

Right: According to McKinley teacher Kathy Tye, "The planners did ask us for input. We were always saying 'numbers, numbers.'" Between this abacus, the magnetic mathematics board, the hundreds chart on the ground, and the multiplication table made of miniature blackboard pieces, it looks like the teachers got what they needed to develop highly interactive math lessons.



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Opening Classroom Doors

Heroes for the Good of the Profession

By James Hiebert, Ronald Gallimore, and James W. Stigler

At a recent meeting of mathematics teachers and educators in Wilmington, Del., an eighth-grade math teacher named Crystal Lancour was introduced to enthusiastic cheers and heartfelt applause. Had she won an award? Had her students accomplished something special? No, nothing like that. Then what prompted the applause? The answer to this question takes a little time, but is worth telling because it opens a new pathway for teacher learning—a path that might in time change the face of classroom teaching in the United States, if the country is wise enough to take it.

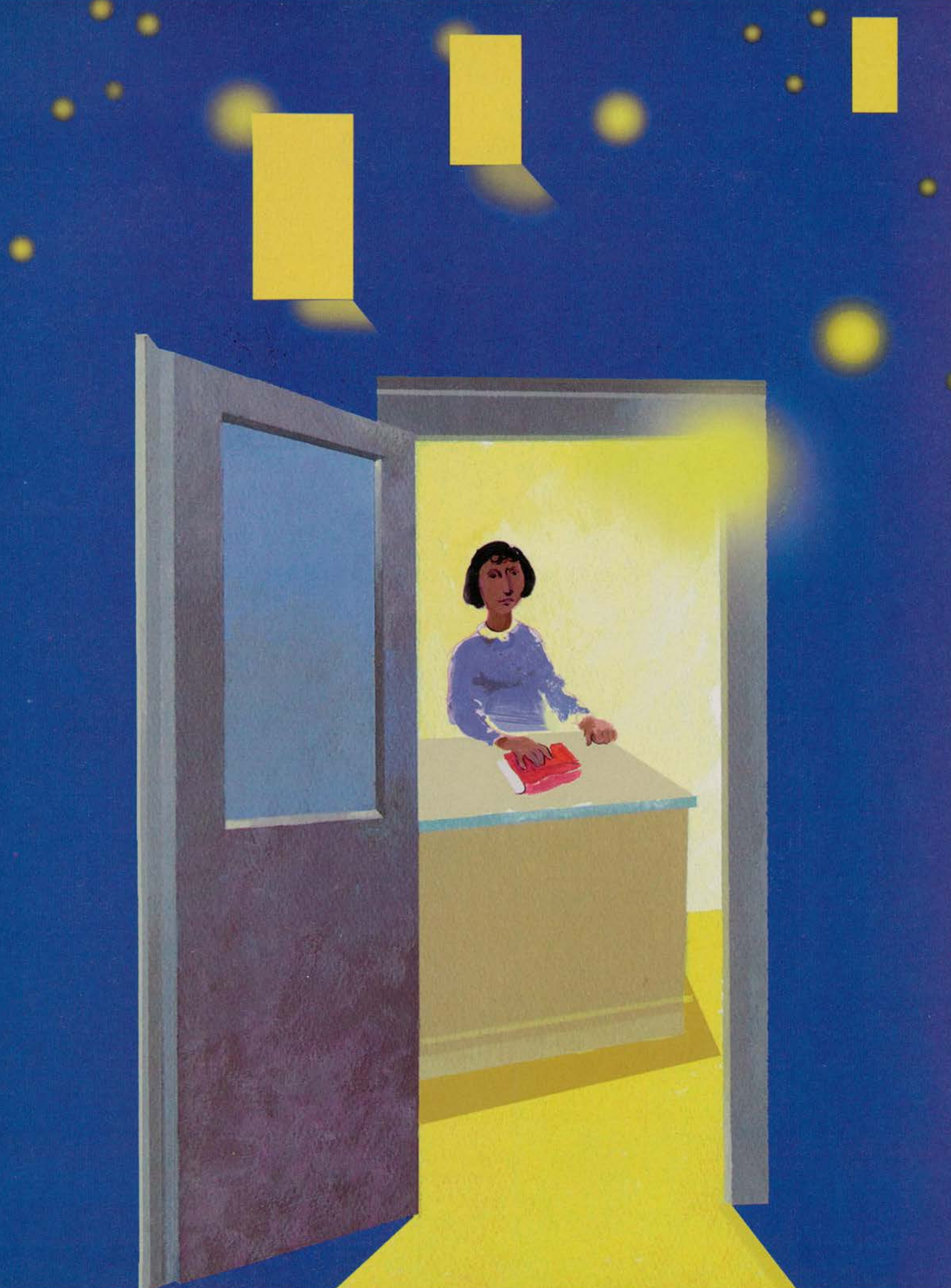
The story begins with a bit of history. Traditionally, classroom teaching in the United States has been viewed as a personal skill, invented and refined by each teacher during his or her career. Good teaching is considered to be the result of each teacher's doing his or her job behind the classroom door. Good teaching is believed to be idiosyncratic, depending on individual style and personality. To improve teaching, many say, the profession must find better teachers. Celebrity teachers, such as Jaime Escalante, are held up as models of what's possible and are hailed as heroes of the profession. The trouble is that most students do not have Jaime Escalante as a teacher, and more Escalantes are hard to find.

Identifying a few excellent teachers and hoping others will copy their methods has not improved teaching in the average American classroom. Teaching, as most students experience it, has not changed for decades. Why? Because the average classroom is not affected much by what the few celebrity teachers do. To make a dent in the learning experiences for most students, educators must find a way to improve the quality of instruction in the average classroom. Even slight improvements in the average classroom, accumulated over time, would have a more profound effect on students around the country than recruiting a hundred more Escalantes into the classroom.

To achieve small and continuing improvements in the average classroom requires a major shift in educators' thinking—from *teachers* to *teaching*. Rather than focusing only on evaluating the quality of teachers, the educational community must begin examining the quality of teaching. What kinds of methods are teachers using now and how could these methods be improved? Tackling this deep-seated problem begins with opening the classroom door. The process starts by learning to analyze the details of ordinary classroom instruction, with all its warts and foibles, and then learning to see more effective ways of teaching. But to do this, to even begin down this path, teachers must be willing to open their doors. They must be willing to allow others to use their lessons as data that can be examined and discussed over and over.

More than 600 math teachers from seven countries have done just this. Chosen at random (not because of their teaching abilities), these teachers agreed to be videotaped for the 1999 Third International Mathematics and Science Study (TIMSS), the results of which were released last year. The video study documented what ordinary or typical mathematics lessons look like in each country. It did not try to find the best teachers, because the goal was to provide a portrait of the kind of teaching that most students experience in each country. There was to be nothing special about

James Hiebert is professor of education at the University of Delaware. Ronald Gallimore is professor of psychology at the University of California, Los Angeles, and vice president of research with LessonLab, Inc. James W. Stigler is professor of psychology at the University of California, Los Angeles, chairman and CEO of LessonLab Inc., and director of the TIMSS video studies. *This article first appeared in the November 5, 2003, issue of* Education Week. *Reprinted with permission of the authors.*



This new path invites ordinary teachers to recognize and accept the responsibility for improving not only their own practice, but the shared practice of the profession.

the filmed lessons—no special preparation, no special materials—because the lessons were to typify the way in which teachers in each country teach mathematics at the eighth-grade level. The teachers were promised anonymity: Only researchers would see their videotaped lessons.

