

CAPITOL IDEAS

THE COUNCIL OF STATE GOVERNMENTS | INSIGHTS & INNOVATIONS

SEPT | OCT 2015

SPOTLIGHT: Transforming Education

WORKING TOGETHER TO FOSTER EDUCATION INNOVATION

**From STEM to STEAM:
Creating Innovation with Arts**

**The Future of
Career Technical Education**

Diversifying the STEM Pipeline

Closing the Skills Gap

**Investing in STEM:
A Public-Private Venture
For Success**

"Using a combination of academic knowledge, technology and hands-on, real-world applications will help students embrace the sciences and understand how STEM impacts their daily lives and defines their future."

New York State Senator Carl Marcellino, CSG 2015 National Chair

PLUS: Preview the CSG 2015 National Conference



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Melissa Allen / Springdale student

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SPOTLIGHT: Transforming Education

11 INNOVATION IN EDUCATION

For generations, America was known as the world capital for innovation. Today, a creativity gap appears to be growing in the United States and other countries seem more than willing to fill the opening. To fix an ailing American ingenuity, many experts are pointing to schools.

15 IN THE KNOW: GROWING INNOVATIVE NEW COMPANIES

One of the primary drivers of successful new business formation in the United States is research in science and technology. Its influence on the economy is ubiquitous, but often invisible. While the U.S. leads the world in research and development spending, other countries are quickly catching up.

16 STARTING STEM EARLY

Building a future workforce in the science, technology, engineering and math fields—or STEM—must begin with education. But just how far should STEM education extend? Some experts say laying the foundation for scientific curiosity should start as early as preschool.

18 GIVE ME AN A!

Adding art has turned STEM into STEAM at many K-12 schools and postsecondary institutions across the country. Not everyone implements STEAM the same way, but education leaders and policymakers generally agree that fostering creativity is essential in preparing students for tomorrow's workforce.

20 DIVERSIFYING STEM

Historically, STEM field jobs have consisted of an overwhelmingly homogenous base; between 80 and 90 percent of workers in those fields were white or Asian in 2014. But efforts underway in states to broaden the appeal of STEM education aim to diversify the pipeline of the future science and technology workforce.

22 PUTTING STEM TO WORK

Jobs in the STEM fields make up about 6.2 percent of all employment, or 8.3 million positions. That's up from 7.6 million jobs in 2010—or a growth rate of just under 10 percent.

24 10 QUESTIONS: NEW YORK SEN. CARL MARCELLINO

A former science teacher and school administrator, New York Sen. Carl Marcellino, The Council of State Governments' 2015 national chair, believes that greater partnerships between schools and businesses will help ensure students have the skills needed for the jobs of tomorrow.

30 THE STATE OF STANDARDS

The adoption of common academic standards across the states has become a prominent—and highly controversial—topic of debate in state legislatures. Here's a state-by-state look at the status of the Common Core and NextGen Science standards across the country.

32 CAREER TECHNICAL EDUCATION

Interest and support for career technical education has grown exponentially over the past few years, with policymakers at all levels working to advance opportunities for students to engage in CTE, as well as strengthen the links between career technical education and the labor market.

34 CLOSING THE SKILLS GAP

High-quality education is critical to preparing students for the workplace, but it's not the only factor to consider. Business and industry experts say that the combination of academics and skills-based training is key for a workforce equipped for future jobs.

36 STEM PAYS

The average annual wage for jobs in STEM fields is \$85,570—nearly twice the wage for all occupations, which sits at \$47,230.

38 PUBLIC-PRIVATE INVESTMENTS IN STEM

STEM programs at every education level can require significant investments from the government and private sector. That's because cost drivers can make STEM education a pricey investment.

40 NEXT STEPS IN STEM COLLABORATION

Ideally, initiatives involving STEM bring together K-12 and higher education, along with business and industry leaders, to ensure students are well prepared for and interested in the high-tech jobs that dominate today's labor market. Making those connections happen, though, isn't a quick or easy process.

44 BUILDING THE ROAD TO STEM TOGETHER

Across the country, schools are approaching learning with a renewed energy, new approaches and meaningful project work to help prepare students for living and STEM careers. But preparing our students for more options upon high school graduation requires that leaders ensure structures are in place for a vibrant learning community.

CAPITOL IDEAS

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SHARPENING STATE IDEAS

The pencils, notebooks and crayons are quickly disappearing from stores' shelves across the country as students—and their families—prepare for the back-to-school rush. It's a time of new routines, exciting new discoveries and some big challenges ahead—at school and here at CSG. Check out what is on our to-do list below. Just don't get caught by the tardy bell.

Here's what's happening at CSG in September and October 2015.

1

CSG 2015 Toll Fellows Class Meets in Lexington.

Members of the Henry Toll Fellowship Program Class of 2015, representing 33 states and Puerto Rico, came together Aug. 28-Sept. 2 in Lexington, Ky., for what is known as one of the nation's premier leadership development programs for state officials. Make plans to join us for the 2015 Toll Fellow Graduation ceremony at the CSG National Conference in Nashville Dec. 10-13. Interested in applying for Toll Fellows? Watch www.csg.org for announcements about the 2016 Toll Fellowship Program application period, which opens Oct. 1!

2

CSG Congressional Briefing.

In collaboration with Elsevier, CSG will host a Congressional briefing in Washington, D.C., in September to highlight the findings of the recently released report, *America's Knowledge Economy: A State-by-State Review*. During the briefing, attendees will hear from experts as they discuss the research strengths of the nation's higher education and private sector institutions; where the U.S. and states have comparative advantages; and how capitalizing on those advantages can drive innovation, attract jobs and foster economic growth.

3

The 2015 *Book of the States* is Now Available Online.

The wait is over! The 2015 edition of CSG's flagship publication, *The Book of the States*, is now available online. This year's volume includes 150 in-depth tables, charts and figures illustrating state government operations. It also includes 29 articles from state leaders, innovative thinkers, noted scholars and CSG's in-house policy experts on topics such as aligning postsecondary education with workforce needs, state finances, environmental bills of rights in state constitutions and the legality (or illegality) of ballot selfies in voting booths. To access the 2015 *Book of the States*, and the full archive of *The Book of the States*, visit the CSG Knowledge Center at www.csg.org/knowledgecenter.

4

CSG Welcomes New Staff.

CSG is pleased to welcome two new staff members to its national headquarters office in Lexington, Ky. Colmon Elridge joins CSG as the director of the National Center for Interstate Compacts, a policy program developed by CSG to assist states in developing interstate compacts, or contracts between the states. Liz Edmondson also joins the CSG staff as the director of energy and environment policy.

5

Call for Suggested State Legislation.

CSG members are encouraged to submit legislation for inclusion in the docket that will be considered by the Suggested State Legislation Committee at its December meeting in Nashville. To be considered, legislation must have been enacted in at least one state and address a current state issue of national or regional significance; provide a benefit to bill drafters; and provide clear, innovative and practical structure and approach. To submit a bill for consideration, please send information to ssl@csg.org by Sept. 25.

EDUCATION



AT THE END OF THE DAY, WE WANT KIDS TO BE BETTER.”

» Pennsylvania State Secretary of Education Pedro Rivera as quoted by the *Pittsburg Post-Gazette*



So the fact that the business community is now telling me that education not just for elites but for everybody is important to them—that makes me optimistic that we’re going to move the needle.”

» Virginia Secretary of Education Anne Holton as quoted in an interview with RVA News



ALL TEACHERS ARE STEM TEACHERS.”

» Jonathan W. Gerlach, former teacher and national STEM consultant, as quoted by *Education Week* in July. Gerlach discusses that STEM teaching practice needs to cross into all aspects of education



So if we’re trying to train for the next technology, innovation idea that comes up, we need to have students that are innovators, that are builders, that are creators and are thinkers that can help us and lead us into that 21st century.”

» Kelli Wells, executive director of the GE Foundation’s Education and Skills program, as quoted by Orlando’s News 13 when discussing the GE Foundation’s STEM conference



WE ARE ALREADY NOTICING A VERY POSITIVE EFFECT OF IMPLEMENTING THOSE [COMMON CORE] STANDARDS. SO WE’RE GOING TO BE CHARGING AHEAD.”

» Kentucky Gov. Steve Beshear as quoted by *U.S. News and World Report*



Modernizing how we educate our students in the STEM fields of science, technology, engineering and math is critical to helping them develop the skills needed for good jobs in the innovation economy.”

» New Hampshire Governor Maggie Hassan in a press release in which the Governor’s Office re-established the STEM Education Task Force



EVERY STUDENT IN AMERICA WILL BE BETTER OFF UNDER THIS LEGISLATION (EVERY CHILD ACHIEVES) THAN THE GENERATION OF STUDENTS WRONGED BY ‘NO CHILD LEFT UNTESTED.’ ”

» Lily Eskelsen Garcia, the president of the National Education Association, as quoted in *The New York Times* in July discussing a Congressional bill to revamp No Child Left Behind



THE MOST EXPENSIVE DEGREE IS THE ONE YOU NEVER COMPLETE. THERE ARE FAR TOO MANY STUDENTS EVERY YEAR THAT END UP WITH BIG DEBTS AND NO DEGREE.”

» U.S. Secretary of Education Arne Duncan as quoted in *The Desert Sun*



THERE WERE DIGITAL MUSIC DEVICES BEFORE THE IPOD, BUT IT TOOK CREATIVE DESIGN AND INTERFACE DEVELOPMENT FROM APPLE TO TRANSFORM THE WAY THE WORLD LISTENS TO MUSIC.”

» Congresswoman Suzanne Bonamici of Oregon, co-chair of the Congressional STEAM Caucus, as quoted in a press release

THE EAST

CT • DE • MA • MD • ME • NH • NJ • NY • PA • RI • VT • NB • NL • NS • ON • PE • PR • QC • VI

TRANSPORTATION

In November, Maine voters will decide on an \$85 million bond proposal to pay for improvements to roads and bridges. Gov. Paul LePage signed the bill in July, according to The Associated Press. Although most of the money from the transportation bond would go toward repair of highways and bridges, some of it would be used for ports, harbors and passenger railroads.

SEX TRAFFICKING

Legislation signed by Connecticut Gov. Dannel Malloy in July will offer enhanced services as well as compensation for victims of child sex trafficking, according to the *Hartford Courant*. It also will give police and prosecutors in the state more tools, including wiretaps, to build cases against alleged pimps and traffickers. Malloy said Connecticut has strengthened its anti-trafficking laws every year for five years.

STANDARDIZED TESTING

Delaware Gov. Jack Markell vetoed a bill in July that would allow parents to pull their children from the state's standardized test, according to *The News Journal*. The House approved the bill 31-5 and the Senate approved it 15-6. Markell said it would "undermine the only objective tool we have to understand whether our children are learning and our schools are improving."

CONCEALED CARRY

New Hampshire Gov. Maggie Hassan vetoed a bill in July that would have allowed individuals to carry a concealed handgun without a permit, according to the *New Hampshire Union Leader*. Senate Bill 116 would have repealed a licensing requirement that says anyone who wants to carry a concealed revolver or handgun must get a permit from a local law enforcement official. The House and Senate approved the bill, but not by the two-thirds margin needed to override the governor's veto.

BODY CAMERAS

State troopers and thousands of local police in New Jersey are being outfitted with body cameras, according to *NJ.com*. The state Attorney General's Office issued a directive that describes the activities during which officers will be required to wear the devices, including frisks, searches, arrests, transports of people under arrest and while responding to calls. The state said it would buy cameras for 1,000 troopers with \$1.5 million from the state police budget and distribute \$2.5 million—financed through criminal forfeitures—to local law enforcement agencies.



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VERMONT CHILDREN TO GET COLLEGE FUNDS AT BIRTH

Vermont babies will soon get more than a birth certificate at their arrival.

Money is being collected from private donors to start college funds for babies, a plan that will require about \$3 million per year, according to the *Burlington Free Press*.

Starting in January 2016, the Vermont Student Assistance Corporation plans to earmark \$250 for postsecondary education for every child born to a Vermont resident or \$500 for children born into families earning less than 250 percent of the federal poverty level.

Subaru of New England kicked off the program with a \$25,000 gift.

The newspaper reported in July that payouts could be less if the program does not receive enough donations. The state does not plan to contribute to the program, but state lawmakers approved the children's higher education savings program in the spring.

The college funds may help increase the number of Vermont students who attend college. The state's college completion rate is about 45.5 percent.

"Vermont has the highest graduation rates from high school in America, and we fail miserably moving people beyond high school," Gov. Peter Shumlin said.

THE SOUTH

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TEXTILE MANUFACTURING ON THE RISE IN SOUTHERN STATES

Low-cost textile manufacturing nations are increasingly opening operations in the United States. While textile production costs have been rising in countries such as China as a result of rising wages, higher energy bills, mounting logistical costs and new government quotas on the import of cotton, manufacturing costs in the United States are becoming more competitive. According to *The New York Times*, manufacturing wages adjusted for productivity have risen less than 30 percent since 2004, to \$22.32 an hour. These higher wages are offset by lower natural gas prices, as well as inexpensive cotton and local tax breaks and subsidies.

The Carolinas are now home to at least 20 Chinese textile manufacturers. Investment in American textiles has come not only from China. Last year, a leading textile manufacturer in India broke ground on a \$70 million factory in Sylvania, Ga., the area's first new manufacturing plant in four decades. Furthermore, a large Brazilian denim manufacturer announced in 2012 that it would open a spinning, dyeing and weaving facility in Edinburg, Texas, though full-scale production has been delayed.

NUCLEAR GENERATION

Under the final Clean Power Plan, three southern states have been buoyed by the ongoing construction of nuclear energy generation facilities, according to *Forbes*. The Environmental Protection Agency will allow Georgia, South Carolina and Tennessee to count 5.5GW of electricity from new reactors under construction toward their goals. The draft rule counted these facilities as existing generation, rather than new generation.

GRAND JURIES

Beginning Sept. 1, Texas judges will no longer have the option of appointing jury commissioners, including friends, to select grand jurors, reported *The Texas Tribune*. When HB 2150 goes into effect, Texas will join the 48 other states that have abolished the controversial "pick-a-pal" or key-man jury system. Although some judges already use random selection for grand juries, the new law will require all grand jurors to be selected using the same randomized system as regular civil and criminal juries.

TOLL ROADS

With the future of the national Highway Trust Fund uncertain, Georgia is looking at toll roads as a way to finance the ongoing maintenance and expansion of their roadways, according to *The Atlanta Journal-Constitution*. The state plans to build a 94-mile network of express toll lanes by 2040 and complete two mega-projects currently underway, which will add a total of 42 miles of reversible toll lanes along Interstate 75.

PORT ACTIVITY

The booming automotive manufacturing sector is contributing to growth at the Port of Charleston in South Carolina. In fiscal year 2015, the port handled 253,000 vehicles and likely will get busier when Volvo opens in the state in 2018, according to the *Columbia Regional Business Report*. The Port of Charleston also has seen growth as a result of the region's agricultural dominance, growing manufacturing sector, plastic products and new distribution centers.

SCHOOL VOUCHERS

On July 23, the North Carolina Supreme Court ruled 4-3 in favor of the state's school voucher program. The program provides low-income families who want to send their children to private schools with as much as \$4,200 annually in taxpayer dollars, *Education Week* reported. Eligibility is based on income guidelines for the school lunch program. State officials already have awarded more than 2,500 scholarships for the upcoming school year.

For more on CSG South, visit capitolideas.csg.org and www.sclatlanta.org.



THE MIDWEST

IA • IL • IN • KS • MI • MN • ND • NE • OH • SD • WI • AB • MB • ON • SK

MEDICAL LEAVE

State government employees in Iowa must report prescriptions and other medical services received during work absences to a private company, according to *The Des Moines Register*. Reed Group, based in Colorado and New York, will be paid \$386,000 a year to track the medical absences of more than 21,000 state employees. Caleb Hunter, a state spokesman, said the state needs the information to determine whether or not an employee qualifies for guaranteed federal medical leave job protections.

