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STEM Programs in K-12: Measuring Success

From *The New York Times* to *The Hartford Courant*, the National Science Foundation to local school boards and companies large and small, the subject of STEM (or Science, Technology, Engineering and Math) education is everywhere. So what is STEM, why is it important, what's being done in Connecticut to prepare K-12 students in STEM and what are the key components to success?

"Most people have a fairly clear definition of the 'S' and the 'M' in STEM," said Elizabeth Buttner, science curriculum specialist for the State Department of Education. "The 'T' and the 'E' are more loosely defined and are interpreted in a variety of ways, which makes it challenging to track and measure success."

Buttner would like to see a clearer definition of STEM. "The State Department of Education is working with a group of educators to more clearly define the qualities of integrated STEM instruction that distinguish it from traditional science, math or engineering courses," she said. "Beyond that, educators and employers need to bring focus to the expected skills and dispositions that STEM education can cultivate in students.

"The STEM subjects are based on data and evidence," she said. "To measure success and move forward in a data-driven way, it is critical to have a common understanding of the attributes of STEM education and STEM jobs. With all the attention STEM is receiving, it's important to recognize that STEM education is great preparation for personal and civic decision-making, as well as inspiration for more students to enter STEM careers," she said. "There are a lot of good things going on, but we are not there yet in terms of a common focus, direction and method for evaluating progress."

One Connecticut-based nonprofit is among the first in the nation to measure the success of its science, technology and math programs. The Center for 21st Century Skills at EDUCATION CONNECTION is working with 43 schools. "Our blended learning opportunities promote interaction among students and with their teachers," said Frank LaBanca, director of the Center. "We teach students to not only be technology 'users,' but also creators of knowledge and producers of technology."

The group tracks program implementation in the classroom and the impact of the program on students. It's hard to measure," LaBanca admits. "We've spent a lot of time developing a measurement strategy and nearly $1 million to implement it."

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Look, Touch, Learn, Save at SmartLiving Center

The SmartLiving Center is part science museum, part hands-on activity center for children and part energy efficiency home improvement showroom for adults. This interactive, professionally-staffed facility is part of the Energize Connecticut initiative and serves as a high-profile resource for promoting energy-efficient products, services and ideas.

Located in Orange, CT, the SmartLiving Center offers

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Young visitors to the SmartLiving Center learn about electricity in 'What Makes the Light Shine' [Photo: SmartLiving Center]

From the National Academies

The following is excerpted from press releases and other news reports from the National Academies (www.national-academies.org).

◆ Study Urges Early Warning System for 'Abrupt Impacts' from Climate Change

A new report from the National Research Council calls for the development of an early warning system that could help society better anticipate sudden changes and emerging impacts on the physical climate system— the Earth's atmosphere, land surfaces, and oceans—from climate change. Some of these changes could occur within a few decades or even years, leaving little time for society and ecosystems to adapt. The report states that even steady, gradual change in the physical climate system can have abrupt impacts elsewhere, in human infrastructure and ecosystems for example, if critical thresholds are crossed.

Abrupt climate changes and impacts already under way are of immediate concern, the report says. These include the disappearance of late-summer Arctic sea ice and increases in extinction rates of marine and terrestrial species. Other scenarios, such as the destabilization of the west Antarctic ice sheet, have potentially major consequences, but the probability of these changes occurring within the next century is not well-understood, highlighting the need for more research.

http://www.nap.edu/catalog.php?record_id=18373

◆ Massive Data Analysis Is New Frontier for Science

Data mining of massive data sets is transforming ways of thinking about crisis response, marketing, entertainment, cybersecurity, and national intelligence. Collections of documents,

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He explained that mitigating factors affect achievement. "Things like school climate, engagement, science and math efficacy can all play a role," he said. "Our measurement focuses on the teacher/student relationship because that is within our control and our ability to measure. We do our absolute best to measure using quasi-experimental studies."

In traditional research one "control" group is given a placebo, while another receives "treatment." "This isn't an option for us," he said. "So, we compare our students to students with similar backgrounds. We measure over time and have demonstrated increased engagement in learning and science and math through the third year of our four-year program. Data shows that our program has had a significant impact on student achievement in science and 21st century skills such as problem solving, innovation/creativity and collaboration," he said.

On average, 20% of US high school seniors intend to pursue STEM careers. In LaBanca's program the average is 42%.

Several independent programs broaden student participation in science, math and innovation. The Connecticut Science & Engineering Fair, the Invention Convention, the Junior Science & Humanities Symposium and the FIRST Robotics Competition are among the learning opportunities that take STEM education beyond the classroom.

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> ***"These kids are thinking for themselves and learning to analyze data and read scientific papers that are often challenging for them. They step out of their comfort zone and take ownership."***

Unique approaches within traditional classrooms also bring STEM to life. At Greenwich High School, 50 students are enrolled in a Science Research elective. "Very few schools offer an actual class for credit in research," said Andy Bramante, who teaches the class.

