

BY JOHN M. EGER

PLEASURE, BEAUTY, AND WONDER:

Educating for the Knowledge Age



The future workforce will need to be more innovative, argues a communications and public policy scholar. While math and science are important, they need to be infused with the creative spark that comes from the arts.

The challenge today is not in acquiring information, but rather in determining what information is most accurate and relevant to us. Knowing how to separate good from bad information and knowing which information has value in our quest for knowledge and wisdom is a unique and essential skill. And the demand for a new workforce to meet these challenges is rapidly increasing.

As a special report in *Business Week* magazine observed several years ago, "The game is changing. It isn't just about math and science anymore. It's about creativity, imagination, and, above all, innovation." Most analysts studying the new global economy agree that the growing creative and innovative economy represents a central ingredient in defining future success.

But how do we make someone innovative and creative? What must schools—from kindergartens to universities—and communities do to nurture and attract the most innovative and creative workers?

"We need a system that grounds all students in pleasure, beauty, and wonder," says Dana Gioia, chairman of the U.S. National Endowment for the Arts. "It is the best way to create

citizens who are awakened not only to their humanity, but to the human enterprise that they inherit and will—for good or ill—perpetuate. ... [America] is not going to succeed through cheap labor or cheap raw materials, nor even the free flow of capital or a streamlined industrial base. To compete successfully, this country needs creativity, ingenuity, innovation."

Learning to learn and finding the joy of learning in an age where people could go through a dozen jobs well before middle age has greatly complicated matters. Now add in the probability that tomorrow's top jobs haven't even been imagined yet because they'll use technologies that haven't been invented, as former U.S. Secretary of Education Richard Riley has suggested. Clearly we are headed into a new and uncertain future.

Do We Need More Math and Science?

Just a few years ago, the America Competes Act was signed into law by then-President Bush, authorizing \$151.2 million to help students earn bachelor's degrees in math or science, \$125 million to help math and science teachers get teaching credentials, and additional monies to create more educational programs at the kindergarten through 12th-grade level to align math and science curricula in preparation for college.

Chester E. Finn Jr. and Diane Ravitch, both former assistant secretaries of education, complained

loudly, "This is a mistake that will ill serve our children while misconstruing the true nature of American competitiveness and the challenges we face in the twenty-first century. Worthy though these skills are, they ignore at least half of what has long been regarded as a well-rounded education in Western civilization: literature, art, music, history, civics, and geography."

In truth, U.S. education needs a huge infusion of capital and a change in attitude for both art and music and math and science. Importantly, we need to define a well-rounded education and to make the case for its importance in a global innovation economy. The evidence for such an effort is slowly mounting.

Robert Root-Bernstein, a biochemist and MacArthur Foundation Fellow, completed a study of 150 eminent scientists from Pasteur to Einstein. His findings were startling to those educators lobbying for more emphasis on the sciences, for he discovered that nearly all of the great inventors and scientists were also musicians, artists, writers, or poets. Galileo, for example, was a poet and literary critic. Einstein was a passionate student of the violin. And Samuel Morse, the father of telecommunications and inventor of the telegraph, was a portrait painter.

In *Sparks of Genius* (Houghton Mifflin, 2000), Root-Bernstein and his wife, Michele, examine the minds of inventive people and show that creativity is something that both artists and scientists can learn and, more importantly, that the seemingly disparate disciplines of art and science, music and math, complement and enhance one another.

All People Learn Differently

Perhaps as a consequence of Howard Gardner's pioneering research on multiple intelligences and the idea that all children learn differently, various practical applications are evident throughout the United States.

More than ten years ago in New York's South Bronx, the poorest congressional district in the United States, the start of something profound was first reported in a PBS

Opposite page: Artist inspires students to express themselves in a class participating in the Wolf Trap Teaching Artists program. The Wolf Trap Foundation for the Performing Arts in Vienna, Virginia, is a participant in the national Early Childhood STEM Learning Through the Arts program to integrate arts into science and math learning in pre-K and kindergarten classrooms.

special documentary called *Something within Me*.