VOTER FRAUD

The Kansas Secretary of State's Office has set up a website for reports of suspected voter fraud. The Associated Press reported in July that Secretary of State Kris Kobach's office had updated its website with a tab where residents can report suspected voter violations, such as voting irregularities, corrupt political advertising and voting without being qualified.

ALCOHOL SALES

North Dakota residents can now buy beer at restaurants an hour earlier on Sundays because of legislation referred to as the "brunch bill," according to the *Grand Forks Herald*. The law moved up the time when restaurants are permitted to start selling alcoholic beverages from noon to 11 a.m. on Sundays.

MEDICAID

State agencies in Ohio are working to get the majority of about 21,000 people released from prison every year enrolled in Medicaid before they leave custody, according to *The Columbus Dispatch*. This effort will allow former prisoners to immediately qualify for health care, mental-health services and prescription drugs instead of applying to county agencies after release and waiting 45 days or longer.

PENSIONS

The Michigan Supreme Court upheld in July a 2011 law that mandated new pension contributions, according to the *Lansing State Journal*. The state will be allowed to keep the \$134 million it collected from state employees when it was decided that state employees on pension plans would have to pay 4 percent of their salaries to maintain full retirement benefits.



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MINNESOTA OFFERING LOWER ENERGY RATES TO INDUSTRIAL CUSTOMERS

Minnesota Gov. Mark Dayton signed a broad jobs and energy budget bill in June that will lower the electricity rates for mining companies, paper mills and steel mills, according to MPR News.

Major industrial customers in northern Minnesota can apply for a rate reduction under the new law, which was designed to help lower energy costs for companies competing in a global marketplace.

State Sen. David Tomassoni said about 1,000 people working in the taconite mines on the Iron Range have been laid off in the past year. He said lower electricity costs might help the companies thrive.

"You know, maybe this is something that will actually help save the industry and the jobs we have," Tomassoni said.

Residents and smaller businesses will pay higher electricity rates under the new law.

"For years, our industrial customers have been subsidizing our residential customers," said Amy Rutledge, manager of corporate communications for Minnesota Power. "This new law brings things back into balance."



For more on CSG Midwest, visit capitolideas.csg.org and www.csgmidwest.org.

THE WEST

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HAWAII RAISES LEGAL SMOKING AGE TO 21

Hawaii has become the first state in the country to raise the legal smoking age from 18 to 21, effective Jan. 1.

Gov. David Ige signed a bill in June that makes it illegal for minors under 21 to use cigarettes and electronic smoking devices, according to Hawaii News Now. Retailers also will be prohibited from selling cigarettes and electronic smoking devices to minors.

The new law does not include a grandfather clause, meaning an 18-year-old who currently smokes will no longer be permitted to smoke in 2016.

"Most people who begin smoking, about 99 percent, start before age 21, so this will help our young people delay starting tobacco use," said Lola Irvin of the Hawaii Department of Health, according to Hawaii News Now.

Local police departments will continue to enforce smoking laws. Stores caught selling tobacco to anyone under 21 will be fined \$500 for the first offense and \$500 to \$2,000 for each violation after the initial violation. Minors caught smoking will face a \$10 fine for the first offense and a \$50 fine for subsequent violations.

Four states—Alabama, Alaska, New Jersey and Utah—also have upped the smoking age, but only to 19.

CYBERSECURITY

Idaho Gov. Butch Otter signed an executive order in July establishing the Cyber Security Task Force, which will be responsible for developing policies, programs and strategies to detect vulnerabilities and prevent attacks. According to the *Idaho Statesman*, Otter said Idaho has had an increased number of cyberattacks, costing businesses and taxpayers billions each year. The task force includes representatives from the Idaho Bureau of Homeland Security, Idaho State Police, the state colleges and other groups.

POLICE PROFILING

Oregon Gov. Kate Brown signed a bill in July intended to deter police profiling in the state, according to *The Oregonian*. A system that allows residents to report profiling cases will be established under the new law, and law enforcement agencies must pass formal profiling bans by Jan. 1. Also, Portland State University's Criminal Justice Police Research Institute will be awarded \$250,000 to help track data on profiling incidents.

MEDICAL MARIJUANA

The Colorado Board of Health in July voted against adding post-traumatic stress disorder to the list of medical conditions that can be treated with marijuana. According to *The Denver Post*, a dozen veterans testified that cannabis helped while legally prescribed drugs did not, however, Tony Cappello, board president and an epidemiologist, said he could not vote to approve pot use for PTSD because of the lack of scientific evidence to support it.

CHEERLEADING PAY

California Gov. Jerry Brown signed into law in July a requirement that cheerleaders for professional sports teams in California be treated as employees, not volunteers or independent contractors. The law says cheerleaders are entitled to minimum wage, overtime pay, sick leave and workers' compensation for injuries, according to *SFGate.com*. Cheerleaders for the Oakland Raiders and Golden State Warriors said they were not paid for mandatory practice and appearances and were told to say that cheerleading was a hobby in response to questions about earnings.

ID FRAUD

Workers issuing driver's licenses and state identification cards in Arizona no longer have to depend on the naked eye to reduce fraud, forgery and theft. According to *The Arizona Republic*, a \$2.7 million software package analyzes applicants' facial features and matches them to photos already in the driver's license database for another person. Employees previously caught about 33 questionable applications a month by visually comparing new and old photos. The facial-recognition software has detected about 1,600 questionable applications in the five months that it has been in use.



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TRANSFORMING EDUCATION

As the global economy continues to evolve into one based on knowledge and innovation, having a workforce that is prepared to meet the high-tech skills increasingly in demand will be critical to America's future economic success. Preparing future workers must start in classrooms. Schools across the states are transforming the way education is provided, with greater emphasis on integrating science, technology, engineering and mathematics—or STEM—disciplines, in an effort to prepare today's students for the jobs of tomorrow. For many school districts, this also means the addition of arts to the STEM formula—incorporating an element of creativity to allow for innovative applications of more technical knowledge and skills—and ensuring that STEM programs engage a broader spectrum of students along pathways to the high-tech and scientific job sectors.

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USING THE ARTS TO FIND INNOVATION

by Katherine Barrett & Richard Greene

For generations, America was known as the world capital for innovation. While other nations competed on the basis of cheap labor and inexpensive materials, America specialized in coming up with the best new ideas before any other nation and capitalizing on them quickly.

There was even a day, decades back, when the phrase “made in Japan,” on the back of a product was interpreted by many as meaning that it was a cheap piece of electronics, usually based on American inventiveness, but available at a lower price than the same thing domestically produced. That’s all changed—and fears abound that it’s changing to such an extent that American manufacturers increasingly have to look abroad for the newest ideas and notions.

According to IFI Claims Patent Services, a consulting firm that tracks U.S. patents, the growth of U.S. patents granted also has slowed, shrinking from 12.8 percent in 2012 to 8.2 percent in 2014.

Successful Silicon Valley venture capitalist Peter Thiel told *The New York Times* in 2013 that innovation in America—which was once a keystone of manufacturing

and agriculture—“has been confined largely to information technology and financial services. By contrast in transportation, for instance, we are hardly more advanced today than we were 40 years ago.”

Meanwhile, as a creativity gap appears to be growing in the United States, other nations are more than willing to jump in and fill the opening. China, for one, is frequently held forth as a rival for the creation of new products and services. India is moving forward rapidly as well, as are other nations.

What’s to be done? The answer for the United States, a growing number of experts believe, lies in the schools.

When a gap was perceived in America’s engineering and scientific prowess, that gave root to the STEM program in U.S. schools. The acronym, of course, stands for science, technology, engineering and mathematics. The idea behind it was that American children weren’t getting enough pre-collegiate training in these skills, so the nation was left with a shortage of the kinds of human capital with the capacity to advance these fields.

More recently, though, there’s been a growing sense that the emphasis on STEM may have shortchanged

MUSIC LESSONS

ELKHART, IND.—Octavia Stewart, a student at Roosevelt STEAM Academy in Elkhart, Ind., shows her skills at the violin. A program at the school called El Sistema offers every student the chance to learn to play an instrument. STEM programs around the country are incorporating creative arts into the traditional science, technology, engineering and math curriculum to spur creative thinking among students. © AP Photo / The Elkhart Truth, Jennifer Shephard



America's creative bank account. As a reaction in the past few years, the letter "A" is increasingly slipping its way into the mix, turning STEM into STEAM. The A stands for art and design and STEAM is gathering steam.

The perils of ignoring the "A" in STEAM become abundantly clear by looking at a series of studies and articles written over the past five years. Back in 2010, for example, *Newsweek* said that the United States was suffering a "creativity crisis." The article argued that America's children have been getting smarter, but scores on tests of creativity have been falling since 1990, most clearly in grades K-6. Though the article cited overuse of television and video games, it also pointed an accusatory journalistic finger at the lack of creative development in schools.

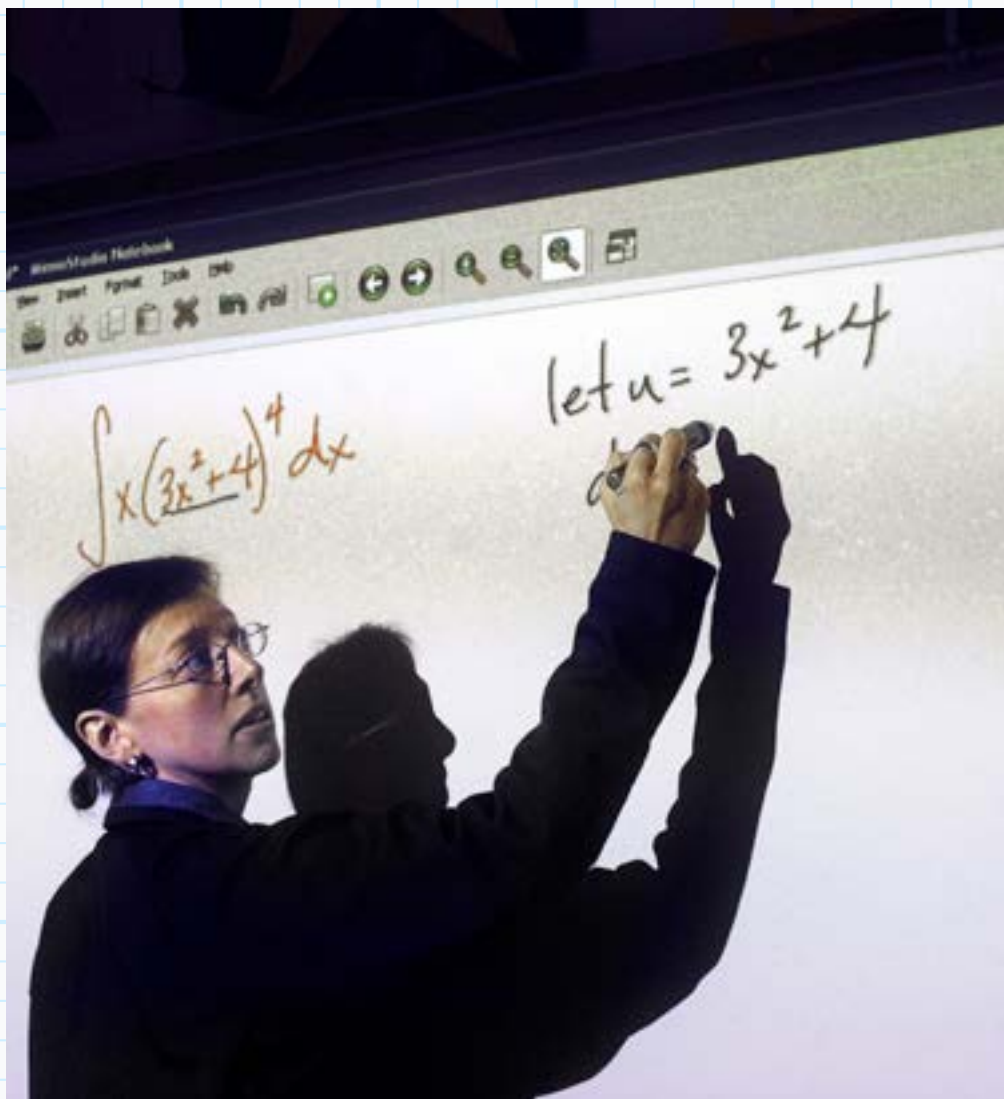
A particularly illuminating 2013 study by Michigan State University suggested that young children who participate in creative expression, such as painting or music, may have a greater propensity for generating patents or launching a business later in life. Researchers think that's because these types of learning experiences foster out-of-the-box thinking. The study found that of the group examined, people who owned businesses or patents had received up to eight times more exposure to the arts as children than the general public.

STEAM education got its start in the United States in 2006 or 2007 and has continued to grow and develop momentum over the past 10 years. Many countries, including China and South Korea, have adopted the STEAM movement, making it a multinational education initiative.

The Rhode Island School of Design, whose mission is to educate the public about the vital role art and design play in society, has championed the STEAM movement to foster innovation. John Maeda, the school's past president, has been a leader in incorporating art and design into STEM's national agenda and bringing the STEAM initiative to the political forums of education policy.

"With global competition rising, America is at a critical juncture in defining its economic future," Maeda wrote in a 2015 article in *Edutopia*. "I believe that art and design are poised to transform our economy in the 21st century in the same way that science and technology did in the last century, and the STEAM movement is an opportunity for America to sustain its role as innovator of the world."

Naturally, the creation of a cool new acronym to describe a persuasive-sounding idea doesn't necessarily mean that any progress will be made. But STEAM has been gaining traction for the last few years, winning support from Congress, the U.S. Department



A NEW EQUATION

ABILENE, Texas—Kesi Prescott, an Advanced Placement Calculus teacher gives a lesson at Clyde High School in Abilene, Texas. The adoption of curricula based on the STEM fields of science, technology, engineering and mathematics has gained momentum across the country, but many schools are turning STEM into STEAM with the addition of arts programming.

© AP Photo / The Abilene Reporter-News, Nellie Doneva

of Education, the National Science Foundation and—most importantly—schools across the country.

According to estimates from the Rhode Island School of Design, there were about 60 self-identified STEAM schools nationwide in 2013. In the couple of years since, there's little question that number has grown.

Sometimes the push toward STEAM education comes from the state level. Pennsylvania encourages applicants for the state's nationally funded 21st Century Community Learning Center grants to transition from a STEM to STEAM approach. Applicants

"WHILE THERE'S A GREAT DEAL OF TALK IN EDUCATION CIRCLES ABOUT THE 'ACHIEVEMENT GAP,' DON DORAN, THE HEAD OF DREW CHARTER SCHOOL, REFERS INSTEAD TO AN 'OPPORTUNITY GAP.' EVEN THOUGH THE SCHOOL IS LOCATED IN A LOW-INCOME AREA, SCHOOL RESOURCES ARE DIVERTED, TO THE GREATEST DEGREE POSSIBLE, TO CREATIVE ENDEAVORS."

are granted extra points if they incorporate STEAM into their curriculum plan.

One of the most outstanding efforts has been moving forward in Chicago through a program called Cities of Learning, which also has made progress in Dallas, Pittsburgh and Washington, D.C. In Chicago, the effort seeks to develop more innovative ways for students to learn, including a focus on problem solving. One example: In Chicago, students are taught about electronic circuits and use that information to create clothing or cards that light up. It's all about creativity.

In Philadelphia, with support from a \$1.1 million U.S. Education Department grant, students are encouraged through their standard curriculum to explore concepts in science and mathematics—such as fractions and geometric shapes—through art-making projects.

“The experience allows students to develop 21st century workforce

skills—encouraging them to be collaborative, creative and imaginative,” said Pearl Schaeffer, chief executive officer of the Philadelphia Arts in Education Partnership.