Each April, prospective students are given one month to write a research proposal. "This engages them in the process before class even starts," Bramante said. "In the fall, they flush out their idea, plan, write and make contacts outside of school. The second term is about taking data and evaluating it."

Student effort determines their grade. "Failure is often part of the scientific process," Bramante explained. "We encourage students to take risks and to turn failure in a positive new direction."

For Bramante, who worked at Perkin Elmer for a number of years, support for students in the Science Research class comes in many ways. "Former industry colleagues are very supportive, our administration loves the program and the bulk of our support comes from our parents," he said. "They recognize that it is good for kids on many levels. The kids develop skills they normally wouldn't and, at our school, it's cool and socially beneficial to be a geek. These kids are thinking for themselves and learning to analyze data and read scientific papers that are often challenging for them. They step out of their comfort zone and take ownership."

Bramante shares with students his early career experience as a flavor chemist. "I try to bury stereotypes and get kids thinking about what a chemist looks like," he said. "Science is not always what they think. It takes a lot of different forms. When we get them thinking, they get interested and see the possibilities."

At University High School of Science & Engineering (UHSSE), where the student body is an even split between Hartford and suburban youth, students can take advanced courses and earn college credit during high school. According to Caryn Baseler, magnet instructional coach at UHSSE, the school's offerings exceed those available at a typical public school. "Many of our students take college-level math and science classes at the University of Hartford while they are still in high school," she said. "We also are involved in the nationally recognized Project Lead the Way program."

In 2012, the school earned the National Secondary School of Merit Award from Magnet Schools of America. The school's success is also demonstrated by the percentage of students who enter college pursuing STEM-related degrees. "Of our 2012 UHSSE graduates, 29% intended to pursue science-related majors (including nursing) and 31% were pursuing some form of engineering," Baseler said.

Baseler cited less tangible advantages as well. "University High School has created a community and family environment where students from all walks of life feel welcomed," she said. "Here the robotics team has an equally enthusiastic fan base as our athletic programs, which might be a different characteristic than many other schools."

Some students decide that they don't want to be engineers or scientists. "That's not a bad thing," she said. "They understand

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Biomedical Research

MAGNET HIGH SCHOOL TO EXPAND BIOMEDICAL PROGRAM. **The Science & Technology Magnet High School of Southeastern Connecticut** in New London announced plans to expand its biomedical program as part of a three-year, $11.8 million application filed in March by **LEARN**, the southeastern Connecticut regional education entity for seven magnet schools in Norwich, New London, Waterford, East Hartford, Windham and Danielson. Administered by the US Department of Education's Office of Innovation and Improvement, the grant is part of the $89.8 million federal Magnet School Assistance Program and will provide funding for up to three years as long as the schools meet the goals established when they applied for the funding.

UCONN GENOMICS INSTITUTE AWARDS $1M IN GRANTS. **UConn**'s I**nstitute for Systems Genomics**, launched in the fall of 2012, has awarded $1 million in funding to four collaborative research programs, called Affinity Research Collaboratives. The cross-disciplinary and cross-institutional collaboratives allow researchers to integrate their different areas of expertise to study important biomedical problems and cure disease. The programs will each receive $50,000 per year for five years. "Our goal in launching Affinity Research Collaboratives, or ARCs, is to spur cross-disciplinary and cross-institutional research programs. This creates new teams of talented investigators who can bring together their different areas of expertise to study important biomedical problems and cure disease. The ARC is also a way to organize research groups that are prepared to apply for larger federal and state funding opportunities," says CASE member **Marc Lalande,** professor and chairman of Genetics and Developmental Biology at the UConn Health Center, and director of the Institute. Lalande was also recently appointed executive director of Genomics and Personalized Medicine Programs at UConn, where he will help develop research and training programs for the Institute, collaborations with T**he Jackson Laboratory for Genomic Medicine** at UConn, and industry and government partnerships for the planned **CT Institute for Medical Innovation and Applied Health Care Economics**.

Business & Industry

30 FIRMS TO RECEIVE CI FUNDING. **Connecticut Innovations** announced this summer that thirty firms will receive $4 million in federal and private funding, enabling them to qualify for federal technology-research grants. Two funding initiatives exist as part of the SBIR Acceleration and Commercialization Program: the SBIR Phase I Matching Grant initiative and the Commercialization Loans initiative. The Matching Grant initiative helps recent federal SBIR Phase I winners advance their Phase I feasibility studies and improve opportunities for winning the Phase II research award of $1 million. The CI grants, of up to $40,000 apiece, can be used to generate additional data, protect intellectual property, and conduct market research. Some recipients include: **Abbott Ball Company Inc., Artificial Cell Technologies Inc., Interface Technologies LLC, Qualtech Systems Inc.** and **Sustainable Innovations LLC.**

CASE'S ADAMS NAMED NEW HEAD OF P&W. In August, **Pratt & Whitney** announced that CASE member **Paul R. Adams**, current chief operating officer, will become president when **David Hess** retires in December. Adams joined UTC in 1999 and recently served as Pratt's chief operating officer. Previously, he led operations and engineering at the firm. He will report to the chief executive of **UTC Propulsion & Aerospace Systems, Alain M. Bellemare**, who noted, "Under Paul's leadership, Pratt & Whitney will sustain its strong momentum in technology development, ensure operational excellence in support of its production ramp up, and continue to deliver superior value to customers."

