

AMERICAN Educator

The Neglected Muse

Why Music
Is an
Essential
Liberal Art



•New Poll: Parents' School Agenda Broadens
•"Brain-Based" Learning: Fact or Fiction?



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Why Music Is an Essential Liberal Art

By Peter Kalkavage

"Music shapes us," says our author. Today, young people are bombarded with popular music that venerates violence, drug use, and promiscuity. How can we help students to better understand the power that music has over their emotions? By introducing them to great, enduring works of music. Through these, students can develop a taste for true beauty and reflect on what popular music does—and does not—offer.

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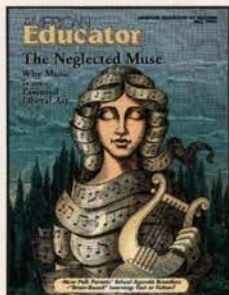
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Parents Like Schools' New Higher Standards—but Are Focused on Funding, Class Size, and Behavior

By Jean Johnson, Ana Maria Arumi, and Amber Ott

In the early 1990s, parents consistently said that raising schools' academic standards was a top priority. Today, standards are higher—and parents know it. As a result, parents' priorities have shifted to issues such as securing more funding for schools, reducing class size, and improving student behavior.

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Cover illustrated by Roland Sarkany

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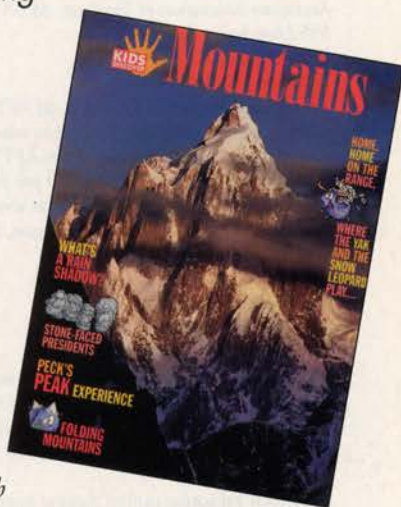
By Daniel T. Willingham

Neuroscientists are making great leaps forward in understanding how the brain works. Unfortunately, when neuroscientific claims jump to the classroom, the facts often get lost and the science misapplied. Our cognitive scientist explores a few such misapplications and explains why neuroscience is not likely to provide answers to teachers in the near future.

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The Best Kids' Magazines Turn Natural Curiosity into Exceptional Knowledge

Kids are naturally curious about science, history, art, current events, ancient peoples—anything they encounter. Keeping up with their interests, answering their questions, and searching for new topics to introduce are, to put it mildly, daunting tasks. For help, turn to the two great magazines highlighted here: ASK (for elementary school) and Kids Discover (for middle school).



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How One Teacher Helped a Student Write Her Way Out of Poverty

By Michael Winerip

American Educator offers this true story as a tribute to all of the students who need someone to believe in them and to the dedicated teachers who gladly accept the challenge.





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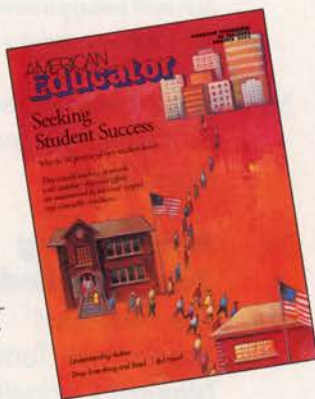
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Supporting New Teachers

After 20-plus
years of teach-
ing, at last I've
found a journal
that expresses

the real educa-
tional scene. Your articles are never
the ideal gobbly-gook that they feed you
in education courses. It is real testimony
from real teachers.

I am now retired, with the emotional
scars to prove it. Before I left, I saw the
new teachers come in, stay a year, and
then decide to get out of the field. This
happened with young teachers as well as
older ones, like a retired Marine who
said, "I'm tough, but not this tough." I
really believe that lack of support was the
reason. They were thrown to the wolves.

—DOROTHY LOOP
Retired teacher
St. Augustine, Fla.

The Summer 2006 issue was interesting
to read as it evoked many concerns.

My career in education—teaching and
coaching in public, middle, and high
schools—has brought to my attention
two missing practices that are not dis-
cussed very often, if at all. Number one,
many of today's administrators have not
been trained to lead and have not had
the needed classroom experience.

The second missing practice is pa-
tience. A beginning educator—one that

has the desire, the love, and an educa-
tion degree—will need one to three
years of hands-on classroom experience
to hone their own teaching techniques
and become a master teacher.

—RICHARD PERRY
Sranaban High School
Fort Lauderdale, Fla.

In regard to your recent article on why
teachers are leaving the profession, you
must know that this has been studied
endlessly; I think the first time was in
the 1970s by the Metropolitan Life In-
surance Company. The reason newer
teachers leave is the same reason lots of
experienced teachers retire early: Many
are finding nothing but frustration in
the day-to-day process of trying to run a
classroom.

This problem will only be solved
when the schools go back to the way
they were, when they insisted on disci-
pline, and the consequences for violat-
ing disciplinary rules were "costly." It is
necessary to remove the view that "noth-
ing can be done" because of poverty.

Yes, the physical conditions of the
building make a difference, and the
cooperation of the administration is
very important. These can be remedied,
but if those who run the system are too
afraid to pinpoint the real problem, and
do something about it without worrying
about losing their jobs, public education
hasn't got a chance.

—JAY BECKER
Retired teacher
Syosset, N.Y.



Is Teaching Reading a Science?

The methods for teaching reading promoted by the National Council on Teacher Quality (NCTQ) and presented on page 4 of "Notebook" in the Summer 2006 issue may be good ones, but this whole "scientifically based approach to reading instruction" sounds like a commercial for shampoo. Please don't fall into the trap of selling an approach by endorsing it with the word "science" and then not telling us what that science is. Convince me with reason, proofs, studies, statistics, and methods. Teach me, don't tell me.

—DANIEL NEWSOME
*John Jay College of Criminal Justice
New York, N.Y.*

In the 2006 summer issue of *American Educator*, the magazine's editors have apparently gone where no American teachers' union has gone before and sided against the academic freedom of its members to choose what their training and judgment tells them is the best method of teaching children to read. On page 4, in a box on NCTQ's "What Education Schools Aren't Teaching and What Elementary Teachers Aren't Learning About Reading," the magazine published the assertion that there is an established scientific method of teaching reading and, furthermore, contended that the use of any other method of teaching reading condemns a goodly number of students to suffering needlessly a life of reading disability.

It is startling to see a union magazine publish the following: "Before the science of reading instruction was developed, teachers had no choice but to develop their own approach—but today, a solid body of research exists: How children read is a matter of cognitive science, not personal philosophy."

What is troubling to me is that the AFT magazine is being used to promote a view that attacks teachers' academic freedom. Academic freedom is not absolute, but this attack is underhanded because it asserts that academic freedom must give way to science. However, it is in the academic world of refereed journals that issues of what is scientific and what is not should be determined.

NCTQ should not be passing off its idea as scientific truth.

—JIM MORDECAI
*Substitute Teacher
Oakland Unified School District
Oakland, Calif.*

The editors respond:

We agree with Daniel Newsome: Teachers should demand evidence when they are presented with claims that a particular educational approach is better (or worse) than another. And, he's right that our "Notebook" piece highlighting the findings of the NCTQ study did not explain the study's research base. In fact, its research base is one of the largest bodies of literature in educational research, consisting of thousands of studies conducted over four decades on both children and adults who were learning to read. A substantial portion of that research was done in conjunction with the National Institute of Child Health and Human Development (NICHD), a division of the National Institutes of Health. NICHD created a network of over 40 research sites that has studied 22,000 proficient and 26,000 struggling readers. The NCTQ recommendations are derived from a review of this body of research conducted by the National Reading Panel (NRP). The panel spent more than two years reviewing over 400 studies that met their methodological criteria, and then, in 2000, released a comprehensive report that identified phonemic awareness, phonics, fluency, vocabulary, and comprehension as the key instructional components. Together, the body of reading research and the NRP's review established the knowledge that constitutes the "scientifically based approach to reading" on which the NCTQ report was based. The NRP's summary and subgroup reports are available online at www.nationalreadingpanel.org/Publications/publications.htm. More information on NICHD's reading research is available at www.nichd.nih.gov/reading.htm.

The research contained in the NICHD studies and reviewed in the NRP report is voluminous and generally written for a scientific audience. *American Educator* has had a long-standing commitment to regularly publishing articles by experts such as Jeanne Chall,

Louisa Moats, and Joseph Torgesen, that keep teachers up-to-date on the science of reading instruction. Most of those articles are now on our Web site—and we created a subject index to make them easy to find. Just go to www.aft.org/pubs-reports/american_educator/subject.htm and scroll down to the section on reading.

When teachers use this research to determine how they will teach students to read, they are not in any way giving up "academic freedom." Rather, they are using the discretion that they, as professionals, have earned to ensure that their students receive the most effective instruction possible.

The science of reading has not produced a script for teachers to follow; instead, it establishes the basic components of effective instruction for typical children and for those who struggle with reading. But it is up to the teacher, as a professional educator, to then apply that knowledge.

When "academic freedom" is presumed to mean that teachers can just use whichever instructional approach they

FRENCH TEACHERS

Teachers, with students aged 11-19, from Metropolitan France, West French Indies, French Guyana, Reunion Island and French Polynesia, would like to contact other teachers for correspondence, exchanges, exchange of flats or holidays.

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E-mail: internat@snes.edu



like best or that best suits their personal philosophy, the idea of professional discretion becomes meaningless. The very concept of academic freedom rests on the assumption that it will be exercised by a professional educator—someone who has expertise gained from classroom experience and from seeking out rigorous research. After all, teachers should be no more free to ignore the science of reading than doctors should be free to ignore the science of treating cancer. The only situation in which doctors develop treatments based purely on their experience is when no research is available to guide them—and, even then, good doctors will consult with as many colleagues as possible before taking action. The premise of teacher professionalism is that teachers hold themselves to the same high standard.

“Read Naturally” Really Works

I was delighted to read the article “Drop Everything and Read—But How?” in the Summer 2006 issue. Finally, someone else noticed! I just completed 21 years of teaching, mostly in reading. The past five years, I have worked with the Read Naturally program. For my students, it was a life raft! My job assignment was kindergarten, first-, and second-grade “learning disabled” students. I found that the majority of the students did not have the opportunity to learn the skills needed for reading. The Read Naturally program worked for me and my students because we used it daily. The big plus of the program was that there was adequate reading material for the students to use in order to master the art of reading. Many of the students exited the resource room by grade four—some before. Thanks again.

—LINDA WITHEM
Hooks Elementary School
Hooks, Texas

Driving the Message ... Home

I am relieved to report that I caught up to the last two issues of *American Educator*. It is the best part of my dues. The summer issue’s critical assessment of silent reading and Round Robin Reading for children who are not fluent tied in nicely with the spring’s focus on addressing deficits in background knowledge. As a

guidance counselor, I know that it would be a great service if we could somehow get this information to caring guardians who are unaware of how everyday living can result in an education deficit to their children and our students.

The challenge is daunting. Now that educators (thanks to AE mailings) are versed in the matter of background knowledge, we must find a way to deliver that information to the frontline—the home. The primary environment remains the key to permanent reversal of deficit learning.

—DALE BENJAMIN DRAKEFORD
Guidance Counselor, Region 1
Bronx, N.Y.

The Need for Hurricane Relief Hasn’t Passed

In the Spring 2006 issue of *American Educator*, your article “The Hurricanes May Have Passed, but the Need Hasn’t” hit home with me. In October 2003, two and a half years ago, the Cedar Fire destroyed my home and over 2,500 others in San Diego County. According to the county, as of March 2006, only about 36 percent of the homes have been rebuilt and occupied. The rest of us are in various stages and many of us, including myself, are not even in the building permit stage.

I was one of the people who received a grant from AFT and I cannot begin to express the moral support the money, donated clothing, etc. from AFT, coworkers, and even students gave me. As one person stated, “it may be just a gift bag with pens, highlighters, and spiral bound notebooks, but when everything you owned was destroyed, that really did mean everything—and now we needed something to write with.”

One suggestion: There is a very helpful Web site, www.carehelp.org, for victims of all disasters. This great organization is made up of people who have survived major disasters.

—CARLYNNE ALLBEE
Mesa College
San Diego, Calif.

Editors’ note:

The victims of Katrina, Wilma, and Rita still need your help. To make a donation, go to www.aft.org/katrina. Thank you for your support.

Help us
blanket
America
with
warmth!

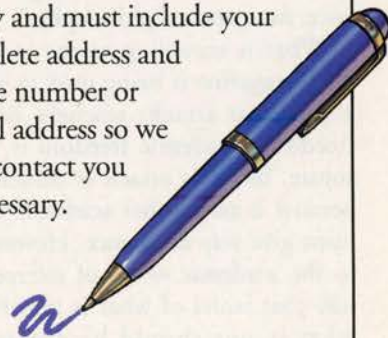


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NOTEBOOK



No Child Left Behind: Let's Get It Right

New Reports on Supplemental Educational Services and Testing Point to Major Opportunities for Fixing the Law's Problems

NCLB's Supplemental Educational Services: Good Idea, Bad Execution

When children are below grade level and struggling with their school work, one-on-one or small group tutoring that is closely aligned with the regular curriculum is an effective way to help them catch up. Ideally, the classroom teacher and the tutor would meet frequently to discuss the struggling children's needs and progress and to ensure that the extra help both reviews and builds on what has been covered in class.

This ideal is probably what lawmakers had in mind when they wrote into No Child Left Behind a requirement that supplemental educational services (SES), such as tutoring, be offered to all low-income students in Title I schools that do not meet their performance targets for three years. But it's just not happening.

According to a new report by the U.S. Government Accountability Office (GAO), only 19 percent of eligible students are receiving SES—and even for these children, their services may not be aligned with the school curriculum. Worse, GAO estimates that during the 2004-05 school year,

“some, most, or all providers did not contact [the students'] teachers in about 40 percent of districts.”

The report also notes that SES implementation has been troubled by everything from notifying parents, to finding SES providers for students who don't speak English, to figuring out how to evaluate SES providers' effectiveness.

As AFT's Executive Vice President Antonia Cortese pointed out, “It is a waste of time and tax dollars when tutoring bears no relationship to a school's curriculum, fails to reach the students who need it most, and lacks any reliable evidence of success.” The AFT is calling on Congress to make sure that SES are delivered in accordance with what experience and research have shown to be most effective—early, intensive intervention provided by a qualified educator, coordinated with the regular curriculum, and available to all students in need.

To read GAO's report, “No Child Left Behind Act: Education Actions Needed to Improve Local Implementation and State Evaluation of Supplemental Educational Services,” go to www.gao.gov/new.items/d06758.pdf.

Missing the Mark: Most Tests Required By NCLB Aren't Aligned to Standards

The AFT has long been a strong advocate for high standards and meaningful accountability. For the last 10 years, since AFT first published “Making Standards Matter,” we've been committed to rating the rigor and quality of each state's core academic standards, and to other aspects of standards-based reform. A new report released by AFT in July 2006, “Smart Testing: Let's Get It Right,” examines how states are doing in aligning their standards and tests.

In brief, most states have made progress in developing clear grade-by-grade standards. But, many have not aligned their high-stakes math, reading, and science tests with a strong set of content standards—meaning the tests probably aren't measuring what teachers are teaching!

Only 11 states had strong content standards and, in a transparent manner, documented that state tests were aligned to those standards in all grades and subjects required by NCLB. At the other end of the spectrum, nine states did not align any of their tests to strong standards in grades and subjects required by NCLB.

Unfortunately, many states had problems not only with alignment between standards and tests, but also with the standards themselves. Just 18 states had strong standards for all grades and subjects required under NCLB. And, despite the national emphasis on reading, on average, states' reading standards are weaker than their standards for other subjects.

The report sums up the problem,

and the only acceptable solution, this way: “Without strong, clear content standards and tests aligned to them, state-level testing is compromised and results are suspect. Unfortunately, this crucial alignment is too often assumed by politicians and pundits eager for bottom-line results. The AFT continues to call on states and districts to administer tests that are fair, transparent, and aligned to clear, specific, and rigorous state content standards. We also feel strongly that assessment programs should be efficient and not spawn redundant, duplicative testing within the system.”

To read AFT's report, “Smart Testing: Let's Get It Right,” go to www.aft.org/presscenter/releases/2006/smarttesting/Testingbrief.pdf.

The Feds Weigh In: Public Schools Perform As Well As Private Schools

In the Spring 2006 issue, American Educator provided excerpts of a study in which Chris Lubienski and Sarah Theule Lubienski reported that when important factors like students' socioeconomic status were taken into account, public schools did as well as—and in some cases, better than—private schools on the 2003 National Assessment of Educational Progress (NAEP) in mathematics. In July 2006, the U.S. Department of Education released a study with a similar methodology—and similar results. The following excerpts provide a brief overview and the key findings. For the full report, “Comparing Private Schools and Public Schools Using Hierarchical Linear Modeling,” go to nces.ed.gov/nationsreportcard/pdf/studies/2006461.pdf.

“The goal of the study was to examine differences in mean National Assessment of Educational Progress (NAEP) reading and mathematics scores between public and private schools when selected characteristics of students and/or schools were taken into account. Among the student characteristics considered were gender, race/ethnicity, disability status, [eligibility for free/reduced-price lunch,] and identification as an English language learner. Among the school characteristics considered were school size and location and composition of the student body and of the teaching staff....

The present report examined results from the 2003 NAEP assessments in reading and mathematics for grades 4 and 8. NAEP draws nationally representative samples of schools and students. In 2003, over 6,900 public schools and over 530 private schools participated in the grade 4 assessments. Over 5,500 public schools and over 550 private schools participated in the grade 8 assessments....

Results from Grade 4

READING

After adjusting for selected student characteristics, the difference in means [be-

tween public and private schools] was near zero and not significant....

MATHEMATICS

After adjusting for selected student characteristics, the difference in means was -4.5 and significantly different from zero (Note that a negative difference implies that the average school mean was higher for public schools)....

Results from Grade 8

READING

After adjusting for selected student characteristics, the difference in means was 7.3 points and significantly different from zero....

MATHEMATICS

After adjusting for selected student characteristics, the difference in means was nearly zero and not significant.”

To summarize, fourth-graders in public schools did slightly better in mathematics, and eighth-graders in private schools did slightly better in reading. Based on this new report and on the previous study by the Lubienskis, we can be reasonably certain that the conventional wisdom on the general superiority of private schools is false.

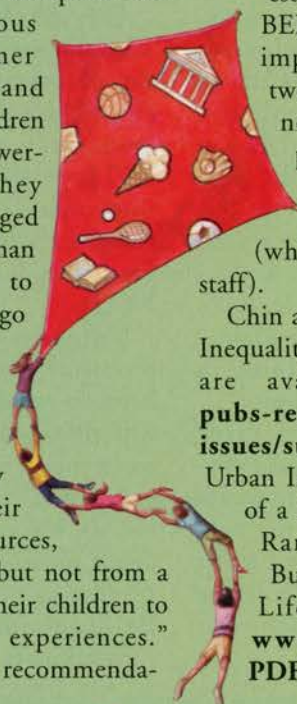
Summer Program Prevents Learning Loss

In the Summer 2005 issue, Tiffani Chin and Meredith Phillips documented the enormous differences in summer learning, enrichment, and fun experienced by children from higher- versus lower-income families. They found that “disadvantaged children are less likely than their middle-class peers to read over the summer, go on vacations, go to summer camp, or get music and art lessons” and that these differences “resulted largely from differences in their families’ financial resources, knowledge, and time—but not from a lesser desire to expose their children to enriching educational experiences.” Naturally, one of their recommenda-

tions was to “establish summer programs that are free (or inexpensive), provide transportation, accommodate parents’ work schedules, and last for most of the summer.”

As a companion to Chin and Phillips’ article, we highlighted a summer program called BELL (Building Educated Leaders for Life), a six-week, full-day program that is targeted toward children from low-income families and combines academics, the arts and other enrichment opportunities, and weekly field trips. Last summer, our confidence in BELL’s effectiveness was based on several evaluations conducted by BELL staff. This summer, the Urban Institute (an independent, highly regarded research organization) published a rigorous evaluation of three BELL sites (two in Boston and one in New York City). Because these BELL sites had nearly 2,000 applicants and just 750 spaces, researchers were able to 1) get parental permission for children to participate in the study; 2) use random assignment to determine which applicants would get a space; and 3) still have plenty of children leftover to make up a “control” group to which the BELL participants could be compared. Because of time and cost considerations, reading was the only academic outcome that was assessed—but the results were impressive. The researchers “estimate that participating in the BELL summer learning program improves test scores by around two months.” Other findings of note were that BELL participants spent less time watching TV and their parents were more likely to read to them (which is encouraged by BELL staff).

