



## Views You Can Use

### Vol. V No. 7

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.

In working with some of the best U.S. high schools, we have found that they do not attribute their success to one defining initiative or program. Instead they attribute it to an unrelenting build up of activity system-wide that eventually resulted in breakthrough performance at the high school. To ensure that all students are prepared for success in their lives beyond school, the middle grades must be made part of the broader secondary school reinvention movement. For this reason, the International Center will sponsor “Building Up in the Middle Grades to Breakthrough Performance in High School – A School Reinvention Symposium” from Friday, October 27 to Sunday, October 29 in Washington, D.C. We will notify you as soon as registration opens.

Sincerely,  
*Bill Daggett*

## Education Trends

### Filling the Math and Science Education Pipeline

By 2012, two-thirds of all K-12 teachers in the United States are expected to retire or stop teaching. The number of teachers needed to fill the vacated positions range in the millions — 200,000 in math and science alone. Until recently, these numbers created a silent panic, with little in the way of a plan to confront them. Fortunately, the tide appears to be turning in favor of action. Government leaders at the state and federal levels are focusing on creative ways to fill the education pipeline with future scientists, engineers, and technology workers.

In January, President Bush pledged funding to train 70,000 additional high school science and math teachers. New York Governor George Pataki proposed six new initiatives in the 2006-07 Executive Budget to increase the number of students majoring in math and science in college by awarding scholarships to students who pursue degrees in these subjects in New York.

For an interesting Op-Ed piece on the process of getting students interested in math and science at an early age and ways to get a support structure in place to keep them motivated, see R. Mark Sullivan, “Known Factor: Creativity is Critical in Math, Science,” *Commission on Independent Colleges and Universities*, March 19, 2006. [www.cicu.org/news/oped.php?id=30](http://www.cicu.org/news/oped.php?id=30)

## Health Trends

## **A Shot in the Arm for Cancer Research.**

Clinical trials of a vaccine for the prevention of cervical cancer, which have been going on for years, are showing astounding success. In June, the U.S. Food and Drug Administration will decide whether to approve the vaccine, called Gardasil, for public use. As of now, there is little to suggest it will do otherwise. The vaccine is administered by injecting the upper arm with the human papilloma virus (HPV), two types of which cause 70% of all cervical cancers that kill 270,000 women worldwide each year. The vaccine prevents infection from these two types of HPVs 100% of the time.

Other cancer vaccines are in early stages of testing, too. These vaccines will not prevent cancer from starting, as Gardasil does, but they do attack tumors that have already formed. A therapeutic vaccine for prostate cancer has shown success in trials and appears to extend patients' lives longer than the best current therapies. One of the most lethal types of cancer, pancreatic, is another new target for vaccines. The Panvac VF vaccine, produced by Therion, in Cambridge, MA, is administered through injection with a benign virus that has been loaded with genes taken from pancreatic cancer cells. The shot gets the immune system to produce cancer-killing cells. The common thread in all these cancer treatments is boosting the immune system to fight targeted cancer cells.

Source: Josh Fischman, "Sticking it to Cancer," U.S. News & World Report, April 3, 2006.  
[www.usnews.com/usnews/health/articles/060403/3vaccine.htm](http://www.usnews.com/usnews/health/articles/060403/3vaccine.htm)

## **Information Technology Trends**

### **Emotion-detecting Software Aids Conversation for Individuals with Autism**

The Media Lab at Massachusetts Institute of Technology has developed a device that can detect emotional cues, which will help people with autism interact better with others. The device is called an "emotional social intelligence prosthetic" and consists of a small camera that can be pinned to the side of a pair of glasses. It is connected to a hand-held computer that uses image recognition software along with software to interpret these images. If the user is failing to engage the person to whom he or she is talking, the software will trigger the computer to vibrate. Since people with autism are typically unable to pick up on social cues, this device will help them considerably in conversation.

The program uses a machine-learning algorithm that was "trained" by showing it more than 100 eight-second video clips of actors expressing particular emotions. The image recognition software identifies movements of the eyebrows, lips, and nose, and tracks various head movements it associates with the emotion. Previous programs have only been able to detect six of the more basic emotions: happiness, sadness, anger, fear, surprise, and disgust. This new device could detect more subtle cues of whether someone is agreeing, disagreeing, concentrating, thinking, unsure, or interested.

Source: Celeste Biever, "Device Warns You if You're Boring or Irritating," *New Scientist Tech*, March 29, 2006. [www.newscientist.com/channel/being-human/mg19025456.500.html](http://www.newscientist.com/channel/being-human/mg19025456.500.html)

## **Biotechnology Trends**

### **Scientists Get Bacteria to Behave!**

Research is underway that could lead to smart biological devices that detect bioterrorism chemicals, behave like digital circuits to perform computations, and possibly aid in restoring function to a damaged

spinal cord. Researchers have figured out how to program bacteria to behave like computers by engineering a special segment of their DNA. This makes it possible for millions or even billions of bacterial to communicate, acting and arranging themselves in a predictable manner.

Ron Weiss at Princeton University programmed *E. coli* bacteria to emit red or green fluorescent light in the presence of other *E. coli* bacteria, ultimately creating a bull's eye pattern. According to Weiss, the bacteria "have an exquisite capability to sense molecules in the environment. The bull's eye could tell you: This is where the anthrax is."

Source: Robert Roy Britt, "Scientists Make Bacteria Behave Like Computers," LiveScience, April 28, 2005. [www.livescience.com/technology/050428\\_bacteria\\_computer.html](http://www.livescience.com/technology/050428_bacteria_computer.html)

## **Nanotechnology**

### **Better Packaging through Nanotechnology**

A diverse range of companies, from brand owners to packaging manufacturers, is getting serious about using nanotechnology applications to improve packaging. Packaging is the largest sub-sector of the plastics industry, and nanomaterials will play an increasing role in this market. These materials will lead to new or improved packaging products, including improved barrier properties that increase shelf-life, biodetection, and antimicrobialism. Nano-enhanced packaging materials could also contain electronic displays. These new packaging technologies will allow active monitoring of product freshness and display that information on the package itself.

Source: "Nanomaterials Are Expected To Be Used To Improve The Properties For Product Packaging," *Chemical Online*, April 11, 2006. [www.chemicalonline.com/content/news/article.asp?docid={6B38C92C-1E75-493B-9DAB-70BE6D23E99B}](http://www.chemicalonline.com/content/news/article.asp?docid={6B38C92C-1E75-493B-9DAB-70BE6D23E99B})

### ***By the Numbers*** **U.S. Graduate Schools –**

- Foreign student applications to U.S. graduate schools increased 11% from Fall 2005 to Fall 2006.
- Prior to Fall 2005, there was a two-year cumulative decline of 32%.
- Applications from China and India increased 21% and 23%, respectively.
- Applications within the engineering field and life sciences field increased 17% and 16%, respectively.

These numbers signify a promising turnaround after a period of declining enrollments, following the 9/11/01 terrorist attacks, but are not yet back to normal figures.

Source: Michelle Healy from staff and wire reports, "Foreigners Returning to U.S. Grad Schools," [http://www.usatoday.com/printedition/life/20060323/bl\\_line23.art.htm](http://www.usatoday.com/printedition/life/20060323/bl_line23.art.htm), March 23, 2006.