NEW, EGG-FREE FLU VACCINE FROM MERIDEN FIRM. Meriden-based biotech firm **Protein Sciences Corporation** announced in September that it would ship 250,000 doses of its new, eggless flu vaccine Flublok for the upcoming flu season; the vaccine is expected to generate millions in revenue for the company. Protein Sciences anticipates regulatory approval for the vaccine's use in people over 50 beginning next year. Anthem Blue Cross and Blue Shield and Aetna have agreed to cover Flublok and **Prasad Srinivasan**, an allergist in Glastonbury, notes Flublok's potential usefulness for patients with egg allergies, because desensitizing those individuals for traditional flu shots could cost up to $1,000 per patient.

GERBER LAUNCHES NEW PRODUCTS. After its acquisition by **Vector Capital** in 2011 and subsequent investment in R&D, **Gerber Scientific** announced this fall that it is launching new products for manufacturers and the apparel and fashion industries. Company officials stated Gerber's earnings grew by 57% in the fiscal year ending April 30, 2013. Gerber is known for designing and processing a variety of flexible materials for sign making, apparel, packaging materials, the aerospace industry and more. Today, Gerber Scientific operates four businesses with the core business, **Gerber Technology,** supplying automated material spreading and cutting systems for flexible materials, while **Gerber Scientific Products** provides computerized sign making and specialty graphics systems.

Communication

AT&T CT NAMES NEW PRESIDENT. In August, AT&T named **John Emra** president of **AT&T Connecticut,** which has approximately 5,000 employees in the state. Emra has worked for the telecommunications company as head of external and legislative affairs in Connecticut since 2001. AT&T invested $140 million in Connecticut networks in 2013; however, Emra noted that investment in Connecticut's infrastructure might slow since the state did not pass laws placing broadband on par with other regulated utilities. Emra believes making the Internet faster is a function of private sector investment. AT&T's investment supports the expansion of the company's 4G LTE network in Hartford, New Haven, Litchfield, Waterbury, and New London County. AT&T also launched a distributed antenna system at Yale Medical School.

CT FIRM NAMED AMONG FASTEST GROWING IN IT SERVICES. **Cervalis**, a provider of IT infrastructure solutions including enterprise cloud computing, business continuity/disaster recovery, managed hosting, and colocation was named one of the fastest growing technology companies in the IT Services category at the Marcum Tech Top 40 Awards ceremony on September 30. The award was presented to Michael Boccardi, president & CEO, during the ceremony, which was organized by the Connecticut Technology Council and Marcum LLP. Rankings are based on the percentage revenue growth over four years from 2008-2011.

Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases. For more information about any In Brief item, please call the Academy at (860) 571-7143, or contact us at acad@ctcase.org,

IN BRIEF

Science and Engineering Notes from Around Connecticut

Education & Cognition

YALE HOSTS 'EMOTIONAL INTELLIGENCE' TRAINING. In August, leaders from more than 50 schools nationwide came to **Yale** to learn more about incorporating Emotional Intelligence in the classroom. The training session was the largest held by the **Yale Center for Emotional Intelligence**, which has a science-based program anchored in the research of **Yale University President** and CASE member **Peter Salovey** and fellow psychologist, **John D. Mayer**. Less than 25 years after the publication of Salovey's *Emotional Intelligence,* 75,000 educators in more than 500 schools have learned about the role of emotions in learning and behavior through the program, RULER, which was developed to teach emotional intelligence. Many studies have shown that RULER improves behavior and academic performance. Yale psychologist **Susan Rivers** states, "What we want is for emotions to be integral to the everyday practices of teaching and learning. Children will benefit the most if their teachers and family members are developing their emotional intelligence, too."

YALE STUDY PROMPTS REQUEST FOR INQUIRY INTO STEM-RELATED GENDER BIAS. **US Representative Rosa DeLauro** was one of three members of Congress who this summer asked that the Government Accountability Office (GAO) examine the government's "efforts to address gender discrimination" including policies and actions to enforce universities' compliance with Title IX specifically as it relates to the pursuit of science, technology, engineering and mathematics—STEM fields. The request is a response to a 2012 study by **Yale** researchers who surveyed randomly selected science faculty from research-intensive universities to investigate their evaluation of student application materials, concluding that male students were rated more competent, more likely to be hired, deserving of a better salary, and worth spending more time mentoring. "Science, technology, engineering and math knowledge helps lay the foundation for a solid education and promising career path," said DeLauro. "Unfortunately, we have known for years that many young girls are dissuaded from pursuing their interests in these fields, which is underscored by a recent Yale study. That is unacceptable and I look forward to reading the GAO's recommendations on how we can end it."

