

Education Trends

Most High School Graduates Are Not College-Ready

There was no significant increase in the percentage of U.S. high school graduates who met ACT's college-readiness benchmarks in math, science, reading, and English in 2009 compared to the previous year. Students who meet these benchmarks are ready to earn a C or higher in first-year college courses in all four subjects, according to the *ACT Profile Report — 2009*. ACT is a not-for-profit organization that provides assessments and research in education and workforce development. Colleges use the ACT college admission and placement exam as one of several measures in deciding whom to admit.

Although there was a slight increase (from 22% to 23%) of students who were deemed college ready in all four subjects compared to 2008, the fact is that less than a quarter of the high school seniors who took the ACT scored at the college-ready level in all four subject areas. This means schools must do more to ensure that college-bound high school graduates have the skills necessary to meet higher-education expectations, the report warned. (See By the Numbers at the end for more statistics.)

Sources: www.act.org/news/releases/2009/crr.html
www.act.org/news/data/09/pdf/National2009.pdf

The Push for a National Standard

All states have signed onto the Common Core Standards Initiative, spearheaded by the National Governors Association (NGA) and the Council of Chief State School Officers. As part of the initiative, the organizations jointly released a draft of proposed national education standards in September. The report details the math and English skills students should master before high school graduation. These skills should align with college and workforce training program expectations, according to the proposal. To help bolster the initiative's efforts further, the federal government is making plans to award \$350 million in grants to encourage states to adopt high-quality common assessments.

The proposal aims to raise expectations for students beyond current standards in a uniform way to help the United States keep pace with global competitors. Over the years, U.S. students have trailed behind internationally, particularly in math. Currently, standards vary widely from state to state. *No Child Left Behind* left it to states to determine what students ought to learn in reading and math and how they ought to be tested. With all 50 states and the District of Columbia on board in support of the initiative, a panel, convened by the NGA, will begin to draft grade-by-grade standards from kindergarten onward.

Sources: www.washingtonpost.com/wp-dyn/content/article/2009/09/21/AR2009092102289.html
www.corestandards.org/

Brain Research

Treating Brain Disorders with Light

Neuroscientists at the Massachusetts Institute of Technology have developed a way to use light to shut off overactive sections of the brain quickly. The research could lead to new treatments for abnormal brain activity associated with chronic pain, epilepsy, brain injury, Parkinson's disease, etc. The research team has found a class of proteins that, when inserted into neurons, allows the neurons to be turned off with rays of yellow-green light. The silencing is near instantaneous and reversible.

These "super silencers" are developed from two genes found in various bacteria and fungi. These genes, called Arch and Mac, encode for light-activated proteins that help the organisms metabolize by shining light on them. Light activates the proteins, which lowers the voltage in the neurons and prevents them from firing. In this way, light can bathe the entire brain and selectively affect only those neurons sensitized to specific colors of light. To achieve brain silencing in mice, MIT researchers loaded the Arch and Mac genes into viruses that carried the genetic material into mouse neurons. The researchers then implanted an externally controllable light source inside the animals' brains. The current device requires mice to be wired up to an external control, but the researchers are designing a wireless system.

Source: www.photonics.com/Content/ReadArticle.aspx?ArticleID=40755

Reversing Progressive Alzheimer's Disease

A fast-acting molecular compound that appears to improve cognitive function impairments in mice similar to those found in patients with progressive Alzheimer's disease has been identified by scientists at Wake Forest University School of Medicine and the Vanderbilt University Medical Center Program in Drug Discovery. The compound, benzylquinolone carboxylic acid (BQCA), has been shown in previous rodent studies to lessen the occurrence and severity of the behavioral disturbances often symptomatic of Alzheimer's, such as hallucinations, paranoia, and outbursts.

BQCA activates a specific neurotransmitter receptor in the brain called the M1 muscarinic acetylcholine receptor. M1 receptors have been the focus of research into treatment of Alzheimer's disease because they affect the part of the brain that stimulates the memory and learning functions that the disease inhibits. Until now, scientists have not found a treatment selective enough to activate the receptors without producing side effects. BQCA also seemed to inhibit production of amyloid beta, one of the markers of Alzheimer's disease in the brain – perhaps key to the compound's potential for slowing the progression of the disease.

Source: www.eurekalert.org/pub_releases/2010-01/wfub-nci011210.php

Nanotechnology

The Heat Is On to Destroy Cancer Cells

Researchers at Rice University and Baylor College of Medicine have created a nanoparticle that can be tracked in real time with MRI as it zeros in on cancer cells, tags them with a fluorescent dye, and kills them with heat.

In designing the new particle, the researchers added fluorescent dye to metallic nanoshells. The dye glows when struck by near-infrared (NIR) light, which is invisible and deemed harmless to humans. Nanoshells harvest NIR light that would normally pass harmlessly through the body and convert it into tumor-killing heat. A layer of iron oxide, just a few nanometers wide, was added to the shell so that the particle could be detectable with MRI. The researchers also attached an antibody that allows the particles to bind to the surface of specific cancer cells. The team tracked the fluorescent particles in laboratory cell cultures and found that the particles targeted cancer cells and destroyed them with heat.

The next step is to develop a system in which a patient receives a shot containing the nanoparticles with antibodies that are tailored for the patient's cancer. Using the combination of NIR and MRI imaging, doctors would observe the particles' progress through the body, identify areas where tumors exist, and then kill them with heat via laser light.

Source: www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=13487

Nanotechnology for Food Production — Risks Are Not Clear

The food industry is increasingly relying on nanotechnology to boost nutrition, increase shelf life, and improve taste and texture, as well as to detect bacterial contamination through nanopackaging. For example, a nutritional drink for children contains nano-iron particles and "nanocapsules" are used in some cooking oils. There also are nano-agricultural applications, such as fertilizers and pesticides, which are used to increase food production.

Yet, there has been little research or oversight on the potential risks of such nanoparticles. To ensure public health and safety, that needs to change, according to a report, *Nanotechnologies and Foods*, released by the House of Lords Science and Technology Committee in the United Kingdom. The report's recommendations include more funding to encourage research into risk assessments of nanomaterials in food and to create a public register of food and food packaging materials that people can access online.

Sources: www.electroiq.com/index/display/nanotech-article-display/1404518428/articles/small-times/nanotechmems/life-sciences-medical/2010/january/uk-group__food_industry.htmlwww.scientificamerican.com/article.cfm?id=do-nanoparticles-in-food-raise-health-risk

By the Numbers

Among the findings of *ACT Profile Report — 2009*, which measured how prepared high school graduates are for college (see the Education Trends section above for the story) are:

- Only 28% of ACT-tested 2009 students are ready for college-level biology.
- Of the students tested, 42% are ready for college-level algebra.
- Nearly 40% of students could not solve multistep problems involving fractions and percentages.

- Of the students, 40% could not predict the results of an additional trial of a scientific experiment.
- In English, 40% were not able to use the correct adverb or adjective in a sentence, use the correct preposition in a phrase, or make sure that the subject and verb agreed in a sentence.
- In reading, 30% were unable to evaluate the contribution that significant details make to the text as a whole.

The ACT standardized test is scored on a scale of 1 to 36, with 36 being the highest possible score. The national average ACT composite score for 2009 high school graduates was 21.1, unchanged from 2008 and 0.2 point higher than in 2005.

Sources: www.act.org/news/releases/2009/crr.html
www.act.org/news/data/09/pdf/National2009.pdf