While Philadelphia school officials are reticent to say they've proven a direct cause and effect between art and design-oriented education and a heightened propensity to create and innovate, they can point to a range of measurable and important changes among the students who have been exposed to this model, including improvements in attendance and homework completion, as well as lower suspension rates.

The underlying belief behind the Drew Charter School in Atlanta is that innovation can be fostered with an appropriate education. At Drew, the teachers aren't relying on innate genius, but ask themselves, “How do kids create?”

While there's a great deal of talk in education circles about the “achievement gap,” Don Doran, the

head of Drew Charter School, refers instead to an “opportunity gap.” Even though the school is located in a low-income area, school resources are diverted, to the greatest degree possible, to creative endeavors. All of the students are exposed to golf and foreign languages, and all third-graders take violin lessons.

A public charter school, Drew is very much project-based. By working on projects, children appear to be able to develop and nurture innovation along the way. Picture a year-long science fair, but unlike a science fair, the lessons learned aren't thrown away like the self-watering plant that wins the gold medal.

For example, eighth- and ninth-graders recently created a lawn mower for a community member in a wheelchair. This required knowledge of engineering, welding and mechanics. Doran said this approach can be duplicated and replicated anywhere.

Of course, STEAM-based education isn't without its potential flaws and challenges. A few that stand out include:

- **Time.** STEAM education is a time-consuming process. It's tough for teachers to find the hours to plan, collaborate and engage in professional development for STEAM on top of their daily duties.
- **Cost.** STEAM and project-based learning requires supplies, tech resources and professional development. These costs can be difficult for school districts and states to bear in tight budget times.
- **Relevance.** There's a need to develop and articulate the ideas of STEAM in a way that moves the initiative forward. The nature of tests that increasingly are used to measure the quality of schools and teachers have tended to focus largely on mathematics and the English language, making it difficult for schools to make the jump and commit to STEAM.

Will STEAM be the wave of the future? As with all educational efforts, that's impossible to tell. The one thing that is clear is that America's innovative capacity is crucial to its future over the remainder of this century. And to the extent that STEAM is proven over the long haul to contribute to that capacity, it's likely to become as commonplace a theme in the schools as “reading, writing and arithmetic” were a century ago. **ci**



About Barrett and Greene

CSG Senior Fellows Katherine Barrett and Richard Greene are experts on state government who work with Governing magazine, the Pew Charitable Trusts, the Volcker Alliance and others. As CSG senior fellows, Barrett and Greene serve as advisers on state government policy and programming and assist in identifying emerging trends affecting states.



DANIEL CALTO

is director of solution services, academic and government institutional markets at Elsevier, Inc.

One of the primary drivers of successful new business formation in the United States is research in science and technology. Its influence on the economy is ubiquitous, but often invisible.

Zvi Griliches, an economist who specialized in studying research and development's impacts to the larger economy, estimated that one-half of the growth in U.S. economic output and three-quarters of its productivity growth could be attributed to investment in research and development in STEAM fields.

The return on investment on both basic and applied research is very high, said Edwin Mansfield, up to 40:1 in some cases. Basic research has an even higher economic payoff than applied research.

While the U.S. continues to spend the most on research and development globally—\$450 billion in 2014, 70 percent of which was industry spending—China's research and development expenditures have increased an average of 22 percent annually over the past decade. U.S. expenditures have increased only an average of 4.5 percent per year during the same time.

RESEARCH IS KEY TO GROWING INNOVATIVE NEW COMPANIES

China spent \$280 billion on research and development in 2014, more as a percentage of its gross domestic product than the European Union as a whole—2 percent compared to 1.68 percent. China's expenditures on research and development are expected to surpass U.S. expenditures in absolute terms around 2020.

The federal government has provided most of the funding for basic and applied research in the U.S. since at least the end of World War II. Public universities, in particular land-grant institutions, historically have been well supported by state governments as part of general education funding. However, both federal and state funding for research have been in sharp decline in real terms since the late 1990s. A 2007 report from the National Academy of Science called "Rising Above the Gathering Storm" argued that the U.S. was at a substantially increased risk of losing its previously unchallenged position as the global leader in science and technology.

Companies that had their beginnings in university settings, with federally funded research, include Google, SAS Software, Cisco Systems, Hewlett-Packard and thousands of other large and mid-sized technology firms. In addition to often dominating their specific economic niches globally, these firms are almost three times as likely as other firms to be manufacturers.

Another major contribution of a STEAM-educated population to business formation is even more obvious, but perhaps less noticeable. Graduates of these programs, especially those who earn Ph.D. degrees but also those who hold master of science and bachelor of science degrees, M.S. and B.S. degree holders, have a highly disproportionate tendency to start new companies. A 2009 Kaufmann Foundation study found that graduates of the Massachusetts Institute of Technology—or MIT—have started more than 25,800 currently active companies with annual global sales of more than \$2 trillion. If these companies formed an independent nation, the revenues would make that nation the 17th largest in the world.

Twenty-six percent of revenues from all Massachusetts firms are derived from the 6,900 companies in the state founded by MIT graduates, generating about 985,000 jobs.

These firms generate \$164 billion in annual sales. California has an additional 526,000 jobs from 4,100 MIT-alumni firms, followed by New York with 231,000 jobs. More than 30 percent of foreign MIT students have started companies, more than half of which are located in the United States.

MIT also has impacted cluster formation in the greater Boston area, including the rapid growth of Kendall Square, which houses 150 biotech and infotech companies in a previously rundown industrial area of Cambridge.

The track record of other universities may not be as exceptional as MIT's, but university graduates add hundreds of billions of dollars of economic value over time through starting and building innovative new businesses. Virtually any economically vibrant metropolitan region or major population center is likely to have one or more research-oriented universities at its core. Those cities and regions lacking such a center frequently also lack economic dynamism and breadth, and are often sensitively dependent on a single industry or major employer. To diversify an economy and reduce risk, whether it is in an urban, suburban or rural district, a well-functioning research university is a fundamental part of the solution to the problem of sustaining high-quality job growth. Another closely related factor is K-12 schools that support STEAM studies with a motivated and well-trained teaching corps. 

To learn more about research in the states, visit CSG's website to download a collaborative report by The Council of State Governments and Elsevier, a world-leading provider of innovative information solutions to science, health and technology professionals, at www.csg.org/knowledge_economy.



*America's Knowledge Economy:
A State-by-State Review*



KEEPING STUDENTS' NATURAL CURIOSITY

ALIVE 

STARTS EARLY

by Debra Miller

For preschoolers, technology means using tools such as crayons and scissors, and science means peering through a magnifying glass or playing with a magnet.

These simple experiences lay an important foundation, said Beth Fredericks, one author of a teaching guide intended to assist preschool educators in focusing and refining the naturally inquisitive behaviors of children ages 3 to 5. And, she said, perhaps that foundation will lead to a career in a chemistry lab.

“Kids lose their love of science and math,” Fredericks said. “They lose their natural sense of curiosity. They stop asking dumb questions that really aren’t dumb.”

The guide, created by the Boston Children’s Museum, is one way that Massachusetts is trying to reverse the disappointing statistic that only 17 percent of high school seniors are interested in math and science, Fredericks said.

Experts say an education in science, technology, engineering, arts and math—or STEAM—is essential to building an innovative workforce in the United States, and the sooner students delve into STEAM education, the better.

Funding for the teaching guide was part of the federal Race to the Top grant program that awarded Massachusetts funding four years ago. Museums in the state received \$500,000 to help close the achievement gap in the state. The guide, now in its second edition, has been distributed to more than 100 museums and 200 libraries in Massachusetts, Fredericks said. She estimated that the kit, which encourages educators to use museums and libraries as informal places of learning, has touched the lives of more than 12,500 preschoolers.

“All kids are curious,” Fredericks said. “All kids want to play and explore.”

MISSION STATEMENT FROM HARVEY WHITE'S STEAM WEBSITE



STEAM Builds an Innovative Workforce

Harvey White, a retired technology executive in California and an ardent advocate for adding arts to STEM education, making it STEAM, said traditional education systems, which he likened to production lines in factories, are out of date. He said businesses and their labor force needs may have been well served in the past, but that is no longer the case. According to White, gearing schools up to produce an innovative workforce that is ready for the technology of the future should be a national economic priority.

“I am thinking about my grandchildren and their future,” White said.

The United States went from first to eighth, and then back to fifth, among innovative nations, White said. STEAM, however, can help the country remain competitive. White said he believes that creativity and innovation require right-brain thinking, which is encouraged by studying the arts.

“As we have lost manufacturing jobs, the need for an innovative workforce has increased,” he said. “[But] it’s not like it’s too late.”

Taking STEAM to Elementary Students

In a northwestern suburb of Chicago, the Glen Ellyn school district has taken up the charge to radically change schools. The district has introduced STEAM education in all of its elementary schools. Part of the impetus for STEAM came with the adoption of the common core standards in Illinois a few years ago.

“Common core increased the rigor of the curriculum by half to one grade level,” said John Bower, a level three (fourth- and fifth-grade) STEAM teacher at the district’s Abraham Lincoln School. “We had to look at making crosscutting connections between what used to be separate silos.”


Starting in third grade, the day is split into two halves: one half of the day focuses on literacy and the other half on integrated STEAM instruction, using problem-based learning.

Problem-based learning is more than projects, Bower said. Students start with an overarching, real problem. An essential question is formulated, often with student input.

“You want to make sure that you can’t Google the answer to the essential question,” Bower said.

A real-world problem Bower’s classroom worked on last year was how to minimize the effects of flooding they were experiencing at their school. They had to research the issue and find evidence to support alternative solutions. Options proposed included eliminating portable classrooms at the school, creating a rain garden with native wild flowers, creating a catch basin for drainage and adding underground drainage to the school playground. The students developed a budget for the playground drainage and discussed how to get the budget proposal on the school board’s agenda.

Bower said he believes his job is to make math, science and engineering come alive. He said high school, where much of the STEM or STEAM education is concentrated, is too late for students.

“If they don’t think it’s cool and fun in the early years, we lose them by middle school,” Bower said. “I want to make learning fun.” 



“If they don’t think it’s cool and fun in the early years, we lose them by middle school. I want to make learning fun.”

*»John Bower,
STEAM teacher
at Abraham Lincoln
Elementary School in Glen Ellyn, Ill.*

GIVE ME AN A

EDUCATORS AND POLICYMAKERS FUSE ART AND STEM

by Shawntaye Hopkins

At a school just outside of Pittsburgh along the Allegheny River, students traverse a lush courtyard garden to move from class to class throughout the day. Art installations decorate the space that includes rain barrels, composting sites, nesting boxes, a pond and a full greenhouse—all designed and built by students.

In the garden, Springdale Junior-Senior High School students grow peppers and potatoes. They study fish and plants using hydroponic and aquaponic systems, also designed and built by students. They analyze data from Bluetooth plant sensors.

It is an outdoor hub for cross-curricular education in science, technology, engineering and math—known as STEM—as well as art.

STEM into STEAM

Adding art has turned STEM into STEAM at many K-12 schools and postsecondary institutions across the country. Not everyone implements STEAM the same way, but education leaders and policymakers generally

agree that fostering creativity is essential in preparing students for tomorrow's workforce.

"The reason that the art came about—it addresses a need for creativity," said Brett Slezak, a health and physical education teacher at Springdale. "You need to be able to design something. You need to be able to think differently so you can make something and affect the world."

The Allegheny Intermediate Unit, which oversees Springdale's district and 41 other school districts in western Pennsylvania, awarded the school a \$20,000 grant two years ago to establish the garden. The intermediate unit has awarded schools more than \$2.6 million in STEAM grants since 2009 with



GROWING INGENUITY

SPRINGDALE, Pa. —In the STEAM Garden at Springdale Junior-Senior High School, students worked on a bed of summer squash with Brett Slezak, a health and physical education teacher at the school. Although the courtyard garden is often referred to as the STEAM Garden, it is formally named Rachel's Neighborhood Garden—for renowned environmentalist Rachel Carson—because the schools sits on the land that was her family's farm. (Melissa Allen / Springdale student)

support from two local foundations—The Grable Foundation and Claude Worthington Benedum Foundation—and Chevron, a new backer this year, said Megan Cicconi, the intermediate unit’s director of instructional innovation.

“The inclusion of art, I would venture to say that it makes one more thoughtful, reflective and intentional in a design process,” Cicconi said. “And it’s not just that we include art; it’s the idea that they are all infused so that it’s STEAM.”

After all, she said, the real world isn’t divided into single-subject textbooks.

“It is a world where learning is not compartmentalized like a typical filing cabinet or a traditional school,” Cicconi said. “And so we should prepare them for that interconnected world.”

For nearly four years, the Rhode Island School of Design has worked to advance the STEAM movement and raise awareness among teachers and policymakers, though the acronym “probably stretches back to about 2008,” said Babette Allina, executive director of government relations and external affairs at the design school. In May, U.S. Rep. Jim Langevin of Rhode Island introduced a resolution in Congress to include art and design in federal STEM programs. Two years ago, the design school supported the formation of the bipartisan Congressional STEAM Caucus, which promotes innovation through STEAM.

The design school is also developing a STEAM curriculum for K-12.

“It is one way to do STEAM,” Allina said of the curriculum. “We’ve heard about hundreds of different ways. The most exciting part is that very often, teachers are finding each other and coming up with ways to integrate their programming.”



“I believe STEAM is what we should be talking about. It’s all art. It’s all about the creativity, the innovation, all of that is art.”

» Illinois state Rep. Camille Lilly

STEAM is primarily about broadening education and fostering innovation through creativity and not necessarily about how arts—whether it’s liberal arts or fine arts—are incorporated into school programs, Allina said. She recalled an engineering professor whose students studied dance to learn more about movement.

Illinois state Rep. Camille Lilly said she prefers to use the STEAM acronym as she pushes her state to realize the value of establishing art programs in schools and in the community.

“I believe STEAM is what we should be talking about,” Lilly said. “It’s all art. It’s all about the creativity, the innovation, all of that is art.”

A Changing Target

Over the past few years, the National Science Foundation—or NSF—has received an increasing number of proposals for programs that integrate arts and science, said Al DeSena, the foundation’s program director for advancing informal STEM learning.

“When it comes to generating new ideas in science education or engineering or things of that sort, ideas can come from a lot of different places, and sometimes they come from the arts world,” DeSena said.

The NSF, an independent federal agency, does not use the STEAM acronym because it was designed to promote science, not art, and it does not want to align with a specific cause. However, the NSF has funded some innovative programs that blend science and art.

DeSena said the integration of science and art is still experimental; there is little evidence of its impact. And STEAM, albeit popular, isn’t the only STEM variation.

STEAM has been turned into STREAM (an R for reading), STREAMS (an R for reading and an extra S for social studies) and SEAD (science, engineering, art and design). Some programs have added agriculture to STEM and referred to it as STEAM.

Slezak, however, recalled that decades ago teachers were fond of the three Rs: reading, writing and arithmetic. It’s not about the acronym, he said, but it’s about trying something different to engage students. STEAM, STEM—they won’t be around forever, he said.

“In 10, 15, 20 years from now, that acronym is going to change to something different,” he said. “It’s going to address whatever the current economic need is or whatever the current workforce need is. It’s going to change.” □

DIVERSIFYING THE STEM PIPELINE

by Jennifer Ginn

While the face of America may be changing rapidly, the face of the STEM workforce in America isn't going anywhere fast.

According to Change the Equation—a nonprofit, nonpartisan coalition launched by 100 business leaders to improve STEM education—the vast majority of STEM workers in 2014 were either white or Asian men. In that year, whites or Asians made up 89 percent of the engineering workforce, 85 percent of the computing workforce and 83 percent of advanced manufacturing. Women in 2014, meanwhile, were only 12 percent of the engineering workforce, 26 percent of the computing workforce and just 10 percent of advanced manufacturing workers.

The pipeline of women and minorities into STEM careers isn't looking too good either, said Karl Reid, executive director of the National Society of Black Engineers.