STUDENTS, COAST GUARD CADETS TEAM UP TO COLLECT ENVIRONMENTAL DATA. On September 24, a group of juniors and seniors from the **Science and Technology Magnet High School of Southeastern Connecticut** in New London joined cadets from the **US Coast Guard Academy** to collect marine samples as part of a study of the biodiversity and ecology of Connecticut's coastal environment. Science teacher **Chuck Mulligan** noted, "Opportunities like this are rare for high school students to conduct higher level research that goes beyond labs in classroom, and to get that opportunity to do this alongside Coast Guard cadets is truly an amazing opportunity. This means the world to them to see how college-level research is conducted."

Energy

STATE TO EXPAND CONSERVATION PROGRAMS. The state **Department of Energy and Environmental Protection (DEEP)** has released a draft for an expanded three-year budget for electricity and natural gas conservation programs of $231 million a year, up from $122 million a year. The increased budget nearly doubles state spending on a variety of efficiency programs, including home energy audits and credits for efficient appliances. The additional spending will benefit those who take advantage of upgrades and home audits, DEEP officials noted, but will also benefit all ratepayers by lowering system-wide charges from peak demand use and air emissions. In addition, officials note, having a three-year budget rather than the usual single-year budget will help businesses make longer-term energy upgrades. Funding the expansion depends on increasing electricity fees from $0.003 per kilowatt hour to about $0.006 per kilowatt hour and $0.017 per hundred cubic feet of natural gas to $0.046 for the same amount of gas, resulting in a customer increase of $2.25 per month for electricity, and an additional $4.40 per month for natural gas, during the winter months

WORK BEGINS ON EAST LYME SOLAR PROJECT. **Greenskies Renewable Energy** began a six-month project in August to build a five-megawatt solar installation on 43 acres in East Lyme. It is one of two projects, in partnership with the state **Department of Energy & Environmental Protection (DEEP),** to bring 10 megawatts of clean energy in Connecticut; the other, the **Somers Solar Center,** owned by **Dominion Power** and developed by **CleanPath** and **Heliosage,** is scheduled for completion by the end of December 2013. The East Lyme installation is double the size of the current largest installation in New England, a 2.2 megawatt array in Springfield, Massachusetts, and will operate with 16,000 solar panels, occupying 35 of the 43 acres and able to generate power for 14% of the 6,312 households in East Lyme. **Connecticut Light & Power** and **United Illuminating** will purchase the energy in a 20-year power purchase agreement. Other projects to enhance renewable energy sources include two clean energy projects approved by DEEP this fall: a wind farm in Maine and a solar array installation in Sprague and Lisbon**.** The two projects' costs will average less than 8 cents per kilowatt hour. The projects are expected to generate 270 megawatts of energy by the end of 2016, or 3.5% of the state's total energy load, with the Maine wind project providing 250 of those megawatts. **DEEP Commissioner Dan Esty** said his department will likely seek bids later this year from companies developing electricity from biomass and landfill gases. The state's goal is to obtain 20% of its total electric power from clean energy sources by 2020.

BLOOMFIELD FURNITURE MAKER UNVEILS SOLAR ARRAY. Bloomfield furniture maker **Salamander Designs** unveiled a 123-kilowatt solar array system in October. Installed by Energy Systems & Installation (ESI) of Pennsylvania, the system is expected to totally fulfill Salamander's electricity needs. Fifty business professionals and government officials were taken to the roof of the facility via a 35-foot lift to witness the unveiling. As a result, in part, of a property tax dispute between ESI and Salamander and the town of Bloomfield, the Connecticut General Assembly voted to make all solar systems exempt from personal property tax.

Environment

MORE WATER FOR UCONN STORRS CAMPUS. In early August, the **UConn Board of Trustees** selected the **Connecticut Water Company (CWC)'s** proposed $21 million plan to build a five-mile long pipeline between the **Shenipsit Lake Reservoir** in Tolland and the UConn campus in Storrs as their top choice to supplement long-term water needs of the campus and Storrs area. **Simsbury First Selectman Mary Glassman** noted that the CWC plan is the best choice financially and logistically. Although she said she was pleased that a controversial option from the **Metropolitan District**

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Commission to build a 20-mile pipeline from East Hartford that would have drawn water from the **Barkhamsted** and **Nepaug** reservoirs had been dropped, Glassman said the question of water quality and supply still needs to be looked at for Connecticut.

UCONN RANKED TOP 'GREEN' CAMPUS. The Sierra Club ranked **UConn** the greenest campus in the country in its 7th annual "Coolest Schools" survey, published in the September/October issue of the *Sierra Club Magazine*. The magazine cited UConn's more than 600 sustainability-related classes. It also noted that the Storrs campus has cut its water use 15% since 2005 and retrofitted 13 campus buildings to stop 2,640 annual tons of carbon dioxide emissions. Trayless dining halls with vegetarian meal options making up 30% of the offerings also helped boost UConn to the number one spot. More than a quarter of the food is processed within 100 miles, with many ingredients harvested on campus.