Chin and Phillips’ article, “Season of Inequality,” and the sidebar on BELL are available at www.aft.org/pubs-reports/american_educator/issues/summer2005/chin.htm. The Urban Institute’s evaluation, “Impacts of a Summer Learning Program: A Random Assignment Study of Building Educated Leaders for Life (BELL),” is available at www.urban.org/UploadedPDF/411350_bell_impacts.pdf.





WORTHWHILE WEB SITES

The International Children's Digital Library Brings Books in 38 Languages to Your Classroom

Whether you are an English language arts teacher with students who recently immigrated and cannot yet read in English, or a foreign language teacher looking to expand your classroom library, you'll find what you need in the International Children's Digital Library. This new, Web-based library is building a collection of more than 10,000 books in at least 100 languages that is freely available to children around the world via the Internet. Currently, the library has over 1,500 children's books in 38 languages. And, users of the Web site can choose among 11 languages (Arabic, Chinese, English, Filipino/Tagalog, French, German, Hebrew, Persian/Farsi, Portuguese, Spanish, and Thai) in which to read the navigation and search options.

The main goal of the project is to make sure that all children have books to read—but the creators of this library are looking

for particularly high-quality books that, in their words, provide "all children with direct access to the resources that are essential to enlightened citizenship: literature, knowledge, and information." They believe that, "Literature is one of society's means for exposing young hearts and minds to new and foreign ideas. Engaging stories help children grow intellectually and emotionally, understand who they are, and inspire them to explore the world around them."

A project like this is a major undertaking; the digital library is being built—with special focus on making it child friendly—by the University of Maryland's Human-Computer Interaction Lab. Its main funding comes from the Library of Congress, National Science Foundation, and several other big donors—but donations of money, books, translation skills, and knowledge of children's literature are all essential. The site's donation page has many ideas for how you can contribute. The library is online at www.childrenslibrary.org.

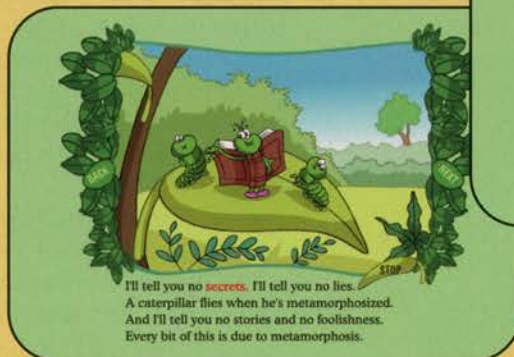
Children's Writing Contest—Winning Entries to Be Animated and Posted Online

After reading books online through the International Children's Digital Library, your students may wonder how they can get their stories online for others to enjoy—SillyBooks.net has the answer. During the 2006-07 school year, SillyBooks.net is having a writing contest for children ages 4 to 16. Entries can be fiction or nonfiction and cover any topic, but they must be under 300 words. One winner is being chosen each month—and each winning entry will be professionally illustrated, read and recorded by actors, put to music, animated in Flash, and posted on SillyBooks.net.

Then, over the summer, readers can vote for their favorite book as the Grand Prize winner. In addition to having their books professionally published online, monthly winners will receive \$25 and the Grand Prize winner will receive \$200.

For inspiration, check out

the professionally recorded and animated children's books and songs on SillyBooks.net. The site is very child friendly (no inappropriate content or ads), and both the books and songs support beginning readers by highlighting each word as it is being read or sung aloud. The sample pages shown here are from one of their most popular books, *Metamorphosis*—you'll have to go online to read the rest and to hear the adorable way this one is sung.



Farewell, Andy

“We need more art on this page, more white space, and a deeper red on the cover type.” It was hard to argue (though we sometimes did) with Andrew Bornstein, our beloved art director and designer; the art he commissioned and the pages he designed were so beautiful. But that was before. Sadly, Andy passed away this June, just days after completing his work on the summer issue of *American Educator*.

Andy was our first and, until this issue, only art director and designer. We stole him from the *Washingtonian* in 1977, and we were lucky to hold onto him for three decades. We depended on him in so many ways—for his willingness to work crazy hours and to put up with our last-minute changes after we assured him we were done; for his extraordinary knowledge of world history and geography and the arts, all of which greatly enriched his work; for his patience in delivering the Design 101 lecture over and over and over; for

making reams of copy somehow fit into exactly 52 pages; for his appreciation of artists and his understanding of how to work with them. As one *American Educator* artist, Michael Gibbs, wrote to us: “I loved the guy... He knew how to work well with illustrators, better than any art director I’ve worked with.”

We loved him, too, not just for his sense of design, but for his dapper dress; his world-class collections of Star Wars and Lucille Ball memorabilia—and globes of all sizes and kinds; his wide interests in politics and world affairs; his love of the

performing arts, including season tickets to Washington’s Shakespeare Theatre, the opera and the ballet, plus regular jaunts to New York to catch the latest Broadway plays.

In paying tribute to him and his work, we will resist the temptation to try to tell you with words. No artist can be fully captured in words, and Andy was indeed a great graphic artist. Instead, we’ll let you glean his love of art, his breadth as an art director, and his skill as a designer from this brief retrospective of his work.

For many, many days to come, we will still expect the polite knock on our office door and the man in the Hermes tie and signature Borsalino straw hat, a new batch of art sketches in hand, to appear. But, alas, it is not to be. Farewell, Andy.

—Andy’s *American Educator* family





ILLUSTRATED BY NENAD JAKESEVIC AND SONJA LAMUT

The Neglected Muse

Why Music Is an Essential Liberal Art

By Peter Kalkavage

*"Music and rhythm find their way into the secret places of the soul."
—Plato*

Music transcends the classroom, the concert stage, and professional recordings. It pervades life. Mankind has long used music in all sorts of ways, to celebrate, to lament, to dance, to pray, to soothe or arouse, to woo, to infuse courage and terrify an enemy, to commemorate, to unite a community. Even the most primitive societies are keenly aware of the power of music, and various myths from cultures throughout the world confer on music and musicians a lofty, even divine significance. In some myths, notably in Plato's dialogue *Timaeus*, the world springs from the composing power of a musician-god.

That music is a vibrant part of life is especially clear in the case of the young. Most young people cherish their favorite music as their most intimate friend and their absolute refuge from care and stress. When we get older, music is inevitably bound up with nostalgia. We older folk have only to hear a song from our youth in order to be magically transported, as if by a familiar scent, to a former time, place, self, or love. Music does not merely sound: It casts a spell and conjures worlds. Music is no mere addendum to human life, no historical acci-

dent that might just as well have never been, but an essential part of who we are as human beings.

Why should young people study music? One answer presents itself on the basis of what I have said so far: Music has a central place in the lives of young people. For many, music *is* their life. Teaching music to the young is therefore much more than conveying historical information and technical facts, or helping students develop their musical talent. It is more than the effort to make them competent and aesthetically refined. In getting young people to engage in a serious study of music, we are giving them an opportunity to know themselves better by becoming more precisely aware of the amazing power that music has over them. Also, as we shall see, we are giving them an opportunity to deepen their knowledge of the natural world—and of our connection to it—by becoming more aware of the mathematical order that underlies music.

Listening and Singing

In my three decades at St. John's College in Annapolis, Md., where all students are required to study music for two years, I have learned that students cannot engage in substantive musical learning without actual musical experience. Such experience takes two forms: listening to and making music.

Listening is an obvious requirement, but it is harder than it might seem. What should students listen to in their music classes, and what should they listen *for*? We should, first and foremost, expose our students to great music in the classical tradition (e.g., works by Bach, Mozart, Beethoven, etc.) and then to other examples of great music (e.g., folk songs, blues, and jazz)—broaden their horizons, as the saying goes. But how to do this is difficult. It makes sense to start with classical works that are appealing and fairly short. For instrumental music, single movements from symphonies, piano sonatas, and string quartets work well. Perhaps the best "first thing" to

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This discovery suggested that great music was not just a matter of taste and convention, but was grounded in the very nature of the physical universe—which could explain why humans respond to it.

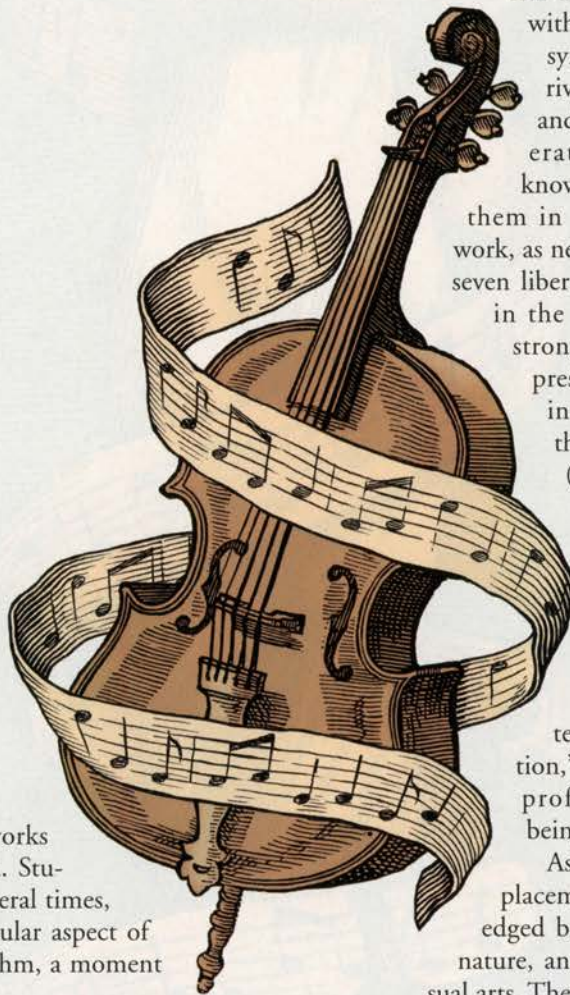
manizing pleasures: that of cooperating with others in the attempt to form a beautiful whole that is more than the sum of its parts. Students thus attain in sound the ideal of a perfected human community—a perfected friendship that preserves differences but renders them harmonious. To sing is to transcend the isolation and vagary of selfhood. Such transcendence is one of the greatest gifts of a genuine liberal education.

Music's Connection to Math and Nature

Music, amazing in its power over our emotions and character, is even more amazing because it is eminently capable of being *studied*. Traditionally, music is one of the seven so-called “liberal arts.” Liberal, here, has nothing to do with its current, political usage. It is not a synonym for progressive. Rather, it is derived from the Latin *liber*, meaning free, and is best associated with words like liberate. The liberal arts constitute the knowledge that free people need to guide them in their decision-making at home, at work, as neighbors, and as citizens. The system of seven liberal arts was first developed and taught in the Middle Ages and has continued to strongly influence education down to the present day. The liberal arts are divided into a trivium (which is Latin for the three ways or roads) and a quadrivium (meaning four ways or roads). The trivium consists of the arts of grammar, logic, and rhetoric; the quadrivium consists of the arts of arithmetic, geometry, astronomy, and music. The former develops the arts of language, the latter the arts of measurement. Together they provide a template for a so-called “liberal education,” whose end is not a technically trained professional, but an educated human being.

As a quadrivial art, music has an exalted placement that points to the long acknowledged bond that music has with number and nature, and sharply distinguishes it from the visual arts. The connection between music and mathematics was established by the legendary Greek, Pythagoras. Pythagoras discovered that the most commonly used (and most singable) musical intervals had intelligible mathematical counterparts.

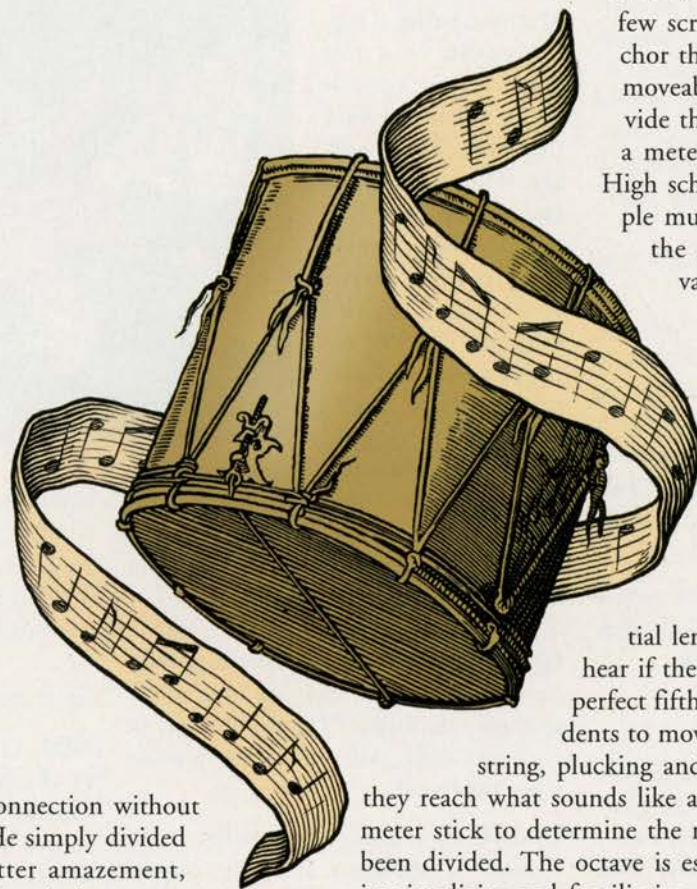
Let's use the octave as an example. To the musician, notes that are one octave apart sound alike—the only difference is that one is higher, or lower, than the other. Modern science tells us that an octave is a musical interval in which one note has either double or half the frequency of another note—if one note has a frequency of 400 Hz (hertz or cycles per second), the note an octave above it has a frequency of 800 Hz and the note an octave below it has a frequency of 200 Hz. So, the ratio for an octave is 2:1.



listen *for* is simply that musical works have a beginning, middle, and end. Students can listen to a given piece several times, each time listening for some particular aspect of the work: a recurring theme, a rhythm, a moment of heightened tension, etc.

But listening by itself is not enough. Students, by singing or playing an instrument, must be made to realize that music is not the symbols on the page any more than a poem is the written word. Music and poem come to be what they are only in the act of sounding. The object of musical study is not the written symbol but the musical event—the living phenomenon, for which the score is but the recipe. More than anything else, singing brings music to life and overcomes the passivity that often attends the act of listening. In singing, students *are* the instrument and the music. Most important here is not that students sing well, but that they make their best effort. In singing great choral works, however imperfectly, students get to experience one of life's most hu-

The study of music as a liberal art gives students an extended opportunity to scrutinize their opinions—and to confront the causes and effects of their passions.



Pythagoras discovered this connection without the knowledge of frequencies: He simply divided a string in half and, to his utter amazement, heard that this division produced the octave. Likewise, he discovered that when one string is two-thirds the length of another, it will produce a higher note that fits another common musical interval, a perfect fifth (the first melodic interval in “Twinkle, Twinkle, Little Star”). This discovery—that notes that sound good together can be represented mathematically with ratios of small whole numbers—was far-reaching; it suggested that great music was not just a matter of taste and convention, but was grounded in the very nature of the physical universe—which could explain why humans respond to it. Our sensuous experience of music might, in fact, be a deep if unconscious response to an intelligible order: The most common and singable musical intervals might be *ratios that we automatically sense*. Moreover, it suggested the possibility of a mathematical physics. If precise, discoverable, numerical ratios were at work in the relation-

ships between notes separated by common musical intervals, then wouldn't they also be at work in, say, the relationship between distance and the time it takes for an object to fall to the ground?

It is easy, and fun, to recreate the Pythagorean discovery by experimenting with different divisions of a string on a device known as a monochord because you need only one string to do Pythagorean experiments. But the device works best when it has two strings: one that is divided and another that is not, so that it can serve as a reference pitch. A sonometer is very easy to make, as I discovered when my son and I constructed one

for his high school science project. All you need is a thick board, metal strings, a few screws, two small bridges to anchor the strings at both ends, a small moveable “bridge” that is used to divide the string at various points, and a meter stick to take measurements. High school students can use this simple musical instrument to verify that the most common musical intervals do indeed correspond to ratios of small whole numbers.

They can do this in two ways. One way is to measure off a length of the string that corresponds to a given ratio (say, 3:2, or two-thirds the length of the undivided string), move the bridge into place, and then pluck the resulting partial length (the two-thirds length) to hear if the predicted interval sounds (the perfect fifth). The other way is for the students to move the bridge around under the string, plucking and listening at each point, until they reach what sounds like a given interval and then use a meter stick to determine the ratio into which the string has been divided. The octave is especially interesting because of its simplicity and familiarity. Knowing that its ratio is 2:1, students can divide a string exactly in half *without ever using a visual measuring device*. All they have to do is listen for the division that sings the octave.

This simple Pythagorean experiment is a real treat for students, who invariably experience amazement at the mathematical grounding of music in nature. The experience helps their learning in a number of ways. It makes them realize that the musical intervals and the scale acquire a precise definition only through the power of mathematics (ratios); that the practical problem of tuning a stringed instrument like a guitar or a piano is a mathematical problem of getting different ratios to fit with one another in a consistent scale; and that the tuning they have inherited (the 12-toned equal temperament in which an octave is divided into 12 equal half-steps) is the

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Wynton Marsalis on America's Musical Classics

What They Are and Why We Need to Share Them with Our Kids

Wynton Marsalis, the jazz trumpeter who has won nine Grammy Awards, is known internationally as a musician of the highest caliber and as artistic director of Jazz at Lincoln Center. But there is another role that he takes just as seriously as being a performer: being an educator. From one-on-one lessons with aspiring trumpeters to whole-school sessions in a noisy auditorium, Marsalis consistently makes time to share the music he loves with children. In the following Q&A provided to American Educator by Jazz at Lincoln Center, Wynton Marsalis explains why all children—not just the few who will become musicians—should study music.

—EDITORS

Question: Through Jazz at Lincoln Center, you've established many music education programs—Jazz for Young People concerts, Jazz in the Schools performances and demonstrations, and the Essentially Ellington High School Jazz Band program. Why is music education so important?

Wynton Marsalis: Music, in its purest form, encompasses the very ideals that we want to impart to our children.

Q: Can you give an example?

WM: Sure. One ideal that music teaches us is how to get along with others. Consider the music I love: jazz. Each member of the group can improvise, but none of it works—for a soloist or an ensemble—if the musicians do not play in balance. If the drummer, who plays the loudest instrument, decides he wants to be much louder than the bassist, who has the softest instrument, you're going to have discord. This group dynamic teaches the importance of choice, and many choices require some form of sacrifice. You must listen. You must have a conversation. The group must work together to achieve its goals.

Q: In the past, you've lamented the fact that only 25 percent of the nation's eighth-graders are able to play instru-

ments in their music classes. What does playing an instrument teach a student?

WM: Well, for one, music teaches us the language of expression. You and I and Martin Luther King, Jr., could read the exact same speech and it wouldn't sound the same. The words are the same, of course, but why is it that Dr. King's voice and tone carried something beyond the words? It's the expressiveness of the performance. Similarly, three people playing a trumpet don't sound the same. They can play the same note or melody, but only some trumpet players have a feeling that touches our heart.

Q: You've called for the federal government to put more funding into music and arts education. Why should that be a priority today when there are so many other concerns?

WM: As Americans, when we live in the shadow of terrorism, it's more important than ever that we have a sense of our identity. When you look at a Stuart Davis painting or listen to Charlie Parker play the saxophone or watch an Arthur Miller play, you're living an important part of the American experience. We need a generation of leaders who understand why we must defend our country, of course. But more importantly, they need to understand what exactly it is that we're defending; something more than just a slogan. We need a generation of diplomats who understand and take pride in our culture and can share it with others. Only then can we truly put our best foot forward and



show the world that America is about a lot more than some "shoot 'em up" movies, quasi-pornography for kids, and a 99-cent hamburger that makes you reach for some Roloids.

