Views You Can Use

Vol. V No. 2

In this monthly briefing memo, which you have requested, my colleagues at the International Center for Leadership in Education and I share our research on trends and technologies that will have an impact on education, learning, and life.

The True Finish Line. *No Child Left Behind* (NCLB) has caused states to take a serious look at their standards and assessment programs. Widespread changes are occurring nationwide in order to comply with the adequate yearly progress (AYP) provision of NCLB. Every district, school, superintendent, principal, and teacher in this country is feeling pressure to get all students to minimum proficiency levels. While I believe that demonstrated proficiency in academic standards is critically important, I also believe that it is not sufficient.

Having all students achieve academic proficiency is a worthy goal, but it should be the starting line. State assessments have become so "high stakes" that in many classrooms, instruction is being geared solely toward to purpose of making sure students pass them. In this respect, state assessments have become the finish line. The student's ability to apply high-rigor knowledge in a real-world setting needs to be the true finish line; instead, it has become an afterthought.

For a new white paper on the subject, "Achieving Academic Excellence through Rigor and Relevance," please visit www.leadered.com.

I welcome your comments and ideas.
Sincerely, Bill Daggett

Nanotechnology

Fighting Cancer in "Small" Steps

Nanotechnology is being used to fight cancer on a variety of different levels – detection, treatment, reduction of side effects of chemotherapy, and, of course, research into the nature of the disease itself. The Immunicon company now markets a diagnostic tool, based on magnetic nanoparticles called *ferrofluids*, that identifies cancer cells in blood for analysis. Triton BioSystems uses a magnetic sphere that attaches itself to certain cancer cells, heating and destroying them. Nanoparticles of paclitaxel, the active part of the anti-cancer drug Taxol, are being incorporated by the Accusphere company into a "porous matrix" to reduce side effects of that drug. Idatech Group is developing an anti-cancer vaccine that uses gold nanoparticles.

Source: "Living with Cancer," *Small Times Magazine - The Business of Micro and Nanotechnology*, September 2005. Vol. 5, No. 6, p. 26.

Nanotech requires the cooperation of specialists across disciplines – materials science, chemistry, physics, and bioengineering, to name a few. Our science curricula should try to reduce artificial compartmentalization and to give students opportunities to see the interconnectedness of learning at the highest levels of application.

Check Your Speckle

Laser speckle is the process by which the nanostructure-level surface pattern of a material – paper, plastic, packaging – is identified using laser light reflection. Since all surfaces contain distinguishing characteristics and minor imperfections, any small area of a sheet of paper, credit card, or cardboard box

has its own unique speckle "fingerprint." Those nano-level substructures are not disrupted by, for example, moisture or rough handling of the surface. Moreover, the process of laser scanning and comparing one unique speckle fingerprint against its own image to show an exact match is both foolproof and inexpensive. Such nanotech identifiers, which are inexpensive to use and cannot be bypassed, altered, or counterfeited, may eventually replace "smart tags," barcodes, molecular markers, or other authentication devices on product packaging, container shipments, passports, ID cards, and pharmaceutical containers.

Sources: "Foolproof 'Fingerprint' on Materials Could Aid the Fight Against Fraud," Imperial College London, July 27, 2005. www.imperial.ac.uk/P6720.htm
"'Fingerprinting' Documents and Packaging," *Nature Magazine*, July 28, 2005. Vol. 436.

Scientists continue to find never-before-considered applications of nanotech. The "ah-ha" moment of discovery often comes when technical experts – like students – operate in Quadrant D of the Rigor/Relevance Framework, where critical and creative thinking are at their peak.

Information Technology

Top 10 Internet Search Terms

According to Internet search engine-provider Lycos Inc., the most popular search term for the past decade was "Pamela Anderson." The other most frequently searched for terms were, in order: Dragonball, Pokemon, Britney Spears, World Wrestling Entertainment, tattoos, Las Vegas, the NFL, the Sept. 11 attacks, and Christmas. What Lycos calls "prurient" terms are not listed in their rankings.

Source: Brian Bergstein (The Associated Press), "'Pamela Anderson' Top Search Term," *informationweek.com*, Sept. 22, 2005.
http://informationweek.com/story/showArticle.jhtml;jsessionid=NOAUCZ4ODYLZMQSNDBOCKHSCJUMEKJVN?articleID=171100025

Internet use should be consistent with the commitment to a safe and orderly school — one of the International Center's 10 Key Components of School Improvement that are a focus of the Successful Practices Network www.successfulpractices.org.

