## States CP

### Permutation

#### Perm-Fed and States need to work together and know what each government is providing so that the funding can be used effectively.

Congressional Documents and Publications, Primary Source, 2014

(CDP, Proquest, “Private Sector STEM Initiatives Make Big Impact,” 1-9-14, https://search.proquest.com/pqrl/docview/1476380939/abstract/2B5FC7D81E524D82PQ/1?accountid=1557, accessed 7-12-17, AS).

"A well-educated and trained STEM workforce will promote our future economic prosperity. But we must persuade our nation's youth to study science and engineering so they will want to pursue these careers. We need to learn what is taking place outside of the federal government so we can be sure we are not spending taxpayer dollars on duplicative programs. And we need to more effectively use taxpayers' dollars to gain the most benefit for our students and our country. You can't have innovation without advances in technology. The STEM students of today will lead us to the cutting-edge technologies of tomorrow."

### Fed Key

#### USFG must centralize STEM education to be effective- delegating offices and splitting duties drains funds, doesn’t solve

**Kuenzi, Education Policy Specialist, 2008**

**(**Jeffrey J., *Congressional Research Service*, “Science, Technology, Engineering, and Mathematics (STEM) Education: Background, Federal Policy, and Legislative Action,” 3-21-08, RL33434, p 3, MM).

There is growing concern that the United States is not preparing a sufficient number of students, teachers, and practitioners in the areas of science, technology, engineering, and mathematics (STEM). A large majority of secondary school students fail to reach proficiency in math and science, and many are taught by teachers lacking adequate subject matter knowledge.

When compared to other nations, the math and science achievement of U.S. pupils and the rate of STEM degree attainment appear inconsistent with a nation considered the world leader in scientific innovation. In a recent international assessment of 15-year-old students, the U.S. ranked 28th in math literacy and 24th in science literacy. Moreover, the U.S. ranks 20th among all nations in the proportion of 24-year-olds who earn degrees in natural science or engineering.

A 2005 study by the Government Accountability Office found that 207 distinct federal STEM education programs were appropriated nearly $3 billion in FY2004. Nearly three-quarters of those funds and n early half of the STEM programs were in two agencies: the National Institutes of Health and the National Science Foundation. Still, the study concluded that these programs are highly decentralized and require better coordination. Though uncovering many fewer individual programs, a 2007 inventory compiled by the American Competitiveness Council also put the federal STEM effort at $3 billion and concurred with many of the GAO findings regarding decentralization and coordination.

### Fed Power Good

#### Federal Funding allows schools to have more freedom with the STEM curriculum—the plan is good for schools and students as education now be individualized on a need-based basis.

Heitin, Education Week contributor, 2016

(Liana, Education Week, “School Systems Get More Say on STEM Education,” 1-5-16, http://www.edweek.org/ew/articles/2016/01/06/school-systems-get-more-say-on-stem.html, accessed 7-7-17, AS).

The new federal education bill gives states and districts more leeway in many areas, including how they use federal dollars for science, technology, engineering, and math programs.

And while the bill eliminates authorization for a key STEM initiative—the Math Science Partnerships program—advocates say it more than makes up for the loss.

The Every Student Succeeds Act also maintains the current requirement around science and math testing. Students will have to take math tests annually in grades 3-8 and once in high school, and science tests three times between grades 3 and 12.

"That's a huge victory because you could have easily seen science testing disappear," said James Brown, the executive director of the STEM Education Coalition.

And the law establishes dedicated federal funding for either a state-led STEM master-teacher corps or STEM professional development. President Barack Obama has been pushing for the creation of a STEM master-teacher corps for some time, and Sen. Al Franken, D-Minn., has championed it. Under the law, the education secretary can create a competitive-grant program for states to attract, retain, and reward exceptional STEM teachers, especially in high-need and rural schools. The secretary could also use that funding to bolster STEM professional development.

## Spending DA

#### Link should’ve been triggered - Previous STEM laws (post 2008) have not caused economic collapse

Public Law No: 114-59 (10/07/2015), H.R.1020 – 114th Congress, **STEM Education Act** of **2015** APW

(This measure has not been amended since it was passed by the Senate on September 24, 2015. The summary of that version is repeated here.)

STEM Education Act of 2015

(Sec. 3) Requires the Director of the National Science Foundation (NSF) to continue to award competitive, merit-reviewed grants to support: (1) research and development of innovative out-of-school STEM (science, technology, engineering, and mathematics) learning and emerging STEM learning environments; and (2) research that advances the field of informal STEM education.

Requires supported activities to include research and development that improves understanding of learning and engagement in informal environments and design and testing of innovative STEM resources for such environments to improve STEM learning outcomes and increase engagement for elementary and secondary school students and teachers and the public.

(Sec. 4) Amends the National Science Foundation Authorization Act of 2002 to allow award of NSF Master Teaching Fellowships to mathematics and science teachers who possess a bachelor's degree in their field (currently limited to those with a master's degree).

Requires fellowship grants to be used, in the case of Master Teaching Fellowships for teachers with bachelor's degrees in their field who are working toward a master's degree, to: (1) offer academic courses leading to a master's degree and leadership training to prepare individuals to become master teachers, and (2) offer programs both during and after matriculation to enable fellows to become highly effective mathematics and science teachers and to exchange ideas with others in their fields. Limits fellowship support during such a master's degree program to one year, with a prorated amount in the case of enrollment in a part-time program.

Includes elementary or secondary school computer science teachers as mathematics and science teachers for purposes of the program of teacher recruiting and training grants known as the Robert Noyce Teacher Scholarship Program.

#### STEM reform costs $25 Million in the past – compare this to $12.8 trillion of 2008 and it becomes obvious the DA’s link is null.

SWE, non-profit educational organization, 2016

*All Together,* “Congress to Decide on STEM Funding for FY17 in December,” September 2016, <http://alltogether.swe.org/2016/09/congress-to-decide-on-stem-funding-for-fy17-in-december/>, 7-12-17, APW)

Speaking of the White House, on September 14, the Administration hosted a “Computer Science For All Summit” at 1600 Pennsylvania Avenue. During the summit, which built on the President’s proposal from earlier this year, the White House acknowledged that there are now 31 states that allow CS to count towards high school graduation. Also announced during the event were the more than $25 million in new grants awarded from the National Science Foundation (NSF) to expand computer science education. (For more on the summit, including details of commitments from the Girl Scouts of the USA, the National Center for Women & Information Technology, Google, and Boys & Girls Clubs of America, go here.) The outgoing President believes computer science is a subject foundational not only to engineering and other STEM subjects, but to almost all academic and professional pursuits in the 21st Century. He and his staff are hoping to make progress on this point as the clock runs out on his time in the Oval Office.

## Politics DA

### STEM K2 Econ

#### STEM proficiency is the key to a stable and growing economy.

Swanson & Kelly, CEO Of Raytheon & US News Editor, 2014

(William H. & Brian, US News, “STEM Proficiency: A Key Driver of Innovation, Economic Growth and National Security,” 4-23-14, https://www.usnews.com/news/stem-index/articles/2014/04/23/stem-proficiency-a-key-driver-of-innovation-economic-growth-and-national-security, accessed 7-6-16, AS).

STEM: what a terrible acronym. It’s one of those awkward labels that become accepted shorthand for a wonky policy topic because no one can figure out a better way to say it. But don’t let clunkiness obscure significance. STEM is also an under appreciated, and troubling, component of the U.S. economy. The real meaning behind “STEM” is the mismatch between supply and demand in a key part of the country’s labor pipeline. The demand for the many jobs requiring STEM skills—science, technology, engineering and math—is outstripping the supply, and the problem will only get worse.

That’s what we found when we crunched the numbers in the first-ever STEM Index, a basket of data measuring the state of STEM jobs and education since 2000. We wanted to impose some metrics on a much-discussed but ill-defined subject that has become a concern for most major industries in the U.S. STEM proficiency is a key driver of innovation, economic growth and ultimately national security. For instance, some of the most coveted and scarce skills today are in the fields of cybersecurity.

But STEM is not just about tech companies. It’s not just about people who wear lab coats. STEM skills are needed in the many millions of jobs that will have to be filled in sectors such as energy, manufacturing, food production and perhaps most significantly, health care. What industry does not need more workers with science and math know-how? And not just at the high end. Having STEM skills could mean making it into the middle class, or not.

### Representative votes don’t change popularity

#### Attracting and retaining students in STEM is key to the economy.

Education Department, Primary Source, 2014

(Education Department, *Federal Register*, “Secretary's Proposed Supplemental Priorities and Definitions for Discretionary Grant Programs

e,” 6-24-14, https://www.federalregister.gov/documents/2014/06/24/2014-14671/secretarys-proposed-supplemental-priorities-and-definitions-for-discretionary-grant-programs, accessed 7-12-17, AS).

It is essential to the health of our economy to increase the number of students attracted to and prepared for careers in STEM and to increase the proportion of students who are from groups historically under-represented in these careers (e.g., minorities, individuals with disabilities, and women), and to retain all of these students in STEM fields.

The 2012 report from the President's Council of Advisors on Science and Technology (PCAST) estimated that about 40 percent of all students who start their postsecondary degree in a STEM field will finish their program. Moreover, even among those who attained a bachelor's degree in a STEM field, only about 56 percent of those working for pay one year after graduation worked in a STEM-related career. [13] Therefore, we propose to revise the priority on STEM from the 2010 Supplemental Priorities to address access to, and persistence in, rigorous and engaging STEM coursework. To increase students' engagement and interest in STEM fields, it is imperative that students are provided opportunities to pursue rigorous STEM coursework and gain research experience prior to entering postsecondary study and the workforce.

In addition, because of continued issues facing the STEM P-12 teaching profession, including teacher shortages and staffing difficulties, the President has challenged governors, philanthropists, scientists, engineers, educators, and the private sector to join a national campaign to find new ways to recruit, train, reward, and retain STEM teachers and to collectively prepare 100,000 STEM teachers over the next decade. Recruitment efforts that attract the best talent into STEM teaching will improve student learning and engagement in STEM subjects. Finally, ensuring STEM teachers have adequate knowledge of the subjects they are teaching and the ability to teach them will improve effectiveness and relevance of instruction in STEM subjects. This priority would also help to bolster local or regional partnerships that enhance students' access to real-world STEM experiences and teachers' access to high-quality STEM-related professional learning.

### STEM education K2 Economy and competitiveness

#### STEM is vital to the future success of the US

University of Cincinnati, 2015

(University of Cincinnati, “The Importance of STEM in K-12 Education,” Spring 2015, http://mastersed.uc.edu/news-resources/infographics/the-importance-of-stem-in-k-12-education/, accessed 7-7-17, AS).

The future success and leadership of the United States lies in the hands of our educational system and the students emerging with degrees in science, technology, engineering, and math. Compared to other developing countries, the United States falls short in terms of mathematics and science literacy as well as innovation-based competitiveness. With countries such as China far surpassing the United States in the numbers of STEM bachelor degrees awarded and the United State’s job market containing hundreds of thousands of unfilled STEM jobs, there needs to be an emphasis on the importance of STEM in our K-12 education system.

Methods to integrate STEM education into K-12 learning include Model-Eliciting Activities, which combine creative thinking, problem solving and self-critiquing in such ways as challenging students to produce a judging strategy based off the accuracy and flight time of paper airplanes. With these activities and other methods for teaching science, technology, engineering, and math, K-12 educators can help foster STEM education literacy and interest to the future university students of this country.

#### STEM is key to US competitiveness.

Machi, Business Development Analyst, 2009

(Ethel, The Heritage Foundation, “Improving U.S. Competitiveness with K-12 STEM Education and Training,” 6-16-09, http://www.heritage.org/education/report/improving-us-competitiveness-k-12-stem-education-and-training, Accessed 7-7-17, AS).