Q: Is music really central to our identity?

WM: Of course. Music has always been at the heart of our national identity. George Washington watched the British return to England to the tune of *The World Turned Upside Down*. In the Civil War, it was *The Battle Hymn of the Republic* versus *Dixie*.

Q: Why do certain pieces of music have such power over us and such timeless appeal?

WM: Because art interprets the human soul, and the technology of the human soul does not change. The power of great music is timeless. That's why it remains such an indispensable tool for teaching our youngsters. What's more, music is one of the few things that transcends the boundaries of race, class, religion, and geography that too often divide us.

“The music our children hear on the radio may feel good, like a candy bar feels good, but it has no nutrition.”

—Wynton Marsalis



PHOTOGRAPH © MELONAE McLEAN



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Q: Speaking of transcending boundaries, tell us a little about the cultural contributions of African-American music.

WM: Going way back, the slaves created the first viable body of purely American music, the Negro spirituals, and those songs are still played, sung, and recorded today and still have meaning. Then, the 20th century saw the blues become the foundation for every music to follow—American popular song, country and western, bluegrass, gospel, rock-and-roll, and the counter-culture music of the 1960s, which was the soundtrack of the civil rights and anti-war movements. And, of course, the blues is the lifeblood of jazz. You turn on the radio today, and even in the music that your kids are listening to, the theme songs of Generation Y, you still hear echoes of the blues—breaks, riffs, call and response.

Q: How is your music, jazz, received around the world?

WM: No matter where I go, people respond to music in the same way. I hear: “Do people like the music in France?” Or “Do they like it in Japan?” Or “Do they like it in Russia?” Everywhere we go, they do the same thing: “Keep swinging.” “Can we hear another tune?” “When are you all going to be back?” Music is the one truly universal language with the power and the spirit to bring people together.

Q: If the great music that you play has such worldwide appreciation, why are

today’s top-selling songs of such low quality?

WM: Over the past 20-something years, I’ve seen a generation of Americans who are culturally ignorant, who lack a basic connection to, and an understanding of, the arts—of music, of theater, of dance, and of the visual arts. I also see a government that is just unwilling to invest in turning this situation around. And in a nation that’s as rich in culture and dollars as ours, that’s truly unacceptable.

Q: So the problem is with the society as a whole, not just today’s kids?

WM: We hear all the time something is wrong with the kids—the music they listen to, what these kids are doing. I always tell older people it’s not the kids. They act on what we give them. They don’t have the ability to control what’s going on. They follow.

Q: If they follow, with what should we lead them? That is, what should music teachers and bandleaders select for their students?

WM: Many times, what’s offered in the schools is a watered-down version of the latest pop song and, as a result, our

kids don’t even know what a classic is. School bands should play, for example, a John Philip Sousa march or a Scott Joplin rag or a symphonic dance by Bernstein or a Duke Ellington swing, something swinging.

Q: But don’t the young people in the band want to play

their favorite music?

WM: If so, it’s because they’ve never heard the music that so many of the world’s great musicians learned from, or even the great music from our country. Instead, they only know about the latest commercial musical ventures—ventures many times designed to drive a wedge between them and their parents, and exploit their young sexuality.

Q: So do you see it as the music teacher or bandleader’s job to broaden their musical taste?

WM: Yes. The music our children hear on the radio may feel good, like a candy bar feels good, but it has no nutrition. The foundation of any music education cannot be found in the Top 40 this week. That’s not how you train the ears of a musician or even a non-musician. That’s not how you lead kids into a deeper understanding of who they are or who they will be, which is even more important. We’re sending our kids into the world with their skills and talents untapped and underdeveloped. We are doing that; it’s not them. We’re depriving them of a fundamental part of their educational development, and our nation is really much poorer for it.

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product of a rich, complex history marked by incredible ingenuity and laborious effort.

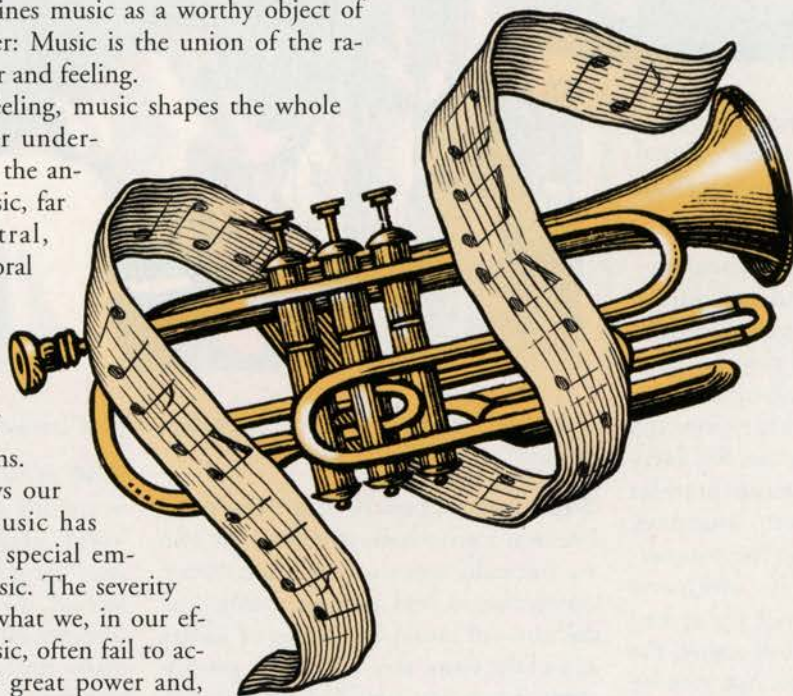
Music Shapes Us

Even apart from this profound connection with mathematics, music is pre-eminent among the arts for the order and clarity, the sharply defined character, of its elements. Music moves us, sometimes to overpowering emotion. It does so through well-defined structures, through an order of tones and rhythms. It is not the mere sound of drums but their rhythmic beating that stirs us. Here we come upon the central paradox of music, the paradox that defines music as a worthy object of sustained intellectual wonder: Music is the union of the rational and irrational, of order and feeling.

Ultimately, by shaping feeling, music shapes the whole human being. For a proper understanding of this, we turn to the ancient Greeks, for whom music, far from being morally neutral, played a decisive role in moral education. Aristotle's *Politics* ends with an extensive discussion of the proper moral and political uses of music and the effect of music on the souls of citizens. In the *Republic*, Plato draws our attention to the power music has over the young. He places special emphasis on the danger of music. The severity of his critique underscores what we, in our effort to excuse or defend music, often fail to acknowledge: that music is a great power and, like any great power, can be used for great good or great evil. Why is music so emotionally powerful, far more powerful than the visual arts? Plato provides a possible answer. In the *Republic*, he calls upbringing in music "most sovereign" because rhythm and concord "most of all sink down into the inmost part of the soul and cling to her most vigorously." In experiencing music, we do not behold from a distance but drink in and incorporate. Some forms of music, so Plato claims, are conducive to orderliness of soul and the love of grace and beauty; others indulge the baser passions and feed the lust for disorder and self-indulgence. Studying music as a liberal art gives students the opportunity to consider the possibility that Plato is right—that music is not limited to taste and enjoyment, but has a powerful influence on who we are and whether we are ennobled or debased.*

This leads me to the observation that we are shaped not only by music, but also by our opinions about music. It is all the more important to revisit the connection between music and moral education in a culture like ours, steeped as it is in self-indulgence and vulgarity. The study of music as a liberal art gives students an extended opportunity to scrutinize their opinions—and to confront the causes and effects of their passions.

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Cultivating Musical Taste

By studying music, we want to cultivate our students' taste, encourage their appreciation of beauty. But what *is* this beauty? Why do we say that an aria from Mozart's *Magic Flute* or a movement from Beethoven's *Ninth Symphony* is beautiful? Although a complete definition of beauty is beyond the scope of this essay, I will venture a few remarks on this topic.

I begin with the old saying, "Beauty is in the eye of the beholder" (or the ear of the listener). This saying is both obviously true and obviously false. True because beauty exists only in relation to a responsive subject: It must appear beautiful *to* someone. False because merely thinking that something is beautiful does not make it so—judgments of beauty are not relative. Thinking that they are confuses judgments of mere subjective liking with judgments of aesthetic taste, which al-

*It is interesting to note that the Greek word for beautiful (*kalos*) also means noble, just as the word for ugly (*aischros*) also means base.

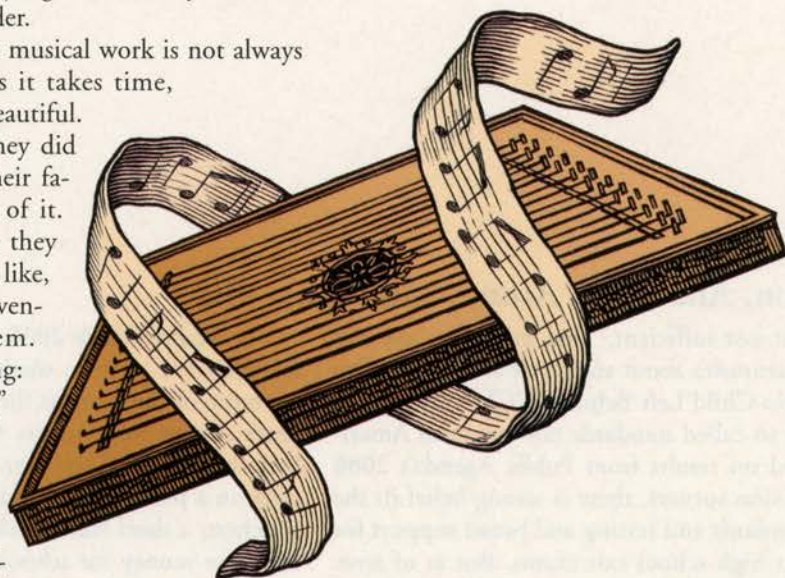
ways claim to be objective and universal. After all, beauty is not the same as pleasure. Just as beautiful things do not always immediately please, pleasures are not always beautiful. We can take pleasure in something ugly and base. Beauty is not a feeling in a human subject but a quality we perceive in an object. The perception comes first, then the emotional response. Beauty can take us by surprise. It strikes, pierces, even transforms us. This would not be possible if beauty came from us. Beauty educates us by taking us outside ourselves. It compels us to transcend self-interest and self-feeling. We do not merely behold beauty, but look up to it. In appreciating beauty, we admire that which deserves to be admired. To cultivate taste is therefore to cultivate judgment. Beauty, in short, is in the eye of the *educated* beholder.

Moreover, the beauty of a great musical work is not always immediately evident. Sometimes it takes time, and training, to realize that it is beautiful. Students often say that a piece they did not like at first became one of their favorites with repeated experience of it. Their taste changed, not because they got used to something they didn't like, but because an inherent quality eventually became apparent to them. There is an ancient Greek saying: "Beautiful things are difficult." This is true to our experience of beauty, which sometimes comes to us only if we make an effort to go to it.

In order for beauty to be admired, it must first be recognized. As discussed in the previous section, there is a long tradition that connects beauty and order, especially mathematical order. The musician and mathematician Edward Rothstein, in his book *Emblems of the Mind*, shows how mathematical relations underlie the beautiful in music. He writes: "A composition is a construction of patterns and proportions, resembling an argument in mathematics." Relations like symmetry and various sorts of proportion are, in fact, evident in the works of the great composers.

But mathematics, though beautiful in its own right, cannot fully explain the beauty of music. By itself, it cannot explain our response to a Mozart aria or a Beethoven symphony. Why do these pieces continue to attract listeners who become familiar with them all around the world, not just in the West? These pieces seem not to have been written for one country, people, or time. They are universal and belong to everyone. They strike us with their amazing wholeness and perfection. Everything seems to fit and cohere in a carefully worked out scheme. The orderliness is not merely correct but inspired. With time and effort, most of us can detect the layers of order and the balance of forces at work in these pieces: the architecture of the whole. We can detect how tensions build and are sustained, and how they are satisfyingly resolved. We can even

Changing a note in a melody—in effect, disrupting a familiar whole—is also a good way to get students to become aware that there *is* a whole.



learn to identify the technical means by which these effects are produced. We hear how a theme is announced and then developed, how it seems to take on a life of its own, occasionally even seeming to spin out of control only to be brought back into the economy of the musical whole.

Beautiful music pleases and sometimes challenges us with its intelligence, depth, and complexity. It does not please for the moment, but invites endless re-experience and return. The more we listen, the more we hear. And the more we study the music, the more reason we have to find it beautiful. Music unfolds in time and exhibits a delightful play of forces or tensions. In music, the question of beauty comes down largely to this perception of how musical forces conspire to form a whole.[†] These forces or tensions are at work in the familiar major and minor scales, and in the chords of harmony. Great musical works exploit these tensions to the fullest. That is why they are both maximally ordered and emotionally potent, why, as we say, they are *beautiful*.

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[†] For discussion of the treatment of tones as forces, see the *Sense of Music* by Victor Zuckerkandl, Princeton University Press, 1959.

Balancing the Educational Agenda

*Parents are Pleased with Schools' Higher Standards—
But Now They're Focused on Funding, Class Size, and Behavior*

By Jean Johnson, Ana Maria Arumi, and Amber Ott

Necessary, but not sufficient. That might be one way to sum up attitudes about standards and testing five years into No Child Left Behind (NCLB) and over a dozen years into the so-called standards movement in American education. Based on results from Public Agenda's 2006 "Reality Check" opinion surveys, there is strong belief in the intrinsic value of standards and testing and broad support for key elements such as high school exit exams. But as of now, every group surveyed by Public Agenda—parents, students, teachers, principals, and superintendents—considers other educational issues more urgent. Among parents, concern about low academic standards in local schools has dropped over the last decade.

Public Agenda has been monitoring Americans' views on academic standards, standardized testing, No Child Left Behind, and other key elements of the standards movement for more than a decade. Our Reality Check surveys and other research have shown repeatedly that support for raising standards is broad and heartfelt—and, based on the 2006 data, that core of support remains intact. In multiple findings, parents, teachers, and students say standards and testing are necessary.¹ Parents and teachers give local districts high marks for pursuing standards-based reform carefully and reasonably.

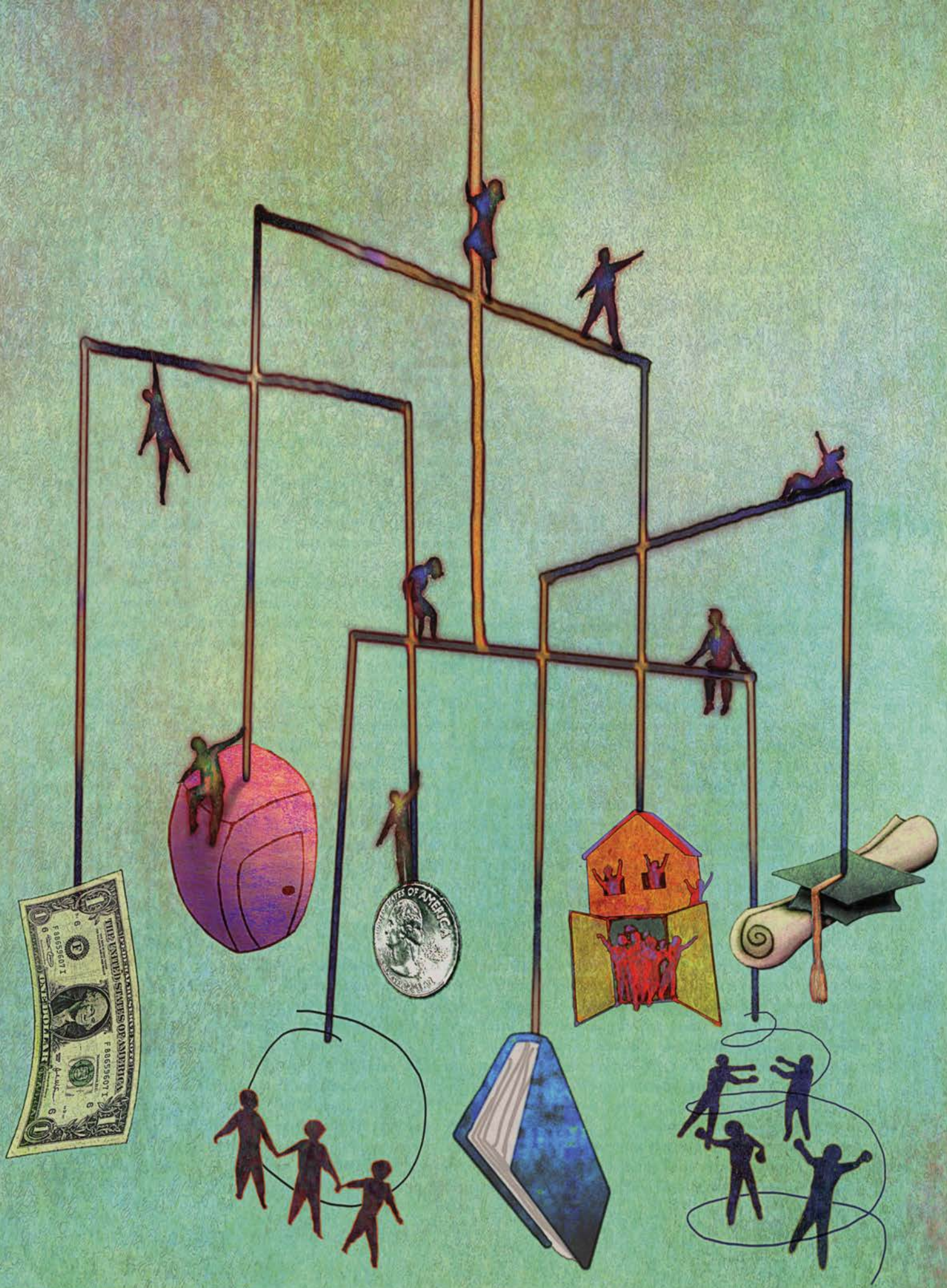
Jean Johnson is executive vice president and director of programs with Public Agenda, where Ana Maria Arumi is director of research and Amber Ott is research associate. This article is excerpted with permission from Reality Check 2006: Is Support for Standards and Testing Fading? The sidebar on page 24 is excerpted with permission from Reality Check 2006: How Black and Hispanic Families Rate Their Schools. Both reports are available on Public Agenda's Web site at www.publicagenda.org. Funding for these surveys was provided by the GE Foundation, the Nellie Mae Education Foundation, and the Wallace Foundation.

But Reality Check 2006 also shows quite convincingly that relatively few parents, teachers, principals, or superintendents see more of the same as the best course for the future. In this year's survey, respondents were asked to choose among four hypothetical candidates for the local school board—one running on a platform of standards and testing, a second backing vouchers, a third backing charter schools, and a fourth calling for more money for schools and smaller classes. Among parents, the standards and testing candidate ranks a distant second to the candidate calling for smaller classes and more money for schools. Fewer than one-in-four parents (22%) chose the standards candidate. Among the educators, support for a school board candidate focusing primarily on more standards and testing is in the single digits.

This tepid support for more standards and testing is not a rejection of the idea itself, nor is it the long-anticipated and much-feared "backlash to testing." Neither parents nor students report significant concern about the number or types of tests youngsters currently take. The majority of teachers are troubled and frustrated by testing, but even here, the concern is the amount of testing and how the tests are used—not whether testing can be useful in and of itself. More than 8-in-10 teachers back a high school exit exam covering either basics (62%) or more advanced learning (24%).

Nor is the negative response grounded in broad hostility to No Child Left Behind, although just 15 percent of teachers say the law is improving local education. Relatively few principals (22%) and superintendents (9%) say meeting the law's requirements is their most pressing problem. Among parents, knowledge about and attention to the law is still sparse. Over half of parents admit that they don't know enough about the law to say whether it is hurting or helping. Among those who are familiar with it, the reviews are split.

Instead, the lack of enthusiasm for standards and testing as a top priority for the future comes from two sources. One is the



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judgment among most parents, students, teachers, and school administrators that standards and testing are not the be-all and end-all of school reform. They see other issues as equally pressing. Not surprisingly perhaps, educators say funding is a higher priority, but they are not alone. About 4-in-10 (39%) parents say that it's a “very serious” problem in their community that “schools are not getting enough money to do a good job.” Among black (49%) and Hispanic parents (52%), the numbers are substantially higher.