PLUM ISLAND ZONING PLAN APPROVED. On August 27, the Town Board of Southold, New York, approved zoning for **Plum Island** that will prevent residential development on the island. Connecticut residents working to preserve Plum Island welcomed the decision as advocates and officials continue working to pass a federal law to preserve Plum Island and/or get the federal General Services Administration to transfer ownership to another federal agency such as the US Fish & Wildlife Service. The Southold zoning decision will permit laboratory research on about 130 acres where the current **Plum Island Animal Disease Center** sits. The remainder of the 840-acre island would be zoned as a conservation district, should the federal government sell the island.

CT GETS $1M GRANT FOR COASTAL HABITAT PRESERVATION. Connecticut received a nearly $1 million federal grant, announced in late September, to acquire and preserve three different parcels totaling 82 acres of critical coastal habitat and to restore and preserve 60 acres of coastal habitat and salt marsh. The competitive grant, awarded by the US Fish and Wildlife Service and provided for by the North American Wetlands Conservation Act of 1989, will fund restoration work to increase interior tidal flow in the marsh habitat at **Silver Sands State Park** in Milford and restore native vegetation, providing source reduction for mosquito control and reducing or eliminating pesticide applications. The project will begin next April in Branford and Milford and will provide habitat for migratory birds, allowing for marsh migration as sea levels rise.

LOANS TO HELP FLOODPROOF COASTAL STRUCTURES. The state **Department of Energy and Environmental Protection** announced in October that it would allocate $2 million to create low-interest revolving loans to help homeowners and businesses elevate and flood-proof their shoreline structures to prepare for severe weather, and to help those who will have significant flood insurance premium increases if properties are not elevated. **Governor Dannel Malloy** indicated that he would ask the **General Assembly** approve an additional $25 million when lawmakers return in February 2014, but acknowledged more money may be needed.

Food & Agriculture

OYSTERMEN WARNED ABOUT OYSTER HARVESTS. In August, state officials discovered illegally harvested, undersized oysters in 20 of 24 samples randomly selected from wholesale shellfish dealers. State law prohibits taking eastern oysters less than three inches in size. **Department of Agriculture** officials reviewed 19 wholesale shellfish dealers and two harvesters and found only four samples were in compliance with oyster size; 20 samples contained illegally sized oysters. The commercial oystermen not in compliance were issued violation notices and warned that future infractions could result in fines of $500 and up to six months in prison.

FARMLAND PRESERVATION GRANTS. On September 2, The **Hartford Foundation for Public Giving** announced it had granted awards of $365,000 to three separate conservation agencies for preserving 130 acres of farmland in Bolton, Ellington and Bloomfield. **The Wintonbury Land Trust** used $200,000 to purchase one of Bloomfield's oldest farms, forty-five acre **Hawk Hill Farm**. The purchase prohibits any development on the land and includes 22 acres of prime currently farmed land. Using a $105,000 grant, the **Northern Connecticut Land Trust** purchased the 70-acre **Meyers Farm** in Ellington. The land trust will lease fields to farmers to keep it a working farm. With a $60,000 grant, the **Manchester Land Conservation Trust** bought **Risley Apple Orchard** in Bolton. Other significant funding for the purchases was provided by the state and the US Department of Agriculture.

FOOD INSECURITY INCREASES IN CT. According to a US Department of Agriculture report on hunger released in September, the number of Connecticut households experiencing food insecurity grew nearly 6% since 2000 to 13.4% in 2012. The report also states that nearly 5% of Connecticut households faced "very low food security," meaning food intake by some household members was reduced, and meals were skipped. **Lucy Nolan,** executive director of Hartford-based **End Hunger Connecticut,** noted Connecticut is taking longer than most other states to climb out of the recession. **Nancy Carrington**, CEO of the **Connecticut Food Banks,** said the state's high unemployment rate has led to higher rates of food insecurity.

CT HUNTERS CAN USE CROSSBOWS FOR THE FIRST TIME. With the opening of hunting season this fall, the state **Department of Energy and Environmental Protection (DEEP)** announced that for the first time, hunters will be allowed to use crossbows if they have an archery permit after completing a Bowhunter Education course. The fall archery hunting season for deer and wild turkey will last until January 31 in Fairfield County and along the shoreline to lower the deer population in those areas. Bowhunters can hunt for deer and turkeys on designated state lands and on private land where they have written permission of the landowner.

HYDROPONIC FARMING PROJECT GETS SBIR SUPPORT. On September 20, **US Senators Richard Blumenthal** and **Chris Murphy** along with **Congressman Jim Himes**, announced that Bridgeport's **MetroCrops LLC**, a hydroponic lettuce business, will receive a Small Business Innovation Research grant through the US Department of Agriculture's National Institute of Food and Agriculture. The $448,000 grant will support expansion of this indoor, urban farming initiative in a previously unoccupied space. **MetroCrops LLC** will work with **Howey Manufacturing Co.** to build grow units housing the hydroponic lettuce crops in an effort to bring fresh, affordable produce to Bridgeport.