“Over the past 12 years, the percentage of African-Americans who receive bachelor's degrees in science and engineering has not budged,” Reid said. “In 2000, only 8.6 percent of African-Americans earned degrees in these disciplines. In 2012, that number had boosted up to 8.8 percent.”

Claus von Zastrow, chief operating officer and director of research at Change the Equation, said research has shown which programs are effective in getting more women and minorities to enter into STEM fields. What's lacking, he said, is often a commitment from state policymakers to make long-lasting changes.

“There are some states that are leading the way,” von Zastrow said. “I think it's

because they've heard from their business communities and employer communities that there's a huge skills gap, that we can't be on a sustainable course if the 70 percent of the population which is female and/or a person of color is so woefully underrepresented in the STEM workforce. That has put a lot of pressure on state leaders to act.”

Iowa's Scale-Up

One of those states taking action is Iowa, where Gov. Terry Branstad signed Executive Order 74 in 2011, which created the Governor's STEM Advisory Council. Jeff Weld, executive director of the council,

said its main goal is to “inspire and generate interest” for STEM careers.

“This one ... is an edu-nomic development initiative,” Weld said. “I think that really characterizes what we're doing with bridging the worlds of education and economic development and industry.”

The council is supported annually with a \$5.2 million appropriation from the state, combined with an almost matching amount from the private sector. One of its major initiatives is called Scale-Up, which promotes exemplary STEM programs statewide.

“This year, 14 of them (the programs) got selected and we have put those 14 programs



CHANGING FACE OF IOWA

DES MOINES, Iowa— Students work on a STEM project at Hoover High School. Jeff Weld, executive director of the Governor's STEM Advisory Council, said it is vital for the historically white state to find ways to increase the number of girls and under-represented minority students who are interested in STEM careers. “We've got a wonderful, diverse future ahead for our state,” he said, “and we have a lot of challenges to getting our programming around to that reality.” Photo Courtesy of Strategic America

FUTURE OF STEM

DES MOINES, Iowa—Elementary students at Cowles Montessori School work with one of the 14 STEM Scale-Up programs offered by the Governor's STEM Advisory Council. Each year, the council does a request for proposals for STEM programs, in which the programs must be able to prove that they increase diversity in the STEM pipeline. Those chosen for the Scale-Up program are given to school districts for free through a cost-share between the STEM Advisory Council and the Scale-Up program providers. Photo Courtesy of Strategic America



into the hands of almost 3,000 educators, touching over 100,000 kids this year," Weld said. "It's mind boggling to think about the numbers and the reach and the impact."

Weld said each of the programs selected for Scale-Up has to provide the council evidence of how it increases diversity in the STEM pipeline. The reason why the council is focused on increasing diversity is easy to understand, Weld said.

"There's a moral imperative and there's an economic imperative," he said. "The moral imperative is that every Iowan ought to have access to these wonderful, recession-proof egalitarian careers. And anybody who would exercise anything but opening, welcoming strategies has got a screw loose."

"The economic imperative is (that) statistics don't lie. Our state is rapidly diversifying. ... We better be welcoming. We better be diversifying our talent pipeline or our state can't sustain this economy."

Arizona STEM Network

The Arizona STEM Network, led by Science Foundation Arizona, is a similar model to what Iowa is using. A collaboration of business leaders, educators, policymakers and philanthropic groups, the network seeks to put proven programs into schools to help encourage more students to look at STEM fields.

"We have STEM clubs," said Ken Quartermain, director of the Arizona STEM Network. "We designed a holistic STEM club where a school could take it and literally drop it into their school and immediately have in place everything they need to know to do a STEM club."

Quartermain said the foundation has partnered with the city of Phoenix to do public service announcements aimed at increasing the number of girls interested in STEM fields. The foundation also is working in conjunction with Google, the Greater Phoenix Economic Council and Phoenix Central School District to open a charter-type school that specializes in computer coding. The school will draw from several neighborhoods with a primarily Hispanic student population.



"I tell the kids when I'm talking to them, you can't hide from math anymore. ... Find a way that it can be fun and you will get to write your future."

» Iowa Lt. Gov. Kim Reynolds

"A lot of minority, underserved populations are struggling economically," Quartermain said. "The fastest way of improving those family situations is to have jobs available to them that are high-paying jobs. ... We know statistically that's jobs in the STEM arena. That requires us to build an entire education infrastructure that is concentrating on that, one that gives kids a vision of what STEM means."

Million Women Mentors

Iowa's Lt. Gov. Kim Reynolds also has been a big supporter of increasing the number of minorities and women in the STEM fields. She launched the Million Women Mentors program across the state in 2014.

Million Women Mentors is a national program aimed at recruiting 1 million male and female mentors in STEM fields to increase the interest and confidence of girls in these high-tech jobs.

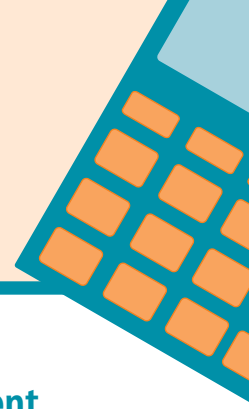
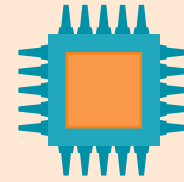
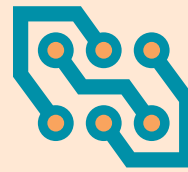
"I've been trying to encourage other lieutenant governors across the nation to participate," Reynolds said. "Our goal is to have 5,000 female and male mentors mentoring young women from seventh grade through professional (levels). The goal is to get them interested in STEM subjects in junior high, high school and to keep them interested once they go into postsecondary education and once they enter the professional field."

"When we launched the initiative almost a year ago, we had at the point, I think, already 15 companies that had committed to participating. I think we launched with 500 mentors already signed up and ready to go. Today, we have 71 companies that are participating and 1,800 mentors in place."

Reynolds said encouraging the state's students to pursue high-tech careers is one of her passions.

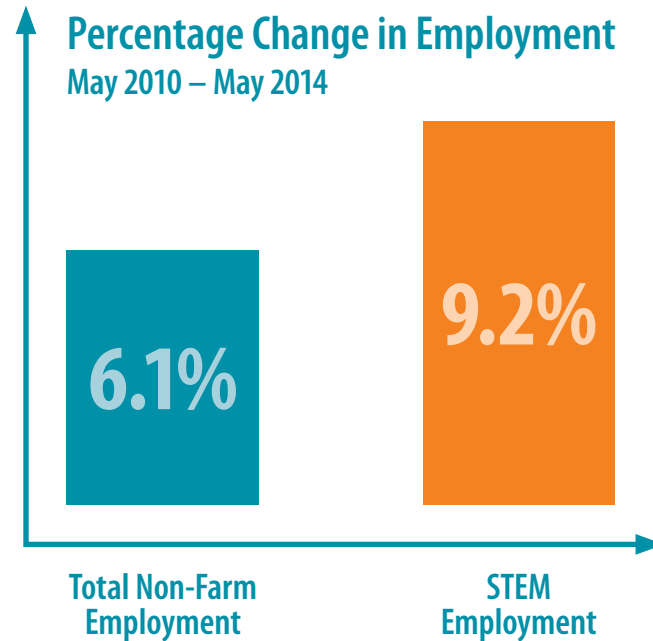
"I tell the kids when I'm talking to them, you can't hide from math anymore," she said. "It's involved in everything; embrace it. Find a way that it can be fun and you will get to write your future." □

STEM JOBS



Recent Growth

Jobs in the science, technology, engineering and math—or STEM—fields make up about 6.2 percent of all employment, or 8.3 million positions. That’s up from 7.6 million jobs in 2010—or a growth rate of just under 10 percent. While STEM positions may not make up a huge portion of total jobs, those positions are growing quickly; total employment across all occupations grew by 6 percent over the same period.

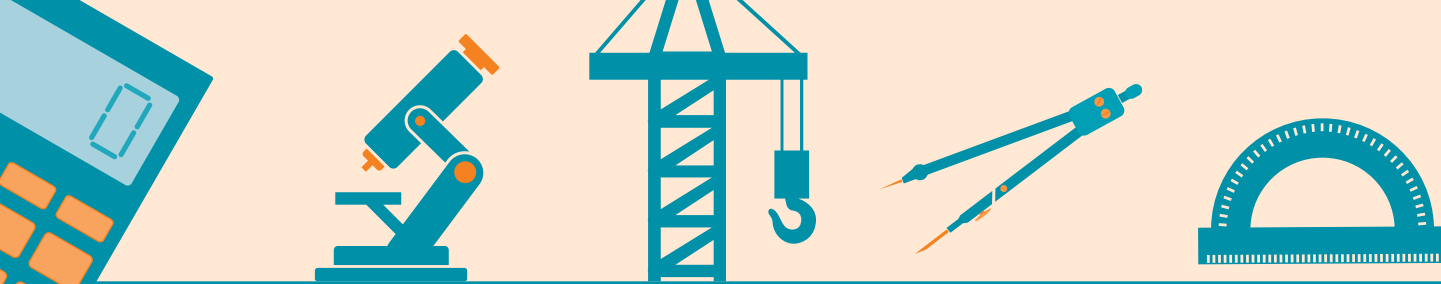


Jobs of the Future

From 2012 to 2022, open STEM positions are predicted to continue growing. For example, software developers—both in applications and systems—are predicted to have more than 350,000 new positions open by 2022.

Selected STEM Occupations: Significant Job Openings Projected between 2012 and 2022

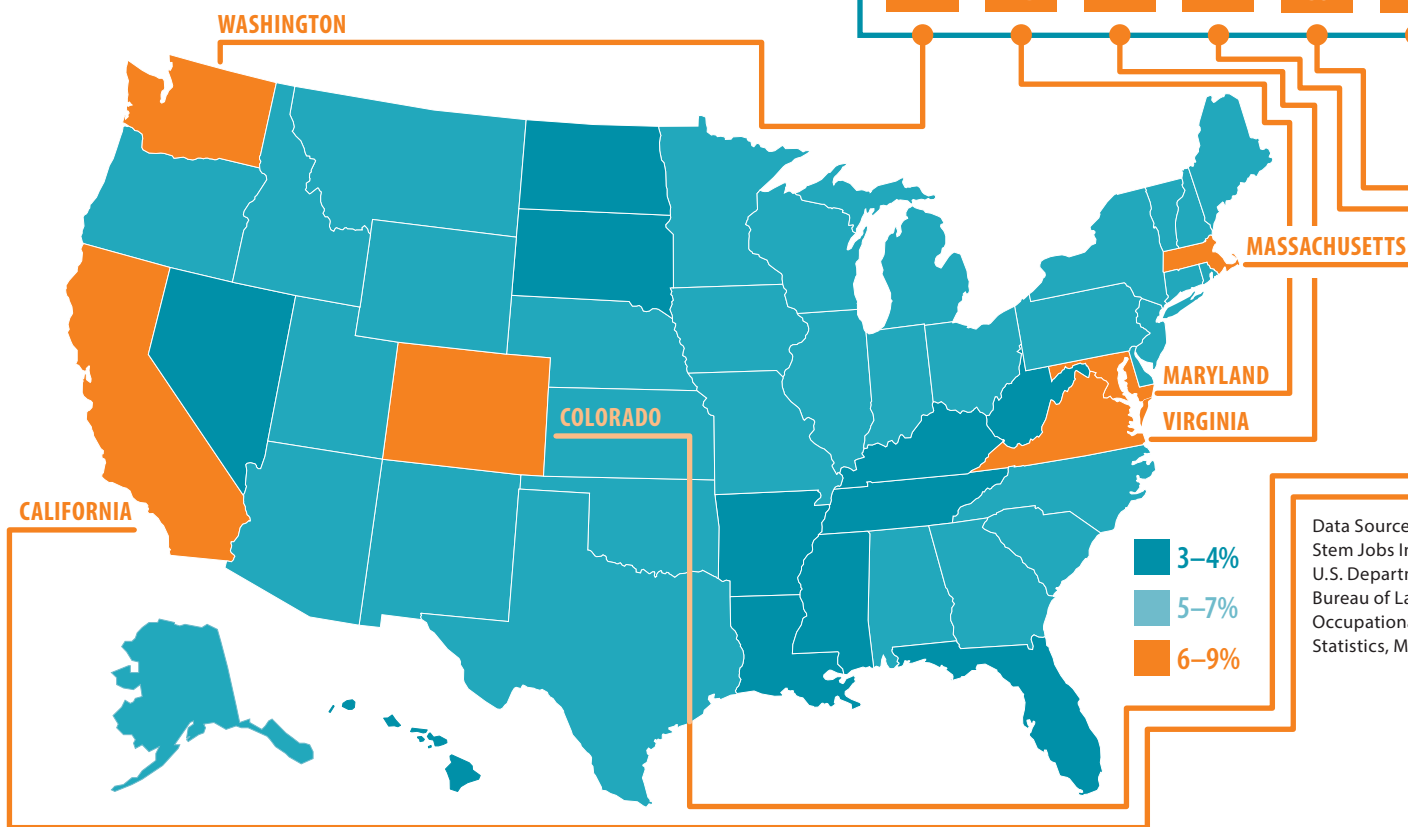
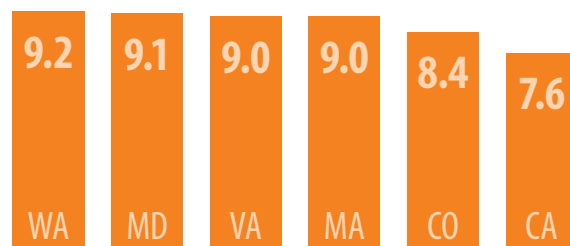
Occupation	Number of Job Openings, 2012–22	Median Annual Wage, May 2013	Typical Entry-level Education Required
Software developers, applications	218,500	\$92,660	Bachelor's degree
Computer systems analysts	209,600	\$81,190	Bachelor's degree
Computer user support specialists	196,900	\$46,620	Some college, no degree
Software developers, systems software	134,700	\$101,410	Bachelor's degree
Civil engineers	120,100	\$80,770	Bachelor's degree
Computer programmers	118,100	\$76,140	Bachelor's degree
Sales representatives, wholesale and manufacturing, technical and scientific products	111,800	\$74,520	Bachelor's degree
Network and computer systems administrators	100,500	\$74,000	Bachelor's degree
Mechanical engineers	99,700	\$82,100	Bachelor's degree
Computer and information systems managers	97,100	\$123,950	Bachelor's degree



National Distribution of STEM Jobs

STEM jobs are a bigger part of the workforce in some states than in others. In Maryland, Massachusetts, Virginia and Washington, at least nine percent of total employment falls under a STEM category. That's compared to just three percent of jobs in Mississippi and Nevada.

Top 6 States With Highest Percentage of Employment in STEM Jobs



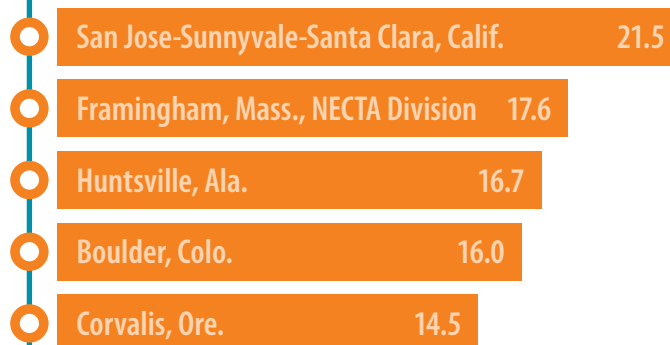
Data Source for Stem Jobs Infographics: U.S. Department of Labor Bureau of Labor Statistics, Occupational Employment Statistics, May 2014.

Local Distribution of STEM Jobs

The importance of STEM jobs to a local economy can be even more dramatic. For example, more than 1-in-5 jobs in the metropolitan area of San Jose-Sunnyvale-Santa Clara, Calif., are in STEM fields.