Similarly, all groups cite problems related to student behavior, motivation, and cooperation as more urgent than low standards. This focus on discipline and school climate is not new. Public Agenda's “First Things First” report in 1994 outlined the broad belief that unless schools are safe, calm, respectful and purposeful, teaching and learning are unlikely to thrive. Most teachers give schools good marks on discipline issues, but 76 percent say they could teach more effectively if they didn't have to spend so much time dealing with disruptive students; 85 percent say the school experience of most students suffers at the expense of a few chronic troublemakers.² Among parents, 73 percent say that the most pressing problems in local high schools are social problems and kids who misbehave. Just 15 percent say low academic standards and outdated curricula are more urgent. Since the standards movement, with its strong emphasis on academics and testing, touches on these concerns only peripherally, it is not surprising that people are beginning to yearn for something that addresses them more directly. But it's critical to note that concerns about low standards, violence, poor discipline, and ineffective principles are

substantially greater among black and Hispanic parents and students, and teachers in largely minority schools, than among white parents and students, and teachers who teach at predominantly white schools.³

The second source of the lack of enthusiasm for standards and testing as a top priority, especially among parents, is a different sense of what “the standard” needs to be. This gap between parents' views on optimal standards and those of key business, government, and educational leaders emerged strongly in an earlier Reality Check 2006 report, “Are Parents and Students Ready for More Math and Science?” Many in leadership believe that standards in American high schools need to be raised dramatically to ensure the country's economic prosperity in a more competitive world.⁴ Meanwhile, most parents, especially white parents, are quite satisfied with the academic portion of their children's education. Majorities of all parents (65%) believe the work their child does in school is harder than what they themselves studied when they were younger.

It is probably worth remembering that much of the public's initial support for raising standards grew out of anxiety over basics. Parents and the public feared that too many youngsters were floating through the system without mastering even fundamental reading and math skills. Consequently, the strong calls for higher standards, more testing, more solid graduation, and promotion requirements touched a responsive chord with many segments of the community. But as promotion standards toughened, as graduation standards were raised, as parents began to see their own children doing harder work than they did when they were in school, the problem of “low standards” began to lose its edge.

For leaders who are convinced that American schools and students need to strive for much higher levels of learning, these findings suggest a two-pronged agenda. One essential goal for leaders is to get their own message out more effectively. If leaders believe that it is imperative to arm the next generation with top-notch skills in math and science, in foreign languages, and in other areas, they need to move beyond panel discussions at business conferences and “get out there.”

But leadership may also need to broaden its agenda. Based on the results here, the strong focus on standards and testing is beginning to strike key segments of the public as a “Johnny-One-Note” approach. Among different groups there is unease about school funding, class size, school climate, student cooperation and motivation, family support, and social problems that seep into the schools. Teachers seem especially troubled about the current course, and majorities say they feel left out of discussions on how to improve schools and learning.⁵ Some of the teachers' doubts and frustrations may be affecting progress. After all, few generals would choose to go into the field with a demoralized, unconvinced fighting force.

The Reality Check 2006 results pose a fundamental strategic question for leaders who believe higher standards are essential. Just how long will communities continue to support the movement without hearing some serious discussion of their other pressing issues as well?

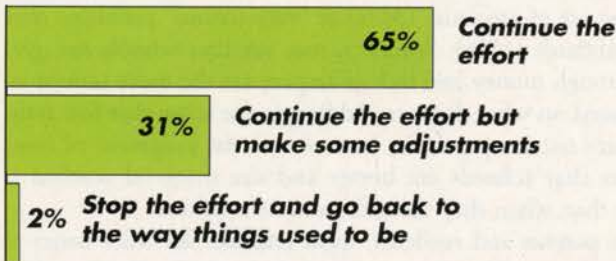
Finding One: Parents and Students Support Standards and Testing...

The vast majority of parents and students continue to voice strong support for raising academic standards. Eight-in-ten students say that requiring students to meet higher standards for graduation and promotion is a good idea. Most parents (86%) say their own district has been "careful and reasonable" in its efforts to raise standards and virtually none (2%) believe schools would be better if districts returned to the policies of the past.

Most parents support continuing to raise standards.

When it comes to raising academic standards, do you think your school district should:

Based on the 63% of parents who say that their public schools are making an effort to raise standards.



Most students say requiring them to meet higher standards for promotion and graduation is a good idea.

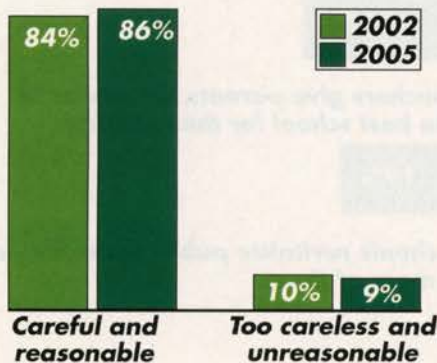
Percentage of students who say that requiring students to meet higher standards in order to be promoted or to graduate is a good idea:⁶



Large majorities of parents say local schools have been careful and reasonable in raising academic standards.

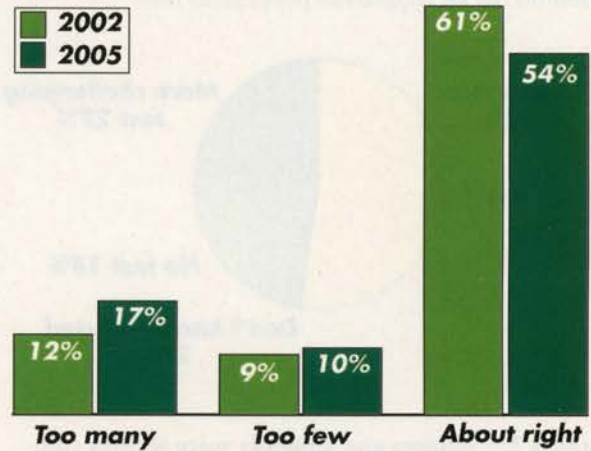
Overall, would you say that the schools are careful and reasonable in putting in place the higher academic standards, or are they being too careless and unreasonable?⁷

Based on the 63% of parents who say that their public schools are making an effort to raise standards.



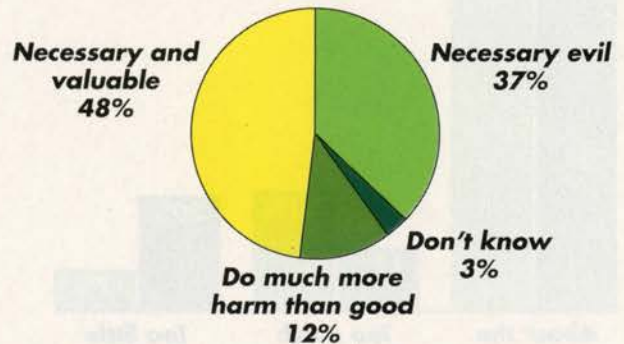
Relatively few parents complain that their child has to take too many tests or that tests are harmful.

Would you say that your child is required to take too many standardized tests, too few, that things are about right, or don't you know?⁸



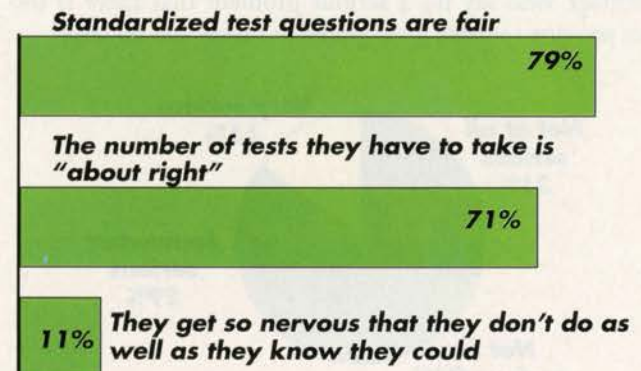
Most parents think tests are necessary.

Please tell me which comes closest to your view? Standardized tests: 1) are necessary and valuable—they are a reliable yardstick for measuring student performance; 2) are a necessary evil—ultimately, the schools need some kind of standardized assessment; or 3) do much more harm than good—the schools would be better off if they were completely abandoned.



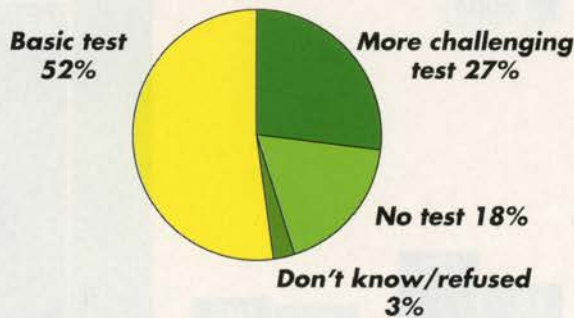
Relatively few students complain about too much testing or say they get overly nervous about them.

Percentage of students who say:



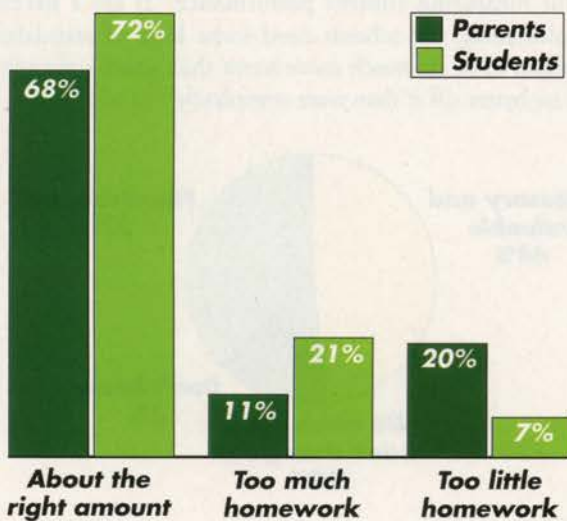
Most students support a high school exit exam.

Before students are awarded a high school diploma, would you want your school district to require students to: 1) pass a basic skills test in reading, writing, and math; 2) pass a more challenging test showing they have learned at higher levels; or 3) kids should not be required to pass a skills test?



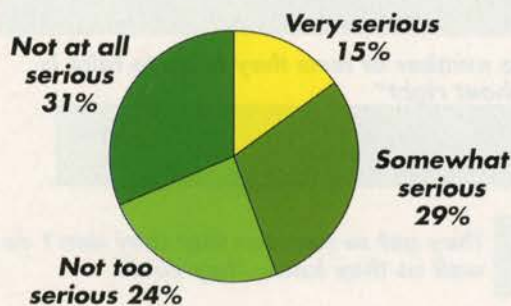
Relatively few parents and students voice serious complaints about too much homework.

Overall, do you feel that your child is/you are getting too much homework, too little, or about the right amount?



Relatively few students say too much academic pressure is a "very serious" problem.

Percentage who say it's a serious problem that there is too much pressure to make good grades in classes and on tests:



Finding Two:

... But Other Issues Are Now Top Priorities for Parents, Students, and Teachers

Despite broad support for standards as a crucial element of public education, Reality Check shows that most parents see other issues as more urgent. The survey presented respondents with four hypothetical candidates for a local school board election. Among parents, a candidate calling for more testing and higher standards comes in a distant second to a supporter of smaller classes and more funding. Parental anxiety about low academic standards has fallen over the last decade. Concern about a lack of emphasis on basic skills has fallen, as well.

When asked about a range of issues facing local schools, relatively few parents or students say low academic standards are a "very serious" problem in their area. Parents are twice as likely to choose lack of money (39%) and lack of respect for teachers and the use of profanity (34%) as "very serious" problems over low standards (15%). Students, too, say that schools not getting enough money and lack of respect are the more serious issues based on what they see. Adding to the sense that low standards are not a top priority item now is the judgment of most parents that schools are better and the material studied is harder than when they themselves went to school.

Like parents and students, most teachers see other issues as more important than low standards in local schools. Over half of teachers (54%) say that schools "not getting enough money to do a good job" is a "very serious" problem in their community. Many also see lack of respect and crowded classrooms as "very serious" issues. Just 10 percent of teachers say low academic standards are a "very serious" problem where they teach.

Fewer than one-in-four parents would support a school board candidate running mainly on a testing and standards platform.

Suppose you were voting in a local school board election. Which of the following candidates would you be most likely to support? A candidate who believes:

If the public schools finally got more money and smaller classes, they could do a better job

45%

More testing and higher standards will ensure kids will master the skills they need

22%

School vouchers give parents the power to choose the best school for their children

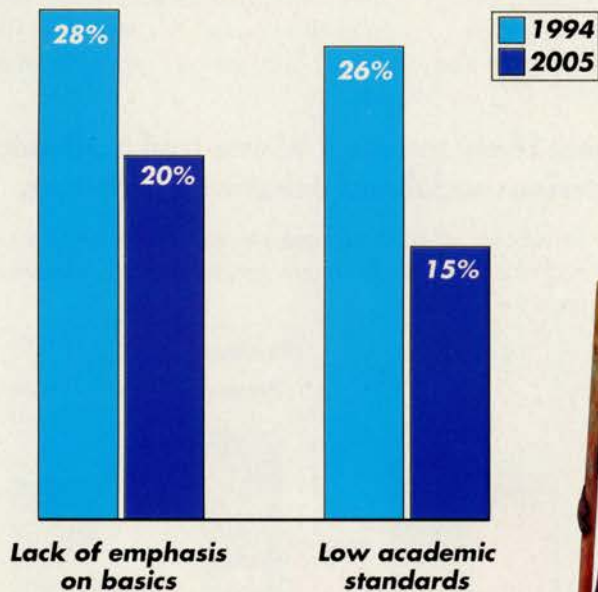
19%

Charter schools revitalize public education, and we need more of them

9%

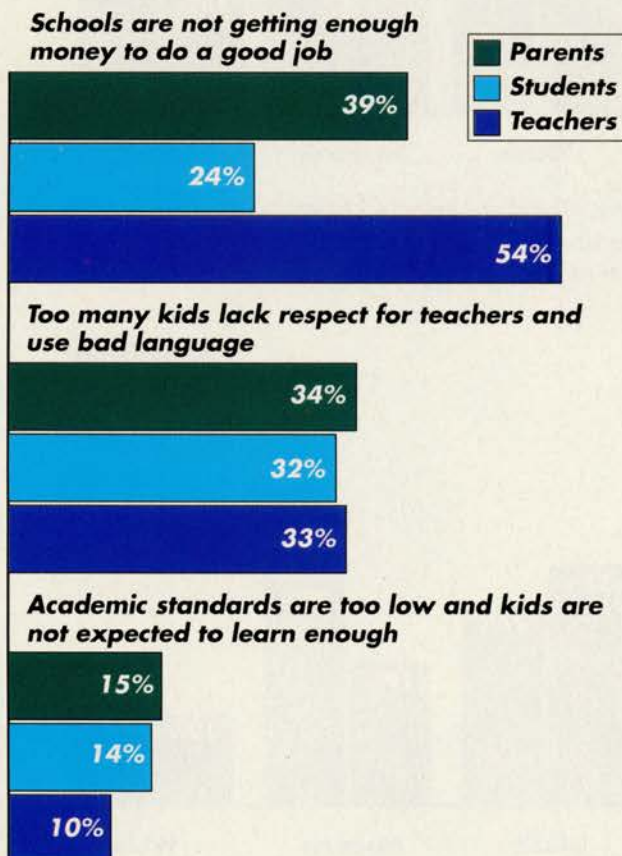
Parents' concern about low academic standards and teaching of basics has fallen since 1994.⁹

Percentage of parents who say the following are "very serious" problems in their child's school:



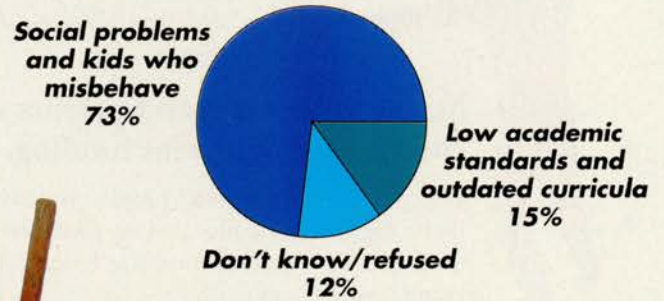
Parents, students, and teachers see lack of money and disrespect for teachers as more serious problems than low standards.

Percentage of parents, students, and teachers who say it's a "very serious" problem that:



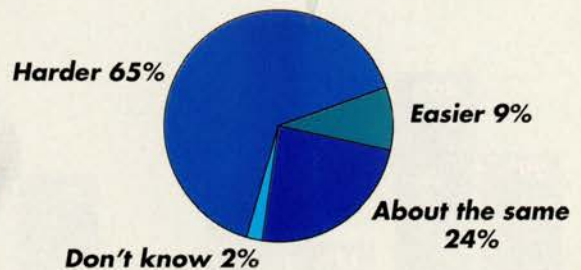
Large majorities of parents say social problems and misbehaving students are more pressing problems for high schools than low standards.

Do you think that the most pressing problems facing the high schools in your local community come from:



Most parents say schools are better and harder than when they went to school.

In general, do you think the material they [your children] are learning [at school] is harder, easier, or about the same as when you were in school?



Methodology

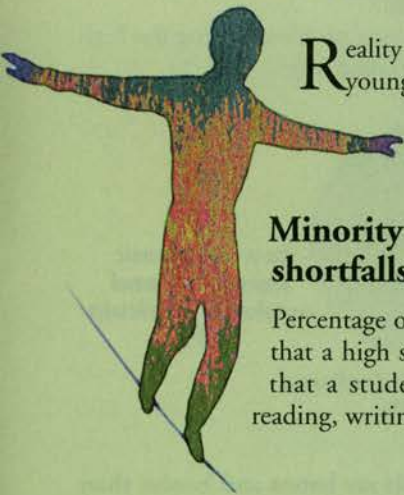
The findings presented in this article and in the sidebar (page 24) are based on two focus groups each with parents and teachers and telephone interviews with a national random sample of:

- 1,379 parents of children now in public school;
- 1,342 public school students in grades 6 through 12;
- 721 public school teachers;
- 254 school district superintendents and 252 school principals.

Interviews with parents were conducted between October 30 and December 18, 2005, interviews with students were conducted between October 30 and December 29, 2005, and interviews with teachers, principals and superintendents were conducted between November 19, 2005 and March 7, 2006. The margin of error for the sample of parents is plus or minus 3.8 percentage points; the margin of error for the sample of students is plus or minus 3.4 percentage points; the margin of error for the sample of teachers is plus or minus 4 percentage points; and the margin of error for principals and superintendents is plus or minus 6 percentage points. It is higher when comparing percentages across subgroups. Selected survey results can be found at publicagenda.org.

(Continued)

Minority Students and Parents See More

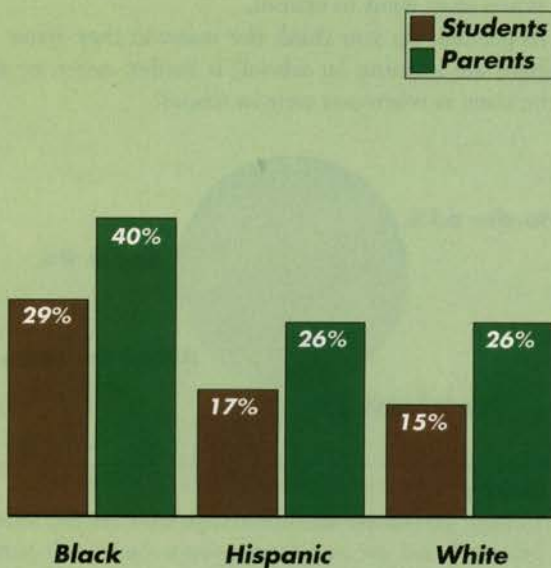


Reality Check's surveys of students show repeated and troubling differences between the way minority youngsters and their parents describe their experiences in schools compared to what white students and parents report. Asked to rate their schools on a range of key academic and social dimensions, black and Hispanic students are more likely to report "very serious" problems in nearly every category.