Twinkle, Twinkle, Little... Oops

On September 4, NASA's Swift satellite detected a gamma-ray burst – the death throes of a giant star as it collapsed into a black hole – from the farthest reaches of the universe, about 12.6 billion light years from Earth. This event, the most distant explosion ever recorded, happened over 12 billion years ago. The burst was observed from more than twice the distance that some scientists had predicted was possible and released 300 times more energy than our sun will give off during its lifetime.

Source: "Most Distant Explosion Detected, Smashes Previous Record," *NASA*, 2005 Press Release.
www.nasa.gov/vision/universe/starsgalaxies/sburst05_pressrelease.html

Far too many students struggle with mathematics because they are not taught meaningful applications of what they are learning. Math is an enabling skill that empowers learners and opens up many jobs in our increasingly technology-driven society. By drawing upon engaging examples from sources such as astronomy and current events, teachers can help students to gain both the confidence and the competence to use math to solve "real" problems.

Safety "Net"

During the recent hurricane disasters along the Gulf coast, the Internet proved its worth as an emergency-services tool. Existing community-based local Web sites and a host of other sites sprang into action by connecting needy survivors with willing individual donors of emergency supplies and housing, posting lost-and-found and missing person listings, even providing information on block-by-block conditions in hard-hit areas. With most cell phones and land-lines inoperable, e-mail, Instant Messenger, and blogs became the only available modes of communication for many.

Source: Keith Axline, "Craigslist versus Katrina," *Wired News*, September 1, 2005. http://wired.com/news/planet/0,2782,68720,00.html

Boy, Do We Feel Dumb!

To celebrate its 125th anniversary, *Science* magazine recently surveyed more than 100 leading researchers across a host of disciplines to compile a list of the Top 125 questions still unanswered by science. The only restriction given was that each question had to have a chance of being answered in the next 25 years. The list, referred to by the editors of *Science* as a "catalogue of bewilderment," shows the staggering breadth of scientific inquiry currently underway across the globe. Included in the list:

- *What is the universe made of?* All of the atoms and detectable energy in the universe add up to less than 5% of what exists. Even by adding in what scientists call "dark matter", experts can account for only 30%. What else is out there?
- *How much can the human life span be extended ?* In the 20th century alone, the average U.S. life span increased from 47 to 77 years, more than 50%. What are the upper limits of human age?

The full list of questions, with essays on the top 25, is at www.sciencemag.org/sciext/125th/#inscience

Source: The American Association for the Advancement of Science

Knowing what you don't know and having a passion to find the answer is a sign of an active and willing learner — the kind of students we need to nurture. As Ray McNulty observed at the International Center's High School Reinvention Symposium, "Sometimes we don't just need to think outside the box, we need an entirely new box to think in."

Biotechnology

Plants That Clean Up After Plants

Ohio University's Coal Research Center has a working bioreactor that can remove carbon dioxide from the emissions of coal-burning power plants. The elegantly simple biotech system uses the photosynthesis capabilities of cyanobacteria (blue-green algae). The algae, which are cultivated in screen-like structures, use water and the CO_2 in the exhaust gases to grow new algae. In the process, the plants give off oxygen and water vapor, but also absorb nitrogen oxide and sulfur dioxide, both of which cause acid rain if released into the atmosphere.

Because the gas emissions are hot, the device uses a type of algae that grows in the mineral hot springs of Yellowstone National Park. Scientists chose a naturally existing form of algae rather than creating a biogenetic strain because, if the bioreactor process proves to be scaleable, the quantities of mutant algae produced could become a biohazard. The current prototype can handle 140 m^3 of flue gas per minute, the output of about a three-megawatt power plant or 50 cars.

Source: Patrick DiJusto, "Blue-Green Acres," *scientificamerican.com*, Aug. 29, 2005. www.sciam.com/article.cfm?chanID=sa006&colID=5&articleID=00000819-0BA7-1306-8A6883414B7F0000

The establishment of economical and yet environmentally friendly energy sources will lie in the hands of a talented pool of future experts – today's students – who can solve complex problems across disciplines, understand data and statistics, and know when (and when not) to use biogenetically produced solutions.

Education Trends

Special Thoughts on Special Education

The International Center's Special Education Institute Executive Director, Larry Gloeckler, challenges his audiences with some keen insights into students with special needs:

- Most special education students today are not significantly cognitively disabled.
- Students with special needs make up on average about 12-14% of K-12 student enrollment nationally, but there are disproportionately high percentages in urban schools.
- When people who say they believe that "all students can learn" have to add "including special education students," they don't yet really believe that all really means all.