Following the taping of these 600-plus lessons for the research project, four teachers in each country went even further: They agreed to have their videotaped lessons made available to the public. These lessons would be posted on the Internet and included on a CD-ROM that could be ordered at cost (available at **www.lessonlab.com/programs/developedLL.htm**). The lessons would be shown around the country as educators interpreted the results from the TIMSS 1999 Video Study of Mathematics Teaching. Many teachers are reluctant even for the teacher next door to come into their classroom and observe their lessons, much less open their classroom to anyone who wants to watch. These teachers whose lessons were publicly released displayed exceptional professional courage by allowing the videos to be circulated and discussed around the world.

The meeting in Wilmington, with which the story began, was taking advantage of the professional-development opportunities provided by these new heroes of the teaching profession. The meeting was organized to introduce participants to the results of the TIMSS video study, and to give them an opportunity to spend two days studying examples of typical lessons from various countries—the lessons that were publicly released.

Some of the participants were skeptical at first about the value of analyzing ordinary lessons. Why not analyze exemplary lessons instead? But by mid-afternoon of the first day, many participants were convinced that much can be learned by analyzing ordinary teaching, studying how missed learning opportunities can be saved, how students can be helped to connect key concepts, and how small successes can be strengthened by altering the methods that are used.

During a break in the afternoon session, the participants were informed that in the audience was one of the U.S. teachers who had released one of her ordinary daily lessons for public use—just like the videos the meeting participants had been collectively analyzing and discussing that day. There was an audible gasp and immediate, spontaneous, and expectant applause—as if a celebrity were about to be introduced.

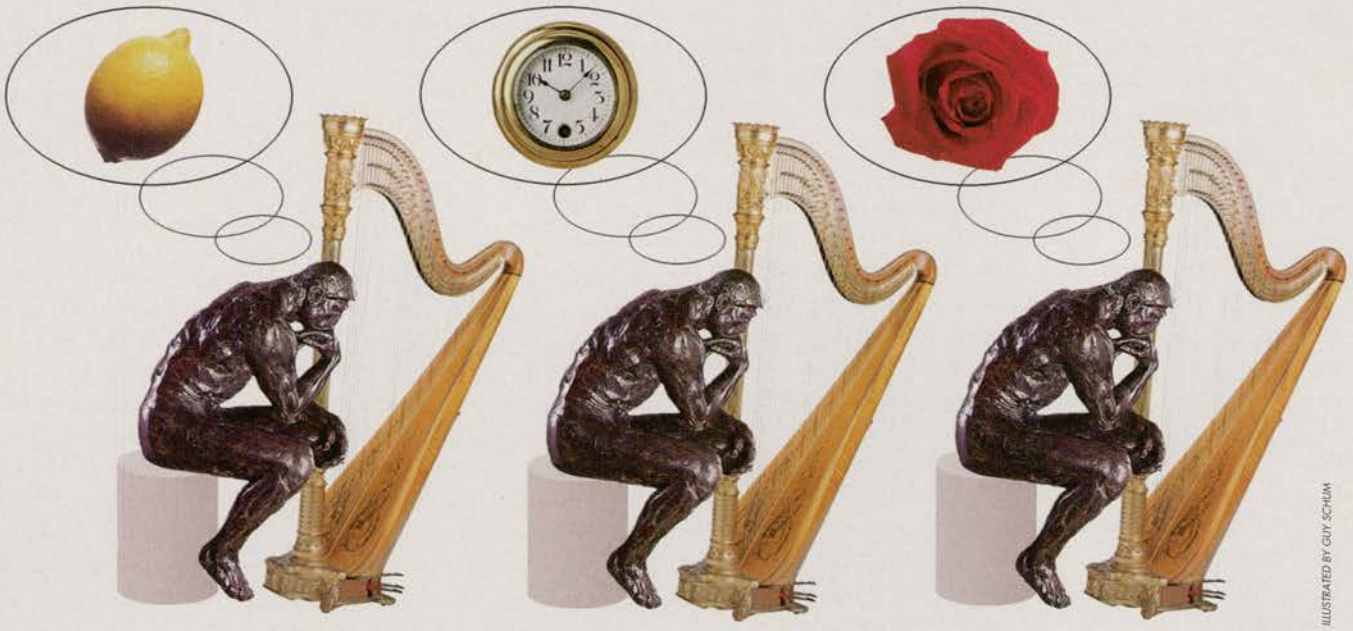
A second round of even louder applause greeted Crystal Lancour as she was introduced by name and stood to acknowledge the audience's appreciation. Clearly, those assembled were not applauding the lesson Ms. Lancour had taught. They had not seen her lesson. They were applauding her courage in allowing others to view the lesson as a means of improving their own mathematics teaching. This audience, at least, had come to understand the importance of her contribution to the profession.

Teachers and educators around the country are beginning to see that the goal of improving teaching—improving students' opportunities to learn—can only be reached by a path that the United States has never taken before. This new path moves educators away from a view of teaching as a solitary activity, owned personally by each teacher. It moves them toward a view of teaching as a professional activity open to collective observations, study, and improvement. It invites ordinary teachers to recognize and accept the responsibility for improving not only their own practice, but the shared practice of the profession. For this new path to be traveled, however, teachers will need to open their classroom doors and, rather than evaluating each other, begin studying their practices as a professional responsibility common to all. In short, it will require more teachers like Crystal Lancour.

Taking this new path also means a change in the culture of the wider educational community. It requires educators, parents, and policymakers to support and maintain this new pathway to improved teaching by respecting teachers brave enough to open their classroom doors. Petty nitpicking and *ad hominem* criticism of typical classroom lessons must give way to serious professional analysis for purposes of improving everyone's teaching.

If not a celebrity, Crystal Lancour surely is a pioneer and a new kind of heroic teacher in what just might become an overdue change in how America goes about improving the heart of its educational system—classroom teaching. □

ASK THE COGNITIVE SCIENTIST



ILLUSTRATED BY GUY SCHUM

Practice Makes Perfect— But Only If You Practice Beyond the Point of Perfection

How does the mind work—and especially how does it learn? Teachers' instructional decisions are based on a mix of theories learned in teacher education, trial and error, craft knowledge, and gut instinct. Such gut knowledge often serves us well, but is there anything sturdier to rely on?

Cognitive science is an interdisciplinary field of researchers from psychology, neuroscience, linguistics, philosophy, computer science, and anthropology who seek to understand the mind. In this regular American Educator *column, we consider findings from this field that are strong and clear enough to merit classroom application.*

By Daniel T. Willingham

Question: Just how much should students practice what they learn? On the one hand, it seems obvious that practice is important. After all, "practice makes perfect." On the other hand, it seems just as obvious that practicing the same material again and again would be boring for students. How much practice is the right amount?

Answer: It is difficult to overstate the value of practice. For a new skill to become automatic or for new knowledge to become long-lasting, sustained practice, *beyond the point of mastery*, is necessary. This column summarizes why practice is so important and reviews the different effects of intense short-term practice versus sustained, long-term practice.

That students would benefit from practice might be deemed unsurprising. After all, doesn't practice make perfect? The unexpected finding from cognitive science is that practice *does not* make perfect. Practice until you are perfect and you will be perfect only briefly. What's necessary is sustained practice. By sustained practice I mean regular, ongoing review or use of the target material (e.g., regularly using new calculating skills to solve increasingly more complex math problems, reflecting on recently-learned historical material as one studies a subsequent history unit, taking regular quizzes or tests that draw on material learned earlier in the year). This kind of practice *past* the point of mastery is necessary to meet any of these three important goals of instruction: acquiring facts and knowledge, learning skills, or becoming an expert.

Acquiring Facts and Knowledge

Intuition tells us that more practice leads to better memory. Research tells us something more precise: Memory in either the short- or long-term requires ongoing practice.