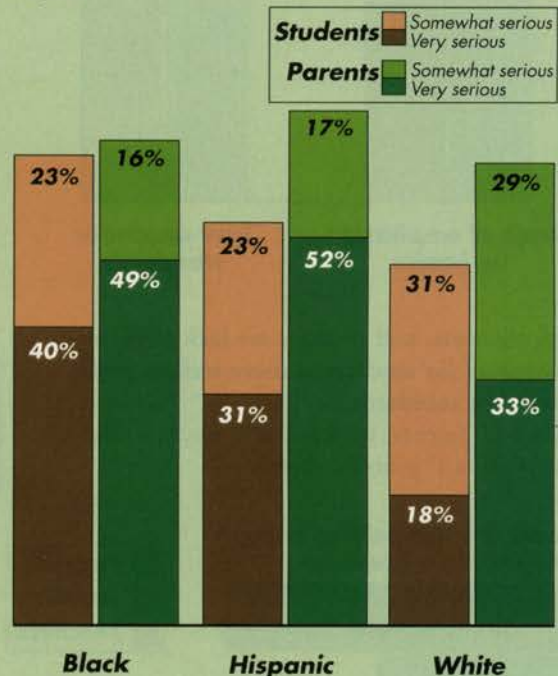
Minority students and parents are more likely to report widespread academic shortfalls, insufficient funding, and serious social and behavioral problems.

Percentage of students and parents who say that a high school diploma is no guarantee that a student has learned the basics of reading, writing, and math:

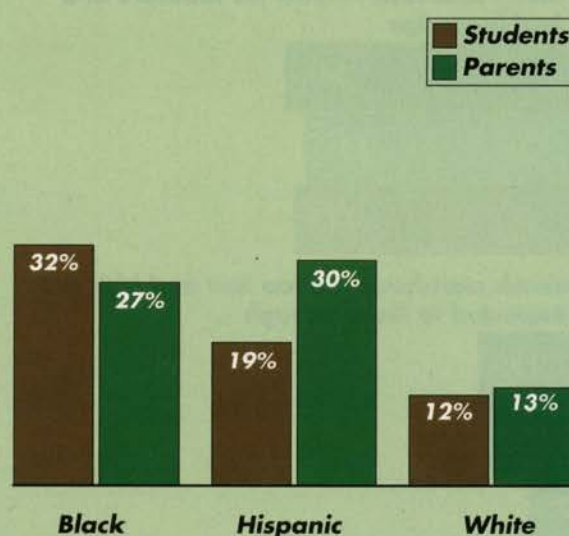
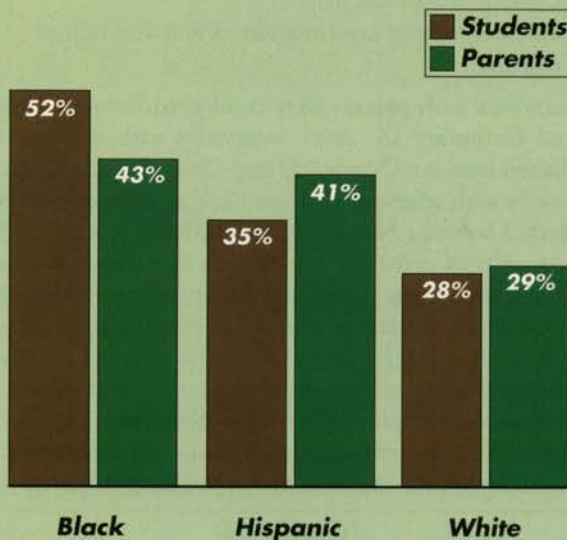
Percentage of students and parents who say it's a serious problem that schools are not getting enough money to do a good job:



Percentage of students and parents who say it is a very serious problem that too many kids lack respect for teachers and use bad language:



Percentage of students and parents who say it is a very serious problem that there's too much fighting, too many weapons on school grounds:



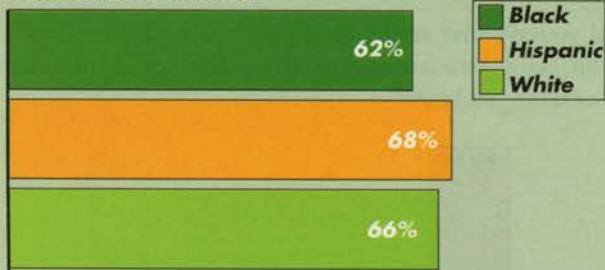
Problems

Good Marks for Teachers, but Too Little Extra Help

Overall, black, white, and Hispanic students give their teachers strong ratings. But minority students are significantly more likely to report that “only some” or “a few” of their teachers give students extra help when they are falling behind.

Percentage of students who say “all” or “almost all” of their teachers:

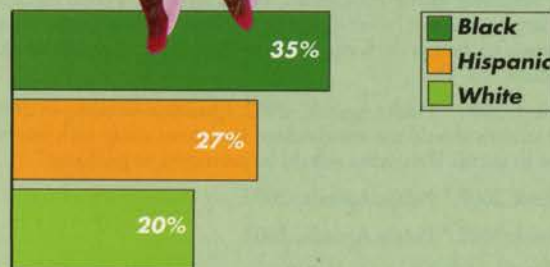
Have a real knack for inspiring and motivating kids to do their best



Have high academic expectations for all of the students they teach



Percentage of minority students who say only some or very few of their teachers give students extra help when they are falling behind:

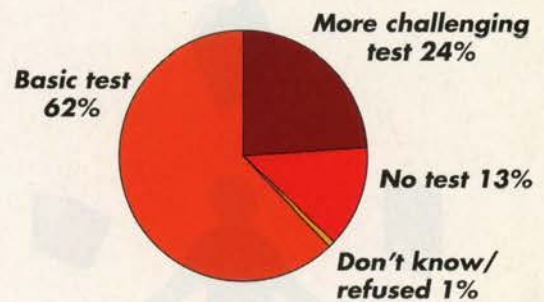


Finding Three: Teachers Believe in Standards and Standardized Testing, but ...

Among all the groups Public Agenda surveyed, teachers have historically had more concerns than parents, students, or administrators about the emphasis on testing that has been the focal point of the standards movement. Even so, most teachers do not question the intrinsic value of standards and testing.

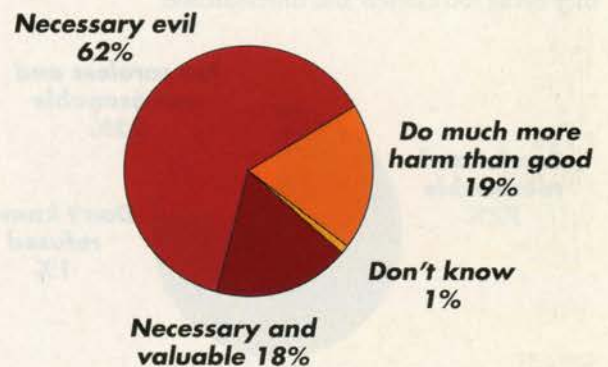
Most teachers back a high school exit exam.

Before students are awarded a high school diploma, would you want your school district to require students to: 1) pass a basic skills test in reading, writing, and math; 2) pass a more challenging test showing they have learned at higher levels; or 3) kids should not be required to pass a skills test?

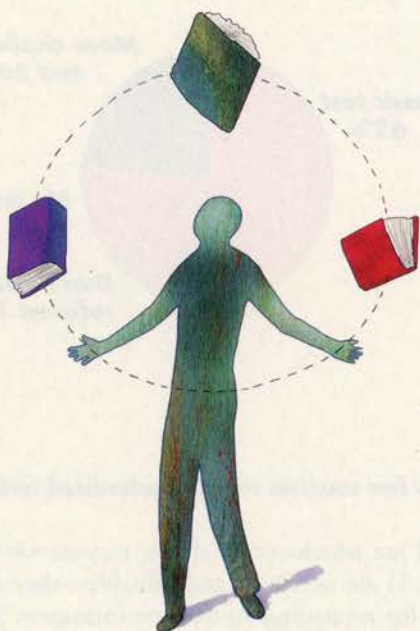


Relatively few teachers reject standardized testing outright.

Please tell me which comes closest to your view? Standardized tests: 1) are necessary and valuable—they are a reliable yardstick for measuring student performance; 2) are a necessary evil—ultimately, the schools need some kind of standardized assessment; or 3) do much more harm than good—the schools would be better off if they were completely abandoned.

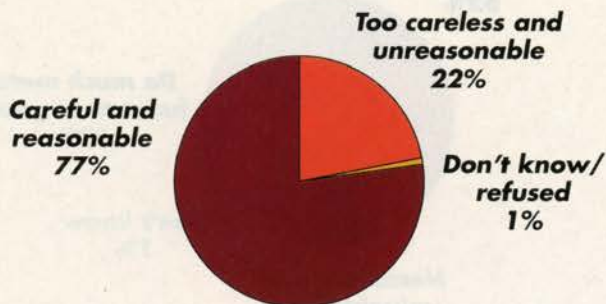


The majority of teachers are troubled and frustrated by testing, but even here, the concern is the amount of testing and how the tests are used—not whether testing can be useful in and of itself.



Most teachers say the district has been careful and reasonable in raising standards.

Overall, would you say that the schools are careful and reasonable in putting in place the higher academic standards, or are they being too careless and unreasonable?



Few teachers want to return to policies of the past.

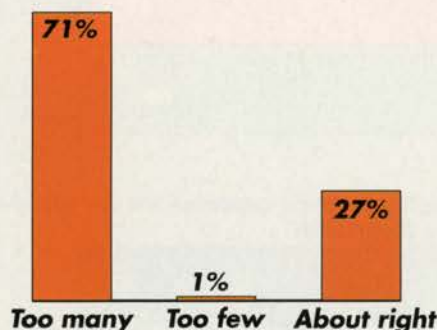
When it comes to this effort toward higher academic standards, do you think your school district should:

Based on the 93% of teachers who say that their public schools are making an effort to raise standards.



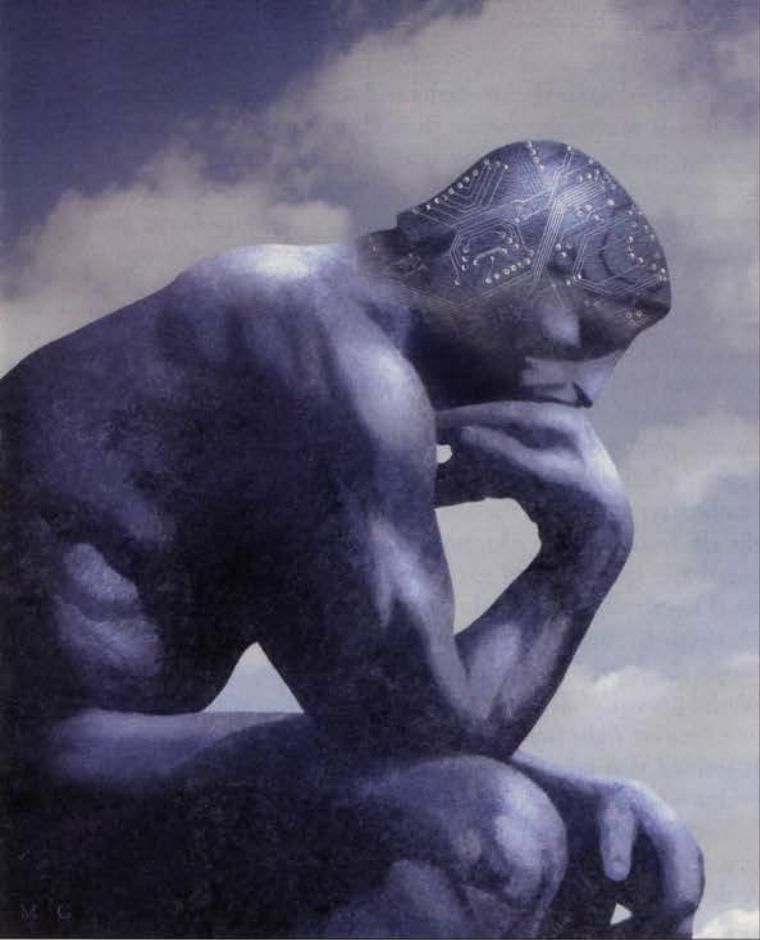
But large majorities of teachers say there is too much testing.

Would you say that students in your school are required to take too many standardized tests, too few, are things about right, or don't you know?



Endnotes

- ¹ "Where We Are Now," Public Agenda, 2003. Online at publicagenda.org/research/research_reports_details.cfm?list=11.
- ² "Teaching Interrupted," Public Agenda, 2003.
- ³ "Reality Check 2006: How Black and Hispanic Families Rate Their Schools," Public Agenda, 2006.
- ⁴ Examples include: Business Roundtable press release, "Business Roundtable Encourages Focus on Math and Science in Initiative for Teacher Excellence," June 6, 2005. Also, the official statement on "Math, Science, and Technology" on the Web site of the Center for Corporate Citizenship of the U.S. Chamber of Commerce, available on the Web site of the Business Education Network, www.businesseducationnetwork.com/bclc/ben/topics/math_science_tech.
- ⁵ Seventy-six percent of teachers say they are often made the scapegoats for all the problems facing education ("Stand By Me," Public Agenda, 2003). A large majority (70%) also say they feel "left out of the loop" when it comes to district decision-making ("Just Waiting to be Asked," Public Agenda, 2001).
- ⁶ "Reality Check 2002," Public Agenda, 2002. Question wording in 2002 was: "The schools should use standardized test scores along with teacher evaluations to decide if students should be promoted or graduate."
- ⁷ "Reality Check 2002," Public Agenda, 2002.
- ⁸ "Reality Check 2002," Public Agenda, 2002.
- ⁹ "First Things First," Public Agenda, 1994.



ILLUSTRATED BY MICHAEL GIBBS

HOW WE LEARN

ASK THE COGNITIVE SCIENTIST

“Brain-Based” Learning: More Fiction than Fact

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: It seems that great progress has been made in neuroscience over the past couple of decades—and especially over the past couple of years. Are there any findings that teachers could apply to the classroom?

Neuroscience has been moving forward in leaps and bounds, creating excitement among scientists, educators, and average citizens alike. No doubt much of the excitement is due to the images of the brain produced by fMRIs, and PET scans. Everyone seems fascinated with images that show which areas of the brain are activated by talking, reading, calculating, etc. But what do these images really tell us? For neuroscientists, they help in piecing together the puzzle of how the brain

works. For the rest of us, though, the payoff is likely to come only in the distant future, not in the next five or 10 years. Consider, for example, an 8-year-old boy who can’t read. A neuroscientist could give his teacher an image of his brain and explain that the wrong areas of his brain are active when he tries to read. A literacy coach or school psychologist could give the student a 45-minute assessment and then explain to his teacher that he doesn’t have a good grasp of the sounds that the letters make. As a teacher, which test results would you rather have? The brain image might be interesting, but it does not provide any information about how to help the boy read. In a nutshell, that’s about where neuroscience is today on most matters related to the classroom: Very exciting research is being conducted, but it is exciting to researchers trying to figure out how the brain works. Some of it is of interest to cognitive researchers who are trying to figure out how the mind works. And virtually all of it is far from being able to guide teachers.

Readers who follow the news on neuroscience may be surprised by my pessimism. It seems that some knowledge gleaned from neuroscience has already made its way to the classroom. Isn’t it true that students who are left-brain thinkers (who are logical and analytical) do better in school than right-brain thinkers (who are creative and intuitive)? That schools are designed in ways that suit girls’ brains? That young children’s brains need lots of sensory stimulation, and that classical music is especially important? Actually, none of these ideas is

The left- and right-brain distinctions held popular appeal because they seemed to capture commonly observed differences among people: Some of us are more logically minded and like math and science (left-brained types), whereas others are more artistic and creative (right-brained types).

then believed to be the strengths and weaknesses of each hemisphere—it wasn't long before their ideas were picked up in the popular media. Some of the left-brain versus right-brain distinctions that the scientists proposed became well known, such as analysis versus synthesis, logic versus intuition, linear processing versus parallel processing, and order versus creativity.

The scientists approached these distinctions as mere speculation—not fact—but that got lost as the research moved from the lab to the living room. The left- and right-brain distinctions held popular appeal because they seemed to capture commonly observed differences among people: Some of us are more logically minded and like math and science (left-brained types), whereas others are more artistic and creative (right-brained types). From the living room, it was a small step to the classroom. Some educators observed that when one compared the specialties of each hemisphere to what is emphasized in schooling, the right brain seemed to be getting short-changed. Reading, writing, and arithmetic seemed geared towards the logical and linear processing that was supposed to be the province of the left brain, whereas the spatial, artistic, and creative right brain had little to do during the school day. It seemed that educators were only teaching half of children's brains—and that left-brained students had a big advantage!

Today, despite efforts by neuroscientists to defuse the hype (e.g., Mike Gazzaniga's [1985] "Left brain, right brain mania: A debunking"), left brain, right brain characterizations still appear in articles and books for educators (e.g., Connell, 2002; Sousa, 2006) and there are still individualized instructional programs based on left- and right-brained learners (McCarthy, 1987; 1996), as well as numerous Web sites for teachers purporting to describe hemispheric differences. For example, under the "Best Practices" category of *Instructor* magazine's Features Library, there's an article titled "Left Brain/Right Brain: Pathways To Reach Every Learner" that offers teaching techniques for left- and right-brained students by discussing how to approach teaching the solar system (Connell, 2002). For left-brained students, the tips include, "Discuss the big concepts involved in the creation of the universe, how the solar system was formed, and so on. Left-brain students love to think about and discuss abstract concepts" and "Keep the room relatively quiet and orderly. Many students with left-brain strengths prefer not to hear other conversations when working on a stimulating project." In contrast, for right-brained students, suggestions include, "Have some time for group activities during the week of the solar system study. Right-brain students enjoy the company of others" and "Play music, such as the theme from *2001: A Space Odyssey*. Discuss how space might feel to an astronaut. Students with right-brain strengths are intuitive and like to get in touch with their feelings during the day." Regarding how students are supposed to demonstrate their learning, left-brained students are to "write a research paper on the solar system that includes both detail and conceptual analysis" while right-brained students are to "create a project (such as a poster, a mobile, a diorama, or papier-mâché planets of the solar system) in lieu of writing a paper."* It's clearly time to put this myth to rest. Let's take a closer look at the research behind it

quite true—they are just popular myths. In this column, I will outline the real scientific findings that led to these mistaken conclusions. I will also comment more generally on the relationship between neuroscience and education, describing why I think it's right to be skeptical of claims that neuroscientific knowledge will improve teaching in the near term, and exactly what I believe neuroscience might contribute in the long term.

Popular Myth 1: School Is Designed for Left-Brained Students

The myth that school is designed for left-brained students was born about three decades ago, when one of the hot questions in neuroscience was whether or not the left and right hemispheres of the brain process information differently. Scientists were trying to find broad categories to characterize what they

Daniel T. Willingham is professor of cognitive psychology at the University of Virginia and author of Cognition: The Thinking Animal. His research focuses on the role of consciousness in learning. Readers can pose specific questions to "Ask the Cognitive Scientist," American Educator, 555 New Jersey Ave. N.W., Washington, DC 20001, or to amerred@aft.org. Future columns will try to address readers' questions.

Efforts to tailor instruction should be based on a careful consideration of what the educational content calls for and on students' individual strengths and weaknesses—not on faulty schemes for characterizing two kinds of thinkers.

and see how the scientists' thinking changed over time.

Scientists have used many techniques to investigate the similarities and differences between the left and right hemispheres, but the best known and most dramatic technique is the investigation of split-brain patients. A split brain occurs when the two largest of the bundles of neurons that connect the left and right hemispheres (the corpus callosum and the anterior commissure) are severed. This surgery was developed in the 1940s and was conducted as a last resort for patients debilitated by severe epilepsy. The idea is that if an epileptic seizure begins in one hemisphere, it cannot spread to the other hemisphere. The surgery did reduce the frequency and intensity of seizures, and there seemed to be few negative effects. (Improvements in medications and the development of other surgical procedures

*My purpose here is not to critique Connell's article beyond pointing out that her base assumption—there are left- and right-brain students—is not correct. Nonetheless, I must reiterate a point I made in a previous article: The best teaching technique is almost always determined by thinking about the content to be taught, not by trying to figure out a student's learning style. For more on this, see "Do Visual, Auditory, and Kinesthetic Learners Need Visual, Auditory, and Kinesthetic Instruction?" in the Summer 2005 issue of *American Educator*, online at www.aft.org/pubs-reports/american_educator/issues/summer2005/cogsci.htm.

mean that this radical surgery is rarely done today.)