The San Jose metro area also has the highest concentration of systems software developers and was the highest paying area for this job, with an annual mean wage of \$138,410. That same job in a different area, however, could pay a much different salary. For example, the same job title in Lafayette, La., pays more than 60 percent less—\$52,720—and at the state level, wages for this job ranged from \$68,580 in North Dakota to \$124,070 in California.

Top 5 Metropolitan Areas With Highest Percentage of Employment in STEM Jobs



'WORKING COOPERATIVELY TO SOLVE PROBLEMS' BENEFITS STUDENTS AND THE COMMUNITY

by Carrie Abner



Photo Courtesy Sen. Carl Marcellino

New York state Sen. **Carl Marcellino** is The Council of State Governments' 2015 national chair. A former science teacher and school administrator, Marcellino believes that education and workforce development go hand-in-hand, and greater partnerships between schools and businesses will help ensure students have the skills needed for the jobs of tomorrow.



Read the full interview with Carl Marcellino at capitolideas.csg.org.

1 How are states showing innovation in education?

“Education is a front burner issue no matter where you travel in the nation. It is critical that education policy and technology evolve with the times. Each state is different as is each school district, however an 8th grade education should mean the same thing in each state. ... Working together with teachers, parents, school leaders, colleges and community business leaders, we can foster a learning environment that sets students up for success.”

2 A former science teacher and administrator, what do you see as the most important trends in teaching the sciences that state leaders need to consider?

“First, we have to recognize the basic fundamental that students learn differently. Our teachers need the educational background and expertise to keep all of our students engaged and enthusiastic about learning. ... Using a combination of academic knowledge, technology and hands-on, real-world applications will help students embrace the sciences and understand how STEM impacts their daily lives and defines their future. The curriculum must put students on a path that leads to not just graduation, but also employment.”

3 What can state leaders do to help prepare students for 21st century jobs?

“Politicians need to understand that the business leaders and employers in their communities know best what kinds of candidates they want to hire. We need to listen to the people who are actually creating the jobs and use their expertise to help our schools provide students with the necessary skills and tools to succeed. I am pleased that many of our school districts are recognizing the arts, and emphasizing STEAM as well as STEM. Partnerships need to be created among the school districts, colleges and business leaders. This strategy will create symmetry between education and job training.”

4 What students learn in the classroom is key, but so is student learning outside the classroom. How can states foster experiential learning opportunities for students?

“Again, this comes down to encouraging partnerships and government working with our business community, colleges and technological startups to create hands-on opportunities that benefit both the student and the employer. We should be pursuing state-sponsored incentives to encourage businesses to offer internships and apprenticeships and making sure that the student gets academic credit for these real-world experiences.”

10?

5 How can state leaders balance the need to support education initiatives with state budgets that have been slow to recover from the Great Recession?

“Five years ago, New York state was saddled with a multibillion dollar deficit and facing the real possibility of draconian cuts to our education programs. Since that time, we turned things completely around with fiscally responsible budgets that demonstrate spending restraint and focus on real priorities, like education. ... This resulted in a record spending on education in our state. We increased school funding by \$1.3 billion over last year and totaled more than \$23.5 billion statewide in 2015.”

6 Data shows the unemployment rate for those with less than a high school diploma is 49 percent higher than the national average. What can states do to increase high school graduation rates?

“We want to attack the problem of struggling schools and make sure these identified schools are on a path towards success. ... In March, we adopted a school receivership plan for schools with chronically low test scores and graduation rates. The approved plan includes a one- to two-year grace period for schools to submit a turnaround plan with the aid of the local superintendent. In the absence of progress, a receiver will be appointed. The receiver will have additional management powers and funding will be provided in order to improve the district’s overall academic performance.”

7 How can state leaders ensure equal access to a high-quality education for low-income and minority students?

“Every student deserves a high-quality education no matter who they are or where they call home. To accomplish this, states must adopt a school aid formula that is progressive. For example, under its 2014–15 budget, New York state provides nearly three times as much aid per pupil to high-need school districts as to low-need districts. Government must provide the school districts with the lowest fiscal capacity with the highest percentage of direct state aid. Yet it is not simply all about money. It takes knowledgeable, supportive and creative teachers to make a great school. We have to find ways to get the best teachers and administrators into these communities. These students deserve nothing less.”

8 How can private-sector companies play a role in promoting STEM and STEAM education in the states?

“As legislators, we need to work hand in hand with the private sector to create and expand targeted programs in workforce, economic and community development. Our priority must always focus on helping businesses become and remain successful. A thriving business will create and keep jobs that utilize the skills learned through STEM and STEAM education. They depend on a well-trained workforce and community support. It is our job to facilitate a partnership that fosters an economic stepping stone for all interested parties.”

“WORKING TOGETHER WITH TEACHERS, PARENTS, SCHOOL LEADERS, COLLEGES AND COMMUNITY BUSINESS LEADERS, WE CAN FOSTER A LEARNING ENVIRONMENT THAT SETS STUDENTS UP FOR SUCCESS.”

New York State Sen. Carl Marcellino
CSG 2015 National Chair

9 In New York, you’ve been a champion of education and the environment. What can STEM/STEAM programs offer in the way of fostering innovation that can help preserve our nation’s natural resources?

“The strong focus on a STEM/STEAM curriculum will encourage a deeper understanding of the environment and the challenges we face in protecting it. The inclusion of arts and design in the STEM curriculum presents opportunities to incorporate new materials and production methods to reduce our footprint on the Earth. In New York, schools have installed solar panels to not only generate electricity, but they are also used to teach about photovoltaic and electricity. Working cooperatively to solve problems, and putting an emphasis on research and development will benefit our community at all levels.”

10 When you reflect on your year as CSG chair, what would you want your legacy to be?

“Communication is key. I have always believed that bringing diverse people together to discuss their best ideas will help coordinate the kind of programs we need to strengthen our economy. A successful combination of investment and education can create the kind of skilled workforce that can adapt and thrive in our perpetually changing world. Hopefully, we will have brought folks together and sparked conversation and ideas that will have a real impact across the country for years to come.”

APPEARING IN

NASHVILLE

FOR THREE NIGHTS ONLY

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NATIONAL
CONFERENCE**

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Reservations: Please make your reservations by calling (800) 843-6664 and asking for the CSG room block or online to receive the group rate. To receive the CSG group rate, reservations must be made by Nov. 9, 2015. CSG cannot guarantee the group rate after Nov. 9.

*All conference sessions will take place at the Omni Nashville. The Nashville International (BNA) Airport is approximately 10 miles/15 minutes from the Omni. Taxis and airport shuttle service are available from the airport.



DEC 10-13

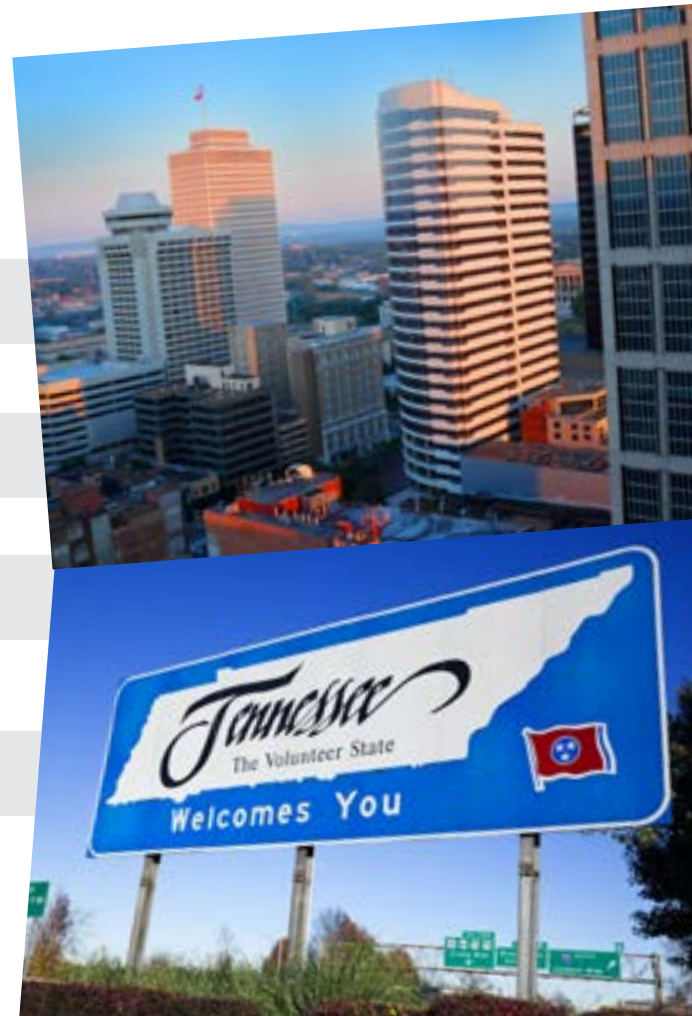
OMNI HOTEL

**EARLY REGISTRATION
& HOTEL CUTOFF:
NOVEMBER 9**

Registration Information ▶

Sessions are open to all attendees unless otherwise indicated as "invitation only."
For complete agenda details and updates, visit www.csg.org/2015NationalConference.

	Early Registration (Ends Nov. 9)	Regular Registration (Nov. 10–Dec. 8)	Onsite Registration (Dec. 10–13)
State & Provincial Government Officials & Staff	\$425	\$525	\$625
CSG Associates	Please check www.csg.org for your specific associate level rate.		
Private Sector	\$900	\$1000	\$1100
Other Government	\$475	\$575	\$600
Government Official One-Day Rate	\$200	\$250	\$250
Private Sector One-Day Rate	\$350	\$400	\$450
Guest/Spouse	\$200	\$200	\$200



Preliminary Agenda ▶

Sessions are open to all attendees unless otherwise indicated as "invitation only." For complete agenda details and updates, visit www.csg.org/2015NationalConference.



THURSDAY, DEC. 10

Buffet Breakfast

7–8 a.m.

CSG Policy Academies

8 a.m.–Noon

- Career Pathways: Transition between Education and the Workforce
For more information, contact John Mountjoy, at (859) 244-8256 or jmountjoy@csg.org.
- Henry Toll Fellow Alumni Leadership Academy (invitation only)
For more information, contact Kelley Arnold at (859) 244-8258 or karnold@csg.org.
- Pensions and Retirement Security Policy Academy
For more information, contact Jennifer Burnett, director for fiscal and economic policy, at (859) 244-8114 or jburnett@csg.org.

CSG Suggested State Legislation (Part I)

8 a.m.–Noon

Lunch

Noon–1 p.m.

Henry Toll Fellow Alumni Leadership Academy, cont. (invitation only)

1–5 p.m.

Policy Academies (cont.)

1–5 p.m.

CSG Leadership Council (invitation only)

1–5 p.m.

Canada Reception

5–6 p.m.

All Attendee Reception

6–8 p.m.

FRIDAY, DEC. 11

Buffet Breakfast

7–9 a.m.

National Conference Committee

8–10 a.m.

The Triple Helix: Government, Academia and the Private Sector Working Together to Create Jobs

Sponsored by CSG's Fiscal & Economic Development Public Policy Committee
8–10 a.m.

Improving State Elections for Military, Overseas Voters

Sponsored by CSG's Overseas Voting Initiative
8–10 a.m.

Innovation Classroom: Mapping for Legislative Offices

Presented by Esri, Inc.
9–10 a.m.

Innovation Classroom: The Knowledge Economy—America's Economic Development Engine

Presented by Elsevier
10 a.m.–11 a.m.

International Committee

8–10 a.m.

Federal Funding Challenges, State Funding Solutions

Sponsored by CSG's Transportation & Infrastructure Public Policy Committee
10 a.m.–Noon

Opening Luncheon

Keynote Speaker: Hampton Sides

Noon–2 p.m.

Sides is best known for his gripping non-fiction adventure stories set in war or depicting epic expeditions of discovery and exploration. He is an acclaimed journalist and the author of the bestselling histories *Ghost Soldiers*, *Blood and Thunder*, *Hellhound On His Trail*, and most recently *In the Kingdom of Ice*.

Getting More Bang for the Buck

Sponsored by CSG's Health Public Policy Committee
2:30–4:30 p.m.

Aging out of Foster Care

Sponsored by CSG's Interbranch Affairs Committee
2:30–4:30 p.m.

Investment Subcommittee

2:30–4:30 p.m.

21st Century Foundation (invitation only)

2:30–4:30 p.m.

Next Generation Education Systems—A 51st State Model

Sponsored by CSG's Education & Workforce Development Public Policy Committee
2:30–4:30 p.m.

Toll Fellow Alumni Reception (invitation only)

5–6 p.m.

All Attendee Reception

6–8 p.m.

SATURDAY, DEC. 12

Buffet Breakfast

7–9 a.m.

CSG Associates Advisory Committee

8–10 a.m.

Transactive Energy: Impacts for State Policy and the Smarter Grid

Sponsored by CSG's Energy & Environment Public Policy Committee
8–10 a.m.

Policy Workshop: Drug Overdose—What's a State to Do?

8–10 a.m.

Innovation Classroom: Building a Smart Community

Presented by Esri, Inc.
9–10 a.m.

Innovation Classroom: The Knowledge Economy—America's Economic Development Engine

Presented by Elsevier
10–11 a.m.

Finance Committee

10 a.m.–Noon

Reshaping Career and Technical Education to Bolster Talent Development

Sponsored by CSG's National Task Force on Workforce Development and Education
10 a.m.–Noon

Civics Education in the States

Sponsored by CSG's Federalism Task Force
10 a.m.–Noon

Policy Workshop: e-Cigarette Regulation and Taxation

10 a.m.–Noon

Luncheon: 2015 Toll Fellows Graduation

Noon–2 p.m.

Policy Academy: Innovative Post-Secondary Education Delivery Models

2–5 p.m.

Suggested State Legislation (Part II)

2:30–5 p.m.





Cybersecurity and Cyber Breach Notification

Presented by the Intergovernmental Affairs Committee; the resolution portion of the committee meeting will begin at 4 p.m.

2:30–5 p.m.

Midwestern Legislative Conference Executive Committee Meeting

2:30–5 p.m.

Regional Receptions

5–6 p.m.

All Attendee Reception

6–8 p.m.

SUNDAY, DEC. 13

Buffet Breakfast

8–9 a.m.

CSG Service Project

9–11 a.m.

Executive Committee Luncheon

11 a.m.–1 p.m.

CONFERENCE TEXT MESSAGE UPDATES



Want conference updates by text?

Follow these instructions to opt in to the text messaging services provided during the 2015 CSG National Conference in Nashville, Tenn.

Join Page:

www.call-em-all.com/join/csg.nashville2015

Or join this group by texting:

csg.nashville2015 to 292929

By opting in, attendees will receive text messages regarding CSG National Conference events and activities between the dates of Thursday, Dec. 10, and Sunday, Dec. 13. Standard messaging charges will apply. To STOP this service, text STOP, QUIT, END, CANCEL, UNSUBSCRIBE or STOP ALL to 292929.

This service is available during the 2015 CSG National Conference only and will be disabled following the conclusion of the conference. Attendees who opt in to this service will not receive additional text messages following the conference.

**PLenary LUNCHEON WITH HAMPTON SIDES
FRIDAY, DEC. 11, NOON - 2 P.M.**



The award-winning editor of *Outside* magazine and a best-selling historian, Hampton Sides has written about polar exploration, World War II, Kit Carson, Martin Luther King Jr. and the American frontier. His book *Ghost Soldiers*, a World War II historical narrative, was the basis for the 2005 Miramax film, *The Great Raid*. His most recent book, *In the Kingdom of Ice*, is a spellbinding tale of heroism and determination in the most unforgiving territory on Earth—the North Pole.

Join us for this plenary luncheon with Sides, an American history and adventure journalist, as he shares his unique insights on current events and examines the qualities of leadership, training, attitude and spirit that cause some leaders to prevail in extremely difficult wilderness or battlefield situations while others do not.