Let's first consider memory in the short-term, meaning

days or weeks. Suppose I am trying to learn the procedures necessary for a bill to become a federal law. I might study these facts (using any number of techniques) and periodically test myself. Suppose further that I study until I perform perfectly on my self test. Do I know these facts? Yes, I know them *now*. But what about tomorrow? In order to protect this learning from the ravages of forgetting, *I need to practice beyond one perfect recitation*. Studying material that one already knows is called *overlearning*. Because memory is prone to forgetting, one cannot learn material to a criterion and then expect the memory to stay at that level very long.

Anticipating the effect of forgetting dictates that we continue our practice beyond the mastery we desire. In an illustrative experiment (Gilbert, 1957), subjects were read a brief paragraph about a fictional country and then asked 22 questions based on the paragraph. If the subject answered a question correctly, the question was discarded. Then the subject heard the paragraph again, and was asked those questions that he or she had missed. The procedure was repeated until the subject successfully answered all of the questions. Another group of subjects participated in a second condition that required overlearning. A question was not discarded until it had been answered correctly three times rather than once. All subjects received a surprise retest after a delay of either 15 minutes or two days. The overlearning group performed better at the short delay (22 questions correct versus 15) and also at the long delay (17 questions correct versus 13). Overlearning has been studied (although not extensively) for many years. These results are typical, but most of the experiments deal with short-term retention.

It may seem that the emphasis on short-term knowledge is peripheral to education. As teachers, we want long-lasting knowledge, not just knowledge for a few days. But, in fact, teachers may have goals that entail short-term knowledge. For example, a science teacher may want students to have a series of facts about certain species at their fingertips so that the teacher can introduce an important abstract concept concerning evolution on which those facts depend. Once the student has used the facts to gain a firm understanding of evolution, no great educational harm is done if the particular facts about particular species are forgotten. But without those facts well-lodged in memory for at least a short time, harm would be done to a student's ability to grasp the larger concept.

For other material, we most certainly do want longer-term retention. In this case again, practice past the point of mastery is essential. In the case of overlearning, the practice begins with active studying for the purpose of learning. Over time, practice will take the form of *using* old material in the course of studying some new material. For example, students will initially study the terms *isthmus* and *delta* to master their meanings, and will later practice these meanings as they use the terms in their continued study of geography.

Although practice takes on a different character for the longer-term, it is no less important. Studies show that if material is studied for one semester or one year, it will be retained adequately for perhaps a year after the last practice (Semb, Ellis, & Araujo, 1993), but most of it will be forgotten by the end of three or four years in the absence of further practice. If material is studied for three or four years, however, the learning may be retained for as long as 50 years after the last practice (Bahrick, 1984; Bahrick & Hall, 1991). There is some forgetting over the first five years, but after that, forgetting stops and the remainder will not be forgotten even if it is not practiced again. Researchers have examined a large number of variables that potentially could account for why research subjects forgot or failed to forget material, and they concluded that the key variable in very long-term memory was practice.* Exactly *what* knowledge will be retained over the long-term has not been examined in detail, but it is reasonable to suppose that it is the material that overlaps multiple courses of study: Students who study American history for four years will retain the facts and themes that came up again and again in their history courses.

> Only with the automaticity that comes from practice, will the student be able to bypass the bottleneck imposed by working memory and move on to higher levels of competence.

Learning Skills

Acquiring factual knowledge is only part of what we want our students to gain from their schooling. We also want them to be skilled problem solvers, effective written and oral communicators, and creative thinkers. These skills—and indeed, all skills that involve thinking—rely on working memory capacity. Working memory is, to put it colloquially, the place in the mind where thought happens. It is often called the bottleneck of the mind because there is a limited amount of space in working memory. That is why it is difficult to mentally divide 34,516 by 87. It is hard to simultaneously maintain the numbers, employ the processes for long division, and update the answer as you derive it. This

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* It is likely relevant that there is not only more practice in this case, but that the practice is distributed across time rather than concentrated in a few months (see former column, "Allocating Student Study Time," available online at **www.aft.org/american_educator/summer2002/askcognitivescientist.html**).

space limitation is relevant not just to mental arithmetic, but to most types of problems we would like our students to solve, such as writing a clear laboratory report, reading an essay with deep understanding, or seeing the links between historical events.

Our ability to think would be limited indeed if there were not ways to overcome the space constraint of working memory. One of the more important mechanisms is the development of automaticity. When cognitive processes (e.g., reading, writing grammatically, reading a map, identifying the dependent variable in a science experiment, using simple mathematical procedures) become automatic, they demand very little space in working memory, they occur rapidly, and they often occur without conscious effort.

For example, if you are reading this article, the process of reading is very likely automatic for you. You do not need to laboriously piece together the letters of each word to puzzle out its identity. Your mind seems to divine the meaning of prose immediately and without effort on your part. Try this classic demonstration of automaticity for advanced readers. In this task you are asked to name the ink color in which the words are printed, but ignore the word that the letters spell. Hence for the stimulus TURKEY, the proper response is "blue." First try this list:

LION
BEAR
TIGER
LION
BEAR
BEAR
TIGER

Now try this list:

RED
GREEN
BLUE
RED
BLUE
BLUE
GREEN

The second list is much harder to read than the first list because, for you, reading is automatic. Even though you try *not* to read the words that the letters form, you read them automatically and doing so conflicts with naming the ink color. For someone who cannot read, the second list is no harder than the first.

But most of the time automaticity is helpful, rather than disruptive. Picture a beginning reader slowly puzzling out the word "blue." Doing so consumes all of working memory, so it is difficult for the student to follow the plot of the story in which the word appears. Once reading is automatic, however, precious working memory resources can be devoted to considering the meaning of a text, the effectiveness of its argument, and so on.

Automaticity is important not only in reading, but in all mental life. Consider how difficult it would be to navigate an unfamiliar city by car if you had to focus on how hard to press the accelerator and brake, how far to turn the steering wheel, when to monitor your mirrors, and all of the other components of driving that have become automatized.

Automaticity is vital in education because it allows us to become more skillful in mental tasks. An effective writer knows the rules of grammar and usage to the point of automaticity—and knows automatically to begin a paragraph with a topic sentence, include relevant detail, etc. The effective mathematician invokes important math facts and procedures automatically. Readers who are able to visualize a map of the world will find various books and assignments easier to read (and learn more from them). In each field, certain procedures are used again and again. Those procedures must be learned to the point of automaticity so that they no longer consume working memory space. Only then will the student be able to bypass the bottleneck imposed by working memory and move on to higher levels of competence.

The development of automaticity for generalized skills depends on high levels of practice (e.g., Shiffrin & Schneider, 1984). There is no substitute. Ensuring consistent, sustained practice is the most reliable way to ensure that a student will become an effective reader, writer, or scientist. Following a complex written argument, writing a convincing essay, or engaging in scientific reasoning are all skills that are enabled by the automatization of each discipline's basics.

Becoming an Expert

What does it take to become an expert in a field? Consider a true expert, meaning one who is recognized not just as fully competent, but as a unique contributor to the discipline. In competitive arenas (e.g., athletics or chess), we would say that an expert competes at the national or international level. When asked how an expert gained such a high level of skill, non-experts usually attribute the success to innate talent. Experts themselves, however, tell a different story. They attribute their success to practice and to the ability to maintain concentration during long practice sessions (Ericsson, 1996). (The importance of practice doesn't mean that innate talent is meaningless, of course; practice is necessary for excellence, but it may not be sufficient to ensure it.)