It was not until the 1960s that careful testing revealed unexpected consequences of the surgery. Roger Sperry and his colleagues noted that, because of the way that the visual system is wired, in split-brain patients it is possible to present visual information selectively to one brain hemisphere. Sperry conducted a series of experiments in which visual stimuli were presented to either the left or the right hemisphere for identification (e.g., Sperry, 1974; see also Gazzaniga, 1970). Subjects responded to the stimuli in different ways: by speaking, by pointing to a picture, or by selecting from among several objects that they could feel, but not see. Sperry found that the left hemisphere did all of the speaking and could understand complex grammar, but the right hemisphere seemed unable to speak, and could understand only simple grammar. He also observed that the right hemisphere seemed to excel in appreciating locations in space. These observations lead neuroscientists to begin speculating about whether or not there really are broad differences between how the left and right hemispheres process information, and, if so, how to characterize them.

After about a decade of trying to find a categorization scheme, scientists concluded that the left and right hemispheres could not be simply characterized. By the mid-1980s, more and better data indicated that there were not left-hemisphere tasks and right-hemisphere tasks. Rather, it seemed that both hemispheres contributed to nearly all tasks in a normal brain, and when one hemisphere was better than the other in a particular type of processing, the advantage was usually modest. (The only exception seems to be language, which does appear to be mostly localized in the left hemisphere for most people.) The broad participation of both hemispheres in most cognitive tasks became especially apparent in the 1990s when brain imaging data (e.g., from fMRIs and PET scans) of normal subjects became widely available—both hemispheres participate in virtually every task.

Why haven't these more recent findings made their way from the lab to the living room or to the classroom? I can't say, but I can reassure educators that they need not be concerned with left- versus right-brain distinctions. Barring severe brain damage or radical surgery, all of us are whole-brain thinkers. Efforts to tailor instruction should be based on a careful consideration of what the educational content calls for and on students' individual needs—not on faulty schemes for characterizing two kinds of thinkers.

Popular Myth 2: Schools Are Designed to Suit Girls' Brains

The myth that schools are a better fit for girls' brains than for boys' brains is the latest version of what seems to be a perennial debate about whether the educational system is biased toward girls or boys. In the early 1990s, educators, researchers, and policymakers directed their concern toward girls after the American Association of University Women published *How Schools Shortchange Girls*. Among other findings, the report stated that, "Research reveals a tendency, beginning at the pre-school level, for educators to choose classroom activities that

When brain differences between boys and girls are found, we can't conclude that the brain differences *caused* the associated behavior differences. It could be that behavior differences caused the brain differences.

appeal to boys' interests and to select presentation formats in which boys excel." But recently the pendulum has swung in the other direction, and critics are drawing on neuroscience to make their case that boys are at a disadvantage in school.

A number of popular writers have pointed out that boys show substantially worse patterns of achievement over the long term than girls (e.g., boys are more likely than girls to be diagnosed with a learning disability, to be held back in elementary school, and to drop out of college) and argued that these differences can be traced to anatomic and physiological differences that are ignored by the educational system. In short, boys are in "crisis" and the cause of the crisis is an educational system attuned to girls' brains.[†] Just in the past few years, these sorts of claims have appeared in popular magazines (Chiarella, 2006; Tyre, 2006; Whitmire, 2006), books (Gurian and Stevens, 2005; Saxe, 2005), and articles directed toward educators (Connell and Gunzelmann, 2004; Laster, 2004).

Teachers have been encouraged to address this crisis by making their classrooms more friendly to boys' brains. For example,

[†] Not everyone agrees that there is a crisis among boys. Mead (2006) argues that, by most measures, boys are doing quite well and better than in the recent past—but girls are improving even more rapidly. Hence, it looks as though boys are doing poorly because they are losing ground to girls, but their academic performance is actually improving.

one suggestion is to use more manipulative materials, which are supposed to tap into boys' greater spatial abilities (Connell and Gunzelmann, 2004). Although this might seem like a good idea, trying to use a cognitive strength like spatial ability to bolster an altogether different cognitive process, like reading comprehension, does not work (Willingham, 2004). Another suggestion is to allow breaks during the day, so that overactive boys have a chance to move around (Connell and Gunzelmann, 2004). That's not a bad idea, but it won't help schools become better attuned to boys' brains—research shows that girls and boys benefit equally from breaks (e.g., Pellegrini, Huberty and Jones, 1995), even though they use them differently.

All told, it seems that neuroscience has brought more confusion than clarity to the debate about educating boys and girls. Why? When proponents of the boys' crisis marshal neuroscientific findings to support their claim, they think that the neuroscience "proves" that a meaningful difference between boys and girls has been found—and then they build on that "proof" to make teaching suggestions. For example, girls have, on average, a larger hippocampus than boys do. The hippocampus is a small structure towards the middle and bottom of the brain that is known to support learning and memory (e.g., Squire, 1992). Gurian and Stevens (2004) cite the brain difference and, based on that, believe that that is the reason why girls have a better memory than boys, on average (e.g., Kramer, Delis, Kaplan, O'Donnell, and Prifetera, 1997). But this assumption that the bigger hippocampus *causes* the better memory is mistaken. It's a common error: People often think that if the brains are different, that must be the cause of the cognitive difference. In other words, if boys have smaller hippocampi, their memory is worse because "that's just how boys are," and not because they are less interested in memorizing than girls are, or because society subtly encourages girls to memorize more than boys. It's nature, not nurture. That conclusion seems to add considerable weight to the argument that our schools are biased against boys. The idea is summed up well in a quotation from a neurologist that appeared in a *Newsweek* cover story on the boy crises: "Very well-meaning people have created a biologically disrespectful model of education."

The assumption that the bigger hippocampus causes the better memory is an oversimplification, however, because your behavior can change your brain. For example, researchers know that if you memorize a lot of material, your hippocampus will get bigger (Maguire et al., 2000). So when brain differences between boys and girls are found, we can't conclude that the brain differences *caused* the associated behavior differences. It could be that behavior differences caused the brain differences. In fact, most researchers of gender differences believe that they are due to a complex mix of biological and social forces (see Kimura, 2002, for a readable overview).

Ultimately, the neuroscience behind gender differences adds a great deal to our knowledge of how the brain works—but it doesn't add any practical knowledge that can be applied in the classroom. If we're interested in cognitive differences—such as differences in memory—then the findings from cognitive studies are decisive. After all, neuroscience is the study of the nervous system and cognitive science is the study of mental

The fact that deprivation results in a poorly developed sensory system does not mean that extra stimulation beyond what's normal would make the sensory system any better. A baby with two mobiles will not have better vision or better processing of visual information than a baby with one mobile.

tasks and processes.

So, what have cognitive studies found? In the last 100 years, many, many researchers have studied boys' and girls' performance in controlled testing situations (e.g., performance on the Scholastic Aptitude Test or in a psychology experiment) and have, in fact, found cognitive differences between males and females—but many of these are so small (even though they are statistically “real”) that they are not worth bothering about. The larger differences include a slight edge for males in certain spatial tasks like mental rotation and mathematical reasoning, and an advantage for females in certain memory tasks and in mathematical calculation. Researchers who do this work debate whether these differences are very modest or moderate—but no researcher claims that they are large (for reviews, see Hyde and Linn, 1988; Voyer, Voyer, and Bryden, 1995; Willingham and Cole, 1997).

What's an educator to make of all this? In short, it may very well be that boys, on average, are having some difficulties in school that girls, on average, are not, and that the reverse is also true. But the surest way to pursue that issue is to investigate data that emerge from the school setting—not by looking to neuroscience. As the hippocampus example explained, neuroscientific data do not identify for us the interesting behavioral differences between boys and girls. The key finding for

teachers to keep in mind is that the modest cognitive differences between boys and girls are average differences. Both boys and girls should be expected to excel in all academic subjects and helped to do so. How individuals should be helped can't be determined by their gender.

Popular Myth 3: Young Children's Brains Must Have Lots of Sensory Stimulation—and Classical Music Is Especially Important

We have all heard of parents who diligently painted large black geometric shapes on the walls of the baby's room, used patchwork quilts with different textured fabrics “for tactile experience,” and played Mozart every day at naptime. On the one hand we may surreptitiously roll our eyes at this subtle competitiveness. On the other hand, when confronted with an array of mobiles at the store, we may figure “Why *not* get the one that claims to provide the ‘right type’ of visual stimulation?” Well, a neuroscientist might reply, “Why not just get the mobile you like the best?” After all, the two neuroscientific findings underlying this trend in parenting—and similar trends in daycare and early childhood education—have been stretched far out of shape.

The first part of this myth, that young children's brains need lots of sensory stimulation, is based on studies of the effects of sensory deprivation in animals. Classic work by the Nobel-prize winning physiologists Torsten Wiesel and David Hubel showed that kittens' visual systems did not develop normally if deprived of certain types of visual stimulation. For example, in one experiment (Wiesel and Hubel, 1963), they deprived a week-old kitten of visual stimulation in one eye, but let it use the other eye. Just a few weeks of deprivation resulted in the kitten's visual cortex not developing normally, and not recovering even after the kitten was allowed to use both eyes. The same experiment had no effect on an adult cat. Wiesel and Hubel concluded that there is a *critical period* for the development of vision. A critical period is a time in development when the organism (be it a kitten or a baby) must have some type of experience in order to develop normally; it has been a commonly accepted principle in visual development since Wiesel and Hubel's work, and has been confirmed in studies of humans who suffered vision deprivation early in life due to a problem in their eye that was later corrected through surgery (e.g., Fine, Wade, and Brewer, 2003).

Unfortunately, those outside the research world seem to have misunderstood this research. The key to understanding—and thus properly applying—it is to keep in mind that Wiesel and Hubel compared normal development to what happens when the brain is totally deprived of a certain type of sensory stimulation. It seems that the general public took away the message that more stimulation is better. But that's just not the case. The fact that deprivation results in a poorly developed sensory system does not mean that extra stimulation beyond what's normal would make the sensory system any better. A baby with two mobiles will not have better vision or better processing of visual information than a baby

Unlike sensory development, which plateaus in early childhood, learning effects are cumulative—the more you know, the easier it is to learn more—so learning things in a rich home environment makes it easier for children to learn still more when they get to school.

with one mobile. So long as a baby is not being raised in an inhumane way—deprived of interaction with others and with the world around him—his sensory system will function just as well as that of the baby with all the latest sensory-stimulating gadgets.

The second part of this myth, that classical music is an especially important form of sensory stimulation, rests on an even weaker neurological foundation. Readers who recall the hype about the “Mozart Effect” will likely be surprised to learn that it began when a scientific paper reported that college students showed a short-lived increase in spatial reasoning (e.g., ability to mentally rotate objects) after listening to a Mozart piano sonata, compared to other students who experienced silence or instructions to relax (Rauscher, Shaw, and Ky, 1993). There were many subsequent efforts to reproduce the effect. Some were successful, most were not (see Chabris, 1999, for a review), and it appears most likely that when the effect is observed, it’s not due to hearing Mozart or classical music per se, but rather to a boost in mood and arousal (Thompson, Schellenberg, and Husain, 2001).

At their best, the data on listening to Mozart supported a very short-lived boost in spatial ability for college students. Somehow, that transmogrified into the idea that playing classical music for babies would make them smarter for life. Here’s

how Norman Weinberger (1998), a leading neuroscientist studying how music affects the brain, described what happened:

Although increased public interest ... [in music is] good, there is also the not-so-good in all of the public press. For example, the “Mozart Effect” has gotten so bent out of shape, one can hardly recognize it. The symptoms are clear and follow a well-trod path. A scientific paper is published. It is novel, potentially important with broad implications. Naturally, it receives attention by the media; it should. But then come the oversimplifications. Not necessarily exclusively from a careless media, but also from the fact that we all receive too much information and perhaps unconsciously boil down the complexities of reality into an easily remembered “cognitive bite”.... These findings have been encapsulated popularly as “Mozart makes you smarter”....

Once “music makes you smarter” became the popular mantra, it seemed natural to start babies and young children on a steady diet of classical music. The idea was so widely accepted that in 1998 then-Governor Zell Miller recommended that every Georgia newborn receive a CD of classical music at the state’s expense. Similarly, the Florida legislature passed a law requiring that all state-funded childcare and educational programs play classical music every day for children under the age of six.

Even folks who weren’t convinced that music makes you smarter didn’t object to these initiatives because they didn’t appear to have a downside. Music may not make those kids in Georgia and Florida smarter, but it won’t hurt them, will it? Of course, music won’t do any direct damage—but there is a cost to supplying all that music and so it is appropriate to ask whether that money could have been better spent. For example, should infants be sent home with a book instead of a CD? Probably. The research indicating that being read to makes a young child smarter is much, much stronger than the “Mozart Effect” research.

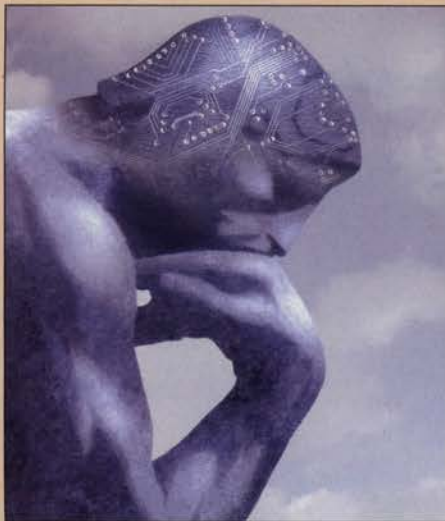
Since this article is about ways that brain research has been misunderstood, I must add one word of caution with regard to this myth: The sensory development research reviewed here does not speak to overall brain development. The sensory systems do not benefit from extra stimulation—but other parts of the brain often do. For example, a baby who is spoken to a great deal will not have better hearing than a baby who is spoken to less often—but the baby who is spoken to frequently will end up with a bigger vocabulary (Hart and Risley, 1995).

So what are parents and early-childhood educators to conclude? When we think about the years zero to three, we should draw a fundamental distinction between sensory stimulation and learning. The sensory systems can and will develop normally under average home and daycare conditions—and without specially designed mobiles or Mozart. The baby’s apparent enjoyment is a perfectly adequate guide to what music to play and what artwork to display. When it comes to learning, the conclusion is different in an important way. Learning at home, or in a daycare or early-childhood education setting, will bring helpful consequences. Unlike sensory development, which

(Continued on page 40)

How Neuroscience *Could* Help...

By Detecting Learning Disabilities Early



I have expressed doubt about the possibility that neuroscientific findings will prove useful in designing classroom instruction in the near future. I am quite optimistic, however, that neuroscience will be successfully applied to another important educational problem—the identification of children with learning disabilities.

Here's why I believe we are on the verge of a breakthrough in this area, particularly in the identification of dyslexic children. Consider first what we already know about dyslexia. We know that children who are slow in learning language (speaking and listening) are more likely to have trouble learning to read, independent of their level of intelligence (e.g., Catts, Fey, Tomblin and Zhang, 2002). Many researchers (e.g., Tallal and Gaab, 2006) believe that this association is observed because both are caused by difficulty in phonological processing—that is, a problem in understanding subtle differences in speech sounds. There is evidence that problems in phonological processing underlie language learning impairment (e.g., Tallal and Piercy, 1973) and underlie difficulties in learning to read (e.g., Shaywitz, 1998).

It has also been shown that you can see brain differences in children with auditory processing difficulties when they are six months old, or possibly

even younger. The technology works this way: While wearing a stretchy, comfortable cap that records the brain's electrical activity (which is a byproduct of neural function), an infant listens to speech sounds or to simpler auditory stimuli such as tones. Researchers have discovered significant differences in the brain responses between infants who later show a language learning impairment and those who do not. For example, in one study, 6-month-old infants listened to a rapid series of identical tones with one “oddball” tone of different pitch. The researchers found that some children showed a smaller neural response to the oddball—and that the size of this response was associated with their speaking skill at age 2 (Benasich, Choudhury, Friedman, Realpe-Bonilla, Chojnowska, and Gou, 2006).

If we can observe brain differences that are associated with language learning impairment, and if language learning impairment is associated with dyslexia, couldn't we use those same brain markers to predict who will develop dyslexia? We already know that dyslexic school-age children show these sorts of brain differences (see Temple, 2002 for a review). Several researchers are currently pursuing this line of thinking and are having some success (e.g., Espy, Molfese, Molfese and Modglin, 2004; Lyytinen, Guttorm, Huttunen, Hämäläinen, Leppänen, and Vesterinen, 2005). We don't yet have a test that can definitively say whether or not an infant will have problems with reading. But the effort has only begun, and there is every reason to be optimistic that the science will develop to that point.

Such a test would be a remarkable advance. Early intervention is critical for dyslexia. Identification of a child who is at risk for reading difficulties before reading instruction begins could be of tremendous use to educators and, of course, to students and their parents.

—D.W.

Researchers have discovered significant differences in the brain responses between infants who later show a language learning impairment and those who do not.

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Motivating Young Minds

*The Best Kids' Magazines Turn
Natural Curiosity into Exceptional Knowledge*

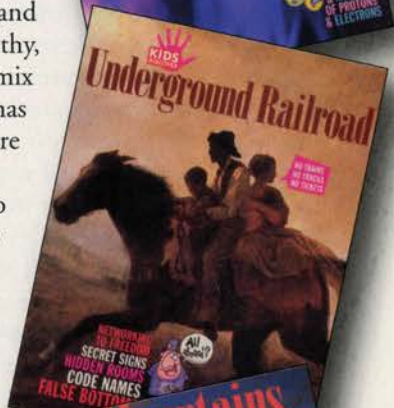
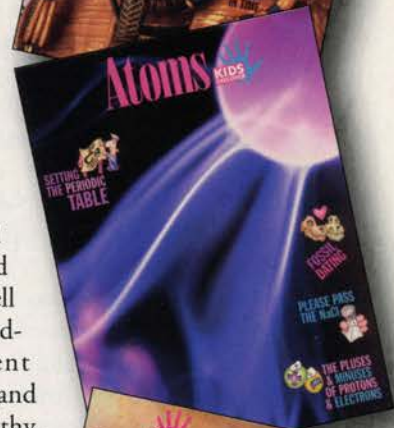
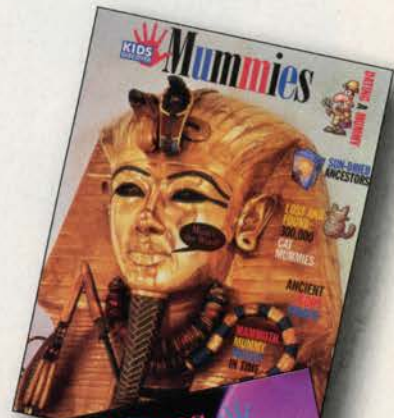
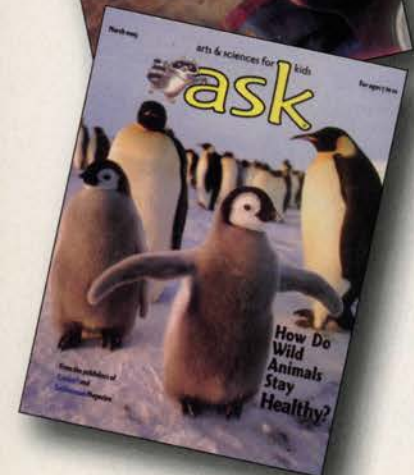
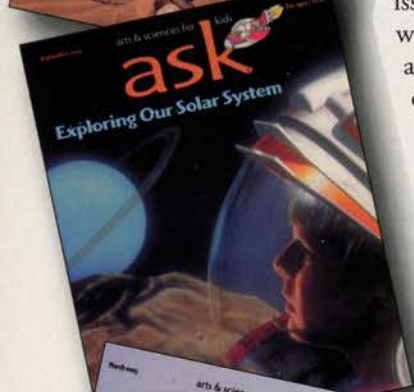
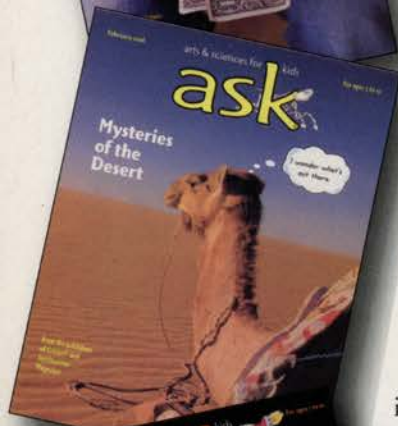
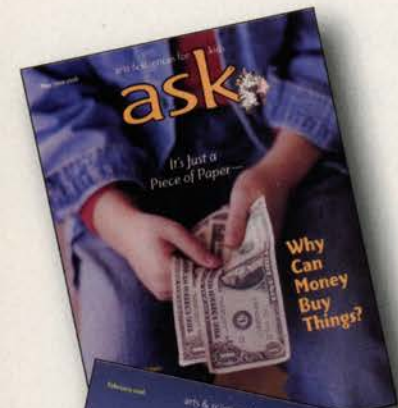
Why is the sky blue? Where did the slaves buy tickets for the underground railroad? How small is an atom? Who was Einstein? What happened to the dinosaurs? When did women start voting? Kids are full of questions. No teacher (or parent) can supply all of the answers—but sidestepping their queries with a quick “look it up” is a sure way to quash most kids’ curiosity. Fortunately, there is an alternative to encyclopedias and textbooks: kids’ magazines.