Health

NEW LAW REQUIRES ALD SCREENING. Under legislation signed into law on August 23, Connecticut health care institutions are now required to screen for the rare, but potentially fatal, genetic disorder adrenoleukodystrophy (ALD). ALD affects the central nervous system, causing neurological, physical, and behavioral symptoms. ALD is an X-linked genetic trait diagnosed in 1 in 20,000 people. Childhood ALD, the most common and severe

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form, appears in males between ages four and eight, causing rapid degeneration of the nervous system. Although there is no cure, several treatments, including a diet low in long-chain fatty acids combined with Lorenzo's oil and bone transplantation, have lowered the blood levels of these fatty acids. Treatments are most effective before symptom onset.

YALE STUDY FINDS AGE, INFLAMMATION LINK. The cover article of the October 2013 issue of *Cell Metabolism* features a study conducted by **Yale School of Medicine** researchers that found that inflammation is "causally linked to functional decline in aging." The study's lead author, **Vishwa Deep Dixit,** professor of comparative medicine and immunobiology, stated, "There are multiple cellular triggers of inflammation throughout the body, but we've pinpointed Nlrp3 as the specific sensor that activates inflammation with age." In a test on mice to determine if reducing the activity of Nlrp3 lowers inflammation and aging-associated decline in function, results showed mice with lower Nlrp3 activation were protected from many age-related disorders including: dementia, bone loss, glucose intolerance, cataracts, and thymus degeneration. The mice also performed better, were less frail, and ran for longer durations.

SURVEY ASSESSES ORAL HEALTH OF OLDER ADULTS. On September 11, the **Department of Public Health** released survey results assessing the oral health of vulnerable older adults, finding many are not receiving essential dental care. A total of 845 adults were screened across Connecticut. Many are not regularly seen by dentists and over half do not have dental insurance, with three quarters of those without insurance stating that they could not afford the care. A pilot project is underway at **Noble Horizons Long Term Care** facility in Salisbury to provide education for administrators and nursing staff, increasing awareness of oral health importance for residents and assisting them in providing the daily oral hygiene care residents need.

ANONYMOUS DONATION BENEFITS WESTERN CT HEALTH NETWORK. On September 13, **Western Connecticut Health Network**, including **Danbury** and **New Milford Hospitals**, received a $10 million committed donation from an anonymous donor. The intended funds will go to a new patient tower in Danbury, a new emergency department addition in New Milford, and the network's **Biomedical Research Institute.** The donor will contribute an additional $30 million when the health network meets its fundraising campaign goal of $40 million, making it one of the largest donations to a medical organization in Connecticut.

High Technology

CT STUDENTS BRING POWER TO NEPALESE VILLAGE. This September, a school in Saldang, a remote village in Nepal's Dolpa region surrounded by the Himalayan mountains, received electricity because fourteen Connecticut high school students designed and built a wind-powered turbine for the school. The students from **Hartford Public High School's Academy of Engineering and Green Technology** (AoEGT), funded by a grant from the Connecticut-based **Werth Famiily Foundation** to the **Conneticut Pre-Engineering Program**, spent months designing and building the generator, which includes a vertical wind turbine and solar panels. Project officials said the generator was delivered by helicopter and installed at the school. The **Connecticut Business and Industry Association's** Education Foundation was instrumental in AoEGT's design and development.

ROGERS CORP. NAMED ONE OF TOP 40 IN GROWTH. The **Rogers Corporation**, a technology company that develops power electronics, advanced foams for cushioning and protective sealing, and high-frequency printed circuit materials, was recognized in September by the Marcum Tech Top 40 as one of the top 40 tech companies in Connecticut. The annual award is based on the percentage revenue growth over the previous four years in six categories; Advanced Manufacturing, Energy/Environmental Technologies, Life Sciences, New Media/Internet/Telecom Technologies, IT Services, and Software.

P&W COMPLETES PHASE TWO OF PLANT RECONFIGURATION. On October 4, **Pratt & Whitney's** Middletown plant completed the second phase of an assembly-floor transformation project for production of its portion of PurePower® PW1100G-JM engines for the Airbus A320neo family and to increase capacity for the F135 engine powering the F-35 Lightning II for the US military. This four-phase project reconfigures the engine center to best use existing factory space for annual production of hundreds of V2500 engines, while making space for new engine lines for the F135 and PW1100G-JM engine programs.