Research studies indicate that experts are right, at least in that they do practice a great deal. Descriptive studies (Roe, 1953) of eminent scientists indicate that the most important factor predicting their success is not innate talent or intelligence, but the willingness to work hard for extended periods of time. This commitment to practice was reinforced by a large-scale study (Bloom, 1985) in which experts in athletics, science, and the arts were interviewed, along with their parents and teachers. Bloom proposed that the training of an expert typically involved four stages. The future expert was usually introduced to the domain under playful conditions as a child. His or her promise was noted, and in stage two, lessons were provided, usually with a teacher or coach who worked well with children, and regular practice habits were established. In the third stage, an internationally recognized teacher or coach was engaged, usually requiring a significant commitment of resources from the parents, as well as dedicated and likely exclusive study by the child. In the fourth stage, the student had absorbed all that he or she

(Continued on page 38)

Cultural Literacy Rocks

How Core Knowledge Can Help You Understand and Enjoy Rock Music … and Much, Much More

By Matthew Davis

"What if you knew her
And found her dead on the ground?"

That's the question rock musicians Crosby, Stills, Nash, and Young (CSNY) asked in their hit song, "Ohio." When the band released the song in May of 1970, every young person in America knew exactly what that question meant.

At the time, the nation was engrossed in its long, painful struggle over the Vietnam War. On campuses across the country, college students had been protesting against the war. In some places, the National Guard had been called in to preserve order. Then, on May 4th, National Guard troops on the campus of Kent State University opened fire on anti-war protesters, killing two men and two women.

Neil Young read about the shootings in the papers. A few days later, the moody Canadian went for a walk in the woods. When he walked out, he had a melody and some lyrics in his head. The refrain was "Four Dead in Ohio," but perhaps the most pointed line in the song was a question aimed right at the listener and focusing on one of the young women killed in the shooting: "What if you knew her / And found her dead on the ground?"

Young and his bandmates in CSNY recorded the song and released a single, which shot up the charts. Soon, young people all over America knew the lyrics. "Ohio" became an anthem of the counterculture.

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So, what does this have to do with Core Knowledge? Well, more than you might think.

You see, in 1970 it didn't take much to understand "Ohio." As long as you weren't living in a cave, you knew what the members of CSNY were talking about. You knew they were angry and were challenging the youth of America to do something to resist the Vietnam War and the government. Today the situation is different. "Ohio" is still played on hundreds of radio stations, but modern listeners need to bring some cultural literacy to the table if they wish to understand the song.

The lyrics of "Ohio" are clipped, fragmentary, and angry. The musicians sing of "four dead in Ohio." They mention some guy named "Nixon" and complain, "soldiers are gunning us down!" And of course they ask the provocative question: "What if you knew her / And found her dead on the ground?" What they never do is identify Kent State or tell you exactly what they are singing about. In order to understand what the lyrics mean and why there is such anger and urgency in the voices of the singers, the modern listener needs to know what happened at Kent State, what the Vietnam War was, and who Richard Nixon was—three things that are taught in the Core Knowledge curriculum for eighth grade.

For those of you who are not familiar with Core Knowledge, it is a particular approach to educational improvement based on the premise that a grade-by-grade core of common learning is necessary to ensure a sound and fair elementary education. The movement was started by Dr. E.D. Hirsch, Jr., author of *Cultural Literacy* and *The Schools We Need,* and is based on a large body of research in cognitive psychology, as well as a careful examination of several of the world's fairest and most effective school systems. Dr. Hirsch has ar-

gued that, for the sake of academic excellence, greater fairness, and higher literacy, early schooling should provide a solid, specific, shared core curriculum in order to help children establish strong foundations of knowledge. After wide consultation, the content of this core curriculum has been outlined in two books—*Core Knowledge Preschool Sequence* and *Core Knowledge Sequence, K-8*—that state explicitly what students should learn at each grade level. Currently, hundreds of schools and thousands of dedicated educators are participating in this school reform movement throughout the United States. (To learn more about Core Knowledge, go to **www.coreknowledge.org**.)

Core Knowledge is sometimes attacked as a reactionary or conservative idea, but it turns out you need a little core knowledge to understand a radical song like "Ohio." And I think this is only one instance of a larger, paradoxical phenomenon: In many cases, you need cultural literacy, even if what you want to understand is the counterculture.

Another example of this paradox is Joni Mitchell's sixties anthem "Woodstock." Mitchell sings of the famous rock concert, held in upstate New York in 1969:

By the time we got to Woodstock
We were half a million strong
And everywhere there was song and celebration
And I dreamed I saw the bombers
Riding shotgun in the sky
And they were turning into butterflies
Above our nation.

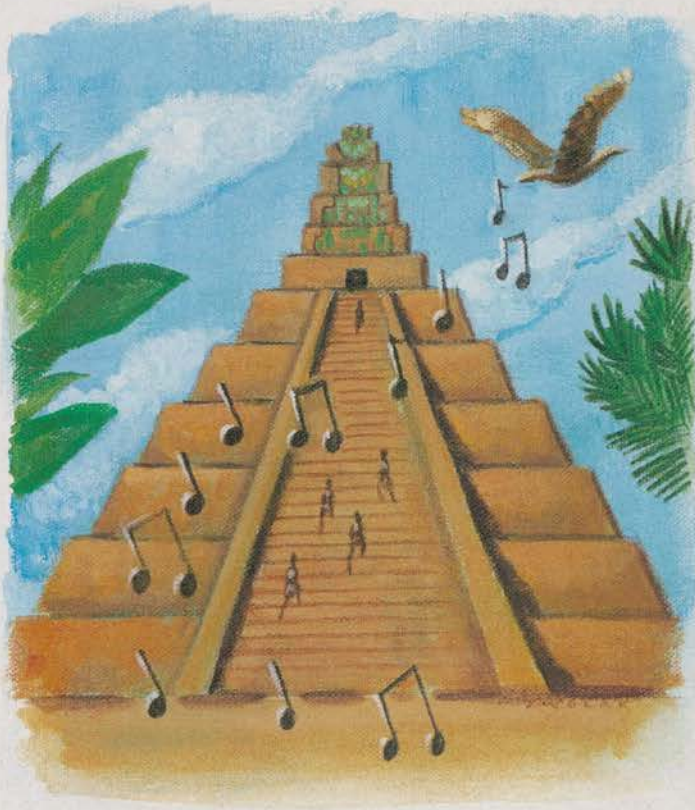
These lyrics will make more sense to a student who has been taught what Woodstock is and what happened in the sixties, as Core Knowledge students are taught in the eighth grade. Such students will understand why, in the context of the Vietnam War, Mitchell dreams of seeing bombers "turning into butterflies." Based on their studies of Judaism and Christianity in first and sixth grade, students may also recognize the biblical reference in the refrain:

We are stardust
We are golden
And we've got to get ourselves
Back to the garden

When Mitchell says we have to "get ourselves / Back to the garden," she doesn't mean just any garden. She means the Garden of Eden, where, according to the Old Testament, Adam and Eve lived at peace with each other, in harmony with nature, and entirely unashamed of their naked bodies. For those with a bit of cultural literacy, those last two lines open a vast world of associations, giving the lyrics the sort of connotations and depth we associate with poetry. They also help explain some sixties phenomena that might otherwise seem baffling. All those naked people at Woodstock and all the communes that sprang up in the sixties—these things make more sense when seen in the light of this felt need to get "Back to the garden."

Another rock song that makes a lot more sense if you've got some cultural literacy is "Sympathy for the Devil," by the Rolling Stones. This song, frequently voted one of the greatest rock songs of all time, is structured a bit like a riddle. Mick Jagger takes on the voice of the Devil. (Some might say that this was not a big stretch for the salacious lead singer.) In the opening verses of the song, the Devil introduces himself but does not actually give his name. Instead, he mentions a number of historical episodes he has

A Core Knowledge fifth-grader would have visions of an Aztec pyramid dancing in her head. That's the best possible argument for Core Knowledge—it makes things happen in your head that wouldn't happen otherwise.



been involved in, pausing now and again to taunt and challenge his listener: "Hope you guess my name!"