Many educational magazines written just for kids are well known—such as *National Geographic for Kids*, *Time for Kids*, and *Sesame Street Magazine*—but we’ve found a couple that aren’t as well known as they deserve to be: *ASK* and *Kids Discover*. *ASK* is a broad-ranging magazine for elementary school children. Recent issues have covered, for example, the solar system, deserts, how (and why) money works, the human body, how wild animals stay healthy, and volcanoes. It’s modeled after adult magazines in that it has a mix of short and long pieces, but it’s more focused in that each issue has one central topic. To stay kid-friendly, content-heavy articles are balanced with content-related comic strips and fun activities.

Kids Discover is aimed at an older audience, typically fifth- to eighth-grade children. Unlike other children’s magazines, it is purely academic—no comics, no mention of the latest video game, no distractions—and each issue is devoted to a single science or history topic. It would work well as a supplement, or alternative, to a textbook. And yet, it’s fascinating. The writing, images, and design are all engaging. But the real reason it works so well is that the world around us is inherently interesting, and *Kids Discover* manages to capture it.

The next few pages have content directly from recent issues of both *ASK* and *Kids Discover*. To see more sample issues, review their companion teaching guides, and find subscription information, go to the *ASK* Web site at www.cobblestonepub.com/magazine/ASK and to the *Kids Discover* Web site at www.kidsdiscoverteachers.com.

—EDITORS



ask



Pleased to meet you!

So Many Kinds of Animals—



From the publishers of *Crickle*® and *Smithsonian Magazine*

Gone

art by Peter Schouster

Suddenly, the bright noonday sky turned black, and the sound of millions of flapping wings filled the air. That's what it was like when a flock of passenger pigeons, once the most common bird in the world, passed overhead. Three hundred years ago, one of every four birds in North America was a passenger pigeon. They flew from forests in massive flocks that might contain a billion birds. A single flock seen in Canada in 1866, stretched a mile wide and 300 miles long and took 14 hours to fly by.

There were so many passenger pigeons, it seemed as if they would always fill the skies. Yet no Ask reader has ever seen a live one. In 1914, the last bird died in a Cincinnati zoo. The passenger pigeon is gone forever.

Why did the passenger pigeon go extinct? How could there be billions of birds one year, then just a century later, none?



Passenger Pigeon, last seen in 1914

Forever

Ready... Set... BIOBLITZ!

by Meg Moss

You might be surprised how many species you can find in 24 hours, right in your own backyard—or a place nearby.



When you're like here, you're like me in my garden!

Sure, the rainforests and tropical islands of the world are filled with exotic animals. But how about city parks, industrial wastelands, and urban outskirts right here at home? For the last 10 years, scientists and citizens all over the U.S. have been searching these unlikely sites for signs of life. And boy, have they found a lot—from mammals to microbes!

South of Chicago lies the Lake Calumet region. A century of industry has badly polluted the area. Woodlands, rivers, lakes, prairies, and wetlands share the landscape with abandoned parking lots, steel mills, railroads, highways,

What could possibly live around there? Well, to be exact, 2,257 species of birds, fish, bugs, plants, mammals, and microscopic life.

In the 24 hours from 2 p.m. August 23 to 2 p.m. August 24, 2002, a hearty bunch of bioblitzers set up camp, and teams of scientists and volunteers overran the area to count all the life they could find. Averaging 15 species every 10 minutes, they turned up everything from the only local colony of Franklin ground squirrels to a fungus not seen in the area since 1902.

Some things they expected, and many they didn't, including several unwanted, "invasive" species that

are not native to the area and threaten local species.

Meanwhile, visitors young and old observed the scientists at work and took guided hikes. They gathered plants and analyzed water samples. They collected native plant seeds and helped to weed out invasive plants. Everyone had something to do at the Calumet bioblitz.



Check out this cool website!

The Field Museum of Natural History in Chicago and a team

Racing the Clock

Searching for New Species

by Ellen R. Brauf

Have you ever wondered how many different kinds of plants and animals live on earth? How many kinds of fish, or birds, or mammals, or trees, or insects? Scientists wonder, too.

And they travel all over the world to try to find out.

Last December a team of scientists trekked through a tropical forest atop the mist-covered Foja Mountains on the island of New Guinea, just north of Australia. For two weeks they explored a wilderness nearly untouched by human beings. No trails cut through the forest; no planes passed overhead. Dr. Bruce Beebles, the group's co-leader, called it a "paradise for biologists—a wild land given over to wildlife."

Getting to the remote site wasn't easy. It took several trips by helicopter to carry the team and its equipment from a

grassy jungle airstrip in the foothills to a small clearing deep in the mountain highlands. The scientists came prepared to find animals. They brought sound recorders to capture birdsongs and frog

calls, and flashlights and headlamps to light the night as they searched for snails, frogs, and nocturnal mammals. Their supplies included peanut butter and oatmeal to bait traps for catching small mammals (mainly mice and rats), and nylon mist nets that work like spider webs to snag birds and bats. Once captured in these traps, animals could be removed without harm and brought back to camp to be photographed.

While the golden-mantled tree kangaroo is one of the most endangered species, no one knows that this one animal lives in the Foja Mountains.

A nice funny rub, please!

The scientists quickly realized that Foja was a special place. The morning they arrived they glimpsed a strange species of honeyeater bird at the edge of



Bruce Beebles and a female beekeeper (in a red cap) in a forest in the Foja Mountains. Beebles says, "We're looking for new species!"



Pig-Footed Bandicoot, last seen in 1901 or the 1950s

Scientists discovered these funny little marsupials tripping along awkwardly on skinny legs, but Aborigines, the native people of Australia, said bandicoots could run at lightning speed when threatened. No one knows exactly

why the kitten-sized animals died out, but their habitat was drastically changed when European settlers introduced sheep, cattle, and rabbits.



KIDS DISCOVER

Cells

CELLS UNLOCKED

HOW GENES FIT



HOW'S YOUR ENDOPLASMIC RETICULUM



IT'S IN THE GENES!

What makes a rooster different from a chicken? Or a Siamese cat different from a Siamese cat? Changes in genes, called mutations, have combined to create different plants and animals. One slight mutation in a gene can have a tremendous impact. For instance, Siamese cats owe their distinctive coloring to a special temperature-sensitive gene that causes darker color to appear on the cooler parts of this breed's body.

HOW ALIKE—GENETICALLY SPEAKING—ARE ANIMALS TO HUMANS? YOU MAY BE SURPRISED.

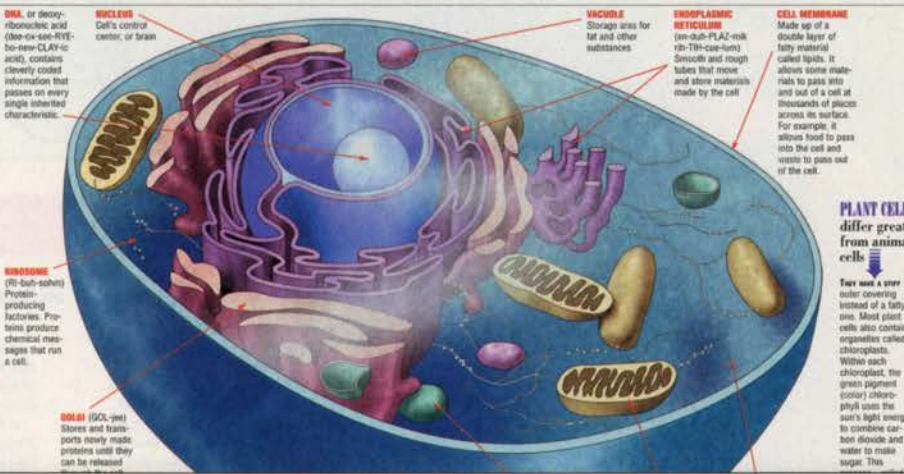


A human 99.8 percent of your genetic information is in the same 3 billion base pairs as a mouse. On Earth, the human 22 X and Y chromosomes...

Zooming In

In 1664, English scientist Robert Hooke viewed a thin slice of cork through an early microscope. Cork looked to him as if it were constructed of dozens of tiny rectangular compartments. He called them *cells*, from the Latin *cella*, meaning small room. At first, scientists couldn't see much within a cell and thought it was just filled with jelly. They called that jelly *protoplasm*. But improved microscopes slowly changed that view. We know now that each cell is really a complex part of life.

What's in a Cell? Each cell is different, but all cells have features similar to this HUMAN CELL.



PLANT CELLS differ greatly from animal cells. They have a stiff outer covering instead of a fatty one. Most plant cells also contain organelles called chloroplasts. Within each chloroplast, the green pigment (color) chlorophyll uses the sun's light energy to combine carbon dioxide and water to make sugar. This...

The Stuff of Life

All living things have one thing in common—they are made from cells. Cells are often described as "building blocks." For instance, you are made of many trillions of cells. Yet cells are not just tiny bricks. Like you, each one gathers fuel, creates energy, grows, and reproduces, and even dies. Every cell also carries a complete set of instructions. In a plant cell, it determines things like leaf size. In a tiger, it tells each cell in a stripe what color to be. In a human cell, it gives us features like height and eye color. It also decides whether an organism turns into a plant, a tiger, or a human. In other words, cells contain the master code that makes all living things what they are.

Cells Can Work Alone or Together

Amoeba
A Single Cell
Creatures made up of one cell are unicellular. An amoeba is a single-celled organism that constantly changes shape.

Slime Mold
Many identical unicellular creatures work so closely with each other that they appear to be one larger creature. Slime molds, for instance, are a colony of cells working together. Individually, they are too small to be seen, but as a colony, they can be seen without a microscope. Scientists have learned that even bacteria can communicate with each other to coordinate their behavior.

Plant Cells
Plant cells are multicellular. Groups of similar cells form tissues, such as muscle or epidermal (the outer layer of skin), and tissues make up organs, such as the heart and lungs.

Animal Cells
Human bodies contain many types of specialized cells, which fall into six categories: blood, nerve, muscle, fat, bone, and skin. (Creatures, including people, which are made up of two or more cells are multicellular.)

The Stuff of Cells

Cells are the smallest of all living creatures. Usually, they can be seen only through a microscope. Like everything else we can touch and see, cells are made up of molecules, and molecules are made up of atoms.



DNA Unraveled
A ball falls over the counter. A laser points dramatically at a room spinning behind a table and thousands. "DNA evidence passes that this case is the killer!" Moments like that—both on TV and in real courtroom—have made DNA the rock star of cell science, or cytology. Even many people who are not sure what a cell is have heard of DNA evidence and DNA testing. Folks today routinely catch criminals by using DNA tests. Your DNA is an individual's own fingerprint pattern. Just a bit of hair, saliva, or blood can provide enough DNA to solve an otherwise unsolvable mystery.

Prokaryotes
The prokaryote is a single-celled organism that lacks a nucleus. It has a circular DNA molecule and a cell membrane. There are two main types: bacteria and archaea.

Eukaryotes
Eukaryotes have a nucleus. They have a cell membrane and a cell wall. They have a circular DNA molecule and a cell membrane. There are two main types: plants and animals.

DOUBLE-STRANDED DNA
The structure of DNA is a double helix. It is made of two strands of DNA that are twisted around each other. The strands are held together by hydrogen bonds between the nitrogenous bases.

GENES
A gene is a segment of DNA that codes for a specific protein. It is the basic unit of heredity.

CELL MEMBRANE
The cell membrane is a phospholipid bilayer that surrounds the cell. It controls what enters and leaves the cell.

NUCLEUS
The nucleus is the control center of the cell. It contains the cell's DNA and is surrounded by a nuclear envelope.

MITOCHONDRIA
Mitochondria are organelles that produce energy for the cell. They have their own DNA and are surrounded by a double membrane.

ENDOPLASMIC RETICULUM
The endoplasmic reticulum is a network of membranes that is involved in protein synthesis and transport.

GOLGI APPARATUS
The Golgi apparatus is a series of stacked, flattened sacs that are involved in the transport of proteins and lipids.

VACUOLE
A vacuole is a large, fluid-filled sac that is used for storage and transport of materials.

CYTOSKELETON
The cytoskeleton is a network of protein fibers that provides structural support and is involved in cell movement.

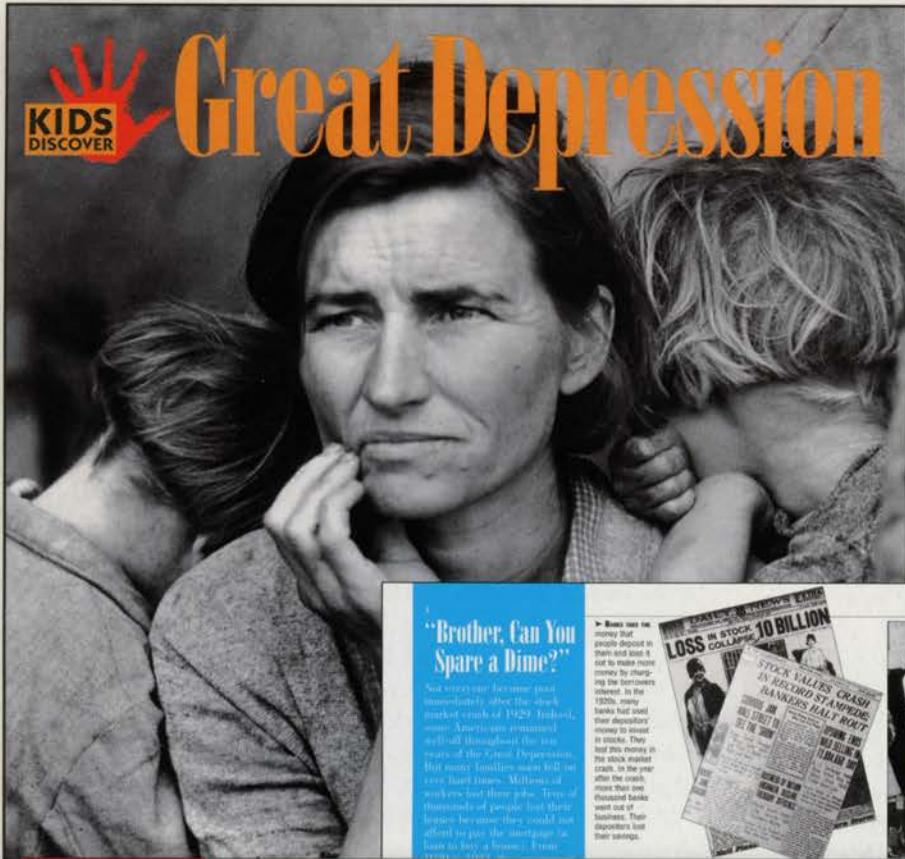
Blood Cells
Red blood cells carry oxygen throughout the body. White blood cells fight off infections.

Nerve Cells
Nerve cells transmit electrical signals throughout the body.

Muscle Cells
Muscle cells contract to produce movement.

Fat Cells
Fat cells store energy in the form of lipids.

Great Depression



◀ **FOR MANY, NEW** clothing was a rare treat. Younger children got hand-me-downs from older siblings. Farm mothers sewed clothes out of flour and feed sacks. Eventually, when they realized this was happening, some companies began making the sacks in pretty patterns.

“Brother, Can You Spare a Dime?”

Not everyone became poor immediately after the stock market crash of 1929. Instead, some Americans remained wealthy throughout the ten years of the Great Depression. But many families were left on very tight incomes. Millions of workers lost their jobs. Tens of thousands of people lost their homes because they could not afford to pay the mortgage. In 1933, the government...

▶ **Bank** was the money that people deposited in their bank. It was used to buy things like cars and houses. In the 1920s, many banks had used their depositors' money to invest in stocks. They had also money in the stock market. In 1929, the stock market crashed, so the year after the crash, most banks had lost their money. Their depositors lost their savings.



12 The Dust Bowl
The Great Depression coincided with the greatest agricultural disaster ever to hit the United States. In 1931, drought (a long period of dry weather) and dust storms began to ravage the Great Plains. They did not end until 1937. The area once considered America's breadbasket because of the great amount of wheat grown there became known as the Dust Bowl.



▶ **THEY** were rumors of work in California. Families that had lost almost everything in the Dust Bowl packed their few possessions in the family car and headed west. Although they came from all over the Dust Bowl, they became known as Okies, a nickname for people from Oklahoma.

▶ **AMERICAN** on the slope of the Capital and quickly left. Many had no place to go but back to the camp. Fearing violence, Hoover ordered them confined there. But the army chief of staff decided to remove them. Soldiers fired tear gas and burned down the camps, depriving the veterans of the few possessions they owned.

▶ **FOR** centuries, the roots of native prairie grasses had kept the soil of the Great Plains from blowing away. But farmers had plowed up much of the grasses to plant wheat. This plowing, as well as the overgrazing of livestock, had left the Great Plains defenseless against wind and weather. When a drought started in 1931, the soil dried up and there was nothing to keep it from blowing away. With no land to farm and little food to eat, many farmers migrated to other places, especially to the West, where they looked for jobs and a new start on life.



▶ **A** DUST STORM could strike suddenly, trapping people in cars or outdoors. People's mouths and noses filled with dust.



▶ **CHECK** IT OUT! Who was Woody Guthrie? (Answer on back cover)



▶ **MOST** OF THE Dust Bowlers who moved to California in the 1930s ended up as migrant farmworkers, traveling around the state picking and packing fruits and vegetables. They lived in tents and...

▶ **THEIR** children had little to eat. Some even died of starvation. They were refused to offer them a helping hand. John Steinbeck's novel...

▶ **THE** poor veterans of World War I came back and he has given his country what had not happened to him.



▶ **DURING** THE Depression, there were “runs” on banks, when panicked depositors tried to withdraw all their money. Banks were forced to close, and many depositors lost all their money. In 1933, Roosevelt declared a bank holiday, meaning that all the banks in the country were closed for four days. Government employees investigated the banks to determine which ones were well managed. Only those banks were allowed to reopen. People began to feel more confident in the banks.

A Ticket for Ms. Miles

How One Teacher Helped a Student Write Her Way Out of Poverty

By Michael Winerip

Rene, who has been teaching English for 32 years, has a writer's eye for detail, and that fall of 1999, what she noticed about her new sixth-grader, Jessica Atkinson, were the cuffs on the little girl's yellow sweatshirt. "They were dirty and worn and stiff," Ms. Miles said.

Ms. Miles teaches creative writing at the Charleston County School of the Arts, a 6th- through 12th-grade public school where students must audition and only one of three is accepted. Even among such talent, Jessica stood out. Ms. Miles felt her writing mixed a child's directness with startling, grown-up insight. The first month of sixth grade, the teacher singled out one of Jessica's poems, "Flame," giving it a 96 and praising "each simile as unique." ("I am like a flame," 11-year-old Jessica wrote, "so elegant in a way, yet so dangerous to curious fingers.")

In the writing program, students stay with the same teacher from sixth grade to graduation, and over those seven years, the simile Jessica brought to mind for Ms. Miles was a mystery novel, slowly unfolding. "Some days she wouldn't have her book bag or a paper signed, and I'd get angry," Ms. Miles said. "She was real quiet, didn't make excuses. She'd just say the facts: 'I stayed at my grandmother's last night,' or 'I didn't go home after school.' I wanted





to say, 'Where'd you go,' but I didn't." Jessica often didn't have money for field trips or supplies, and Ms. Miles helped out.