This report is aimed at education and private-sector leaders as well as at national defense strategists, but can also be useful to other interested parties. The private sector and defense industry will need to work closely with education reformers to create a feasible plan for improving the current state of STEM education: Success in both industry and defense is vitally linked and inextricably tied to the capabilities of the STEM workforce

In order for the United States to be globally competitive, innovative, and prepared for new economic and security challenges, the U.S. must have a competitive and innovative educational environment that encourages entrepreneurship and excellence in STEM subjects. Doing so will require federal and state policymakers, as well as the private sector, to take the following steps:

#### STEM is a bipartisan movement- critical for both parties, no conflict

AIP, physical science nonprofit organization, 2017 (American Institute of Physics, “Senate Appropriators Spotlight STEM Education Funding,” *FYI Science Bulletin*, Volume: 37, 3-23-17, https://www.aip.org/fyi/2017/senate-appropriators-spotlight-stem-education-funding, MM).

On March 15, the Senate Labor, Health and Human Services, and Education Appropriations Subcommittee held a hearing highlighting the importance of federal investment in STEM education programs. In his opening remarks, Subcommittee Chairman Roy Blunt (R-MO) kicked off the meeting, emphasizing that “STEM … is critical for the economic competitiveness and security of our nation … [STEM education] provides the basic skills and competencies all students need, and prepares them for well-paying careers across education levels.”

Subcommittee Ranking Member Patty Murray (D-WA) echoed Blunt’s sentiment, commenting that “investments in education and training are some of the most important we can make.”

At the hearing, educational leaders from different places in the U.S. testified about their experiences implementing programs funded by federal education grants, underlining the role of STEM programs as drivers of local economic growth and regional prosperity. Neil Lamb, vice president for educational outreach for the HudsonAlpha Institute for Biotechnology, warned the subcommittee about a “‘leaky’ STEM workforce development pipeline”, and stressed that “with fierce competition from other countries seeking to overtake the U.S. position in achievement and innovation, sustained national support of STEM literacy is critical.”

Imperative to fixing this "leaky” STEM pipeline, said the witnesses, is federal support for local STEM education program development. Sarah Tucker, chancellor of the West Virginia Council for Community and Technical College Education, spoke about partnerships with community colleges in her state that provide students with experiences in local industry as well as work-based learning opportunities for workers displaced from coal-mining. Caroline King, chief policy and strategy officer for Washington STEM, spoke about the state youth aerospace apprenticeship program which provides high school students with paid, on-the-job training for students in Takoma Public Schools.

Others witnesses advocated for funding of various federal education programs, including components of the Every Student Succeeds Act (ESSA), a major K-12 education law enacted in December 2015 that authorizes grants to the states for STEM education, among other activities. Larry Plank, Director of K-12 STEM Education for Hillsborough County Public Schools in Tampa, Florida, urged the subcommittee to fully fund ESSA Title IV grants, which support access to a well-rounded education and aim to improve the conditions for learning, as “[they] would allow high need districts to promote hands-on STEM learning … and integrate informal and formal STEM programs”, such as informal after school robotics clubs.

Bipartisan support expressed for STEM programs

Subcommittee members on both sides of the aisle expressed their overwhelming support for continued federal funding for STEM programs. Sen. Marco Rubio (R-FL) commented that STEM will have a role in every field of work in the future, passionately declaring, “I think we need to have a broader conversation about why basic STEM education should be increasingly become a part of our overall curriculum … because I can’t imagine any field of work in the next ten to fifteen years that won’t require people to be proficient to some degree on the use and application of technology.”

On a similar note, Sen. Jeanne Shaheen (D-NH) agreed that “STEM jobs are the future" and meeting the need for filling STEM jobs “is a real challenge and one that we have to meet if we are going to be competitive in this country.” Shaheen also reflected on her experience as an educator, praising Title IV Part A grants, which aim to support programs outside the classroom that engage students with STEM subjects.

#### Both bipartisan and huge public support of STEM education- plan won’t cost PC

Brown, Executive Director, STEM Ed Coalition, 2015 (James F., *STEM Education Coalition*, “Group of 19 Bipartisan Senators Urge Support for STEM in ESEA,” 11-3-15, http://www.stemedcoalition.org/2015/11/03/coalition-supports-senate-stem-letter/, 7-11-17, MM).

A bi-partisan group of 19 US Senators joined together in support of keeping key STEM provisions from the Senate’s version of the Elementary and Secondary Education Act (ESEA) in the conferenced legislation. This letter comes in tandem with a similar bi-partisan letter signed by 34 House of Representative Members sent in October.

In the letter, the bi-partisan group stresses the importance of Math and Science Partnerships in the states, along with teacher professional development that is so critical to perpetuating modern STEM education in schools.

“…Our amendment would reauthorize and modernize the Department of Education’s existing Math and Science Partnerships (MSP). This is a proven program that aims to increase the academic achievement of students in mathematics and science by enhancing the content knowledge and teaching skills of K-12 educators…This provision would provide mentorship and leadership opportunities for outstanding STEM teachers and provide financial compensation to help keep these excellent teachers in the classroom.”

So far, more than 100 organizations have publicly supported making STEM a key priority under the rewrite of the law:

House-Senate staff-level negotiations over the ESEA bill have reached a critical juncture and the fate of the major STEM provisions in the Senate bill will shortly be decided. It appears that a final agreement on a bipartisan bill is within reach.

#### STEM is a popular, unifying agenda

114th Congress, 2015 (114th Congress, Committee on Science, Space, & Technology, “Bipartisan STEM Education Act Clears House and Senate,” 10-1-15, https://science.house.gov/news/press-releases/bipartisan-stem-education-act-clears-house-and-senate, 7-11-17, MM).

Washington, D.C. - The House of Representatives today unanimously passed the Senate amendment to the STEM Education Act (H.R. 1020), a bipartisan bill introduced by Science, Space, and Technology Committee Lamar Smith (R-Texas) and Rep. Elizabeth Esty (D-Conn.). The bill strengthens ongoing science, technology, engineering and math (STEM) education efforts at federal science agencies and ensures computer science is included in these efforts as a subject that builds on the traditional STEM subjects. The bill now heads to the president’s desk for signature and enactment.

Chairman Smith: “A well-educated and trained STEM workforce ensures our future economic prosperity. This means motivating more American students to study science and engineering so they will want to pursue these careers. A healthy STEM workforce that is literate in all STEM subjects, including computer science, is critical to America’s ability to create jobs and compete in the world. I thank my colleague Rep. Esty for working with me on this important bipartisan legislation that will help prepare our students to thrive in a technology-based economy.”

Rep. Esty: “More and more jobs of the 21st century require science, technology, engineering, and math skills. Final passage of the bipartisan STEM Education Act demonstrates that we can come together to help our children thrive and to help ensure that they can be competitive in a global economy. I hear from manufacturers, high-tech companies, and small businesses across all sectors that struggle to find workers with the necessary technical and critical problem-solving skills to fill jobs in demand. I am grateful to my colleagues in the House and Senate for their support, and I look forward to this bill reaching the President’s desk and becoming law.”

#### Statistics- broad public support for federal science investment

Funk, Rainie, Director of Research, Director of Internet, 2015 (Cary, Lee, *PEW Research*, “Public and Scientists’ Views on Science and Society,” 1-29-15, http://www.pewinternet.org/2015/01/29/public-and-scientists-views-on-science-and-society/, 7-11-17, MM).

Scientific innovations are deeply embedded in national life — in the economy, in core policy choices about how people care for themselves and use the resources around them, and in the topmost reaches of Americans’ imaginations. New Pew Research Center surveys of citizens and a representative sample of scientists connected to the American Association for the Advancement of Science (AAAS) show powerful crosscurrents that both recognize the achievements of scientists and expose stark fissures between scientists and citizens on a range of science, engineering and technology issues. This report highlights these major findings:

Science holds an esteemed place among citizens and professionals. Americans recognize the accomplishments of scientists in key fields and, despite considerable dispute about the role of government in other realms, there is broad public support for government investment in scientific research.

The key data:

79% of adults say that science has made life easier for most people and a majority is positive about science’s impact on the quality of health care, food and the environment.

54% of adults consider U.S. scientific achievements to be either the best in the world (15%) or above average (39%) compared with other industrial countries.

92% of AAAS scientists say scientific achievements in the U.S. are the best in the world (45%) or above average (47%).

About seven-in-ten adults say that government investments in engineering and technology (72%) and in basic scientific research (71%) usually pay off in the long run. Some 61% say that government investment is essential for scientific progress, while 34% say private investment is enough to ensure scientific progress is made.

#### DOE, nation, both parties want STEM

Johnson and Bardi, Director of Media Services for AIP, N.D. (Tawanda W., Jason, *APS Physics*, “APS and AIP Announce New STEM Education Policy Fellowship Partnering with U.S. Department of Education,” ND, https://www.aps.org/publications/capitolhillquarterly/201311/stemedpolicy.cfm, 7-11-17, MM).

The American Physical Society (APS) and the American Institute of Physics (AIP) recently announced a new jointly sponsored STEM Education Policy Fellowship that will fund a scientist or educator for up to two years, sending him/her to the U.S. Department of Education where they will work intensively on education policy and programs related to science, technology, engineering and mathematics (STEM).

APS and AIP will begin accepting applications immediately from qualified applicants. The first Fellow will be selected this fall and will begin working in January 2014. More information on the Fellowship and applications for the program may be accessed at the STEM Education Policy Fellowship web page.

"We started this new program in recognition of the increased emphasis on STEM education at the Department of Education," said APS Executive Officer Kate Kirby. "The STEM Education Policy Fellowship offers scientists with expertise in and passion for STEM education an opportunity to come to Washington D.C. to help shape science education policy critical to our nation's future. I think that the Department of Education will benefit greatly from the presence and contributions of this Fellow."

"Improving STEM education is a bi-partisan national priority that is key to our nation's economic and national security," said H. Frederick Dylla, AIP Executive Director and CEO. "As the U.S. Department of Education ramps up its portfolio of STEM programs and initiatives, the STEM Education Policy Fellow will be there to provide relevant perspective and important guidance."

#### RNC supports **STEM already**

Montgomery, Tech Reporter, 2016 (Blake, *Edsurge*, “Republican Party Platform Addresses Education, Nods to Edtech,” 7-19-16, https://www.edsurge.com/news/2016-07-19-republican-party-platform-addresses-education-nods-to-edtech, 7-11-17, MM).

The Republican Party has released its official party platform in full. The 58-page document outlines issues the party will focus on during the home stretch to the election and after, though nominee Donald Trump has not officially endorsed it.

The platform claims that, "After years of trial and error, we know the policies and methods that have actually made a difference in student advancement." Those things are school choice, STEM education, phonics, career/technical education, merit pay for teachers, parental involvement, "ending social promotions" and strong administrative leadership. Here is what the party had to say about edtech: "Because technology has become an essential tool of learning, it must be a key element in our efforts to provide every child equal access and opportunity."

In the platform, Republicans praise the value of STEM education and the transformative effects of the "digital revolution" on everything from malls to schools. "Innovation" is high on conservative policymakers' minds—the word appears 22 times throughout the document. Rather than encouraging schools to look to the federal government for STEM education and innovation, the party urges them to make use of the expertise in their communities: "teaching talent in the business community, STEM fields, and the military, especially among our returning veterans."

#### Bipartisan support for federal STEM programs, increase much more popular than cuts- seen with NASA budget proposal

Foust, Senior Staff Writer, 2017 (Jeff, *Space News*, “House members criticize proposed NASA education and Earth science cuts,” 6-9-17, http://spacenews.com/house-members-criticize-proposed-nasa-education-and-earth-science-cuts/, 7-13-17, MM).

WASHINGTON — House members criticized a NASA budget proposal for fiscal year 2018 that would cancel several Earth science projects and close the agency’s education office.