Please allow me to introduce myself.
I'm a man of wealth and taste.
I've been around for a long, long year.
Stole many a man's soul and faith.
I was around when Jesus Christ
Had his moment of doubt and pain
Made damn sure that Pilate
Washed his hands and sealed his fate.
I stuck around St. Petersburg
When I saw it was a time for a change,
Killed the czar and his ministers:
Anastasia screamed in vain
I rode a tank,
Held a general's rank,
When the Blitzkrieg raged
And the bodies stank.

Obviously, the Devil gets around! In fact, it takes a good deal of cultural literacy just to recognize the various events in which he claims to have played a role.

In order to understand the second stanza, you need to know a little about the Christian religion, the life of Jesus, and the Devil's role as a stealer of "souls" and "faith." The Devil also says he was present when Jesus had his moment of "doubt and pain." This might refer to the time when the Devil tempted Jesus in the desert, to the moment when Jesus is said to have cried out on the cross, "My God, my God, why hast thou forsaken me?" (Mark 15:34), or perhaps to some other episode during Jesus's last days. Certainly the last lines of the stanza refer to the last days. There the Devil says he "Made … sure" the Roman procurator Pontius Pilate "Washed his hands" and disclaimed responsibility for Jesus's death. This is an explicit biblical reference: "When Pilate saw that he could prevail nothing, but that rather a tumult was made, he took water, and washed his hands before the multitude, saying, I am innocent of the blood of this just person" (Matthew 27:24). While few students will recognize the specific biblical references, Core Knowledge students who have studied Christianity in first and sixth grade should know who Jesus and Pilate are and should recognize the story that involved them both—and this knowledge may enable them to guess the identity of the speaker. If not, the next verses provide additional clues.

In the next stanza, His Satanic Majesty boasts of having played a role in the Bolshevik Revolution. But again the references are oblique, and it takes some cultural literacy to unpack the lyrics. Core Knowledge students who have studied Russian history in fifth and seventh grade, will know that St. Petersburg is in Russia and that the czars were the rulers of Russia until 1917, when Lenin and the Communists took power and, not long after, executed the royal family. The czar's most famous daughter, Anastasia Romanov, is said to have "screamed in vain."

In the last stanza quoted above, the Devil claims to have ridden a German tank during World War II. But once again he doesn't explicitly identify the war or his national affiliation. The word that unlocks the specific meaning of this stanza is "Blitzkrieg"—a word that is listed in the *Core Knowledge Sequence* for seventh grade.

After each of these verses, the speaker turns to the listener and issues the same challenge: "Hope you guess my name!" The listener who has some cultural literacy will definitely be up for the challenge.

As a final example, consider another popular Neil Young song, "Cortez the Killer." Students who have studied Meso-American civilizations (taught in Core Knowledge schools in first and fifth grade) will know that Cortez was a Spanish conquistador. He was indeed a "killer," for his bloody conquest of the Aztec Empire in the early 1500s left many thousands dead. This basic cultural literacy enables one to follow the opening verses of the song:

He came dancing across the water
With his galleons and guns,
Looking for the new world
And a palace in the sun
On the shore lay Montezuma.
With his coca leaves and pearls.
In his halls he often wandered
With the secrets of the worlds.
And his subjects gathered 'round him
Like the leaves around a tree.
In their clothes of many colors
For the angry gods to see.

Without cultural literacy, none of this makes much sense. But graduates of Core Knowledge schools will recognize that the "he" in the first line is Cortez, and that the waters he came "dancing across" are the Atlantic Ocean and the Gulf of Mexico. They will know that guns played a major role in the Spanish conquest of both the Aztecs and the Incas. They may also know, or be able to guess, that a galleon is a Spanish ship.

Once the name Cortez has been introduced, a Core Knowledge student will expect to hear about Montezuma, too, since Montezuma was the leader of the Aztec Empire when Cortez appeared. A Core Knowledge student will know that the Aztecs worshiped many gods. The description of the "halls of Montezuma" is likely to echo in at least a few ears, too, since the fourth-grade music guidelines in the *Sequence* include the Marine's hymn, with its famous opening line: "From the halls of Montezuma / To the shores of Tripoli." Consciously or unconsciously, the Canadian Young seems to be echoing this American classic.

Alert Core Knowledge graduates should also be able to tell when Young begins to romanticize the Aztecs in the next few stanzas:

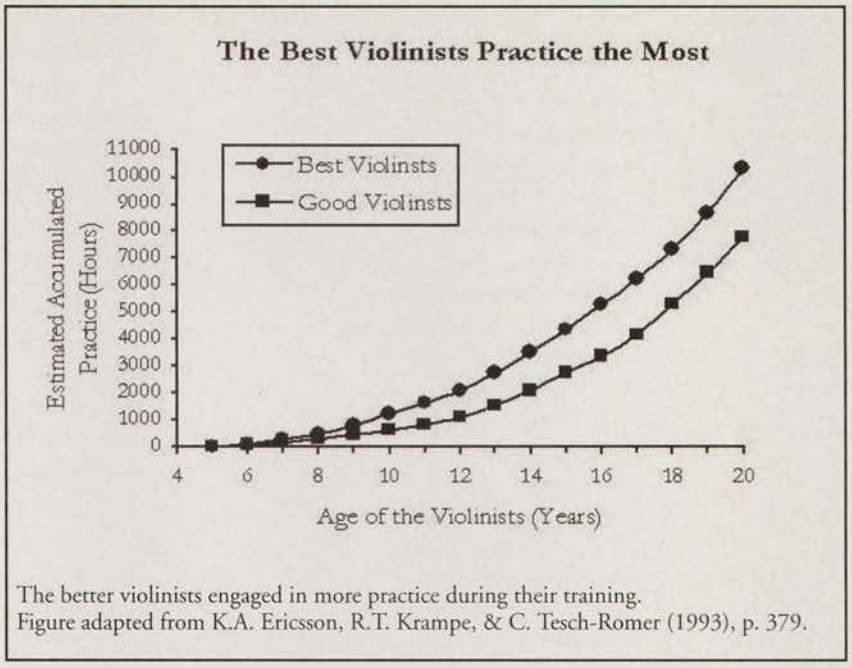
And the women all were beautiful
And the men stood straight and strong.
They offered life in sacrifice
So that others could go on.
Hate was just a legend
And war was never known
People worked together

(Continued on page 39)

(Continued from page 33)

could from teachers and began to develop his or her personal contribution to the field.

Recent research that measures practice time more carefully paints a similar picture. The figure on the right depicts the estimated cumulative practice time of violinists separated by their ability levels. The *best* and *good* students were enrolled at a music academy that trains professional musicians; they were put into these categories, unbeknownst to them, by their professors for the purpose of this study. Subjects were asked to estimate the time they spent practicing each week. The graph on the right shows the total accumulated practice time at each age. Two conclusions may be drawn from the graph: Experts engage in a great deal of practice, and that even among very able performers, the best are those who have practiced more.



The better violinists engaged in more practice during their training.
Figure adapted from K.A. Ericsson, R.T. Krampe, & C. Tesch-Romer (1993), p. 379.