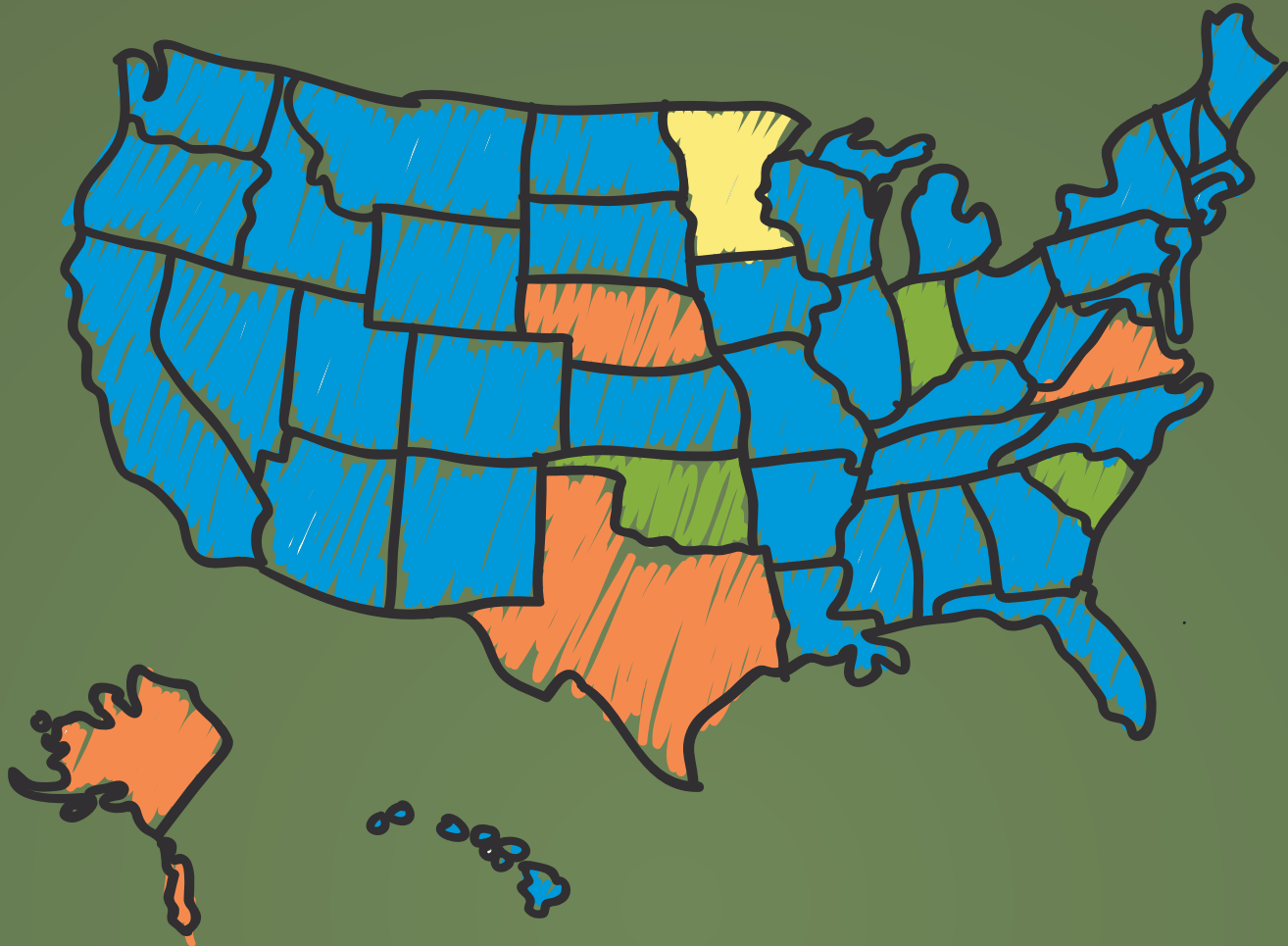


“Experience and enjoy vibrant Nashville, Tennessee, as we travel state pathways to prosperity together.”

- Tennessee Senate Majority Leader Mark Norris
CSG Immediate Past Chair

WWW.CSG.ORG/2015NATIONALCONFERENCE

THE STATE OF STANDARDS



Did Not Adopt
Common Core



Initially Adopted But Later Repealed
Common Core Standards



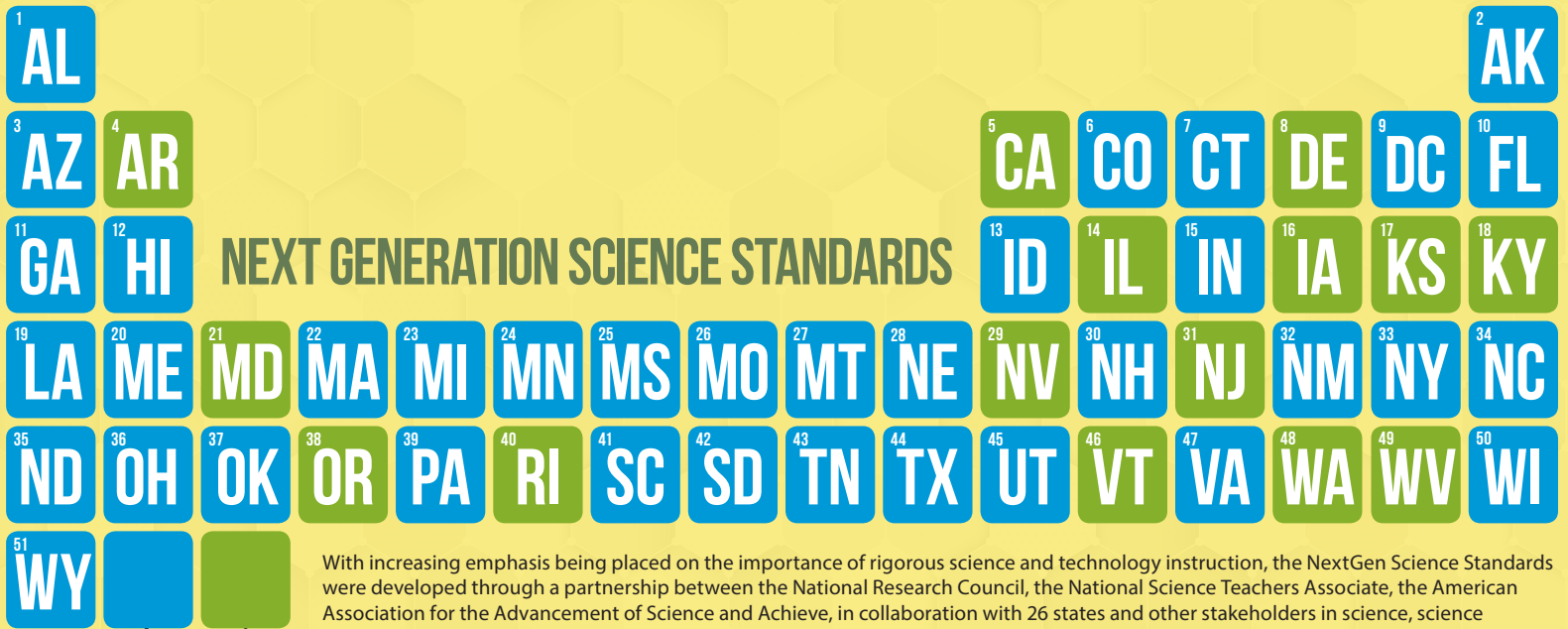
Adopted Common
Core Standards



Adopted English Language Arts
Standards Of Common Core Only

STATE ACADEMIC STANDARDS AND THE COMMON CORE

With origins in a report published in 2008 by the National Governors Association and the Council of Chief State School Officers, the Common Core State Standards were developed in an effort to help ensure students across the United States graduated from high school consistently prepared for college and career. Standards cover English language arts and math. In 2009, President Obama launched the Race to the Top program, which provided funding to states that adopted college- and career-readiness standards, with incentives for states that adopted Common Core, in particular. But the process hasn't come without controversy. In the years since their development, most states have adopted the Common Core State Standards, however some have chosen to utilize their own state standards. Still, other states originally adopted Common Core but later withdrew to develop state-specific standards.



NEXT GENERATION SCIENCE STANDARDS

With increasing emphasis being placed on the importance of rigorous science and technology instruction, the NextGen Science Standards were developed through a partnership between the National Research Council, the National Science Teachers Associate, the American Association for the Advancement of Science and Achieve, in collaboration with 26 states and other stakeholders in science, science education, postsecondary education, and the business and industry community. The standards, published in 2013, cover physical science, biology, Earth and space science, engineering, and technology. As of August 2015, 15 states have adopted the NextGen Science Standards.

ADOPTED

NOT ADOPTED

NEXT GENERATION LEAD STATE PARTNERS

During the development of the NextGen State Standards, 26 states were named as lead state partners. In this role, these states provided guidance and leadership to the standards writing team as standards were being development. Following the publication of the standards, these states continue to work with other states as they consider the adoption of the standards.

ARIZONA
ARKANSAS
CALIFORNIA
DELAWARE
GEORGIA
ILLINOIS
IOWA

KANSAS
KENTUCKY
MAINE
MARYLAND
MASSACHUSETTS
MICHIGAN
MINNESOTA

MONTANA
NEW JERSEY
NEW YORK
NORTH CAROLINA
OHIO
OREGON
RHODE ISLAND

SOUTH DAKOTA
TENNESSEE
VERMONT
WASHINGTON
WEST VIRGINIA

THE FUTURE OF CAREER TECHNICAL EDUCATION

by Kate Blossveren Kreamer

It has almost become cliché to say it is an exciting time for career technical education, also known as CTE, but only because it continues to be true.

Interest and support for career technical education has grown exponentially over the past few years, with policymakers at all levels working to advance opportunities for students to engage in CTE, as well as strengthen the links between career technical education and the labor market.

Just a few examples:

- Between 2013 and 2014, every single state passed at least one CTE-related legislative, regulatory or administrative action;
- Since 2013, the U.S. House of Representatives has held multiple hearings on the Carl D. Perkins Career and Technical Education Act focusing on issues of employer engagement, industry-recognized credentials and programs of study; and
- Career technical education has been a consistent and key feature of President Obama's education agenda. He recently expanded the U.S. Presidential Scholars program to recognize CTE students.

Those of us in the career technical education community have long understood its value in preparing individuals with the skills they need to succeed in the workplace. And, as times have changed, so have we. CTE must continually evolve to better align to the shifting demands of our economy, employers and students. This can best be demonstrated by the evolution from “vocational education” to “career technical education.”

This is not just a name change or a rebranding effort, but rather a true transformation of the field. While vocational education was primarily focused on preparing a subset of students for jobs right out of high school, the scope of career technical education is very broad and allows for and encourages a variety of pathways for students. Today, CTE reaches across K–12 education into postsecondary education and workforce training. It covers everything from early career exploration to highly technical training and encompasses the full world of work, including all sectors and professions. In short, career technical education is any education that is anchored in the goal of preparing students for success in the careers of their choice.



What does this look like in practice? While there are many models of high-quality CTE, there are some common elements that all successful programs of study have, including:

- An intentional sequence of technical and academic courses spanning both secondary and postsecondary education, allowing students to master the full range of academic, technical and employability skills needed for success and a seamless transition to postsecondary and the workplace;
- A full array of career exploration, career preparation, credential and degree opportunities to prepare students for a lifetime of career and educational options;
- Employer partners who support program development and validation, provide input into relevant industry-based credentials and make available work-based learning opportunities where students can be exposed to real-world experiences and challenges; and
- Highly skilled educators who possess up-to-date knowledge and technical skills.

THE TECH TRACK

In a photo from Wednesday, Feb. 11, 2015 in Lansing, Mich., Lansing Community College adjunct instructor Marty Kroell looks over computer code as Travis Reglin works on a computer numerical control mill in the advance precision machining class. Gov. Rick Snyder wants to re-establish vocational and technical schooling as an “equally honorable, equally important and equally well-compensated” career track. To that end, his new budget proposes a \$36 million, or 75 percent, increase in spending on trades training, technical education and career planning. © AP Photo / Carlos Osorio



CTE & STEM

While career technical education is very much in the spotlight these days, STEM—or science, technology, engineering and mathematics—remains a top priority for many states and state leaders. CTE and STEM often are kept separate at both the policy and programmatic levels, when in fact they have much in common. High-quality CTE programs of study go a long way in preparing students for careers in the STEM fields, defined broadly as everything from engineering and manufacturing to agricultural sciences and telecommunications.

Perhaps even more importantly, career technical education can help students master the STEM skills and competencies that have value in just about any career, such as inquiry, problem solving and creativity. While there is clear labor market demand for workers in STEM jobs, the demand for STEM skills is even more comprehensive with upwards of 26 million U.S. jobs requiring a high level of knowledge in any one STEM field, according to a 2012 report by the Brookings Institution. By considering STEM as preparation for a variety of careers—and not just limited to the traditionally defined STEM jobs—the strategy of leveraging CTE to deliver STEM education simply makes sense.

Future of CTE Summit

There’s little question that we are in the middle of a truly transformative moment. Yet for career technical education to continue to attract attention and support from the broader education and policy community—and meet its inherent goal of preparing students for the careers of their choice—we must all commit to developing, promoting and sustaining only programs and policies that are of the highest quality and continue to push the field forward.

That’s why nine national organizations have joined together to create an updated vision for CTE. This October, the National Association of State Directors of Career Technical Education Consortium, The Council of State Governments, Association for Career and Technical Education, Council of Chief State School Officers, National Association of State Boards of Education, National Council of State Directors of Community Colleges, National Governors Association, National Skills Coalition and U.S. Chamber of Commerce Foundation will co-host The Future of CTE Summit.

This three-day, interactive summit will allow the invited state and national leaders representing CTE, education, workforce development, business and industry, and the philanthropic community to brainstorm and begin to lay out where career technical education needs to go to meet its full promise. This collaborative effort will culminate in the release of a new Vision for the Future of CTE in spring 2016. [Q](#)



Perhaps even more importantly, career technical education can help students master the **STEM skills** and competencies that have value in just about any career, such as **inquiry, problem solving and creativity.**”



About the Author

Kate Blossveren Kreamer is Associate Executive Director of the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) where she leads policy and communications efforts to ensure all students have access to high-quality CTE.



CLOSING THE SKILLS GAP

CRITICAL TO GLOBAL COMPETITIVENESS

by Pam Goins

High-quality education is critical to preparing students for the workplace, but it's not the only factor to consider. That's according to business and industry experts who say that the combination of academics and skills-based training is key for a workforce equipped for future jobs.

A 2015 report from the Georgetown University Center on Education and the Workforce shows that STEM occupations offer the best opportunities for college graduates, nearly doubling the job vacancies of managerial positions and those in healthcare. Yet business and industry lament the lack of adequately trained employees entering the workforce and fear for America's competitive edge.

According to Burning Glass Technologies, STEM jobs offer a substantial salary premium. The average advertised salary for entry-level STEM jobs requiring a bachelor's degree or higher is \$66,123 compared to \$52,299 for non-STEM jobs.

"We hear from employers constantly that college graduates come with no real experience and only have the educational background, not the right skills for the job," said Jamai Blivin, founder and CEO of Innovate+Educate, an industry-led nonprofit organization focused on research-based strategies to close the national skills gap.

According to data in a 2013 Raytheon report, "The 21st Century Workforce and the STEM Dilemma," employees must have STEM skills for businesses and industry to be able to drive future growth and innovation. The skills and competencies provided through STEM education are necessary for professions ranging from photography and architecture to computer and video game design.

The Raytheon report noted that U.S. students aren't prepared to enter the dynamic and ever-changing workforce. Nearly 97 percent of all jobs in STEM fields require at least a seventh-grade math comprehension, but nearly 66 percent of U.S. eighth-graders are not proficient in math and 28 percent

failed to score at even the basic level of math competency.