In back-to-back hearings June 8 by the space subcommittee of the House Science Committee and the commerce, justice and science (CJS) subcommittee of the House Appropriations Committee, members expressed general support for the agency’s $19.1 billion proposed budget.

However, members of both parties opposed the proposal to defund the Office of Education, which received $100 million in the fiscal year 2017 appropriations bill. The office would receive $37.3 million in 2018 to close out its operations.

“I’m concerned about, in your budget, your cuts to the Office of Education,” said Rep. Hal Rogers (R-Ky.), a former chairman of the House Appropriations Committee who is now a member of the CJS subcommittee. “I can’t understand why you would want to cut that.”

NASA Acting Administrator Robert Lightfoot, the sole witness at both hearings, said the decision was the outcome of an assessment on how the agency could do its outreach activities more efficiently. “We felt we could balance them better,” he said of the various NASA education activities, including those in its mission directorates. “We felt like, in the balance of things, we could do this more effectively, in a different way.”

However, Rogers and other members criticized the cuts to programs such as Space Grant, Experimental Project To Stimulate Competitive Research (EPSCoR) and Minority University Research and Education Program, which are all part of the Office of Education. Members expressed concern about how the cuts would affect programs in their home states.

Rep. Evan Jenkins (R-W.V.), a member of the CJS subcommittee, pressed Lightfoot in particular on the fate of EPSCoR, which supports research infrastructure in underserved regions of the country. When Lightfoot said EPSCoR would not be funded in the proposal, Jenkins responded, “I will be going to bat because I believe that EPSCoR has been very effective.”

“This budget request zeroes out funding for three long-standing programs within NASA’s Office of Education,” said Rep. José Serrano (D-N.Y.), ranking member of the CJS subcommittee. “I hope we can work together, in a bipartisan manner, to preserve these programs that so greatly benefit the American people.”

Serrano and other Democrats on both committees also criticized the planned cuts to NASA’s Earth science program, including the termination of five projects. “I do want to make sure that the Earth sciences mission is also protected,” said Rep. Ami Bera (D-Calif.), ranking member of the space subcommittee.

### Midterm-Specific PTX

#### Anti-science Republicans are facing steep opposition from STEM advocating candidates in upcoming midterm elections

**Bowman, Senate Reporter, 2017**

(Bridget, *Roll Call*, “Rep. Lamar Smith Out of Touch With Science, Challenger Says,” 5-23-17, <http://www.rollcall.com/news/politics/joseph-kopser-lamar-smith-challenger>, 7-18-17, MM).

GOP Rep. Lamar Smith, the chairman of the House Science, Space and Technology Committee, is getting a Democratic challenger who says Smith is out of touch with science and his constituents.

Joseph Kopser announced Tuesday that he is taking on Smith, who is running for re-election for a 17th term in Congress in the solidly Republican central Texas district. Kopser, a combat veteran who served in Iraq and earned a Bronze Star, is one of a slew of candidates in science and technology fields running for elected office as political outsiders.

“For me this is about public service ... It’s something that I’ve been working on my whole life,” Kopser said. “In reality this is just the next chapter.”

Kopser said he had been traveling the district in recent months, and decided in the last few weeks that he could launch a formidable challenge. Kopser’s announcement comes as Democrats are expanding their list of targets in 2018 to more traditionally Republican areas, and encouraging candidates with diverse backgrounds to run for office.

Scientific focus

Smith has been in the crosshairs for a group known as 314 Action for his views on climate change. Smith recently said at a March hearing that climate science was based more on “exaggerations, personal agendas and questionable predictions than on scientific method.”

314 Action, which is named after the first three digits of Pi, is encouraging people in the science, technology, education and math (STEM) fields to run for office. The group heard about Kopser back in February since he was working with Joe Trippi, one of the group’s founders and advisors.

“Lamar Smith is one of our top-targeted seats,” said Joshua Morrow, 314′s executive director. Morrow said they helped connect Kopser’s team with other staffers and consultants.

The group is working with about a dozen congressional candidates — and hundreds of potential candidates at the state and local levels.

It is also working with another Texas candidate, Dr. Jason Westin, who is challenging GOP Rep. John Culberson in the 7th District. Inside Elections with Nathan L. Gonzales rates that race as Likely Republican.

Morrow said candidates in STEM fields have to be trained on campaign basics, and are also realizing that they often need to step away from their jobs to run for office. But, Morrow said, people are willing to make that sacrifice to bring their knowledge to the policymaking process.

“We need that level of expertise to handle the issues that are really complicated like climate change,” Morrow said.

Kopser said his background in public service, technology, and business puts him in a unique position to run for Congress.

Fascinated by space exploration as a child, Kopser decided to study aerospace engineering at West Point. He served in the Army for 20 years. After his time in the Army, he founded a technology company that developed a transportation app to help people find all of the options for transportation near them.

Kosper said Smith’s views on science, as well as the degrading civil discourse and increasing divisions in the country, helped spur him to run for office. And, he noted, others are responding to “attacks on science” by taking action and becoming involved in their communities.

“All of this stuff that has been causing people grief is finally turning to action,” Kopser said. “It’s created a new awakening in ideas, in movements, and people.”

For Kopser, science ties into his three campaign focuses: jobs, education and our children’s future.

He also sees the 21st District, which stretches from San Antonio to Austin, as a place where technology and new energy jobs could flourish.

“The Texas 21st is going to be engine of change on an issue like climate change,” Kopser said. “Right in our backyard we have the people, the engineers and the manufacturers to actually build the technology we need.”

But Kopser won't be the only candidate stressing climate change. Consistent with other races across the country, the Texas 21st is shaping up to have a crowded Democratic primary.

Derek Crowe is also running as a Democrat, and says climate change is important to the people in Smith's district.

Crowe is a former congressional staffer who helped set up the local chapter for 350.org, a grassroots group focused on climate change. Crowe said his young son, and Smith's views on the issue, have motivated him to run against Smith.

"It was clear to me once Lamar Smith became an outspoken Trump supporter, that it was no use trying to change his mind on issues like climate change," Crowe said.

Running in GOP territory

But Kopser faces a difficult environment running as a Democrat in GOP territory. Inside Elections rates Smith’s district as Solidly Republican.

President Donald Trump won Smith’s district by 10 points in November, according to calculations by Daily Kos Elections. Smith won his re-election by 21 points.

Democrats are looking to target more traditionally Republican districts and announced a second round of targets on Monday to include seats that President Donald Trump won in November.

## Tradeoff DA

### STEM Key to Econ

#### The future of the global job market lies in STEM – spending on STEM will ensure our economic security in the future.

Evans, Executive director of National Science Teachers Association, and Milgrom-Elcott executive director of STEM teacher training initiative 100Kin10, 17

(David and Talia, *The Hill,* “STEM Education Will Carry Our Children in Tomorrow’s Economy,” 4-4-17, <http://origin-nyi.thehill.com/blogs/pundits-blog/education/327195-stem-education-will-carry-our-children-in-tomorrows-economy>, 7-6-17, APW)

Now it’s the entire world competing for the same jobs, the same resources, the same opportunities. It’s no longer about passing algebra; it’s about thriving in an increasingly worldwide workforce.

American students should be able to compete with kids from anywhere in the world, because when they graduate from high school, technical school, or college, that's who they'll be measured against.

In this global economy, one of the most effective ways to set our children up for success is to ensure they receive excellent STEM (science, technology, engineering, and math) education.

As you may have heard, there are a lot of jobs to be found in STEM fields: indeed, ten of the top 14 fastest-growing industries require STEM training. But STEM is more than a specific set of classes or subjects.

STEM education teaches kids how to think critically and solve problems: valuable skills they’ll need to succeed in school, work, and life. Teenagers taking algebra need to understand why it matters and how they might use it in real life.

Whatever today’s kids want to be able to do tomorrow, they will need serious STEM skills – and the ability to use what they’ve learned when solving new problems or tackling new dilemmas. That will be true whether they become a mechanic called in to fix something they’ve never seen before, or a medical professional faced with an outbreak of a new disease.

Fortunately, we have a powerful opportunity to strengthen STEM education for all American students through the Every Student Succeeds Act (ESSA).

ESSA, passed with strong bipartisan support, provides states with the flexibility to set new policy and funding priorities, and as part of the ESSA framework, states must develop their own education plans. The key to help develop and nurture a new generation of thinkers and creators depends on these state plans supporting and promoting STEM education.

As leaders of two national efforts focused on recruiting, training and supporting STEM teachers, as well as fostering excellence in STEM education, we hear firsthand from our partners and allies across the country about the exciting innovations to champion STEM education in the classroom: including supporting teachers to incorporate STEM labs into their classrooms, create digital learning communities to connect their students with practicing scientists or engineers, or implement new courses in computer science and engineering.

We need these kinds of initiatives in every state. We must continue to encourage and foster expanded support and opportunities for STEM education.

We are working alongside nearly 20 additional 100Kin10 partner organizations to ensure that all students receive outstanding STEM educations. We’re calling it Every Student Succeeds with STEM, and it offers resources and tools to learn more about ESSA and how to promote STEM learning to your state leaders. Whether you're a parent, a teacher, or a citizen who wants to make sure America will be leading the way on discovering new cures and creating new jobs, we've made it easy for you to help. If you live in a state that’s already offering robust support for STEM initiatives, let your state officials know to keep up the good work.

But if your state needs to be doing more – the time to advocate for STEM education is now: whether that means contacting your governor or chief state school officer, spreading the word on social media, or submitting a comment on your state’s draft plan. In addition to working with your state on its ESSA plan, tell your representatives in Congress to fully fund ESSA to be sure there are resources to implement it.

Education should be about helping our kids acquire the skills they’ll need to live successful, productive, and satisfying lives. In a rapidly changing world, where it’s difficult to predict what challenges and technologies lie ahead, it is more important than ever that kids learn to think carefully, critically, and creatively.

We must do everything we can to prepare our children to meet this uncertain future. Securing robust STEM support in every ESSA state plan is an important path forward -- because advocating for high quality STEM education is crucial to safeguarding the future of every child.

#### Government spending on STEM won’t collapse the economy – in fact it’s key to the future of our economy.

Gordon, former executive associate director of the Office of Management and Budget, and Shea, principal in Grant Thornton LLP Global Public Sector, 2013

(Robert and Robert, *U.S. News,* “No Time to Waste in Making STEM Education Work,” 6-28-13, <https://www.usnews.com/opinion/articles/2013/06/28/stem-education-will-keep-america-competitive>, 7-8-17, APW)

Although Democrats and Republicans don't agree on much today, they have a moral imperative to make progress where they do. One area for potential cooperation is in better educating our children in math and science. This is critical to keeping America competitive globally and creating good jobs here at home. And we all know that in an era of budget deficits, we will need to achieve better results without spending more. Both those goals can be met through bipartisan reforms in the “STEM” fields of science, technology, engineering and math.

Despite spending nearly $3 billion annually on STEM education, America ranks 25th in math and 17th in science when compared to other countries on international assessments. A 2012 report from the Government Accountability Office found that 83 percent of federally funded STEM education efforts had duplicative elements. Today, 13 federal agencies run 226 different STEM programs. Most of them aren't coordinated and aren't accountable for results. They are more responsive to individual members of Congress than actual needs in the classroom or our economy.

As former Office of Management and Budget officials under Presidents George W. Bush and Barack Obama, we know firsthand that our government can increase its focus on rigorous evidence in STEM programs.

Bush started that work through the American Competitiveness Initiative and the America COMPETES Act, which targeted funding to critical areas like increasing the number of college graduates with STEM expertise. He also directed the first comprehensive survey of government STEM programs – a simple step that was sorely needed. And, through aggressive efforts at the Institute of Education Sciences, Bush, for the first time, established rigorous standards for looking past anecdotes and puffery to identify what actually works in education programs.