Some evidence that a great deal of practice, and not just talent, is a prerequisite for expertise is the "ten year rule," which states that individuals must practice intensively for at least 10 years before they are ready to make a substantive contribution to their field. What about prodigies like Mozart, who began composing at the age of six? Prodigies are very advanced for their age, but their contributions to their respective fields as children are widely considered to be ordinary. It is not until they are older (and have practiced more) that they achieve the works for which they are known.

How are such studies relevant to the average student? Few students will become a Mozart, Shakespeare, or Einstein, but if we want children to understand and appreciate excellence, we would do well to send the message that excellence requires sustained practice. The athletes and artists revered by many students excel not solely by virtue of their talent, but because of their hard work. Edison remarked that "genius is one percent inspiration and ninety-nine percent perspiration." The relative percentages of talent and practice are unclear, but the necessity of long periods of focused practice to exploit inborn talent is not.

What Material Merits Practice?

When we refer to "practice," it is important to be clear that it differs from play (which is done purely for one's own pleasure), performance (which is done for the pleasure of others), and work (which is done for compensation). Practice is done for the sake of improvement. Practice, therefore, requires concentration and requires feedback about whether or not progress is being made. Plainly put, practice is not easy. It requires a student's time and effort, and it is, therefore, worth considering when it is appropriate.

It was noted above that sustained practice over time is especially useful for developing automaticity in specific skills (which enables higher-level thinking) and in ensuring that a memory lasts as long as needed. Thus, the following types of material are worthy of practice:

1. The core skills and knowledge that will be used again and again. In this case, we give practice in order to ensure automaticity. The student who struggles to remember the rules of punctuation and usage (or must stop to look them up in a reference book) cannot devote sufficient working memory resources to building a compelling argument in his or her writing. The student who does not have simple math facts at his or her disposal will struggle with higher math.

2. The type of knowledge that students need to know well in the short term to enable long-term retention of key concepts. In this case, short-term overlearning is merited. For example, as noted earlier, a science teacher may want students to know a set of facts about certain species so that she can introduce an important abstract concept concerning evolution that depends on these facts. Or, a high school history teacher may want students to master the facts of several Supreme Court cases in order to build long-term understanding of a particular constitutional principle.

3. The type of knowledge we believe is important enough that students should remember it later in life. In this case, one might consider certain material so vital to an education that it is worthy of sustained practice over many years to assure that students remember it all of their life. A science teacher might spend the better part of a year emphasizing basic principles of evolution in the belief that the material is essential to consider oneself conversant in biology. Further, the curriculum might address and require practice in evolution in multiple years to assure that such knowledge will last a lifetime. Do we expect that a 40-year-old will have retained everything learned through the 12th grade? No, but do we expect that she will retain anything? Should she be able to grasp the basics of evolution or describe the different responsibilities of the three branches of the federal government or calculate the area of a circle? Exactly what sorts of knowledge merit the focus required to create long-lasting memory will be controversial, but that practice is required to create such memories is not.

How should practice be structured—should a teacher strive for overlearning in the short term or repeated learning over the long term? The answer will depend on whether the goal is automaticity in skills, short-term knowledge, or long-term knowledge—and what the teacher knows about the future curriculum students will encounter. For example, an English teacher might deem it very important that students understand the use of metaphor in poetry, but extensive, focused practice may not be practical or necessary. This knowledge will likely be developed over a number of years, and there will be opportunities for practice in the future. In other cases there will be future opportunities for practice, but the timeliness of the learning is important. For example, one teacher might provide just a cursory introduction to first-graders on how to tell time, figuring that the students will have ample opportunities for practice in the future. But another teacher might also reason that first-graders need to know how to tell time (so that, for example, they can monitor their activities during the day and be more self-directed) and so focus practice on this skill. Similarly, a French teacher may realize that students will have plenty of practice conjugating the verb *être* (to be) over the long term, but may justly believe that students must know this material early in their training or their ability to read, write, and understand French will be badly hampered.

Exactly when to engage students in practice, through what method, and for what duration are educational decisions that teachers will need to make on a regular basis. But, that students will only remember what they have extensively practiced—and that they will only remember for the long term that which they have practiced in a sustained way over many years—are realities that can't be bypassed. □

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Cultural Literacy

(Continued from page 37)

And they lifted many stones.
They carried them to the flatlands.
But they died along the way.
And they built up with their bare hands
What we still can't do today.

The romanticizing of the Aztecs begins in the opening lines, when Young claims that all of these native peoples were beautiful and healthy, a condition which has probably never prevailed in any civilization at any time.

Young also glides over the subject of human sacrifice. It is true that the Aztecs "offered life in sacrifice / So that others could go on." They believed that such sacrifices would appease the gods. But the lives they sacrificed were *human* lives: sacrificial victims were tied to an altar, whereupon their chests were sliced open and their still-beating hearts offered to "the angry gods." By avoiding the fact that the Aztecs killed human beings and emphasizing the unselfish motives behind these sacrifices, Young puts a cheerful face on a terrible practice and presents a one-sided view of the Aztecs.

"Hate was just a legend, / And war was never known," is more of the same kind of romanticizing, all too common today. The residents of pre-Columbian Mexico were well acquainted with hate and war. In fact, the Aztecs stand out in the annals of history as an exceptionally belligerent civilization: In order to keep their altars supplied with a steady diet of sacrificial victims, the Aztec emperors kept up a perpetual war with neighboring peoples. It would be more accurate to say that "peace was never known."

Young again claims too much for the Aztecs when he declares that modern engineers could never build things as grand as the Aztecs built. But it certainly is true that "they lifted many stones." And here is another unexpected benefit for the culturally literate: Young doesn't tell us what the Aztecs "built up" when they "lifted many stones," and a culturally illiterate listener might be left envisioning a nondescript pile of rocks. A Core Knowledge fifth-grader, on the other hand, should have visions of an Aztec pyramid dancing in her head. To my way of thinking, that's the best possible argument for Core Knowledge—it makes things happen in your head that wouldn't happen otherwise.

Now I don't want to claim too much here. It's true that there are many rock songs that require no cultural literacy whatsoever. ("De-doo-doo-doo, de-dah-dah-dah.") It's also true that there are many other songs that are so oblique, or disjointed, or drug-addled, that no amount of cultural literacy will allow you to make sense of them. Finally, and most importantly, it's true that there are many things that are more important to understand in life than rock lyrics—including textbooks, newspapers, beautiful literature, poetry, job applications, contracts, warranties, manuals, and ballots. The point isn't that rock music is especially important (it's not); the point is that cultural literacy has the power to make texts meaningful, even in situations far removed from the classroom. □

BENCHMARKS

(Continued from page 21)

Example: Graph the exponential function $y(x) = 2^x$. Recognize that $y(x+1)$ is twice as large as $y(x)$ since $y(x + 1) = 2^{x+1} = 2 \cdot 2^x = 2 \cdot y(x)$.

4.8. Read information and draw conclusions from graphs; identify properties of a graph that provide useful information about the original problem.

5. Solve problems by converting the verbal information given into an appropriate mathematical model involving equations or systems of equations; apply appropriate mathematical techniques to analyze these mathematical models; and interpret the solution obtained in written form using appropriate units of measurement:

5.1. Recognize and solve problems that can be modeled using a linear equation in one variable, such as time/rate/distance problems, percentage increase or decrease problems, and ratio and proportion problems.

5.2. Recognize and solve problems that can be modeled using a system of two equations in two variables, such as mixture problems.

Example: A chemist has available two solutions of acid. The first solution contains 12% acid, and the second solution contains 20% acid. He wants to mix the two solutions to obtain a 500-milliliter mixture containing 15% acid. How many milliliters of each solution should he mix?

5.3. Recognize and solve problems that can be modeled using a quadratic equation, such as the motion of an object under the force of gravity.