Over time, bits of Jessica's life peeked through her writing.

Somewhere around eighth grade, Ms. Miles said,

"I realized there was no mom there. I remember crying one day

when something she wrote about her mother made me understand her situation a little

better." By high school, Ms. Miles said, "I realized she was having trouble with her father. Jessica's writing was tackling some of these things head-on. By that age, they're writing from their heart, from their inside."

What came from Jessica just kept getting better. At its best, her writing feels like something by Ann Beattie or Raymond Carver, stories about ordinary people living on the edge, trying to maintain their sanity and continue going forward. In Jessica's stories, a young woman can be accidentally squeezed into the same section of a revolving door with a man in a business

suit, and in a few seconds' time, as she steps away in the opposite direction, she knows "my boyfriend wasn't going to be my one and only."

Ms. Miles's favorite is "Swampland," a short story about a 22-year-old woman working as a supermarket bagger and living with a boyfriend who doesn't know many of her secrets, including that she is pregnant.

At the start of senior year, Jessica moved out of her father's home, was supporting herself by working as a supermarket bagger at Publix, and paying rent to share a room at her boyfriend's family's house.

The teacher worried: What was Jessica and what was Jessica's fiction? "I tried to get a sense, but she was evasive," Ms. Miles said. At a meeting last fall to plan for college, Jessica said she had no idea how she could afford it or where to go. "It was the first time I'd seen her cry," Ms. Miles said. "She looked at me and said, 'Ms. Miles, is my life ever going to get better?'"

Each year Ms. Miles's seniors enter the national Scholastic writing competition, which dates back to 1923. Five \$10,000 first prizes are awarded. Winners have included Bernard Malamud, Truman Capote, Sylvia Plath, Joyce Carol Oates. Only once, in 2003, had Ms. Miles produced a winner, Sara Saylor. "Someone asked me, 'Rene, you think you have one this year?' And I said, 'If someone wins, it will be Jessica.'"

Jessica was hoping, too, though she didn't say so aloud. "Since I was 15, I wanted to win like Sara Saylor," Jessica said. "She was just an idol for us. Ms. Miles talked about Sara Saylor, Sara Saylor. Some people would tell me, you're the next Sara Saylor. I didn't think I had a chance, but also thought maybe I did."

There aren't many people she can show her writing to. "I get scared when my family reads my stuff," she said. "I don't want them to think it's about me." She is particularly close to her grandmother. "My grandmother made sure we were fed every day, made sure we had the rent," she said. "Swampland" frightened her grandmother. "She said, 'You're preg-

Michael Winerip has covered many beats for the New York Times, including education. This article originally appeared as "It's a Tough Life, to Live It and to Write It, but It Just Got a Little Better" in the May 31, 2006, issue of the New York Times. Copyright © 2006 by The New York Times Co. Reprinted with permission.

nant?!” recalled Jessica. “I said, ‘No, it’s not me.’”

She asked her boyfriend, Justin Wooton, a music major, what he thought of her writing, but he doesn’t say much. Jessica is a voracious reader, loves Milan Kundera, Natsuo Kirino, Chuck Palahniuk, Philip Pullman; Justin rarely reads. “If I say, ‘Is this good?’ he says ‘Yeah,’” Jessica said. “I ask why, but he says, ‘I don’t know, it’s just good.’”

“I’m in CP English,” Justin said. “That’s the lowest English. A lot of it was above me, but I liked it.”

They have been together two years. “She was probably the most independent kind of girl,” Justin said, “the way she dressed and how she acted. It didn’t seem like she cared about what people thought.”

As for Jessica, she said it wasn’t love at first sight. “He liked me first, but I didn’t like him,” she said. “I don’t know why I started liking him, he just seemed to get cuter. He’s very good looking. He’s just so genuine. Not like most guys. I think most guys cheat. But he’s one of these guys who doesn’t, he’s gentle and sweet.” When she moved in, she said, it was hard at first, living with him and five family members in a small ranch house. But now, she said, “I like spending time with him, it doesn’t bother me at all.”

As for her parents, she prefers to say little. She says she loves her father, a car salesman, and feels he did his best even though they had trouble living together. He and her grandmother always ask if she needs money. “I try not to take anything,” she said. “It feels kind of selfish if I’m not living with them.” About her mother, Jessica said only, “She recently came back into my life.”

Last month, Ms. Miles got a call saying Jessica had won a Scholastic \$10,000 first prize. Tracking her down took awhile; Jessica doesn’t have a cell phone or home phone, but Ms. Miles knew to try her grandmother. “Remember at the beginning of the year you asked if your life was going to get better?” Ms. Miles asked Jessica. “It just got better.”

Jessica had one concern that took her a few weeks to voice. Did she win because she could write? Or because the judges felt sorry for her? “I know they’re giving people opportunity,” she told Ms. Miles. “I thought maybe it was like, ‘Let’s give a girl a chance, she didn’t have a mother.’”

Ms. Miles showed Jessica the cover letter to Scholastic. There was nothing about Jessica’s background, only Jessica’s writing.

“Then I really won,” said Jessica, “didn’t I?”

“You really won,” said Ms. Miles.

This fall, Jessica is attending Oglethorpe, a small liberal arts college in Atlanta that has given her a scholarship to go with the Scholastic money. She chose it, she said, because she will be near an aunt who has looked out for her, and because “all the teachers are Ph.D. doctorates, and the tour guides were really nice.”

Justin decided to go to Oglethorpe, too, and major in business.

In early June, Jessica Atkinson, the writer, flew to New York City to get her Scholastic award. Each winner is allowed to take one adult, usually a family member, but Jessica chose her teacher, Ms. Miles. □

“Brain-Based” Learning

(Continued from page 32)

plateaus in early childhood, learning effects are cumulative—the more you know, the easier it is to learn more—so learning things in a rich home environment makes it easier for children to learn still more when they get to school. (For more on the cumulative effect of learning, see “How Knowledge Helps” *American Educator*, Spring 2006, www.aft.org/pubs-reports/american_educator/issues/spring06/willingham.htm.)

Will Neuroscience Inform Educational Practice in the Future?

Based on these three “well known” findings from neuroscience that turn out to be inaccurate, it might seem that the problem in applying neuroscientific data to education lies in how the data are used. Isn’t the challenge to make better use of the data? To a certain extent, yes. But applying neuroscientific findings is not at all straightforward.

For neuroscience to mean something to teachers, it must provide information beyond what is available without neuroscientific methods. It’s not enough to describe what’s happening in the brain, and pretend that you’ve learned something useful. For example, some brain-based teaching books explain what’s happening in the nervous system—and thus why it is hard to learn—when the room is uncomfortably hot or cold (Jensen, 2005). But teachers are well aware that an uncomfortable room makes it hard to learn. And knowing what is happening within the nervous system does not give teachers any new solutions to the problem.

The challenge for those trying to apply neuroscientific findings to the classroom is the dramatically different levels of analysis that must be bridged as we transition from looking at a brain to looking at a child in a classroom. To understand that problem, let’s set neuroscience aside for a moment, and just consider cognition. Findings from cognitive psychology can only be applied to classrooms with care and forethought because of the complexity of the mind. For example, cognitive psychologists know that practice is important to memory, but you can’t conclude that students should, therefore, practice the same lesson continuously until they have mastered it; many students will get bored and attention will wander. More generally, we can say that cognitive systems interact. Laboratory experiments are carefully designed to examine one cognitive system at a time; but in the classroom, all of the systems operate simultaneously, and they affect one another. Continuous practice is good for memory, but it’s bad for attention. When you apply a cognitive principle to the classroom, you have to think of the effect throughout the whole mind, not just in the system that you’re targeting.

This example of interactions among cognitive processes illustrates what’s meant by “a different level of analysis.” Because processes of the mind interact in complicated ways, it’s difficult to examine all the parts (attention, memory, motivation, and so on) and confidently predict what will happen in the system as a whole. For example, if you have a new reading program in mind, it doesn’t make sense to evaluate the effect

of the program on memory, attention, and so forth. It makes sense to evaluate the effect of the program on the whole system at once—that is, on the student's ability to read.

Once we start trying to use neuroscience to tell us about student learning, we have still another layer of complexity because neuroscience uses a different, more fine-grained level of analysis than cognitive psychology does. For example, "attention" is not supported by a single brain structure—it's supported by several brain structures that act together as one system. And those brain structures have their own set of complex interactions. Thus, when we examine a brain structure and try to tie it to classroom behavior (e.g., noting that girls have bigger hippocampi, and thus expecting them to remember more facts in class), we are jumping across two levels of analysis: We are looking at one structure in a larger brain system and guessing at its effect on the memory system as a whole; and then we're guessing that this effect on the memory system will have a predictable effect on student learning in the classroom.

In general, if you are interested in describing effects at a given level of analysis, you are most likely to make progress by sticking to that level of analysis. If you're interested in describing ways that students learn best, it makes sense to study classroom situations. To the extent that neuroscience will inform good teaching practice, it seems most likely that this influence will be funneled through the cognitive level of analysis: For example, neuroscience will help us better understand memory, and this improved understanding of memory might be used to improve classroom practice. It's unlikely that leapfrogging the cognitive level analysis and going straight from the brain to the classroom will work out very often.

In a trivial sense we could say that a better understanding of the brain is bound to lead to improved classroom practice some time in the future. A deep understanding of the brain will come, hand-in-hand, with a deep understanding of the mind, and that is bound to help education. There is not, however, any prospect of a brain-based learning program of any substance in the near future. Neuroscience may, however, contribute to the diagnosis of some learning disorders in the near future (see box, pg. 33). In summary, I hope educators will approach claims that instructional techniques and strategies are "proven" because they are based on neuroscience with a healthy dose of skepticism. Cognitive and educational studies are the best sources for educators looking to improve their students' cognitive and educational outcomes. □

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Neglected Muse

(Continued from page 17)

Learning from a Simple Melody:

Scarborough Fair

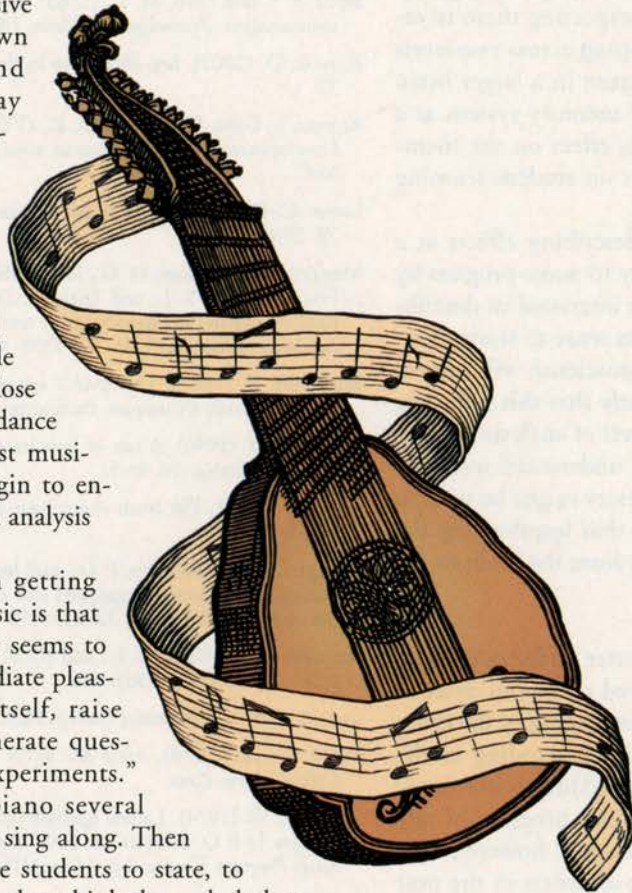
Music education that aims at real knowledge requires careful attention to the elements of music: tones, time-values, intervals, etc. Students must learn to read music and correctly identify notes on a staff. Soon after this “basic training,” they should look closely at how the elements conspire to form significant musical wholes. These wholes need not be impressive compositions by well-known composers like Bach and Mozart—they demand way too much all at once. A better way to begin is with a folk song.

Scarborough Fair, the very old folk song made popular by Simon and Garfunkel in the '60s, is a good example of a beautiful, simple melody that lends itself to close analysis. With the right guidance and materials, even the most musically naïve students can begin to engage in a deep and thorough analysis of this haunting melody.

One of the problems in getting students to think about music is that it comes to us too easily. It seems to be right there for our immediate pleasure. Music does not, by itself, raise questions. One way to generate questions is with a series of “experiments.” Play the melody on the piano several times and have the students sing along. Then change one note and get the students to state, to the best of their ability, how they think the melody has changed in sound and “feel.” Do this with different notes in the melody and examine each change in turn. At each point, ask, “What happened? What was the effect of the change?” Changing a note in a melody—in effect, disrupting a familiar whole—is also a good way to get students to become aware that there *is* a whole. What is right sounding about a melody comes to light when we cause it to stray from its intended path and sound “wrong.” Students then begin to realize that the melody consists of carefully made choices, and that a change in one part is a change in the whole. Such experiments become even more revealing when we alter the melody’s rhythm.

Next, students should explore the connection between the notes of the melody and the *words*. To do this thoroughly, they should have access to the complete text (whose story is very sad). Does the sound of the melody fit the meaning of the words? What do the words gain in being sung? Does the

As a music teacher, I hope that the study of music begets in my students a habit of searching for the causes and details of beautiful things, and that the love of beauty will nourish the love of knowledge and truth.



melody make certain words stand out?

How does the rhythm affect the mood of the song, the meaning of the words, and the story they tell?

Finally, students can compose a variation of *Scarborough Fair*, perhaps with their own lyrics. In this exercise (which I have found works beautifully in class), students learn, through direct experience, that composition involves revision: that certain musical choices don't work, that some work better than others, and, more generally, that a piece of music (like a piece of writing) can be improved.

A simple, familiar folk song is a musical education in itself. The examination of simple melodies encourages students to give reasons for what they feel. This liberates them from the erroneous and stultifying opinion that a response to beauty is based solely on subjective feeling (that beauty is “relative”) or habit (that we hear musical events as we do only because we've heard them repeatedly). It reveals, in highly specific ways, that human feeling is complex, that our emotional re-

sponse to beautiful sound is grounded in a remarkably precise, if usually unconscious, perception of order. Similarly, examination of simple melodies reinforces the trust that analysis, however abstract it may seem at first, can lead us back to our musical experience with renewed wonder, a keener sense for the details of a beautiful whole, and a more intense and discerning pleasure. By analyzing *Scarborough Fair*, we get a better idea of what to listen *for* in this melody. We also come to understand it better and, as a result, appreciate it even more. To borrow from Elizabeth Barrett Browning's famous poem, it is like being able to "count the ways" in which we love someone.

Music As a Liberating Art

The study of music has several goals. One of them is to improve, through education, students' aesthetic taste: to introduce them to truly great music in an effort to beget a love for all things graceful and well formed. As a music teacher, I hope that the study of music begets in my students a habit of searching for the causes and details of beautiful things, and that the love of beauty will nourish the love of knowledge and truth. As students' intellects are opened to the power of music, I hope they will strive to imitate in their day-to-day lives the musical virtues of harmoniousness, proportion, good timing, appropriate flexibility or grace, and "striking the right note" in thought, speech, feeling, and action.

Music, as I noted earlier, is one of the traditional liberal arts. It liberates us from vulgarity, intellectual rigidity, and the

tyranny of unexamined, popular opinions about music and beauty. Music does this by encouraging human fellowship (in singing), by inspiring a love of beauty that transcends the mere gratification of desire, by making us more attentive to the elements and causes of our emotional response to beauty, and by compelling us to test conventional opinions against the standard of our own experience.

Music, alas, is the neglected Muse of educational programs across the board, from kindergarten to college. One reason for this is a failure to perceive the importance of music in the education of the young and in human life generally. Another is the tendency to regard music as a "soft" subject—there for the sake of amusement or a vague sort of "music appreciation." Yet another is the opinion that music is not basic to our human nature, but is the prerogative of a trained or gifted elite—something that only those with the potential to be professional musicians need study. I have endeavored to show that none of these is true.

If studied as a liberal art (i.e., in order for the student to become more inquisitive and reflective and more aware of music's power) rather than as a fine art (i.e., in order for the student to become a musician), music gets students to look beyond surface distinctions in order to seek out deep, underlying harmonies or bonds between things apparently remote. In the breadth of its domain, in its union of the mathematical and the poetic, and in its involvement of the whole human being (body, heart, and mind), music is an essential liberating art. □

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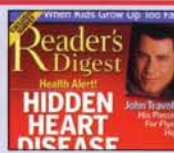
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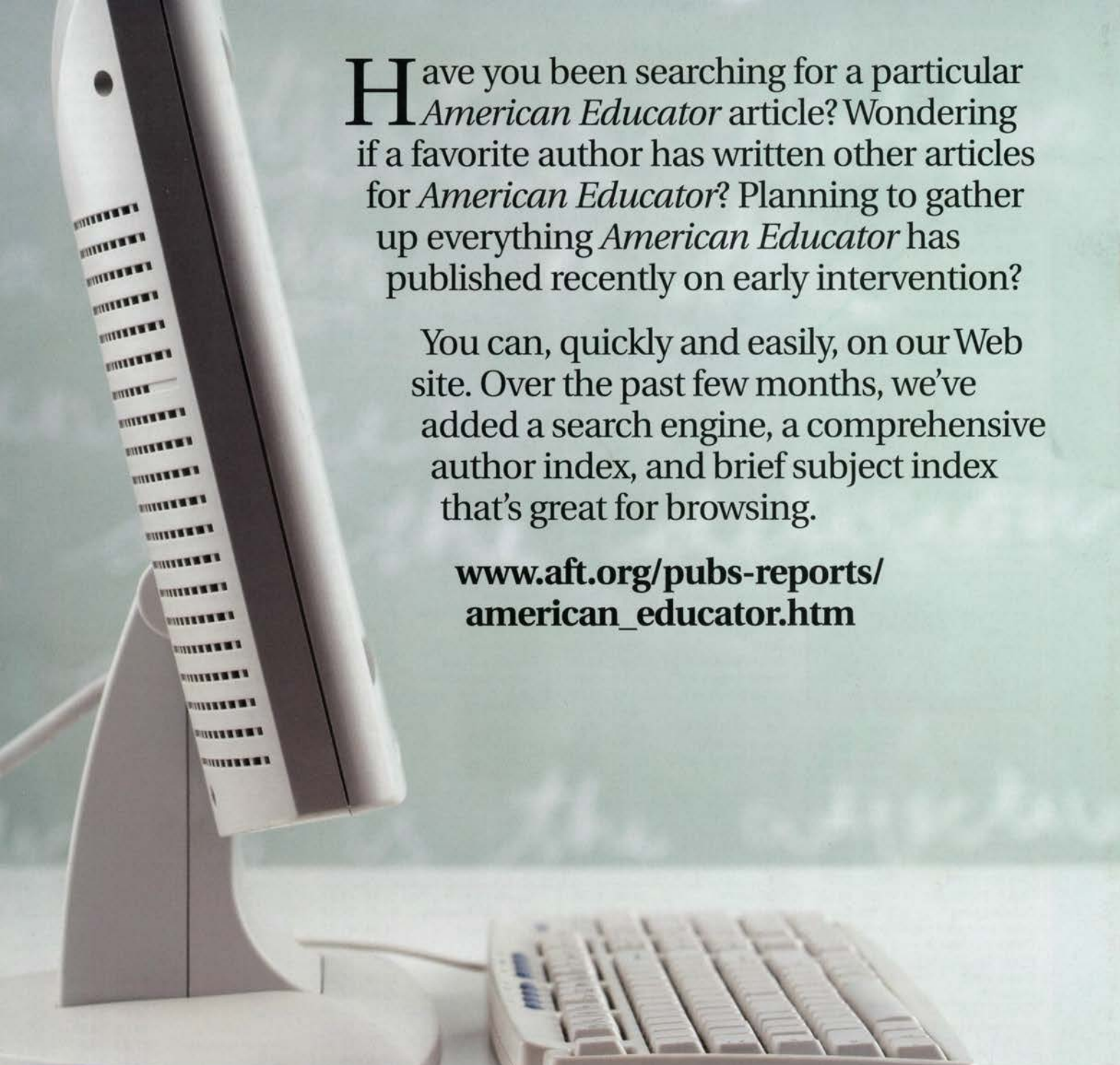
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