Obama has built on these efforts. His latest budget proposal takes the key step of proposing to consolidate more than 100 STEM programs into larger initiatives that are geared toward specific, critical goals, like improving the quality of math and science instruction. More funding will flow to programs with more evidence of their effectiveness, using standards similar to those developed in the Bush administration.

In addition, STEM programs will operate in a framework that emphasizes evaluation – so that government can build on what works and change or stop what doesn't. The Institute on Education Sciences is now working hand-in-hand with the National Science Foundation and other science-focused agencies to establish more specific evidence standards that can apply across STEM programs.

While these efforts may seem like common sense, they are a major break from business as usual. Program duplication in the federal government abounds, and nearly every program has an owner in the executive branch and an owner in Congress. They fight to keep what they have. But things have to change, and the good news is that change has begun. Much of the leadership behind the current Obama administration proposal came from outstanding civil servants with whom both of us served. They understand that in this era of deficits and sequestration, the status quo is simply not sustainable. And at a time when bipartisanship is critical, members of Congress are giving the proposal a respectful hearing.

The real challenge now is to make the Obama administration's STEM proposals into a template for more aggressive government reforms in other areas. The Bush administration established one of the first truly evidence-based initiatives, a small pilot for home visitation. The Obama administration has now built on that approach – not just in home visiting, but in fields like job training and international development.

The truth is that these programs still allocate only a tiny fraction of taxpayer funding, even in areas like education where we have real evidence about what works and what doesn't. This means that taxpayers don't get the best return on their investments – and the people who are supposed to benefit from government programs don't either.

As Obama's current budget recognizes, this has to change. We have to build on the efforts made by both these presidents to consolidate low-performing programs and drive resources toward solutions that actually work.

Evidence-based policy isn't the most exciting subject, but it's one of the most important. And at a time when Americans are looking to Washington to stop bickering, these smart reforms are a good place to start. We don't have a second – or a dollar – to waste.

## Federalism DA

#### Federal Investment Stable – Key to Education

Katz, Vice President and Director, Metropolitan Policy Program, 12

(Bruce, Brookings, “Remaking Federalism to Remake the American Economy,” 6-23-17, <https://www.brookings.edu/wp-content/uploads/2016/06/0216_federalism_katz.pdf>, 7-15-17, RV).

Yet pragmatic leaders are also demanding that the federal government invest, at scale, in economy-driving assets over a sustained period. The list of target areas for recommended investments, and even the institutional vehicles for investments, is remarkably similar and consistent across a broad cross-section of corporate, political, civic and university leaders. Last year, the American Energy Innovation Council, an organization founded by seven major corporate leaders (including Bill Gates, Jeff Immelt and John Doerr) recommended scaling clean-energy R&D investments from $5 billion to $16 billion annually. The investments would be “focused on technologies that can achieve significant scale, and be freed from political interference and earmarking.” Felix Rohaytn, a respected investment banker and former chairman of the New York City Municipal Assistance Corporation, has been a long-time champion of a National Infrastructure Bank. Rohatyn’s design, backed by a diverse set of political and corporate leaders, would initially capitalize a bank at $60 billion to leverage $250 billion of new capital in the private sector during its first few years and as much as $1 trillion over the next decade.

Finally, a plethora of business, university and philanthropic leaders have argued for aggressive steps to upgrade the education and skills of the American workforce. Andrew Liveris, the CEO of Dow Chemical Co, has, for instance, called for significant investment in STEM (science, technology, engineering and mathematics) education and improved skills training programs at community colleges so that workers can learn the skills necessary for high-paying advanced manufacturing jobs in the United States.

#### State and local governments do not possess the resources to stay self-sufficient during times of economic stress- fed is key

Robinson, Virginia University Professor of Law, 2014 (Mildred W., “It Takes a Federalist Village: A Revitalized Property Tax as the Linchpin for Stable, Effective K-12 Public Education Funding,” *Richmond Public Interest Law Review*, Volume: 17, 1-1-2014, page 40-41, <http://scholarship.richmond.edu/cgi/viewcontent.cgi?article=1305&context=pilr>, MM).

Neither school districts nor state governments acting alone possess the necessary fiscal capacity to meet even the minimal challenge of adequacy. On the local level, school districts have been deeply disadvantaged by voter and state imposed limitations on the ability to generate revenues from property taxes. As lawmakers for local government, it is incumbent upon state legislators and policymakers to take steps to reverse the effect of these limitations by rethinking the structuring of economic initiatives. States must refrain from imposing limitations, or engaging in initiatives, that undermine locals' ability to be as self-sufficient as possible. The local property tax remains the best way to raise local revenue for public education. Further, local power to impose the tax for this limited purpose should not be abrogated by TELs, or other measures of overly broad property tax relief. States can begin the process of revitalizing the tax by crafting economic initiatives that protect public education from the effects of using property tax diversions or abatement incident to incentives for development.

Even assuming that states adopt this stance, wide variations in the value of districts' taxable property will continue to make generating substantial funding, equal to that provided by richer school districts, impossible for poorer school districts. State assistance to poorer districts will be critical if adequate and equitable funding is to be a reality. In providing this support, states must make funding from general source revenue a priority. While some earmarking from specific revenue sources might be exploited to supplement funding for education, states must refrain from relying exclusively on such sources. Earmarking from excise taxes, such as tobacco, alcohol, or gaming, should not, in any case, be the primary source of funding. Realistically, states will occasionally face periods of financial exigency over which they have no control. A modified and revitalized property tax should, however, provide some protection from possible reductions in state support as long as recessions are not prolonged.

The assistance of the federal government remains critically important to achieving stable, efficient funding. Federal assistance for particular purposes, such as that provided through Title I and IDEA, should be continued. Importantly, as I have demonstrated, additional federal financial assistance for unrestricted use need not be in the form of direct subsidies; instead, a credit available to all taxpayers bearing this cost provided through the Internal Revenue Code would work well for this purpose. The credit, especially in combination with a state level credit, could contribute significantly to stabilizing revenues over time.

Indeed, treating that part of the property tax liability earmarked for sup- port of public education as a credit against what would otherwise be income tax liability would signal a powerful federal preference for reliance on a stable source of funding for public education. A credit is also particularly attractive from the federal point of view in light of Congress' ability to control its ultimate cost to the federal treasury while simultaneously according to all taxpayers bearing this cost some message of relief. As such, the credit could well shore up routine financing and make the cost of supporting public education more politically palatable. Finally, the role of the federal government during periods of economic exigency would be clearer. The federal government would remain a resource for critical support during such periods of economic stress, as it did subsequent to the Great Recession.

## Disability Kritik

#### STEM Technology Prepares Students With Disabilities To Pursue Jobs In the Field

Cortez, Associate editor with EdTech: Focus on Higher Education, ‘17

(Meghan, *EdTech: Focus on Higher Education*, “Accessible Technology Helps Students with Disabilities Pursue STEM Degrees,” 10 March 2017, https://edtechmagazine.com/higher/article/2017/03/accessible-technology-helps-students-disabilities-pursue-stem-degrees, 6 July 2017,RV).

Students with disabilities are now just as likely as other students to enroll in science, technology, engineering and math (STEM) fields when they enter higher education, recent research from the National Science Foundation reports. The study found that 11 percent of undergraduate degree pursuers have a disability, which Education Week indicates is on par with the 12 percent of K–12 students that have a disability.

As the STEM field clamors to add the expertise of those underrepresented, previous NSF research indicates that this expansion to disabled students is a win for these fields:

“First, the nation’s long-term prosperity is dependent upon ‘talented and motivated individuals who will comprise the vanguard of scientific and technological innovation.’ Second, every student in the United States ‘deserves the opportunity to achieve his or her full potential.’ … In short, excellence and equity in STEM education are interrelated.”

Recent updates to technology and education endeavors that boost accessibility could be helping to level the playing field for students with disabilities in K–12 schools, which could also lead them to more education.

INCREASED ACCESS TO TOOLS IN BOTH K-12 AND HIGHER ED

At the end of 2016, Microsoft announced additions to OneNote that aim to help students with disabilities like dyslexia have an easier time in the classroom.

“With accessibility in mind, and based on direct feedback from educators and students, the team continues to expand the capabilities and availability of the tools that help students be successful,” reports the blog post announcing the tools.

Taylor Tefft, a K–12 teacher from New York, even tells Microsoft in the post that Office 365 tools have played a key part in helping her students with disabilities succeed and advance to the next grade level.

At the university level, technology like Adobe Acrobat Pro’s accessibility checker has helped educators make sure class material works for all students. California State University, Northridge has gone a step further with their Accessible Technology Initiative, which helps the school assess tech tools for potential accessibility issues before purchasing.

But, what about tech tools specific to STEM careers?

Students at A. Harry Moore School in New Jersey all have low-incidence disabilities, but supervisor of curriculum Courtney Pepe regularly helps facilitate STEM tech, like robots, to help students with things like social skills and hand-eye coordination. The school also held a Computer Science Education fair last year, where students could practice STEM skills.

EdTech has discussed how STEM technology tools can help students with autism spectrum disorder or attention-deficit hyperactivity disorder succeed because of their inclination to be hands-on learners.

“Students with disabilities and science and math go together because they’re about problem-solving and thinking about things in new ways,” says Josh Miele, an associate director of technology research and development at Smith Kettlewell Eye Research Institute, in an SAS Institute blog post.

Miele, who is blind, once wanted to be a NASA scientist. In his endeavors to make science technology more accessible, he found a passion for helping to create STEM tools for disabled students, the post reports.

His initiative, the Blind Arduino Project, is designed to help those who are blind or visually impaired to have access to the popular do-it-yourself hardware.

On his blog, Miele investigates which tools would work best with these students and offers how-to guidance on using this tech.

“Arduino is an ideal platform for creating a variety of accessibility devices which blind makers and users might find useful,” writes Miele.

Though efforts have been made for increased access to STEM and other tech in the K–12 and undergraduate levels, the NSF study indicates that far fewer students with disabilities continue on to graduate school than their counterparts.

AccessSTEM, a project from the University of Washington, aims to help students across the country reach “critical junctures” on their path from elementary school to graduate school to a career.

“AccessSTEM shares promising practices to help K–12 teachers, postsecondary faculty, and employers make classroom and employment opportunities in STEM accessible to individuals with disabilities,” reads their website.

With outreach programs like these and continued updates to STEM technologies, hopefully this trend of students with disabilities participating in these fields continues to grow.

#### Higher Teaching Quality in STEM Education Prepares Students with Disabilities

Grumbine, principal investigator, and Alden is Title III Strengthening Institutions Director and an associate professor in education. ‘17

(Rich and Peg, *National Science Teachers Association*, “Teaching Science to Students with Learning Disabilities,” 23 February 2006, http://www.nsta.org/publications/news/story.aspx?id=51706, 6 July 2017, RV).

Learning is enhanced when teachers recognize and teach to diverse learning styles and strengths.

Learners have diverse ways of making meaning, constructing knowledge, and expressing understanding; using this perception as a starting point in our science teaching is particularly important for LD students. These students—who show deficits in certain aspects of their learning such as organization, reading, memory, and writing—have benefited when instructors accommodate and teach to a variety of learning styles (Carbo and Hodges 1988).

Teachers interested in reaching the broadest range of students can offer multiple means of representing the content in their classroom and provide students with multiple means of expressing their mastery of that content. This universal design approach to education is strongly advocated by organizations that work to expand learning opportunities for those with disabilities, such as the Center for Applied Special Technology (Dolan and Hall 2001). [Editor’s note: See “Universal Design in Science Learning’’ on page 32 of this issue of The Science Teacher.]

Although this principle may require more time to implement, the field of science lends itself well to teaching to a diversity of learning styles. Teachers can apply the following approaches.