Example: A stone is dropped off a cliff 660 feet above the ground. When will the stone hit the ground if its height in feet at time t seconds after it is dropped is given by $h(t) = 660 - 16 \cdot t^2$?

5.4. Recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.

5.6. Recognize and solve problems that can be modeled using a finite geometric series, such as home mortgage problems and other compound interest problems.

Example: How much money will you have in a retirement fund if you deposit $1,000 each year for 20 years and the interest rate remains constant at 4%?

***

Incremental Steps Will Bring the Benchmarks Within Reach

What will it take to make the high school diploma signify readiness for college or a good job in the high-performance job sector? First, state policymakers need to anchor high school graduation requirements and assessments to the standards of the real world: to the knowledge and skills that colleges and these employers actually expect if young people are to succeed in their institutions. In return, colleges and employers need to start honoring and rewarding student achievement on state standards-based assessments by using these performance data in their admissions, placement, and hiring practices. Although most states have worked hard in the last 10 years to raise the quality of academic standards and the rigor of assessments, the ADP benchmarks may seem even more demanding. For example, no state currently requires all students to take Algebra II to graduate, and few high school exit tests measure much of what ADP suggests that students need to know. In some cases, the knowledge and skills in the benchmarks are not sampled at all on state tests. Incorporating ADP benchmarks into state education systems is a long-term agenda, and progress will be measured by incremental steps rather than radical shifts. State education and business leaders must devise strategies that build on, rather than discard, ongoing standards-based reforms; that sensibly ratchet up the rigor of standards, assessments, and course-taking requirements over time; and that blend them into a coherent system of requirements for earning a high school diploma that signifies college and workplace readiness. □

Sample Postsecondary Assignment in Introductory Chemistry

Introductory chemistry at Ball State University, a moderately selective institution in Muncie, Ind., (with average SAT scores around 1050) that offers both associate's and bachelor's degrees, challenges students to interpret, manipulate, process, and present quantitative information accurately and present solutions in the appropriate unit of measure or dimension. Students must have a solid foundation in mathematics in order to concentrate on learning chemistry. In this sample, students are being taught about the ideal gas law, but they are not being taught the algebra involved in applying that law; to succeed in this course, they must have learned all the necessary mathematics in high school. In the following assignment, students must have mastered algebra benchmarks 1.5 and 5, as well as language benchmark 7.

Use formulas such as the ideal gas law ($P \cdot V = nR \cdot T$) to calculate unknown quantities such as pressure, temperature, volume, molar mass, density, or molecular formula.

Problem: What is the temperature of 0.520 mol of argon gas that occupies 4.25 L at 750 torr?

Solution: Use the ideal gas law: $PV = nRT$. Solve the ideal gas law for T, and substitute the known information.

$$T = \frac{PV}{nR} = \frac{(750.0 \text{ torr})(1 \text{ atm}/760 \text{ torr})(4.25 \text{ L})}{(0.520 \text{ mol})(0.0821 \text{ L atmmol}^{-1} \text{ K}^{-1})} \approx 98 \text{ K}$$

It's Time To Tell the Kids

(Continued from page 15)

are developing high school exit exams. But in many states the high school exit exams were developed to assess minimum competence. So every year many students pass a high school exit exam, but then do poorly on a college placement exam and end up in remedial courses. According to a recent study that compared 66 state high school exams (35 in English and 31 in mathematics) to a set of standards for university success found that just three of them (all in English) could offer useful information about students' preparation for college (Conley, 2003).

In 2000, Kentucky became the first state in the nation to pass a state law creating an online mathematics assessment developed specifically to let high school sophomores and juniors know if they are ready for college-level algebra and calculus. Called the Kentucky Early Mathematics Testing Program (KEMTP), the test assesses Algebra I, Geometry, and Algebra II and was developed by high school and college mathematics teachers from Kentucky. This purely diagnostic assessment does not become part of the high school transcript and is not used for admissions to college; it does give students (and their schools) immediate feedback on which topics they have—and have not—mastered and urges students to use the one to two years they have left in high school to address those weaknesses. (To learn more about KEMTP, go to **www.mathclass.org/welcome-kemtp.htm**.)

3) High schools should clear up the misconceptions. Counselors are the front line here, and they'll need a lot of support. All school personnel should be well-armed with the facts and encouraged to convey them to students. And the facts are clear: High school performance matters. Hard work in high school matters. Doing homework matters. Taking rigorous courses matters. Getting good grades matters. All of these are closely connected to whether students succeed in college. (And, interestingly, they're also closely connected to whether non-college bound students succeed in their jobs.) High schools should also make sure students are well informed about college remedial courses, specifically: These are the courses they will be enrolled in if their high school work is not up to snuff; these courses do not bear college credit; taking them amounts to paying for an education that could have been had for free in high school; and students who have to take several of them almost never reach college graduation. (The sidebar on page 11 is a student-friendly fact sheet on the importance of high school achievement for college.)

4) High schools should serve college- and work-bound students equally well. Teachers, counselors, and administrators dream of students working hard, doing well in school, and graduating from college. It is a wonderful dream—but that doesn't mean it is in every student's best interest. Those who haven't done well academically and those whose interests are not in the liberal arts are best served with an honest look at their current chances in college and a serious examination of the alternatives, such as training opportunities and job placement assistance. The fact is, despite the economy's growing preference for college degrees, there are many good jobs available to high school graduates. (For more information on the importance of high school for the non-college bound, see the sidebar on page 13.) Postponing college is also a viable option. Many students enter college when they are older, often after several years of work. More than half of the students in two-year colleges are older than 24, and about one-quarter of them are over 35 (NCES 1999). Their age and employment may give them the experience to make better course choices, the maturity to be more disciplined students, skills that will help them pass some courses, and perhaps even employer-paid tuition benefits.

Too often, we think students' problems are inside of them, and we blame students' poor motivation. However, most students tend to be motivated if they see incentives for effort. But in the case of high school performance, we obscure what is at stake for most students. While top quartile students (those aiming for highly selective colleges) are told the incentives for better grades and test scores, the vast majority of students get the impression that high school achievement, grades, and test scores are irrelevant.

Students must realize that high school grades are important: Grades strongly predict future careers. There are strong incentives for school effort and students can improve their adult attainments by improving their high school grades. Al-

though most colleges are not selective—and most unselective colleges (and most employers) ignore grades in selecting applicants—even unselective colleges and employers discover that youths with better high school grades are more successful in attaining college degrees and higher earnings.

The American educational system has taken a bold step in making college accessible to so many students. However, the revolution is still incomplete, and research has identified a number of difficulties in educators', parents', and students' understandings of college and what it requires. This revolution poses new challenges and a set of unintended consequences. We will need thoughtful solutions to address them. □

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LETTERS

(Continued from page 3)

plaud our physics teachers and marvel at their understanding of the forces at work in the world, but what would the competitive market pay for an excellent K-3 teacher?

These are arguably the most important teachers in education. Let us remember that future prison populations are based on how many students fail elementary reading classes, not on how many have failed physics or secondary math. These teachers are equally deserving of competitive pay. In industry there is no demand for primary grade teachers, so how should their pay scale be developed?

In industry, people seek advanced degrees to earn greater responsibility within the firm and greater pay. In this sense, education is no different. But in industry, the employer can control the factors that lead to the success or failure of a product. The firm controls inputs, processing time, and can quantifiably measure its outcome to see that quality standards are maintained. Educators do not have that option. The single greatest contributor to a child's academic achievement is the home environment (Coleman, 1966). Merit pay for teachers, which Miller is trying to push us to, does not affect this input.