"Employers have many of the same needs of its workforce today as they've had for decades," said Thomas Plath, vice president of Global Businesses, Human Resources at International Paper. "Companies need employees who are ethical, reliable, innovative, team-oriented and passionate about their work. But it goes beyond that today.

"Today's employees must be everything that they were in the past and much more. The best employees can balance communication styles, work with many different types of people in team settings, excel at technology-based problem solving and understand their role in the big picture."

To build economic prosperity and forge pathways for success, college and career academies are establishing collaborative partnerships between K-12 education, postsecondary institutions and employers. In LaGrange, Ga., THINC College & Career



Today's employees must be everything that they were in the past and much more. The best employees can balance communication styles, work with many different types of people in team settings, excel at technology-based problem solving and understand their role in the big picture."

» *Thomas Plath, vice president of global businesses and human resources, International Paper*

Academy works with local high school students to engage in rigorous academics combined with work-based learning to prepare young adults for the workplace.

THINC leaders and stakeholders conducted an Employer Needs Assessment Report to determine the current and projected workforce needs of 188 organizations with more than 17,000 workers. Based on those results, THINC collaborated with West Georgia Technical College to build career pathways in STEM fields including mechatronics, energy, healthcare, engineering, business and marketing.

THINC focuses both on academic skills and deeper learning competencies, such as collaboration, communication, problem solving and critical thinking, to make students more employable. Students spend half their day at their local high school and half at the technical college. Students explore career opportunities while learning leadership and entrepreneurship skills as they are naturally built into the curriculum.

Instruction at THINC is hands-on and project-based, providing an environment that offers real work experience. Students complete both high school and, in most cases, a technical industry-recognized certification.

KIA Motor Manufacturing Georgia is one of the businesses actively involved with students at THINC. Corinne Hodges, senior manager of public relations, said they saw the need to train employees entering their plant.

"KIA determined that we had to train our own employees, which is why we are


partnering with education and the delivery of education," she said.

Funding to start the college and career academy came from public and private funds, including \$3 million from KIA and \$3 million from the Georgia community and technical college system.

Kathy Carlisle, chief executive officer of THINC, said more than 100 community stakeholders came together to build the partnership due to their previous graduation rate of 72 percent. College and career academies in Georgia graduate 94 percent of students enrolled in their programs.

"Dual enrollment is the priority," Carlisle said. "We bring teachers with industry experience to prepare our students for the future."

THINC has an agreement with local businesses that the students they send will have appropriate training. If not, the business can send the students back to the academy within the first 90 days of employment for additional training and education.

"KIA is fortunate to have a terrific workforce, but we need to make sure we are taking care of our workforce of tomorrow," said Randy Jackson, senior vice president of KIA Motor Manufacturing Georgia. "In less than 10 years, students who will be sitting in sixth grade this year will be KMMG's workforce pool. We need to make sure we are doing what we can to give students the best chance to succeed with the jobs that will be available in this region in the years ahead." 



CSG STATE PATHWAYS TO PROSPERITY INITIATIVE

In 2014, national leaders of The Council of State Governments created a vision to help states prepare today's students for the jobs of tomorrow. Through the State Pathways to Prosperity initiative—established by Gov. Earl Ray Tomblin of West Virginia and Tennessee Senate Majority Leader Mark Norris and continued by CSG's 2015 national chair, New York state Sen. Carl Marcellino—CSG members have identified a series of policy options for states to consider as they engage in preparing students for college, careers and life. CSG's National Task Force on Workforce Development and Education reviewed the major barriers to education for a vast number of Americans and, through the initiative, addressed the lack of opportunities to engage students in the learning process.

As a result of the task force's efforts, CSG is pleased to provide, "A Framework for State Policymakers: Developing Pathways to Ensure a Skilled Workforce for State Prosperity," which outlines recommendations for robust state-level policies to support a set of competencies that are invaluable for success, both in postsecondary education and in the workforce. These competencies go beyond the acquisition and mastery of content knowledge and align with many of the workplace competencies, or soft skills, that so many employers feel their employees' lack—critical thinking, communication, collaboration, self-direction and an academic mindset. The report's recommendations are timely given the proportion of recent high school graduates attending college is far higher than the proportion of 12th graders who are prepared for college.

For more information and to download the report, visit www.csg.org/statepathwaystoprosperity.



STEM PAYS

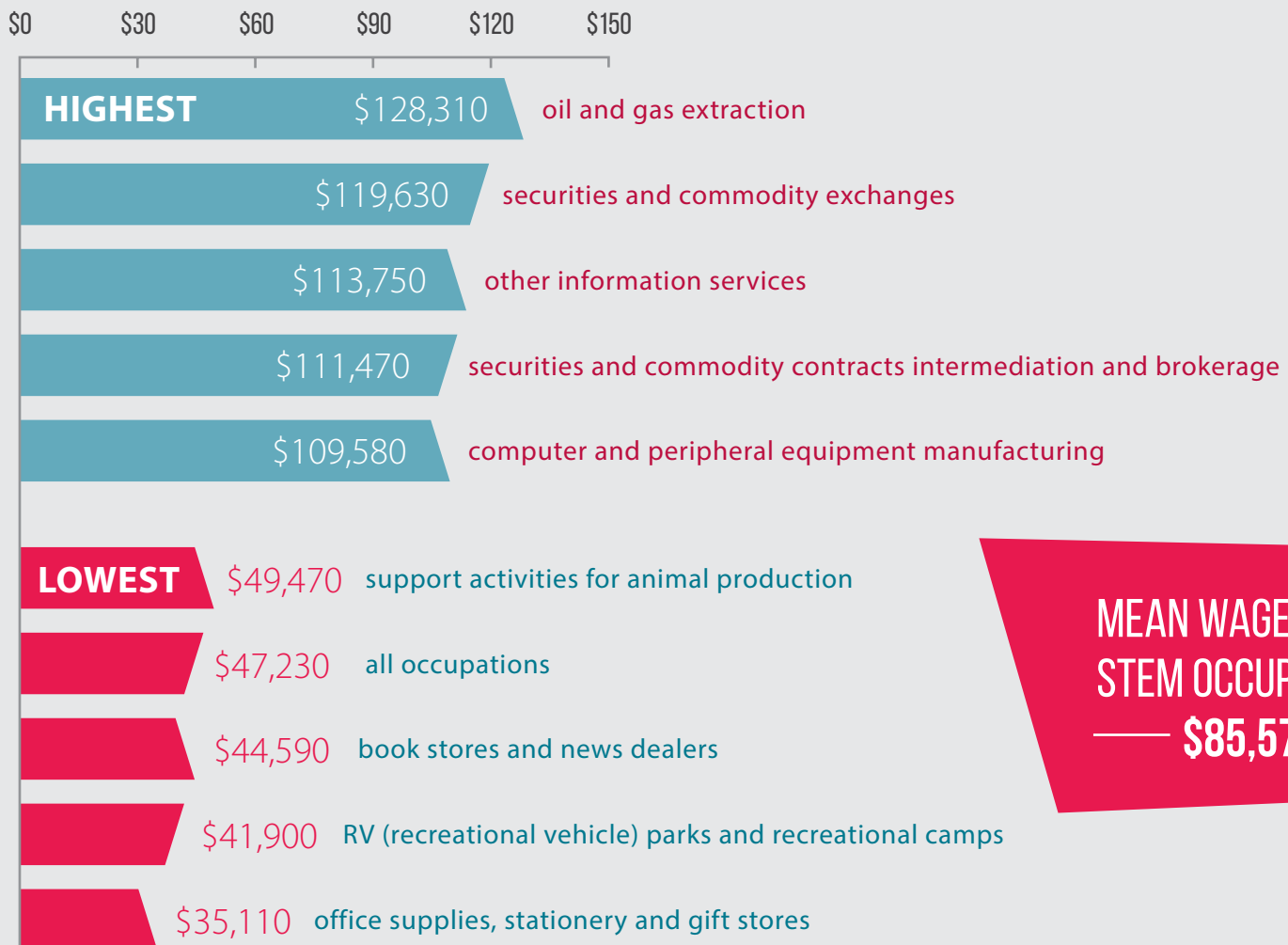
The average annual wage for jobs in the science, technology, engineering and math—or STEM—fields is **\$85,570—nearly twice** the wage for all occupations, which sits at \$47,230.

Not all STEM positions are created equal. Wages for STEM positions can depend heavily on their respective industry. For example, the mean wage for STEM positions in the oil and gas extraction industry is \$128,310 compared to STEM positions in the office supplies, stationery and gift stores industry, which have a mean wage of \$35,110.

U.S. Department of Labor Bureau of Labor Statistics, Occupational Employment Statistics, May 2014

AVERAGE WAGES

Industries with the highest and lowest mean wages for STEM occupations, May 2014





COMPUTER SCIENCE AT THE TOP

Computer occupations make up the largest category of STEM positions, with 3.7 million people employed in this category. Seven of the 10 largest STEM occupations are related to computers.

STEM OCCUPATIONS WITH THE HIGHEST EMPLOYMENT LEVELS

NUMBER OF JOBS IN MAY 2014

1	Software developers, applications	686,470
2	Computer user support specialists	563,540
3	Computer systems analysts	528,320
4	Software developers, systems software	382,400
5	Network and computer systems administrators	365,430
6	Sales representatives, wholesale and manufacturing, technical and scientific products	335,540
7	Computer and information systems managers	330,360
8	Computer programmers	302,150
9	Mechanical engineers	270,700
10	Civil engineers	263,460

..... Computer-related positions in **bold**

HIGHEST-PAYING STEM OCCUPATIONS

Petroleum Engineer
\$147,520

Architectural and engineering managers
\$138,720

Natural sciences managers
\$136,450

Computer and information systems managers
\$136,280

Physicists
\$117,300

All STEM
\$85,570



DESPITE UNCERTAINTIES, STATES AND PARTNERS INVEST IN STEM

by Sean Slone

STEM programs at every education level can require significant investments from the government and private sector. That's because cost drivers—like teacher training and retention and purchasing equipment for high-tech classrooms and laboratories—can make STEM education a pricey investment.

“Iowa’s state government invests in STEM education at lots of levels and in lots of ways,” said Jimmy Centers, communications director for Iowa’s Gov. Terry Branstad and Lt. Gov. Kim Reynolds. “The bulk of Iowa’s legislative investment in STEM goes toward the scaling up of exemplary STEM programs to educators and learners across Iowa—almost 3,000

teachers this year, and over 100,000 youth. Over 90 percent of the state investment goes toward programming all together.”

The state legislature provides \$5.2 million annually for the Governor’s STEM Advisory Council, which helps coordinate all the state’s STEM efforts among the various stakeholders.

But when it comes to STEM education funding, it is still relatively rare for state governments to make dedicated appropriations available at a level above what states receive from the federal government’s Math and Science Partnership Program, which divvies up \$150 million in grants to states each year for teacher professional development in the STEM

areas. That can make enlisting new corporate partners difficult, said James Brown, executive director of the STEM Education Coalition, a Washington, D.C.-based alliance of more than 600 business, professional and education organizations.

“It’s a frustrating thing for the business community to hear that in most states there’s not a STEM funding line item,” Brown said. “They don’t separate out professional development or hiring of teachers in the STEM subjects from how that’s supported in the state education formula in general. There aren’t subject-specific lines in state education budgets in most states.”



INDUSTRY FUNDING INNOVATION IN STEM

Private sector investment in programs such as the FIRST Robotics Competition has provided students with exposure to the STEM fields outside of formal STEM classrooms.

At far left, Alexander Mann, 15, of Pepper Pike, Ohio, works on a basketball-playing robot built by his team from Orange High School during the 11th annual Buckeye Regional FIRST Robotics Competition in Cleveland, March 23, 2012.

© AP Photo / Amy Sancetta

At left, an eighth-grade student with the Near North Student Robotics Initiative accepts the winning \$10,000 grant for her team in the FedEx Innovation Social Media Challenge at the FIRST Robotics Championship in St. Louis, April 26, 2014.

© Dilip Vishwanat / AP Images for FedEx

Another source of frustration for state governments and corporations alike, said Brown, is that they don't always know what they're getting for their investments in STEM education. While some individual STEM programs have achieved a level of scale in school districts around the country and been assessed for their effectiveness, many others have not.

"It's a big challenge for companies to be effective in getting the most out of their investments in education because education and business are just different worlds and the time scale for managing and measuring improvements can be frustrating for the business community," Brown said.

One area where corporations see great promise is in informal STEM education, including state science fairs and other outside-the-classroom competitions that can provide kids exposure to STEM-related fields, reinforce their classroom experiences and even accelerate their job prospects. Brown said a prime example is the FIRST Robotics Competition—founded by inventor Dean Kamen and supported by corporations like Lockheed Martin, Intel and

Texas Instruments—which now has contact with 400,000 students every year.

"Investments in the informal sphere are easier for companies to make because there are (fewer) rules in that world," Brown said. "This is an area where companies have really been investing aggressively and are starting to see the kinds of measurable outcomes that make investments ... easier to justify to their corporate boards and to the investors in the company."

But many believe demonstrating success is an important key to increasing funding for formal, in-the-classroom STEM programs, as well.

"At our first STEM Council meeting, we learned from business representatives ... that Iowa needed a trusted central portal to serve up proven successful programs," said Centers in Iowa. "That's exactly what we did in creating the proposal system—screening through a rigorous rubric of all those STEM program providers to serve up a short list of proven winners. Since doing so, a number of private sector partners have collectively invested hundreds of thousands of dollars in helping to

spread those programs across Iowa. We fully expect that trend to grow."

State governments and the private sector have found common ground in funding STEM scholarship programs in some states. With Washington state's two largest employers, Microsoft and Boeing, clamoring for a well-educated workforce, state lawmakers in 2011 created the Opportunity Scholarship Program, which provides scholarships for low- and middle-income students to study STEM and health care fields at Washington's public universities. State Sen. Andy Hill is among the lawmakers who have helped steadily increase funding for the scholarship program in recent state budgets.

"We want to make sure that there are not barriers to getting these STEM degrees and our Opportunity Scholarship Program I especially like, because it is a public-private partnership and so the state matches private donations," he said. "If you look at Boeing and Microsoft, they put \$50 million into the Opportunity Scholarship Fund. ... I think (the program) is a great example of where we can get corporations involved, where they see their money being spent wisely in a targeted way."

Hill said the Opportunity Scholarship Fund is indicative of "a nice little symbiotic relationship" between government and the private sector that is allowing each to fill a need.

"In Washington state, we are a net importer of STEM degrees," he said, referencing a two-year-old report from a consulting group that showed the state had 25,000 high-tech jobs that had been open for 90 days or longer. "We've got all these great jobs in Washington state. Are our students and our residents going to be able to fill these jobs or are we going to have to go out of state or out of the country to get them?"



"We want to make sure that there are not barriers to getting these STEM degrees, and our Opportunity Scholarship Program ... is a public-private partnership and so the state matches private donations."

»Washington state Sen. Andy Hill

NEXT STEPS

STEM Initiatives are Getting Widespread Support, but Getting Everyone to Work Together is Harder

by Jennifer Ginn

While much of education can be viewed as a collaborative effort, STEM education is more so than most.

Ideally, initiatives involving STEM bring together K-12 and higher education, along with business and industry leaders, to ensure students are well prepared for and interested in the high-tech jobs that dominate today's labor market. Making those connections happen, though, isn't a quick or easy process.

Teri Quinn Gray, co-chair of the Delaware STEM Council and technical service manager for DuPont Performance Polymers, knows well the problems inherent in bringing such a diverse group of people together.

"It is quite a lift, you know," Gray said. "I think it's more because many of the state agencies are just not wired, just not organized to bring together so many different

voices around an issue that goes across everything from education ... to economic development. Usually, that's quite a siloed process in most governments. The STEM conversation is one that needs to be very interconnected and the hand-offs (between agencies) need to be seamless in many cases to make it really work."