Provide instruction that reaches the full spectrum of diverse learners.

Example: Students can see or perform a demonstration of osmosis (real or computer-based), view and/or construct a diagrammatic depiction of diffusion versus osmosis, read a text-based description of cell transport mechanisms, and enact a role play that shows active transport kinesthetically.

Provide various means of assessment that capitalizes on students’ learning strengths or preferences.

Example: Students can choose from—or the teacher can alternate among—varied-format tests, graphic organizers, oral interviews, three-dimensional models, written summaries, PowerPoint slide presentations, or posters. The teacher could also have a set order to cycle through.

Principle 2: Content learning is supported by explicit instruction in skills and strategies.

The science curriculum is embedded with an ever-increasing array of thinking, study, and organizational skills that are predictors of future academic success (Everson, Weinstein, and Laitusis 2000; Zimmerman 2002). The demands for planning, prioritizing, time management, and follow-through can be daunting for any student, but overwhelming for LD students (Shmulsky 2003).

Before LD students can show mastery of content, they must first be explicitly taught effective ways to study and organize for their courses (Gersten, Schiller, and Vaughn 2000; Swanson, Haskyn, and Lee 1999; Vail, Crane, and Huntington 1999). McCleery and Tindal’s (1999) study found that LD students who were provided with an explicit, rules-based template for understanding the thinking behind scientific methods were able to outperform their peers who did not receive this explicit instructional support.

#### Plan key to addressing inequality within STEM fields

National Science Foundation, independent federal agency, 2011

(National Science Foundation, *National Science Foundation*, “Women, Minorities, and Persons with Disabilities in Science and Engineering,” 2011, http://www.cssia.org/pdf/20000304-Women,Minorities,andPersonsWithDisabilitiesinScienceandEngineering.pdf, 6 July 2017, RV).

Women, persons with disabilities, and three racial/ethnic groups—African Americans, Hispanics, and Native Americans—are considered underrepresented in science and engineering because they constitute smaller percentages of science and engineering degree recipients and of employed scientists and engineers than they do in the American population (U.S. Commission on Civil Rights, 2010). Addressing this underrepresentation in STEM fields has been an initiative of the U.S. Congress for the past 30 years, but the challenge still remains unresolved. Diverse learners are capable of becoming talented professionals in STEM, but they need opportunities to develop (Roberts, 2010). Alvarez, Edwards, and Harris (2010) suggest exploring programs that allow underrepresented students to overcome issues linked to educational underachievement, including socioeconomic status, cultural trends, and lack of awareness of STEM opportunities and career fields.

One of the first barriers that should be addressed is access. Diverse learners initially need to have exposure to various STEM opportunities. For example, the Alliance for Students with Disabilities in Science, Technology, Engineering, and Mathematics (AccessSTEM) (http://www.washington.edu/doit/Stem/) serves to increase the number of people with disabilities in STEM careers by encouraging students with disabilities to pursue STEM fields and then supporting those who show an interest and aptitude in STEM. The National Girls Collaborative Project (http://www.ngcproject.org) is working to bring together organizations that are committed to informing and encouraging girls to pursue careers in STEM.

Another barrier to participation in STEM education opportunities is a lack of connection with diverse learners. In a recent study, 12 recommendations were made to strengthen math and science programs for diverse learners (Kaser, 2010). Two of the recommendations focused on hiring leadership and staff members that have an understanding of the various cultures and backgrounds of the students that they are serving. Many of the opportunities needed for diverse learners to become successful in the area of STEM require connections through their cultural beliefs and practices. STEM experiences need to relate to the actual lives of the students, their ages, and their interests. In addition to connecting to students’ culture, diverse learners are also in need of high quality curriculums, classroom practices that foster equity, and connections to real-world experiences (Kaser, 2010; PCAST, 2011). These robust STEM learning opportunities are only possible when all stakeholders become involved in the improvement of STEM education for all. With continued support and encouragement, diverse learners will break the access barrier to STEM opportunities.

Over the past 10 years, there has been an upsurge in the number of STEM focus schools and programs. While STEM schools historically have tended to target the top math and science students in a state or district, the new wave appears to have a broader reach, with many of the schools aimed especially at serving groups underrepresented in the STEM fields, such as African Americans, Hispanics, women, and students from low-income environments (Education Week, 2011). In addition, STEM Out-of-School-Time (OST) programs demonstrate a number of positive outcomes for girls (and in some instances, boys) related to academic achievement and school functioning, youth development, and workforce development (Chun & Harris, 2011). The next section highlights additional strategies for girls that may help to increase their interest and engagement in STEM education and careers.

#### Assistive Technology For Students with Disabilities – Supports interest for pursuit in STEM fields

Elsworthy, CEO of CEL, makers of the Robox 3D Printer, ‘15

(Chris, *eSchool News*, “Article Title,” 25 June, 2015, https://www.eschoolnews.com/2015/06/30/tech-learning-difficulties-104/2/, 6 July 2017, RV).

There is a somewhat obvious connection between the use of technology and an increase in students’ interest in STEM. According to the National Science Foundation, individuals with difficulties are currently employed in only 5-6% of U.S. STEM jobs. However, with the increased focus on technology to promote learning in students with difficulties, this number will hopefully begin to rise.

Traditionally, STEM education has been based largely on expository reading, which is difficult for many students with learning disorders. With the use of assistive technology tools such as SLTR (Span Limiting Tactile Reinforcement) on mobile devices in classrooms, students with learning difficulties are overcoming this challenge. Beyond that, the presence of technology that involves accelerated mathematic skills—like 3D printers—in the classroom is organically driving an interest in math and engineering fields. The ability to succeed through hands-on learning with these tools promotes an overall interest in the fields the technology correlates to.

Though I struggled through my education experience—in both school and university—I found inspiration in my work with technology. For me, it was beyond an educational aid—my success in college was largely due to grants I received for computers to help with my studies. But the real benefit that technology provided was the confidence to know that someday I could have a thriving career.

Echoing my experience, the outlook of the general public and the education system on children with learning difficulties has vastly changed. Day after day, difficulties such as dyslexia, dysgraphia, ADD, and ADHD are not viewed as roadblocks to a successful future, but as manageable obstacles that require different learning approaches.

I found a passion with 3D printing, and was able to build a successful and innovative company because I was able to be creative with technology. As most technology tools are connected to STEM industries, their presence in the classroom, especially among students with learning difficulties, helps support interest in these fields, just as it did for me.

#### STEM Participation Not Encouraged Enough Currently for Students with Disabilities

Chen, journalism graduate from Northwestern University, 16

(Cathaleen, *The Christian Science Monitor*, “How special needs students can benefit from STEM education,” 9 February 2016, https://www.csmonitor.com/USA/Education/2016/0209/How-special-needs-students-can-benefit-from-STEM-education, 6 July 2017, RV).

In a 2012 study published in the Journal of Autism and Developmental Disorders, scientists found that students diagnosed with autism had the highest STEM participation rates. By examining 11,000 students nationwide, they found that young adults diagnosed with an autism spectrum disorder chose STEM majors in college more often than their peers in the general population – 34 percent versus less than 23 percent.

"It may be that people with autism naturally think like scientists,” Simon Baron-Cohen, director of the Autism Research Center at the University of Cambridge, told Scientific American magazine. "They look for patterns, and, in science, you are always looking for patterns that you hope reflect a natural law."

But the study also found such students are much less likely than their peers to enroll in college at all. This conclusion brings to the forefront the need for parents and educators to encourage kids with special needs to pursue higher education and thus help boost overall STEM participation.

#### Primary and Secondary STEM Education Key For Students With Disabilities

Georgia Tech, Engineering and design research center, 2012

(Georgia Tech, *Georgia Tech*, “Accommodating Students with Disabilities in Science, Technology, Engineering, and Mathematics (STEM),” Summer 2012, http://www.catea.gatech.edu/scitrain/accommodating.pdf, 6 July 2017, RV).

The NSF has placed a high priority on the cultivation of a diverse science, technology, engineering, and mathematics (STEM) workforce in the United States (NSF, 1996, 2000, 2004). This concern has been echoed by the National Science Board in its 2010 report, Preparing the Next Generation of STEM Innovators. This study presents two mutually reinforcing observations. First, the nation’s long-term prosperity is dependent upon “talented and motivated individuals who will comprise the vanguard of scientific and technological innovation.” Second, every student in the United States “deserves the opportunity to achieve his or her Page 10 full potential” (National Science Board, 2010). In short, excellence and equity in STEM education are interrelated. This goal can be realized only if underrepresented groups receive a larger proportion of the nation’s STEM degrees. Americans with disabilities historically have been excluded from postsecondary STEM education, as these students face significant barriers to access and inclusion in such programs. Research has demonstrated that when compared to peers without documented disabilities, students with disabilities enroll in and complete postsecondary education at only half the rate. Yet the problem is not limited to postsecondary education. Accommodating students in K-12 science and mathematics courses is often problematic, and many students with disabilities are not integrated within the general classroom and are relegated to learning in special education classrooms that do not prepare them for the rigors of university education in STEM fields. Statistics demonstrate how representation of students with disabilities decreases longitudinally over the course of the STEM education process. According to IDEA, individuals with disabilities comprise about 13.7 percent of the school-aged population. However, the same demographic makes up only 11 percent of all students enrolled in undergraduate education and 9-10 percent of Page 11 students who are enrolled in STEM majors. This latter figure (See Figure 1.1) includes over 173,000 students in the United States, a significant proportion of the postsecondary population at risk of exclusion from STEM education.

#### Applied STEM courses support students with disabilities

Gottfried, PhD University of California, Santa Barbara, USA , and Sublett, PhD University of California, Santa Barbara, ‘17

(Michael A., and Cameron. "Does Applied STEM Course Taking Link to STEM Outcomes for High School Students With Learning Disabilities?." Journal of Learning Disabilities (27 February 2017): 0022219417690356., RV)

Students With LDs Even though the vast majority of students with LDs are educated along with the general student population (Cawley, Hayden, Cade, & Baker-Kroczynski, 2002), evidence suggests traditional STEM courses may not be ideally suited for them. Traditional approaches to STEM teaching rely heavily on text-based instruction and lecture. This creates an emphasis on language-based learning and consequently places students with LDs, many of whom experience Gottfried and Sublett 3 vocabulary and reading deficits, at a disadvantage (Parmar, Deluca, & Janczak, 1994). This disadvantage is further compounded by the fact that many students with LDs also experience issues such as attention-deficit disorder or attention-deficit/hyperactivity disorder (Steele, 2004).

On the other hand, being structured around skillsbased and hands-on modes of learning, applied STEM courses appear promising for students with LDs. Indeed, previous research has indicated that students with LDs benefit from and even prefer activity-based learning (Brigham et al., 2011). Palincsar, Magnusson, Collins, and Cutter (2001) found students with LDs made substantial gains in science comprehension through a handson instruction intervention. Additionally, Scruggs, Mastropieri, Bakken, and Brigham (1993) found activities-based science instruction more effective than textbased instruction for eighth-grade students with LDs. While it is important that skills-based curriculum (e.g., applied STEM) does not necessarily translate into skillsbased pedagogy, there is convincing reason to believe applied STEM courses can provide the kinds of interactive and inquiry-based learning environments evidence suggests is conducive to improved STEM learning for students with LDs. Therefore, given the evidence that students with LDs struggle in traditional STEM courses, which often emphasize approaches to learning (e.g., reliance on textbooks, verbal learning, and memorization) inimical to the ways students with LDs learn best (Brigham et al., 2011; Dexter et al., 2011), and given the aforementioned skill sets that applied STEM courses emphasize (e.g., learning through activities and engagement), applied STEM courses might be one way to make STEM curriculum more accessible and efficacious for diverse learners (Plank, DeLuca, & Estacion, 2008).