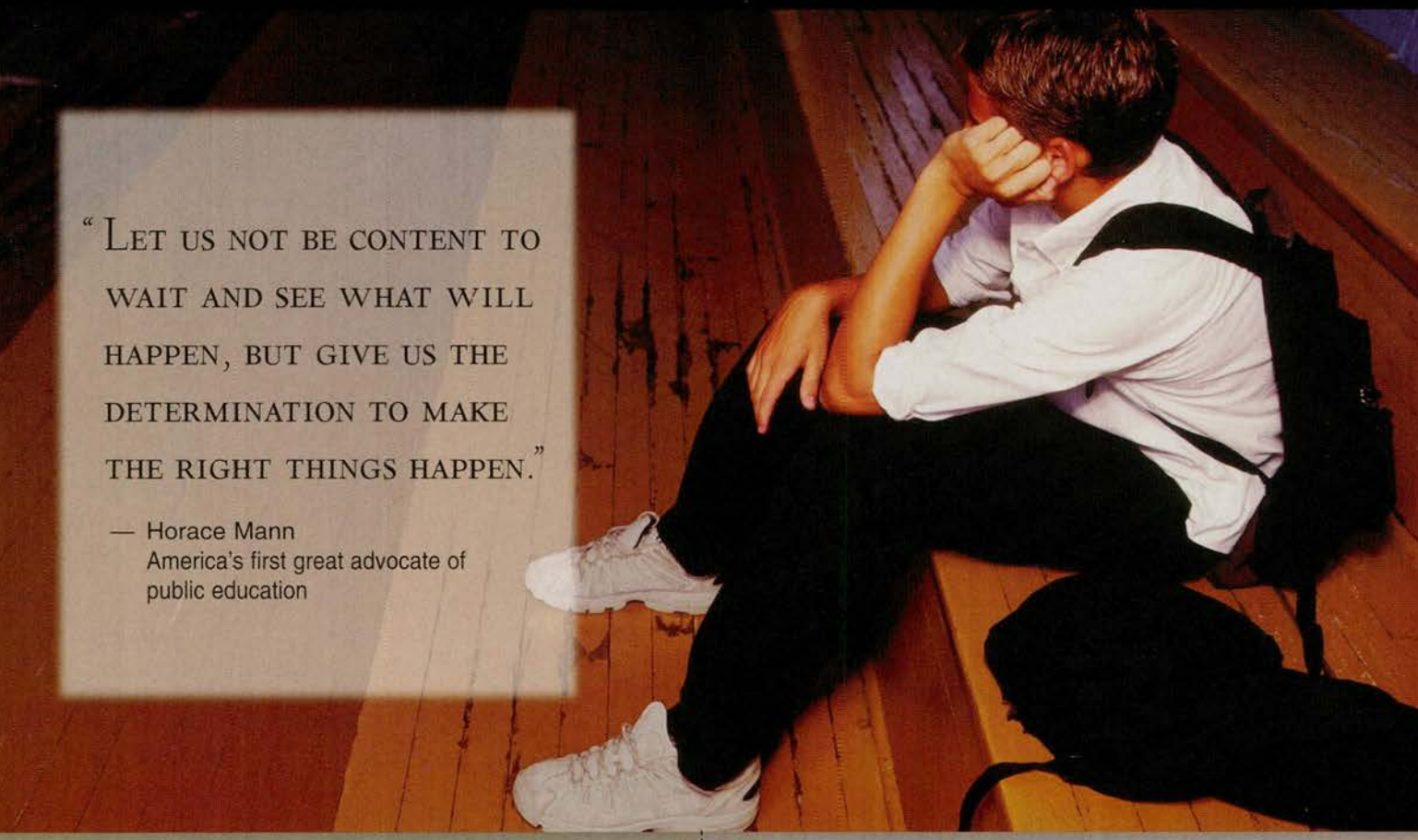
Miller contends that inner city teachers deserve more pay. Maybe, but not merit pay.

—KEITH NEWMAN
Morrison Elementary
Philadelphia, Penn.

Matthew Miller responds:

Mr. Spicher is right that suburban districts may raise salaries in response to my high-poverty teacher pay initiative, and it's possible that in some areas this would diminish the impact of my proposal. But my conversations with many teachers persuade me that so long as the absolute salary levels and salary trajectory available for excellent teachers in high-

(Continued on page 44)



You know how it feels to see changes that need to be made, to be ready for a new challenge, to be eager to make a difference. It's time to step up! It's time to apply your classroom experience and take your career to the next level.

Presently, there is a shortage of qualified principals, and seasoned teachers—like you—are the best candidates to fill those jobs. Accountability and raising student achievement are in the forefront as never before. With these factors shaping the job, new routes to the principalship are opening every day. If you haven't already considered a career as a middle level or high school principal, now is the time!

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poverty areas were raised dramatically, as I propose, there would still be a big impact on the caliber of college graduate we could attract and retain in these neighborhoods. And I agree with Mr. Spicher that money, while an important part of the answer, is by no means the full answer; his ideas for how to make the experiences of new teachers better seem very sensible.

I think Mr. Newman confuses what I mean by "market forces" in thinking about teacher pay. The relevant question is not what would "the competitive market pay for an excellent K-3 teacher," but what would we need to pay to lure excellent K-3 teachers who have chosen to work in affluent suburban schools to teach in our tougher, poorer neighborhoods instead. Across the board, this is an area in which some empirical research could be done.

Also, I am not calling for merit pay, but for differential pay based on a blend of assessments, involving everything from peer review by master teachers to improvement in test scores over the course of a year.

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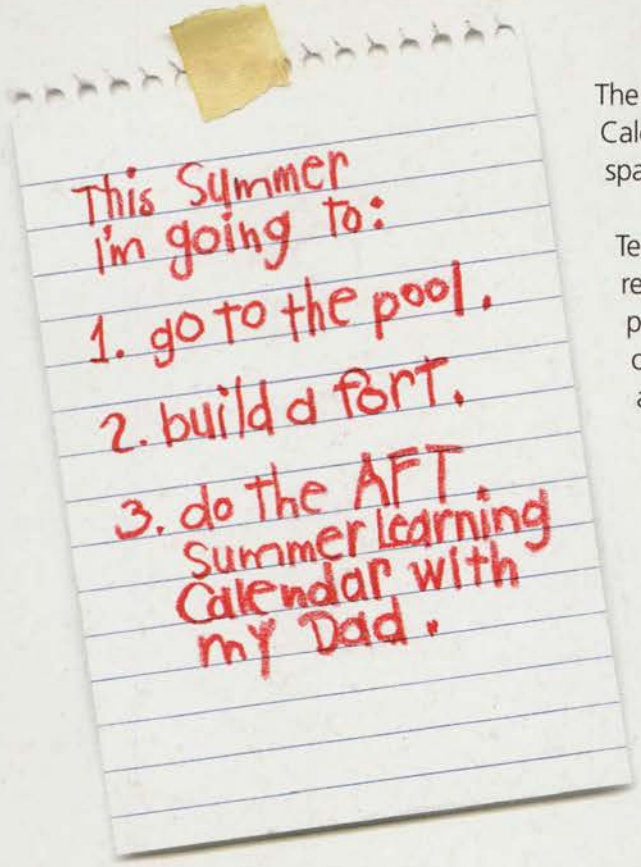

The American Federation of Teachers' online Summer Learning Calendar helps keep students' minds sharp and imaginations sparked over the summer months.

Teachers will find AFT's interactive online calendar to be a great resource for students. And even young children and their parents can sit down together at the computer and share a taste of summer learning when they check out the food themes and activities in AFT's online Summer Learning Calendar.

Summer vacation shouldn't be a vacation from learning. Visit **www.aft.org/calendar** beginning in June.

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