In a place where only one in four children once graduated from high school, a small school called St. Augustine boasted that 95% of its students read at or above grade level, and 95% met New York state academic standards. These were highly significant achievements despite a student population that was 100% minority, with many of the children living in single-parent homes in communities plagued by AIDS, crime, substance abuse, and violence.

What was the secret of the school's success?

St. Augustine infused every discipline—math, history, science, and biology—with dance, music, creative writing, and visual arts. Sadly, as the parish was located in an extremely poor neighborhood, the school was eventually closed for lack of funds.

Educating Artfully

In 2002, the Los Angeles County Board of Supervisors adopted "Arts for All: A Regional Blueprint for Arts Education." The program's vision is for every public school student in the county to receive an effective K-12 education, of which the arts are an important component.

The county hopes that all of its school districts will eventually acknowledge that exposure to and "participation in the arts strengthens a child's academic development and growth as an individual; prepares the child to feel a part of and make a contribution to the community; and ensures a creative and competent workforce to meet the economic opportunities of both the present and the future." Thus, sequential instruction in the multiple arts disciplines will be scheduled into each school day and accounted for in the budget of every Los Angeles County school.

The Chicago Arts Partnership in Education (CAPE) offers a model of interdisciplinary collaboration, using arts integration as a way to approach thinking and learning; the program encourages schools to reach out to community resources and to make connections to the school curriculum.

Such a multidisciplinary approach encourages leaders of young learners

to see the connections between the knowledge that they are acquiring in, for instance, a unit in mathematics and a unit in social studies, or in a science unit and a language arts unit. This approach illustrates integrative thinking as it is actually done in the real world.

High Tech High (HTH) in San Diego is another remarkable example of art infusion, indeed infusion of all the various disciplines. HTH is a charter school well funded by the Bill and Melinda Gates Foundation, the Gary Jacobs family (founder of Qualcomm), and many San Diego businesses.

It consists of six schools: three high schools, two middle schools, and one elementary school, with a total of 2,500 students and 200 employees. One hundred percent of graduates have been admitted to college, 80% to four-year institutions of higher learning.

At High Tech High, there is no math class or art, though these disciplines are still taught and still relevant. Instead, they are infused in the curriculum, integrated into larger questions like: "How does the world work?" "Who lives here?" "Why does this matter?" Each semester the entire faculty and student body are assigned a topic they work together on that draws on all the disciplines, thereby forcing students to work collaboratively on real-world problems.

Larry Rosenstock, CEO of High Tech High, points with pride to these projects, as they bring all the disciplines and all the energy and intellect of the class together. The design principles of the school—"personalization, adult-world connection, and common intellectual mission"—are unified.

Rosenstock has been accused of running "an art school in disguise." Others have complained about the way the school teaches math. Indeed, High Tech High is not a school many of us would immediately recognize. It is a place and a curriculum that has turned the K-12 world upside down.

Changing Lenses

Maybe we really need to go back to basics and ask what the purpose of

public education is. What do we consider an educated person to be? Maybe we need to change the vocabulary of the educational establishment, change the lenses in the camera, and in the process awaken to the competitive demands of this new age.

A few universities do seem to be exploring the best way to blur the lines between art and humanities and science and mathematics, and to overcome the divide between these two cultures. At Binghamton University, for instance, biology professor David Sloan Wilson and English professor Leslie Heywood collaborated to create a program that builds on some of the themes explored in Wilson's evolutionary studies courses, which have proved enormously popular with science and nonscience majors alike.

"You can study music, dance, narrative storytelling, and art making scientifically, and you can conclude that, yes, they're deeply biologically driven, they're essential to our species, but there would still be something missing," Wilson says, "and that thing is an appreciation for the work itself, a true understanding of its meaning in its culture and context."

As a whole new economy based upon creativity and innovation emerges—the dawn of the "Creative Age"—the importance of reinventing business strategies, corporations, communities, schools, and more is critical. Nothing can remain the same if we are to survive, let alone succeed, in this new global economy.

We in the United States need to redesign our high school and college curricula in particular, to focus on preparing students for this new competition. Yet today, in the rush to confront the wave of outsourcing and offshoring, it is math and science alone that are urged upon young people, to our peril and that of future generations across the world. □



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