Previous research has found that for the general student population, the odds of taking advanced mathematics and science coursework later in high school dramatically improve after having taken applied STEM courses early in high school (Gottfried, 2015). Thus, early exposure to these applied STEM courses might also have the potential to boost students with LDs through the STEM pipeline, given the characteristics of the applied STEM courses as described above. That said, no research has explored patterns or effects of early enrollment in applied STEM coursework for students with LDs. This study is one of the first to do so.

## Neolib

#### Turn – STEM increases education awareness of neoliberalism which allows discourse for more ethical and empowering purposes

**Rabbi ’17** (Department of English, The Pennsylvania State University, University Park, PA) (Shakil Rabbi, “Socialization in the Neoliberal Academy of STEM Scholars: A Case Study of Negotiating Dispositions in an International Graduate Student in Entomology”, page #1, EEM)

This article examines how neoliberal orders of discourse shape the dispositions to academic literacies of an international graduate student in entomology. As this ideology of market logic consolidates its hegemony in universities of excellence and US culture at large, academic socialization and disciplinary activities increasingly aim to create scholarly dispositions and subjectivities that align with it. Such processes are further complicated by the backgrounds of international graduate students—an ever-larger proportion of graduate students in STEM who often hail from educational cultures significantly different from the U.S. Our analysis of an international graduate student’s literacy practices in terms of motivations and outcomes shows that his literacies echo the dispositions pushed by neoliberal ideologies, but are not over-determined by them. Rather, as our case study illustrates, his socialization is a layered process, with ambiguous implications and strategic calculations making up literacies and disciplinary outcomes. We believe closely mapping such tensions in literacies and socialization processes increases humanities scholars’ awareness both of the potential contradictions of educating international graduate students into the neoliberal model and of how the university can still be used to develop the dispositions needed to renegotiate the neoliberal order of discourse for more ethical and empowering purposes.

#### Implementing neoliberal ideas through STEM helps ‘neoliberal pressures for more ethical and empowering purposes’ on a global scale

**Rabbi ’17** (Department of English, The Pennsylvania State University, University Park, PA) (Shakil Rabbi, “Socialization in the Neoliberal Academy of STEM Scholars: A Case Study of Negotiating Dispositions in an International Graduate Student in Entomology”, page #23, EEM)

This layering is good news, though it does still reproduce neoliberal norms. It testifies to the existence of spaces for progressive scholars to pursue altruistic, community-minded, and ecologically friendly research in academia. Bringing such negotiation strategies into the open can have far-reaching implications. We can make scholars in the STEM disciplines and humanities aware of the competing interests in their academic work and how they are interwoven in their research and writing at diverse scales. A continued sensitivity to orders of discourse will also help scholars and researchers understand how progressive interests at the local scale might have compromising implications at more global scales. Or how market constraints at the macro-order can be exploited for social and environmental good at the local level. This story also sheds light on the cultural adjustments being made by an international graduate student in the face of the neoliberal context of US academe—adjustments that enables him to continue in his socialization activities without disinvesting in the process by finding outlets for his progressive dispositions in work outside of academia. This study provides promising insights for both humanities and STEM disciplines about the ideological adjustments international students might make if they are to succeed in US academe. It suggests that novice STEM scholars can adopt creative and critical scholarship even as they pursue the hard academic literacy practices required of socialization into research or professional disciplines. It is possible for humanities scholars to help STEM scholars negotiate the tensions between neoliberal dispositions and oppositional ethical dispositions as Gunter does. Humanities scholars in fields such as rhetoric, literacy, and languages can develop pedagogies and mentoring practices to socialize STEM students into the strategic negotiation practices that facilitate work in and outside of academia, recognizing that certain orders of discourse are cultural norms must be negotiated cautiously because they cannot be entirely rejected. Rhetorician Rebecca Dingo (2013) argues that we should adopt a “networking pedagogy” in academic literacies to make students aware of how different levels of social action and communication have geopolitical implications. Such pedagogies could help Gunter and other scholars in the STEM disciplines identify how to renegotiate the seemingly intractable neoliberal pressures for more ethical and empowering purposes in their academic literacies.

#### Humanity Scholars can work with those in STEM will allow those in STEM it enter the ‘real world’ challenges that tear down this mindset

**Rabbi ’17** (Department of English, The Pennsylvania State University, University Park, PA) (Shakil Rabbi, “Socialization in the Neoliberal Academy of STEM Scholars: A Case Study of Negotiating Dispositions in an International Graduate Student in Entomology”, page #22, EEM)

Showing that graduate education in the US context can be modified to facilitate community-minded activities might be of relevance to international graduate students who intend to work in countries where academic work is not organized in the same way as the US disciplines. This point, which academic socialization scholars recognize, needs to be addressed in graduate student education (Weidman et al. 2001). Pedagogies of reflexivity are an ideal tool to enable this process. Humanities scholars are well positioned to advocate for such outcomes of academic socialization. Their scholarly work, after all, is well attuned to developing reflexivity and critical dispositions. Humanities scholars can work with the STEM disciplines so that they can teach for other ways and trajectories of disciplinary work, and develop socialization structures that prepare STEM students to contribute to local communities and fit into professions where the metrics of success are not blind to everything but research excellence. Engagement in the socialization of STEM scholars is bound to be of value to humanities too. While scholars in rhetoric, linguistics, and communication have an interest in theorizing notions such as neoliberalism, academic discourse, and scientific rhetoric, engaging closely with STEM scholars in their writing and socialization would introduce them to “real world” challenges that complicate their theorization and pedagogies constructively.

## Settler Colonialism

#### No link – inquiry-based science exploration and exposure to technology are compatible with indigenous culture

Miller et al, Assistant Professor of Science Education at the University of Idaho, 2012

(Brant G., “Fostering Indigenous STEM Education: Mobilizing the Adventure Learning Framework through Snow Snakes,” *Journal of American Indian Education*, 5-16-2012, 67-68, RCU).

Inquiry-based instruction offers a strategy to bridge the divide between Indigenous and Western epistemologies. An example of utilizing science as inquiry is the science-technology-society (STS) approach offered by Yager (1993). An STS approach provides students an opportunity to explore a question or problem that is relevant and meaningful to them. In this way, student-centered inquiry can take place that engages scientific and technological tools within human experiential contexts (Yager et al., 2009). The essential features of STS, according to the National Science Teachers Association (NSTA) position statement include:

(1) Student identification of problems with local interest and impact; (2) the use of local resources (human and material) to locate information which can be used in problem resolution; (3) the active involvement of students in seeking information that can be applied to solve real-life problems; (4) the extension of learning beyond the class period, the classroom, the school; (5) a focus on the impact of science and technology on individual students; (6) a view that science content is more than concepts which exist for students to master on tests; (7) an emphasis upon process skills which students can use in their own problem resolutions; (8) an emphasis upon career awareness — especially careers related to science and technology; (9) opportunities for students to experience citizenship roles as they attempt to resolve societal issues they have identified; (10) identification of ways that science and technology are likely to impact the future; and (11) some autonomy in the learning process as individual issues are identified and used as the basis for science study. (Yager et al., 2009, p. 187-188)

Building on this approach is the idea of a place-based education offered by Sobel (2004). The interactions of the natural and built environment along with sociological factors of a place are combined for meaningful learning within a place-based education approach. This is especially true in Indigenous settings where the physical and cultural environment has shaped individuals, families, and communities and has engendered a deep connection to the land for thousands of years (Barnhardt & Kawagley, 2005). From a science education perspective, a place-based education approach carefully considers characteristics associated with a unique location geographically, the inherent interdisciplinary nature of a place, and the engagement of entities outside of the school setting (Semken & Butler Freeman, 2008).

The role of technology in connecting students to place should also be considered. Although there is scant research on the topic to date, using technological affordances to support a sense of place in students’ learning can have powerful pedagogical implications. As technologies continue to evolve to accommodate sensory stimuli that attach students to place, the accessibility to those technologies will open up fruitful avenues for pedagogical inquiry for diverse learning needs.

## Hawaii PIC

#### Hawaii is key for national cyber security – but the STEM programs in the state need federal subsidies to be sustainable

Shen, Lt. at ANG, and Nettis, Cpt. At USAF, 2016

(Francis and Michael, *Signal,* “Military, Government Focus on Statewide Cyber Education: STEM in Hawaii is boosted to sow seeds for cyber personnel,” 4-1-16, <http://www.afcea.org/content/?q=Article-military-government-focus-statewide-cyber-education>, 7-14-17, APW)

As the U.S. Cyber Command recruits 6,200 cyber warriors for teams positioned around the world, it must deliberately work to develop a new generation of cyber-minded warfighters rather than simply repurpose existing service members to meet its goal. The nation may not be prepared to defend cyberspace unless it emphasizes key skills early in students’ educational development. Many of these efforts must begin locally, and some military forces already are working in that direction.

The U.S. Cyber Command’s (CYBERCOM’s) commander, Adm. Michael S. Rogers, USN, says cybersecurity is all about partnerships. “There is no single group, there is no single nation, there is no single segment … there is no single entity that has all the answers,” he states. “This is a challenge that will require us to work together in collaborative and innovative ways.”

Across Hawaii, military units and individual service members are tackling this challenge head-on. For example, Lt. Col. Bob Takao, USA (Ret.), has worked at both the collegiate and high school levels to further cybersecurity education. After he finished his Army career as a professor of military science with the University of Hawaii (UH) ROTC detachment, he took a position at a local high school leading its JROTC detachment and mentoring its CyberPatriot teams. Through these efforts, he can share his military experiences and improve cybersecurity knowledge in multiple parts of the education system.

Capt. Cliff Bean, USN, the National Security Agency (NSA) Hawaii commander, has advocated for closer relationships between his organization and the local community. He saw the benefit in partnering with UH for GenCyber, a summer cybersecurity camp experience for K-12 students and teachers. Local military cyberspace experts volunteered as course instructors, which served the twofold purpose of immersing young students in the cyberspace culture and encouraging them to pursue careers in the military.

Those students will be needed in the future to fill jobs in the rapidly growing science, technology, engineering and mathematics (STEM) fields. According to the U.S. Commerce Department, these jobs “will grow 17 percent by 2018—nearly double the growth for non-STEM fields. By 2018, the U.S. will have more than 1.2 million unfilled STEM jobs because there will not be enough qualified workers to fill them. STEM is where jobs are today and where the job growth will be in the future.”

More cyber experts are needed, and even more so, they are needed in the military or directly supporting it. Hawaii, home to the U.S. Pacific Command and its component headquarters, possesses potential to be a prime source for this manpower. However, by 2017, Hawaii is projected to have 16,000 more jobs requiring STEM skills than it has qualified workers, and the state ranks only 47th in the number of STEM degrees awarded per 100,000 inhabitants. Academia and public and private organizations in the state have taken notice and actively are pursuing solutions. A concerted effort is underway to include education and business sectors to turn this around. David Lassner, the UH System president, states that an important part of this is “looking at current and emerging work force needs in the state of Hawaii and then designing both education and training programs that reach all the way down to public schools through public higher education at all 10 UH campuses and into the work force.” Both UH and the state vigorously have pursued grants and programs not only at the university level but also at the K-12 level.

Another example of the state’s strategic relationship with the military is the recent appointment of Col. Reynold T. Hioki, ANG, the Hawaii Air National Guard’s top communications officer, as Hawaii’s cybersecurity resiliency coordinator. Tapping into his experience with Air Force cyber operations, Col. Hioki oversees cybersecurity and cyber resiliency matters, including economic, education and infrastructure security. He also was vital to the creation of the Po‘oihe Cyber Security Exercise between the state of Hawaii, the National Guard and industry to rehearse cybersecurity responses.

Many of the state’s efforts urge industry, government and military experts to share knowledge and serve as mentors for programs that teach STEM principles and cybersecurity skills to young students. Specific efforts integrate Hawaii’s military, education and industry organizations to introduce STEM and cybersecurity to the next generation.