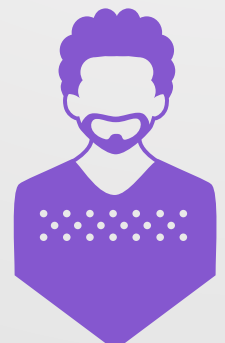
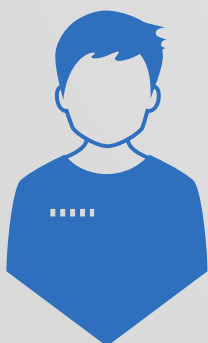
For many states, STEM has been handled primarily by the education department. Gray, who also serves as president of the Delaware State Board of Education, said that might not be the best fit.

"We can no longer be totally tied to education," she said. "I think most folks were kind of letting the Department of Education and K-12 drive it. It (education) is just not wired right now to do that in the space where we're bringing all these different groups

(together). That's not their mission, not their total focus. They have much more to do and need to do with STEM being a part of the education conversation, not driving it."

Gov. Jack Markell established Delaware's STEM Advisory Council in 2010 through an executive order. In the order, Markell gave a detailed list of who would have a seat on the council. While that may have originated in a desire to ensure all of the main players had a seat at the table, Gray said it created an unintended problem.

"We were blessed by the governor," Gray said of the council's current members. "So if you didn't get your blessing, then how did you play? We're trying to figure it out. ... I think it's going to work because we (Delaware) are small enough to maybe figure it out."





Gray said the STEM Advisory Council is currently going through a reinvention, trying to rethink how it operates and how people and businesses can be involved.

"We saw last year that we had to reinvent ourselves," she said. "We saw the relevancy—saw how difficult it was to work across agencies without having that reinvention. Really, it's a reinvention of mindset rather than the organizational lines."

Delaware state Rep. Debra Heffernan, who has been on the House Education Committee since 2010, said it may be time for legislators to also rethink how they look at STEM. It might be time, she said, to think of how education and economic development committees can work together.

"We haven't had too many meetings that are cross category," Heffernan said. "A lot of

it has been in education. If it's related very much to business, then it's in economic development. ... I think that would be a really great idea, to have education and economic development together."

Francis Eberle, deputy executive director of the National Association of State Boards of Education, said it helps for states to have a focused vision of why they want to be involved in building their STEM programs.

"For some states, they recognize it as an economic development issue," Eberle said. "Then the legislature will intervene in some way, whether they facilitate additional funding or institutional structures or regional centers as part of a university to address this. They see it as really something they can do that is concrete to move (the issue) from an economic point of view."

The growth of interest in STEM initiatives from both the public and private sector is what has been fueling Delaware's interest in reinventing its STEM Advisory Council, Gray said. It's a situation that may be increasingly familiar in more states as STEM programs evolve to include more players.

"We're finding the ideas and the energy are bigger than we are organizationally," Gray said. "It's kind of getting in front of us right now. We were small, kind of one or two people doing it, then two or three agencies. And now everyone ... wants a piece of it. We actually want them to have a piece of it; we've just got to figure out how to do it." **CI**



"We were small, kind of one or two people doing it (STEM), then two or three agencies. And now everyone ... wants a piece of it. We actually want them to have a piece of it; we've just got to figure out how to do it."

» Teri Quinn Gray, co-chair of the Delaware STEM Council

Straight TALK



VIRGINIA BARRY

Commissioner, New Hampshire
Department of Education

PUBLIC-PRIVATE COLLABORATION

“New Hampshire is reframing STEM education by fostering collaboration among all levels of education and business. One example is STEAM Ahead N.H.—a collaboration between the Manchester School District, the University System of New Hampshire, Manchester Community College and the business community, with significant support from Dyn, Silvertch and N.H. FIRST, as well as Manchester Mayor Ted Gatsas and former Mayor Bob Baines. A primary aspiration of STEAM Ahead, like all the innovative STEM initiatives across the state, is to increase the number of high school graduates who can pursue STEM careers. Gov. Hassan’s Task Force on K-12 STEM Education outlines eight recommendations that are grouped into three broad areas: inspiring students; empowering teachers; and raising standards. The embedded strategies are designed so educators can innovate locally—capitalizing on each district’s assets, priorities, resources and existing educational initiatives, while incorporating business and higher education as partners.”



CANDACE MCQUEEN

Commissioner, Tennessee
Department of Education

BUILDING SPECIALIZED SKILLS

“The class of 2028 will start kindergarten this fall, and the world will look dramatically different when they graduate high school in 13 years. The finish line is changing for our students, and we must adapt the way we teach so our students are prepared for a reality we can’t yet define. Innovation in education allows us to mirror the progress happening in the world. A high school diploma is no longer enough. We know that the workforce demands specialized skill sets, and it’s our responsibility to prepare our students to obtain those specialized skills in postsecondary education—whether it’s a two- or four-year college or a technical school—because when our students enter the workforce, they will be competing with their peers across the country. Innovation in education is the lynchpin to ensure that our students are prepared for these opportunities.”

HOW IS INNOVATION IN EDUCATION BETTER PREPARING THE FUTURE WORKFORCE OF AMERICA?



ELLIOTT ASP

Interim Commissioner, Colorado Department of Education

GLOBAL COMPETITIVENESS

“Innovations in education, particularly STEM and STEAM programs, are helping all students to be better prepared to compete in a global economy and participate meaningfully in a democratic society because they are focused on the acquisition/creation and communication of new knowledge rather than a passive approach to learning. STEM skills such as critical thinking, problem solving, collaboration and using technology to create and communicate innovative solutions to problems are vital for today’s workers, no matter which career path they choose. STEM literacy includes being able to understand the world in a logical manner, ask critical questions, and form hypotheses and seek data to confirm or deny them. In innovative schools, these skills are being embedded in all classes in authentic ways that allow students to apply their knowledge in real world settings.”



DENISE JUNEAU

State Superintendent, Montana Office of Public Instruction

DEVELOPING PROBLEM SOLVERS

“Innovation in education has become a necessity to ensure students are prepared for future jobs. Rote learning and memorization isn’t enough for students to develop the skills necessary for meaningful careers. Innovation in education means helping students develop a nimble and holistic approach to problem solving while being culturally competent for working in a global economy.

This kind of innovation in education is already happening in Montana. Schools have developed specialized training tracks focused on the health and finance industries. Schools are boosting technical education programs by offering certificates for learned skills such as welding and culinary arts. Schools are finding ways to provide relevant real-world learning environments. Plus, the implementation of the Common Core standards has raised the bar for all Montana students by increasing academic standards, which has long been a request of business and industry.”

BUILDING THE ROAD TO STEM TOGETHER

by June St. Clair Atkinson

Imagine pulling into the parking lot of a non-descript elementary school built in the 1960s. As you look around the exterior of the school, it appears that little has changed in five decades other than the new roof and the fresh paint on the wood trim and front door.

However, inside the school you are immediately greeted by a group of enthusiastic fifth graders who walk you down a hall named Design Avenue then another hall with a plaque for Prototype Road.

The fifth-grade students at Central Elementary excitedly explain that they attend a science, technology, engineering and mathematics—or STEM—school, where all subject matter is taught through the lens of engineering design principles, even English, language arts and reading! The students learn design principles that provide a structure and framework for developing projects, evoking creativity and applying criteria for classwork. The students use technology tools as appropriate to do their work collaboratively or individually. In each classroom, it is difficult to tease out where math instruction ends and science instruction begins. These subject matters are integrated while teachers guide, help and ask questions to assist student learning.

Central Elementary is an example of one of many schools across North Carolina and the nation changing the way instruction is delivered. In large and small school districts, schools are approaching learning with a renewed energy, new approaches and meaningful project work to help prepare students for living and STEM careers. The shift requires strong leadership from each sector of education—teachers, principals, local superintendents and state departments of education.

Preparing our students for more options upon high school graduation requires that leaders ensure structures are in place for a vibrant learning community of teachers and principals. Time must be carved out of the school year for teachers to work together, share ideas, visit other schools and classes, and read about effective practices in other schools. A leader must create an environment where teachers and principals feel free to share both successes and failures with each other and administrators. Technology is an important component to ensuring that the learning organization functions effectively. Skyping with another school, using available online modules and creating online wikis are some tools that can be used to support a learning organization.

The old saying, “A picture is worth a thousand words,” holds true when it comes to opportunities for teachers and principals to visit other schools doing similar work. Experiencing the excitement and engagement of students and teachers in another school is contagious and can pay significant dividends in accelerating progress in someone else’s school. Knowing about mistakes or challenges also helps with progress.

School or district education leaders must be vigilant in seeking out business partners and speaking to community groups about the importance of a STEM initiative. A leader must always have a plan that details ways in which community leaders and businesses can get involved. The work of selling a STEM initiative is

never done, and it is up to the leader to ensure that there are always conversations within and outside the school about the initiative.

State and local leaders must find ways to recognize and value the work of schools to undertake change and to be on a pathway of change. The North Carolina State Board of Education has chosen a recognition program consisting of a rubric of attributes. Schools are recognized for integrated STEM curriculum that is aligned with state, national, international and industry standards; ongoing community and industry engagement; and connections with postsecondary education. Schools rank themselves in each area as early, developing, prepared or modeled. To show achievement, schools at the high-school level have specific targets to meet, including a 90 percent graduation rate in a STEM school or program; 90 percent of students at a composite score of 17 or above on the ACT; and 90 percent of career technology education, or CTE, concentrators qualifying for a silver certificate or above on WorkKeys.

Schools with a strong, vibrant STEM program can attribute the program’s success to the strong leaders orchestrating the change. Supporting the educational family and forging partnerships with the school and business communities can help ensure that STEM education is integrated into daily classroom instruction. The ultimate benefit is students who are fully engaged in their studies and who graduate ready to succeed in 21st century careers and life. **□**



About the Author

June St. Clair Atkinson is the first woman elected state superintendent of the public schools for North Carolina and has served in this position since August 2005.



STATED BRIEFLY

//CSG WEST Former Colorado Gov. Roy Romer Receives Bettye Fahrenkamp Award

CSG West awarded the Bettye Fahrenkamp Award for Distinguished Legislative Leadership to former Colorado Gov. Roy Romer the CSG West 68th Annual Meeting in Vail, Colo. Romer has a distinguished career serving the people of Colorado as a state representative and senator, and three terms as governor. The Fahrenkamp Award, named in honor of Alaska state Sen. Bettye Fahrenkamp, recognizes leaders whose legislative careers demonstrate the ability to work beyond the borders of their own states in the interests of the West.

CSG West 2015 chair, Colorado state Sen. Nancy Todd, presents the Fahrenkamp Award to former Colorado Gov. Roy Romer.



//NASS Appoints Two Representatives to the CSG Executive Committee

Pennsylvania Secretary of the Commonwealth Pedro Cortés and Tennessee Secretary of State Tre Hargett have been appointed to represent the National Association of Secretaries of State on CSG's Executive Committee. Hargett is a 2010 graduate of the CSG Henry Toll Fellowship program. Cortés and Hargett will serve a one-year term, beginning Jan. 1.

//CSG Policymakers Gather to Discuss Postsecondary Education Strategies

In July, more than 70 state legislators and postsecondary officials attended the CSG Policy Academy on Innovative Delivery Models in Postsecondary Education as part of the Southern Legislative Conference and CSG West annual meetings. The focus of each policy academy was on state strategies to ensure students complete postsecondary degrees with the skills and credentials needed to succeed in a global economy. Speakers described a number of efforts states are undertaking to help align postsecondary curricula to the needs of businesses and industry, and initiatives to help students obtain postsecondary education, such as fostering

partnerships between colleges and industries to ensure programs of study prepare students with the skills they need for available jobs and helping students earn their degrees more quickly and cheaply by awarding credits for knowledge gained outside of the classroom through prior learning assessment and competency-based education programs.



CSG West Education & Workforce Development Committee chair, Rep. Wendy Horman of Idaho, moderates a panel discussion about the use of competency based education and prior learning assessments to award students with credit for knowledge learned outside the classroom.

//NEMA **Presents Distinguished Service Award**



The National Emergency Management Association, or NEMA, recently presented David Maxwell with the Lacy E. Suiter Distinguished Service Award. Maxwell is the director of the Arkansas Department of Emergency Management. His 37-year career not only includes numerous acts of service and leadership, but also defines the history and evolution of the emergency management profession. Maxwell has served in the administration of three governors and is a former president of NEMA.

//NCIC **Welcomes New Director**

The Council of State Governments recently welcomed Colmon Elridge as the new director of the National Center for Interstate Compacts. Elridge previously served as executive assistant and senior adviser to Kentucky Gov. Steve Beshear. Prior to joining Beshear’s staff, he served as the Central Kentucky director of Uniserv operations for the Kentucky Education Association and has also served as chief of staff and community housing director for the Kentucky Association of Regional Mental Health and Mental Retardation programs.

Elridge will provide day-to-day management and oversight of the center, including development, policy project management, member outreach and coordination, supervision of staff and fulfillment of the center work plan.

The National Center for Interstate Compacts is a policy program developed by CSG to assist states in developing interstate compacts, which are contracts between the states.



//CSG **New Energy and Environment Policy Director**

CSG is pleased to announce the addition of Liz Edmondson to the national policy staff as the director of energy and environment policy. For the past eight years, Edmondson has worked in a variety positions in environmental law and policy. As a staff attorney for the Kentucky Resources Council, she conducted extensive research and policy analysis on issues ranging from energy efficiency and net metering to nuclear waste disposal and wind energy. Edmondson also has served as an environmental attorney with Morgan Worldwide Consultants, where she prepared environmental impact statements for the Office of Surface Mining’s Stream Buffer Zone rulemaking, advised policymakers on legal and technical issues surrounding the proposed rule, and worked with the U.S. Environmental Protection Agency to assess how policies directed toward surface coal mining in Appalachia could improve environmental outcomes while balancing economic impacts. Edmondson

graduated from the University of Louisville Brandeis School of Law and serves as chair of the Kentucky Bar Association’s Environment, Energy and Resources Law Section.



SAIRA BLAIRE

West Virginia State Delegate and Freshman at West Virginia University

For Saira Blair of Martinsburg, W.Va., learning about civics in high school took on a whole new meaning when, at age 16, she decided to run for state delegate. Just a few months after turning 18, she won. Blair now serves as the nation's youngest legislator and the youngest legislator ever elected in West Virginia's history, but she says she had some help—and inspiration—along the way. Blair's father, Craig Blair, served for six years in the West Virginia House of Delegates and as a state senator since 2012. Saira Blair's work as campaign manager during both of her father's senate races helped plant a seed. "I had always known that (running for office) was something I wanted to do at some point in my life, but not necessarily at this age," she said. A participant in Youth in Government, a mock government program for high schoolers, Blair ultimately decided not to delay the opportunity. "I had seen the floor in session before with Dad," she said. "When I saw students doing everything exactly the same, presenting ideas that were completely unique and that deserved the respect and ears of legislators, I thought ... that I didn't need to be 30 or 40 or 50 or 60 to do it." As a delegate, Blair has focused on bringing new jobs to West Virginia, one of a few states with a declining population. "The greatest reason for that is because people who are millennials, like me, are getting their high school education, they're getting their college education and then they're leaving (the state) in order to find good-paying jobs," she said. Blair said the state must diversify its economy beyond coal to ensure the state's future success. "It's kept the lights going in our state and across the country. It's provided jobs for families. It's a part of our heritage, but clearly it's becoming apparent that it's not a part of our future."

Do you know someone in state government who deserves a shout out? Email Carrie Abner at cabner@csg.org.

For more on Saira Blaire, visit capitolideas.csg.org.



Thank you!

CSG'S LEADERSHIP CIRCLE



To learn more about CSG's Associates Program and Leadership Circle, please contact

Maggie Mick, Director of Development | The Council of State Governments | **ph** 859.244.8113 | mmick@csq.org



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COMING IN *CAPITOL IDEAS'* NEXT ISSUE!

GLOBAL AFFAIRS & ENERGY