Transportation

CT RESIDENTS DRIVING LESS. A recent **ConnPIRG** report found that Connecticut residents "cut their per-person driving miles by 3.45% since 2005," paving the way for increased emphasis on public transportation development. The report found a national trend towards less driving. **Abe Scarr,** director of the **ConnPIRG Education Fund** observed, "It's time for policy makers to recognize that the driving boom is over. We need to reconsider expensive highway expansions and focus on alternatives such as public transportation and biking—which people increasingly use to get around." In June, **Governor Malloy** and **Department of Transportation Commissioner James Redeker** launched Transform CT, an interactive website, with the intent to "improve economic growth and competitiveness, build sustainability, and provide a blueprint for a world-class transportation system."

CONNDOT ANNOUNCES DOWNTOWN STAMFORD PLAN. In September, the **Connecticut Department of Transportation** announced details of its $500 million plan to improve downtown **Stamford's Transportation Center**. The Transit-Oriented Development Project will increase the parking garage to accommodate a minimum of 1,000 parking spaces, improve traffic flow and include approximately 600,000 square feet of commercial office space, 60,000 square feet of retail space, as well as a hotel with about 150 rooms and about 150 residential units. Construction is expected to begin in spring 2014 and take several years.

BUSINESS ENTERPRISE ZONE APPROVED FOR WATERBURY-OXFORD AIRPORT. After more than two years of discussion, the **Connecticut Airport Authority** in August unanimously approved creation of a "business enterprise zone" near the **Waterbury-Oxford Airport.** The project is expected to add jobs, increase business growth and generate new state and municipal taxes. In addition, the enterprise zone bill will expand tax incentives for businesses in the airport area. **State Senator Rob Kane** of Watertown noted, "The zone's creation sends a clear, straightforward message to the business community that we are committed to growing jobs."

— Compiled and edited by Wendy Swift

From the National Academies *(from page 1)*

images, videos, and networks require sophisticated analysis techniques. Analyses of the information contained in these data sets have already led to major breakthroughs in fields ranging from genomics to astronomy and high-energy physics and to the development of new information-based industries.

Traditional methods of analysis have been based largely on the assumption that analysts can work with data within the confines of their own computing environment, but the growth of "big data" is changing that paradigm, especially in cases in which massive amounts of data are distributed across locations. This report from the National Research Council examines the frontiers of such analysis. It notes that terabytes and even petabytes of data are increasingly common in scientific fields such as particle physics, remote sensing, and genomics, as well as Internet commerce, business analytics, national security, communications, and elsewhere. But the tools that work to infer knowledge from data at smaller scales do not necessarily work, or work well, at a massive scale; new tools, skills, and approaches are required. This report identifies many of them as well as promising research directions; reviews pitfalls in trying to infer knowledge from massive data; and characterizes seven major classes of computation that are common in the analysis of massive data.

http://www.nae.edu/88247.aspx

◆ A Call for Action on Antimicrobial Resistance

IAP—The Global Network of Science Academies—and the InterAcademy Medical Panel (IAMP) issued a Joint Statement on 'Antimicrobial Resistance: A Call for Action' on November 18, 2013. In the Joint Statement, IAP and IAMP highlight the critical role that antimicrobial (including antibacterial, antiviral, antifungal and antiparasitic) drugs play in today's medical practices, but also that there have been dramatic increases in the number of pathogens developing resistance to these drugs. "The global pandemic of antibiotic resistance in both community care and hospital-associated infections represents a major health and economic burden and this crisis is being exacerbated by a relative lack of innovation in generating new antibiotics," says the Joint Statement, warning that: "We are in danger of returning to a pre-antibiotic era."

Among the recommendations are a call for immediate action to include the issue of antimicrobial resistance in the global sustainable development agenda; the promotion of integrated world-wide surveillance systems that should include both human and animal diseases (so-called "one-health"); education programs for the prudent use of antimicrobials for medical and veterinary professionals, as well as for patients and the wider public; and the need for additional research, including building research capacity in developing countries, with the aims of better understanding the determinants of resistance and of devising new therapeutics, diagnostics and vaccines.

http://www.interacademies.net/News/PressReleases/22792.aspx

◆ Science and Engineering Ethics Education

Over the last two decades, colleges and universities in the United States have significantly increased the formal ethics instruction included in science and engineering programs. Today, such programs socialize students in the values of scientists and engineers as well as their obligations in the conduct of scientific research and in the practice of engineering. This report from the National Academy of Engineering presents the edited papers and a summary of a workshop on best practices for ethics education programs in science and engineering, with presentations in four key areas: goals and objectives for ethics instruction, instructional assessment, institutional and research cultures, and development of guidance checklists for instructors and administrators.

http://www.nae.edu/Projects/CEES/70909/88312.aspx

Yale's Rothman and Shiller Honored with Nobel Prizes

In October of this year, two Yale University professors were awarded Nobel Prizes by the Nobel Assembly at Karolinksa Institute in Sweden.