Two programs, for example, leverage service members to serve as mentors and volunteers during robotics competitions for students. The concept of robotics involves all the major STEM disciplines and moves theory into world application—letting students experience their creations. The nonprofit Friends of Hawaii Robotics manages nine robotics programs statewide, including FIRST Robotics and VEX Robotics competitions. FIRST Robotics boasts impressive results in fostering STEM skills and a lifelong passion for science: Almost 90 percent of FIRST alumni are in STEM fields as students or professionals. VEX students, with guidance from their teachers and mentors, use the VEX Robotics Design System to build innovative robots and score the most points possible in qualification and elimination matches and skills challenges.

In tandem with these efforts, Hawaii is working to introduce cybersecurity training to students earlier—establishing CyberPatriot teams at high schools and starting programs at the middle school level. The Air Force Association’s CyberPatriot, a national youth cyber education program featuring the National Youth Cyber Defense Competition, is open to all high schools and middle schools in the nation as well as JROTC units, Civil Air Patrol composite or cadet squadrons and Naval Sea Cadet Corps units. Hawaii has a total of 53 teams registered across the state. In 2015, the Mililani JROTC team took top honors in the state and narrowly missed earning a spot in the national championships in Washington, D.C., finishing third in its division.

Grants and funding from a variety sources also support STEM injection into school curricula. For example, Project Lead the Way is improving STEM representation for K-12 students and teachers. The national program provided nearly $2.2 million in funding to help 48 Hawaii schools. The idea is to shift STEM activities from extracurricular pursuits to a fully integrated educational experience. Upon entering college, students ideally will have developed a passion for STEM disciplines and pursue degrees and eventual careers in these fields.

At the collegiate level, Hawaii universities are incorporating cybersecurity actively into their curricula. Educators at UH–West Oahu realized the importance of improving the cyber talent pool in Hawaii and partnered with industry and government to create a new Bachelor of Applied Science in information security and assurance (BAS-ISA). This is the first public institution in Hawaii as well as the Pacific region offering this type of degree. The development of the degree program demonstrates a critical capability to link multiple facets of the community to identify economic needs and create a sustainable work force plan.

In 2015, UH at Manoa achieved a significant milestone in becoming a premier institution for cybersecurity. The NSA and the Department of Homeland Security designated the school as a National Center of Academic Excellence in Cyber Defense Research (CAE-R). This prestigious designation will help attract students interested in cybersecurity degrees and retain homegrown talent, supporting the local economy.

The UH System also supports cyber knowledge through all stages of student development with the GenCyber program. Last summer, UH, in partnership with the University of Alaska, the National Science Foundation and the NSA, hosted the first GenCyber Camp in Hawaii. The program’s goals are to help all students understand correct and safe online behavior; increase interest in cybersecurity and diversity of the nation’s cybersecurity work force; and improve teaching methods for delivering cybersecurity content in K-12 computer science curricula.

In the past year, Hawaii also has made significant progress as a site for startups and accelerator programs. In 2015, UH’s XLR8UH was recognized by the U.S. Small Business Administration (SBA) as one of the nation’s most elite accelerators during the SBA’s Growth Accelerator Fund Competition. To date, 11 companies have graduated from the program, and the SBA has provided more than $4 million in follow-on funding. Overall, Honolulu can boast three incubators, five accelerators, six investment funds, six startup-focused organizations and three co-working spaces. Flowing through all this is $50 million to $100 million in capital, according to estimates from Sultan Ventures, one of the accelerators. As Hawaii becomes a tech startup hub, the military can capitalize on small local businesses to create capabilities for cyber warfighters.

Another example of cooperation between the state, military and industry is the Po‘oihe cyber exercise, now in its fourth year. The exercise is sponsored by the Hawaii National Guard and was integrated into Vigilant Guard 2015, an annual regional exercise, and Makani Pahili 2015, an annual state hurricane preparedness exercise. Networks were developed in coordination with UH and hosted in the university’s Information Technology Center. In the cyber exercise scenario, a Category 4 hurricane has swept through the state, paving the way for a pandemic outbreak and a cybersecurity attack. Addressing cybersecurity within the hurricane exercise begins to expand the doctrine for Defense Support of Civil Authorities to which the National Guard is uniquely positioned to provide. The Po‘oihe exercise also provides an opportunity to strengthen Hawaii’s international relationships. Last year’s exercise marks the second time individuals from Hitachi of Japan have participated.

Yet, the state has room for improvement. According to a 2015 WalletHub study assessing STEM careers in the top 100 metropolitan regions in the United States, Hawaii ranked in the bottom five overall and was the worst-ranked for median wage for STEM workers and housing affordability. Yet Hawaii as a whole is embracing the need for change and continues to pursue opportunities to diversify its economic pillars. Hawaii Gov. David Ige noted in his January State of the State address his proposal to provide $30 million in funding to innovative industries over the next six years. Additionally, USA Funds granted $4.6 million to the University of Hawaii Foundation with the purpose of addressing STEM deficits to create a statewide work force solution. This infusion of cash, along with educational and other initiatives, sets Hawaii up for a major STEM-based economic boom.

#### STEM programs in Hawaii are finding a foothold, but they cannot exist on state dollars alone.

Young, Director of K-12 WIT STEM program, 2017

(Isla, *Women in Tech*, “8th Annual Hawaii STEM Conference Empowers New Generation of STEM Innovators,” May 2017, <http://www.womenintech.com/8th-annual-hawaii-stem-conference-empowers-new-generation-of-stem-innovators/>, 7-15-17, APW)

HONOLULU – On May 1-2, more than 1,000 students, educators, industry partners and community leaders throughout the state and the nation gathered for the 8th Annual Hawaii STEM Conference – an empowering STEM event dedicated to engaging a new generation of Science, Technology, Engineering and Math (STEM) innovators in Hawaii.

Presented by Maui Economic Development Board’s (MEDB) Women in Technology (WIT) project, the conference was held for the first time at the Hawaii Convention Center on Oahu. This year’s theme, “Download Knowledge. Upload Service,” invited students to demonstrate and showcase the skills and abilities they have gained to help create a thriving future, not only for Hawaii, but the world.

Students and teachers representing intermediate and high schools from every island across the state of Hawaii participated in this regional technology conference which featured 40+ student breakout sessions, 30+ teacher breakout sessions, 14 software competitions, a STEM playground, a formal awards banquet (“The STEMMYS), and exhibit presentations.

This year’s Hawaii STEM Conference competition winners were: CAD Showcase Application Competition – Brandon Marcos, Mayumi Fulgencio (Kauai High School) Digital Storytelling Competition – Brandon Marcos (Kauai High School) Game Design Competition – Henry Lonborg (Roosevelt High School) GIS – Storytelling with Maps Competition – Pag-asa Fulgencio (Kauai High School) Music – instrumental Competition – Trey Metoyer (King Kekaulike High School) Music – lyrical Competition – Emma Rich (King Kekaulike High School) Photography Competition – Czhara Jan Saclayan (Maui High School) T-Shirt Design Competition – Shanelle Ancheta (Maui High School) STEM Career Interview Competition – Janine Harris (King Kekaulike High School) On-Site Video Competition \* – Caleb Soo Hoo, Chris Kau (Baldwin High School) On-Site Royer Studios Competition – Micah Ban, George Villanueva, Taylor McCary, Taniya Whittman-Valdez, Kalia Kapisi (Maui High School) ArcGIS Online U.S. School Competition (Hawaii finalists): Pag-asa Fulgencio (Kauai High School); Courtney Cadiz, Jett Bolusan, Braiden Paa (Maui High School); Amanda Schiff (Kealakehe High School); Kau’iwai Poepoe-Mollena, Kamahina Kaiama-Kanuha (Molokai High School HLIP) Intermediate School PIA Competition – Czerena Bayle, Jadynne Zane, Cynthia Mercado Santana, Jaycie Iha (Maui Waena Intermediate School) High School PIA Competition – Haven-Luper-Jasso, Brooke Kanna, Marlena Lang, Leanna Thesken (Kauai High School) 3Cs Intermediate – Maria Inong, Alyson Kar, Logan Tsukiyama, Hannah Okamoto (Maui Waena Intermediate School) 3Cs High School – Yasha Ronquillo, Carissa Pagan, Summer Montehermoso, Tiffany Banggo (Maui High School) To view all the winning videos, visit http://www.hawaiistemconference.com.

During the conference, Hawaii State Governor David Ige announced the offering of a Digital Alliance program for high school students across the State of Hawaii in the summer of 2018.

A partnership between Microsoft, Maui Economic Development Board’s Women in Technology Project (WIT) and the State of Hawaii; the Digital Alliance program will provide students with the knowledge and skills to succeed in computer science and/or in any STEM-related careers. The program is designed to promote critical and creative thinking; encourage collaboration with other students; and intersect with industry professionals in various Science, Technology, Engineering and Math (STEM) fields.

“Microsoft has done so much in our community and they are committed to assuring that many of you will have access to a lot of the great technology that is really defining the future for all of us,” said Hawaii State Governor David Ige. “And so the Maui Economic Development Board, State of Hawaii and Microsoft have formed a Digital Alliance partnership because we do understand that software development and access to the latest and greatest software tools gives our young people opportunities to explore all of these technologies. In today’s world anything can be done anywhere and it really is about who is brave enough to take it on and solve our world’s challenges.”

While this year’s conference excelled in engaging students and educators on a myriad of hands-on STEM activities, competitions, and access to the latest technologies; it was the overarching mission of the state’s largest STEM conference that brought home the true impact of STEM education.

According to Leslie Wilkins, MEDB Vice President, “Virtually every field in every sector of the economy whether a small business or major industry is needing STEM professionals – people who are literate and fluent in various technology skills. But just teaching current technology applications does not serve our children well, because technology changes so rapidly. So we need to focus on empowering our youth to be self-directed learners, to be resilient, to stay current and be adaptive to change and not be scared by it. And, most importantly, to have the confidence that they can do it. Instilling these values are at the heart of MEDB’s STEMworks™ program and what this conference is all about.”

#### STEM grants to Hawaii come from the feds and are key to defense R&D, but will expire soon

Hawaii State Department of Education, 2015

​​​​​(*Hawaii State Department of Education,* “HIDOE receives $1.5 million grant for STEM education at eight West Oahu schools,” 9-29-15, <http://www.hawaiipublicschools.org/ConnectWithUs/MediaRoom/PressReleases/Pages/DODEA-Grant.aspx>, 7-15-17, APW)

HONOLULU – The Hawaii Department of Education (HIDOE) has received a $1.5 million grant from the Department of Defense Education Activity (DoDEA) Partnership that will allow the Campbell-Kapolei Complex Area to provide Science, Technology, Engineering and Mathematics (STEM) learning opportunities to kindergarten through eighth grade students at eight military-impacted schools over the next five years. These schools will use Project Lead The Way (PLTW), the nation’s leading comprehensive research-based STEM curriculum, to enhance STEM academic achievement, as well as to equip the students with the skills necessary to pursue STEM-related careers.

“The grant will allow students new opportunities to explore STEM subjects and develop these skills critical to the workforce of today and the future,” said Superintendent Kathryn Matayoshi. “We want to thank our partners at DoDEA for this generous grant that will help to enhance our STEM curriculum at eight West Oahu schools.”

The grant includes seven elementary schools: Barbers Point, Ewa Beach, Holomua, Iroquois Point, Kapolei, Keoneula and Mauka Lani; along with Ilima Intermediate School. Each of these eight schools has significant populations of military-dependent students whose parents serve in the various branches of military service.

“The goal of this partnership program is to improve academic achievement of non-high-needs and high-needs military-dependent students in kindergarten through eighth grades,” said Heidi Armstrong, Campbell-Kapolei Complex Area Superintendent. “We are honored to be a first time DoDEA grant recipient and we look forward to boosting STEM learning opportunities at these schools to get students college and career ready.”