The Public Speaks Out on Education

According to a recent Educational Testing Service (ETS) poll, only 9% of Americans think most high school students are being challenged by their schoolwork. Three-quarters of respondents also said America's ability to compete in the world will weaken if, 25 years from now, high schools have not changed. Additionally, and reflecting national survey results, respondents felt that:

- Teachers need ongoing support to be experts in the subjects they teach (74% agree).
- Teacher salaries should be increased so more well-qualified teachers can be hired and retained, even if it means increased taxes (80%).
- Schools need to emphasize real-world learning opportunities in high school through work study, community service, and career technical courses (64%).
- Students should pass a state graduation test before they can receive a diploma (80%).
- All students should get rigorous coursework before graduation, including computer science (95%), four years of English (85%), three years of history and civics (81%), four years of mathematics (73%), at least three years of science (69%), and two years of foreign language (63%).

Source: Peter D. Hart and David Winston, "Ready for the Real World? Americans Speak on High School Reform," Educational Testing Service, June 2005.
www.ets.org/Media/Education_Topics/pdf/2005execsum.pdf

Many of the sentiments expressed in the poll mirror what the International Center has been telling educators and their stakeholders since 1991, especially about the importance of high-quality curriculum and instruction in support of rigorous and relevant learning.

No Bloke or Sheila Left Behind

Concern about quality and equality of educational opportunity and academic rigor is not just a U.S. issue. The Australian federal government has just announced plans to compare Grade 12 English, math, physics, and chemistry courses across the various Australian states to determine if any curricula are being "dumbed down." Aussie parents and other stakeholders will be able to compare the quality of curriculum from state to state. In tandem, the Federal Education Ministry has proposed a common Grade 12 exit exam that would credit test-passers with a national Australian Certificate of Education.

Source: Samantha Maiden, "States Rated on Year 12 Excellence," *The Australian*, September 24, 2005.
www.theaustralian.news.com.au/common/story_page/0,5744,16703273%5E13881,00.html

We are reminded that our schools compete not only against one another, but also against increasingly higher global standards for academic excellence. An emphasis on world-class curriculum and instruction and ensuring that our students have access to rigorous and relevant academic coursework are the best investments in guaranteeing America's long-term success as a world leader.

Displaced Teachers Connect to Jobs

The National Science Teachers Association (NSTA) has created a Katrina Job Bank to help displaced science educators to connect with organizations that have immediate job openings. This service is free at http://careers.nsta.org/katrina.asp.

Demographic Trends

- Science and engineering degrees now make up 60% of the Bachelor's degrees awarded in China, compared to 5% of degrees in the U.S.
- It is estimated that by 2010, 90% of the world's scientists and engineers will be in Asia.

- By 2008, the ratio of new retirees to young people entering the workforce will be 3:1.

The implications of demographic, globalization, and other mega trends for education and American society, which Dr. Daggett outlined in his 2005 Model Schools Conference opening address and at the High School Reinvention Symposium, are staggering. To learn more, order the 75-minute video *Preparing Students for Their Future* or download the corresponding white paper at www.leadered.com/

By the Numbers:

The Council of Chief State School Officers (CCSSO), partner of the International Center for Leadership in Education on a five-year high school initiative, has released its 2004 report on Key State Education Policies. Some highlights from 2004:

- 35 states with policies on minimum length of a school year require at least 180 days; 6 states require 175 to 179 days. In 1995, the numbers were 33 and 9, respectively.
- 34 states require a minimum of five instructional hours per day for grades 1 through high school.
- 37 states report at least one district operating year-round schools, a 28% increase since 1995.
- 42 states require their districts to operate kindergarten programs, nine of them full-day.
- 38 states require four or more English credits for graduation; 37 states require two to three credits in math; 38 require two to three credits in science; and 34 require two to three credits in social studies.
- 17 states require Algebra 1 and 5 states require a lab science course.
- 33 states require at least one physical education course.
- 27 states require students to pass a high school achievement test for graduation.
- 45 states have content standards in the arts, 36 in foreign languages, 41 in health, 39 in physical education, and 15 in career and technical education.
- 23 states have no state policy on classroom instructional materials use or selection.
- 31 states require high school teachers to have a major in their specialty for certification, up from 19 in 1995.
- 48 states plus Washington, D.C. set a minimum number of professional development hours (most frequently six semester credit hours) for teacher licensure renewal approximately every five years.
- All states require statewide assessments in English language arts and math in 2004. About two-thirds use criterion-referenced tests.
- 43 states have testing programs in science in anticipation of a 2008 deadline under NCLB.

Copies of the entire report are available free at www.ccsso.org/whats_new/press_releases/index.cfm