James E. Rothman, a 1971 graduate of Yale College and the Fergus F. Wallace Professor of Biomedical Sciences, and professor and chair of the Department of Cell Biology at Yale University, received the 2013 Nobel Prize in Physiology or Medicine for his work on how molecular messages are transmitted inside and outside of cells. Rothman, who is also professor of chemistry at Yale, shares the prize with Randy Schekman of the University of California, Berkeley and Thomas Südhof of Stanford University. The three, whose research explains how vesicles (cellular cargo packages) perform their transport functions, will split an award of $1.2 million. Rothman's individual contribution focuses on the protein machinery that allows vesicles to dock at their destinations.

Robert J. Shiller, the Sterling Professor of Economics at Yale University, was awarded a Nobel Prize in Economic Sciences. He shares the award with Eugene F. Fama and Lars Peter Hansen from the University of Chicago. According to the Nobel committee, the three were honored "for their empirical analysis of asset prices."

Shiller, whose name became a household word with the wide use of the Case-Shiller Home Price real estate Index, came to national prominence with the publication in 2000 of "Irrational Exuberance." The book, which quickly became a bestseller, described speculative bubbles fueled by mass misinformation and herd instinct, and accurately predicted the dot.com implosion. As early as 2003, Shiller warned of the housing market collapse, and later wrote a precept for recovery, "Subprime Solution: How the Global Financial Crisis Happened and What to Do about It."

SmartLiving *(from page 1)*

student tours and workshops, seminars for adults, special events, meeting hosting and more. Exhibits are designed to teach people how to use energy wisely while not sacrificing comfort or style.

The SmartLiving Center offers guided educational tours for schools, summer camps, Boy and Girl Scout troops, nonprofit organizations, civic organizations and environmental groups. All schools in the Connecticut Light & Power Company and The United Illuminating Company service territories are eligible to receive a $250 bus reimbursement for their visit.

Visitors will see a cut-away house to learn how insulation placement helps keep houses cool and warm. At the interactive Puzzle Wall, students learn how electricity is generated, transmitted and distributed to our homes. During a tour, students will also learn about energy, electrical safety, nonrenewable and renewable resources, conservation, efficiency and the connection between energy, electricity and the environment. K-12 educational materials are aligned with the Connecticut Science Standards.

The SmartLiving Center is open Monday-Friday 10 am – 6 pm and Saturdays 10 am – 4 pm. To learn more, call (203) 799-0460 or visit www.uinet.conm/slc.

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STEM *(from page 2)*

what they do and don't want to do. They graduate as well-rounded students who can think and who have been exposed to extra science. That is never a disadvantage."

At the Amity Regional School District, which serves middle- and high-school students from Woodbridge, Bethany and Orange, students can participate in clubs like Junior Engineering Technical Society (JETS), Infinite Possibilities, Science Olympiad and a Science National Honor Society, among other things. All middle school students also take a required Engineering and Technology (E&T) Education course, including robotics. In eighth grade, students have the additional option of taking a one-semester E&T Ed elective course.

About eight years ago, the district instituted a high school Science Research course. "The first year, 16 freshmen enrolled," said Deborah Day, the Science Research instructor and co-chair of Amity's STEM committee. "We now have more than 80. It's a community of extremely ambitious students, who take creative ideas and work with a mentor to develop a realistic research project that they own from start to finish."

In this nontraditional class, everyone is at a different place in their research and there are no tests or quizzes, but everyone takes their knowledge beyond the traditional classroom. The class encourages students to collaborate with the Center for Research on Interface Structures & Phenomena (CRISP) in volunteer efforts in the New Haven area, as well as within the Amity district. CRISP is part of the Materials Research Science and Engineering Centers at Yale and Southern Connecticut State University. "Volunteering teaches them to be good citizens and encourages them to reach out to others with their passion for science," Day said. "We also have partnered with Yale's Pathways to Science, including the summer scholars program for underrepresented students, allowing students further STEM opportunities."

Amity Science Research students are also required to participate in the Southern Connecticut Invitational Science & Engineering Fair, where they present their research to judges. "It's an invaluable experience," Day said. "They learn time management, the benefit of setbacks and failures and critical thinking skills. They also make contacts that may help them going forward. I'd encourage other districts to come to a science fair and see the final product including the excitement on the faces of the kids as well as the enthusiasm, motivation and rich dialogue in the air."

She cites the support of the board of education and town taxpayers as key to these programs. "We have a progressive community that believes in the importance of science," she said.

For Ted Sergi, honorary CASE member and former commissioner of the Connecticut Department of Education and former president of the Connecticut Science Center, the equation for success is fairly simple. "It needs to start with leadership at the superintendent and board of education level," he said. "In successful programs there is often a principal that unites humanities, arts, history, sports and music with STEM education. We need to make those connections for kids and parents."

He applauds the state's investments in Jackson Labs and the University of Connecticut. "Those investments will pay off," he said, "but, in the meantime, we need to ignite enthusiasm for science in young people. There are concrete ways to assess success, but for me, it's about seeing a kid's face light up and having them say, 'I want to do more of that!'"— ***Karen Cohen, freelance science writer and owner, The Write Stuff, LLC.***