PLTW also has a built-in STEM Professional Development component that offers teachers tools for robust and flexible instructional support leading to increased academic achievement, as well as an ongoing professional community.

“I am very excited to be able to move STEM education for our students forward via the PLTW curriculum and we will also be integrating research-based strategies, such as Response to Intervention, K-8 Advancement Via Individual Determination (AVID), and extra-curricular activities during each year of the five-year grant,” said Project Director Hope Espinda.

The five-year grant will end in 2020.​

# Neg

## States CP

#### State is necessary—focused regulation is the best.

Advocacy STEM, 2017

(STEMX, “How Washington STEM advocates for public funding,” 1-26-17, http://www.stemx.us/news/2017/01/how-washington-stem-advocates-for-public-funding/, accessed 7-18-17).

Q: What have you learned from efforts to acquire such state funding? What would you tell other STEM groups looking for dollars from their state legislatures about a successful approach?

A: Working to acquire state funding is a long game. We have found it is key to work with regional networks to build ongoing relationships to identify and support community needs. The state can and should be a crucial partner in supporting STEM education, and, as with any other supporter, it is key to identify their interests and needs, address them and move forward in order to support Washington students.

#### Federal STEM fails—too broad.

Burke, Director of Center for Education Policy, 2011

(Lindsey, Heritage Foundation, ““Educate to Innovate”: How the Obama Plan for STEM Education Falls Short,” 1-5-11, http://www.heritage.org/education/report/educate-innovate-how-the-obama-plan-stem-education-falls-short, accessed 7-18-17, AS).

President Obama’s Educate to Innovate initiative has provided billions in additional federal funding for science, technology, engineering, and mathematics (STEM) education programs across the country. The Administration’s recognition of the importance of STEM education— for global competitiveness as well as for national security—is good and important. But the past 50 years suggest that federal initiatives are unlikely to solve the fundamental problem of American underperformance in STEM education. Heritage Foundation education and national security analysts explain that, though Educate to Innovate is intended to raise the U.S. “from the middle to the top of the pack in science and math,” the federal program’s one-size-fits-all approach fails to remedy the underlying problems of academic performance and does not plug the leaky pipeline in the American education system.

#### States Key—more aggressive reform.

Lips, Senior Policy Analyst, 09

(Dan, Heritage Foundation, “A New Approach to Improving Science, Technology, Engineering, and Math Education,” 4-15-09, http://www.heritage.org/education/report/new-approach-improving-science-technology-engineering-and-math-education, accessed 7-18-17, AS).

Given the importance of addressing these needs, policymakers should recognize the need for a new approach to STEM education in America. Instead of continuing to pursue elusive federal solutions, national and state policymakers should recognize the need for systemic K-12 education reforms at the state and local levels. Aggressive reform is the most promising strategy for fixing the leaky pipe­line in STEM education and for increasing the pop­ulation of American students prepared to pursue these fields in college and beyond. State policy­makers and the private sector should support reforms that allow greater innovation to improve STEM education, including new school models, providing incentives for teacher excellence, and supporting other initiatives to promote learning in STEM fields.

## Spending DA

#### STEM education puts a strain on the economy – not only does it cost too much upfront, but it doesn’t pay off in the long run.

Kiesel, Education writer, 14

(Laura, *The Street*, “Why Emphasis on Math And Science In Schools Is Hurting Our Economy,” 10-1-14, <https://www.thestreet.com/story/12899236/4/why-emphasis-on-math-and-science-in-schools-is-hurting-our-economy.html>, 7-19-17, APW)

NEW YORK (MainStreet) — There’s been a lot of buzz about the surge of STEM (science, technology, engineering and math) fields as hot career tracks that can ensure better financial security while bolstering our overall economy. But, counterintuitively, the stress on STEM curricula in schools is heightening high school drop-out rates -- a trend that could actually have adverse effects on the economy.

According to the U.S. Department of Labor, the average starting annual salary is $62,655 for an engineer and $59,221 for those with a computer science degree. By comparison, those who graduate with degrees in the humanities and social sciences are earning an average annual salary ranging from $36,988 to $40,668 -- that is, if they are lucky enough to even find a stable job. Analyzing unemployment among 2007-08 graduates, the Bureau of Labor Statistics also found that those with degrees in computer and math had some of the lowest unemployment rates at 6%.

These findings are partially what prompted the Obama Administration to commit $3.1 billion to improve national STEM education efforts, with roughly $450 million directed toward increasing the number of trained STEM educators and developing new STEM programs.

That strategy, of course, is at odds with new research indicating that STEM emphasis in schools is raising drop-out rates. The study—which was conducted at Washington University in St. Louis, funded by the National Institute on Drug Abuse (NIDA) of the National Institutes of Health (NIH) and published this summer in the journal Educational Researcher—found that dropout rates increased by three percentage points in those schools that required six math and science courses, from 8.6% to 11.4%.

“There’s been a movement to make education in the United States compare more favorably to education in the rest of the world, and part of that has involved increasing math and science graduation requirements,” Andrew D. Plunk, PhD, a postdoctoral research fellow in the Department of Psychiatry at Washington University School of Medicine and lead author of the study, said in a press release. “There was an expectation that this was going to be good for students, but the evidence from our analyses suggests that many students ended up dropping out when school was made harder for them.”

Plunk and his colleagues studied census data that tracked the academic performances of high school students in states with more rigorous math and science requirements as compared to students in states where these requirements were less stringent. The researchers analyzed performances in 44 states where more stringent graduation requirements went into effect during the 1980s and 1990s.

They found that dropout rates varied significantly across gender and racial lines, adding as much as five percentage points.

“As graduation requirements were strengthened, high school dropout rates increased across the whole population,” said Plunk. “But African-Americans and Hispanics were especially affected.”

In particular, the dropout rate increased 2.5% and 2% among Hispanic and African-American males, respectively. Though the overall dropout rate for African-American males is 19%, those who attended schools in states with the most stringent math and science graduation requirements, the dropout rate rose to 23%. Meanwhile, dropout rates for Hispanic females, increased by just over 5.3 percentage points.

“Going forward, state policymakers must understand that students can’t take more math and science courses if they quit school,” said William F. Tate, PhD, the Edward Mallinckrodt Distinguished University Professor in Arts & Sciences and co-author of the report.

Tate also worries about the far-reaching societal impacts of increased dropout rates.

“Individuals who drop out of high school report more health problems and lower quality of life," Tate said. "Higher dropout rates also can strain the welfare system, which can affect people’s health.”

This study isn’t the first to imply that STEM subjects aren’t for everyone or that its emphasis can adversely impact academic performance.

A collaborative study by Ralph and Todd R. Stinebrickner of Berea College in Kentucky and the University of Western Ontario for the National Bureau of Economic Research found that though STEM majors are initially popular with incoming college students, more than half the students who start out majoring in a STEM subject wind up changing over to a social science or humanities-oriented major.

The overwhelming responses of the more than 650 students surveyed at Berea College indicated that those who changed out of a STEM major did so not because of large amount of work, which they expected, but because they were getting poorer grades than anticipated; many switched in order to shore up their grade point averages.

Overall, Plunk believes having a more versatile and flexible education model is preferable to a “one-size-fits-all” method in order to maximize academic success and boost graduation rates.

“I think our findings highlight the need to anticipate there may be unintended consequences, especially when there are broad mandates that, in effect, make high school coursework harder,” said Plunk.

## Politics

#### Science funding is a hugely partisan issue

**Funk, Director of Science and Society Research at PEW, 2017**

(Cary, *PEW Research*, “Democrats far more supportive than Republicans of federal spending for scientific research,” 5-1-17, http://www.pewresearch.org/fact-tank/2017/05/01/democrats-far-more-supportive-than-republicans-of-federal-spending-for-scientific-research/, 7-17-17, MM).

There is a wide and growing partisan gap in the U.S. over how much government should spend for scientific research.

Six-in-ten Democrats and Democratic-leaning independents back increased federal spending for scientific research, up from 46% four years ago. But just a third of Republicans and Republican leaners support increased spending for scientific research today, up modestly from 25% in 2013.

Among the public overall, 48% of Americans say they would increase spending for scientific research, according to a [Pew Research Center survey](http://www.people-press.org/2017/04/24/with-budget-debate-looming-growing-share-of-public-prefers-bigger-government/) conducted in April, up 11 percentage points since 2013. Just 12% of Americans say scientific research funding should be decreased, and roughly four-in-ten (38%) think it should stay the same.

The partisan gap in views of spending for scientific research has grown steadily over time. In 2001, there was no significant divide between parties over federal spending for scientific research. Since then, Republican support trended steadily downward before a modest uptick in recent years, while Democratic support remained relatively steady before rising significantly in the current survey. The partisan gap in support for more spending was 16 percentage points in 2011 and now stands at 27 points.

President Donald Trump’s proposed budget in March [raised the possibility of deep funding cuts](https://www.washingtonpost.com/national/health-science/trumps-budget-would-slash-scientific-and-medical-research/2017/03/15/d3261f98-0998-11e7-a15f-a58d4a988474_story.html?utm_term=.58c66ec729f1) for a number of [federal agencies](http://www.nature.com/news/us-science-agencies-face-deep-cuts-in-trump-budget-1.21652) with science research missions, including the Environmental Protection Agency, the National Institutes of Health, the National Science Foundation and NASA. [According to analysis](https://www.aaas.org/news/trump-administrations-science-budget-toughest-apollo) by the American Association for the Advancement of Science, the president’s proposed budget would lead to some of the deepest cuts for science and engineering research in more than 40 years. Concerns over the funding outlook for scientific research were among issues raised by people participating in the [March for Science](https://www.nytimes.com/2017/04/17/science/march-for-science-voices.html?_r=0) held April 22.

#### STEM education marginalizes students with disabilities

Gottfried, PhD University of California, Santa Barbara, USA , and Sublett, PhD University of California, Santa Barbara, ‘17

(Michael A., and Cameron. "Does Applied STEM Course Taking Link to STEM Outcomes for High School Students With Learning Disabilities?." Journal of Learning Disabilities (27 February 2017): 0022219417690356., RV)

For the general student population, prior research has established a connection between completing high school STEM coursework and positive STEM outcomes throughout the pipeline, as mentioned above. The fact that students with LDs are underrepresented in STEM courses has both individual and national implications. As for the former, the lack of success and persistence of students with LDs in STEM fields limits educational and employment opportunities for this group of students (Moon, Todd, Morton, & Ivey, 2012; National Science Foundation, 2013). While students in the general population are being exposed to (and succeeding in) high school STEM courses that would allow them to pursue STEM areas of study later on, students with LDs are not being exposed to—nor are they gaining—the same levels of expertise in these fields even though research suggests students with LDs are highly capable of succeeding in STEM classes, given proper accommodations (Dexter, Park, & Hughes, 2011; Therrien et al., 2011). This is problematic considering our economy is projected to benefit those individuals with the most technical and STEMrelated skill sets (Vilorio, 2014). According to the Bureau of Labor Statistics (Vilorio, 2014) and the U.S. Department of Commerce (Langdon, McKittrick, Beede, Khan, & Doms, 2011), overall STEM employment will grow faster than the rate of growth projected for all other occupations over the next decade. Therefore, it seems highly likely that educational and employment stratification for students with LDs will worsen: As the economy continues to favor strong STEM skills, only those students who pursue and persist in these areas will benefit as such.

On a national level, the lack of participation among students with LDs in STEM fields has the potential to trigger a number of spillover effects. First, the exclusion of students with LDs from STEM areas of study creates a restricted labor supply in STEM industries. Because employers report difficulty filling STEM occupancies for lack of skills (Rothwell, 2014), excluding students with LDs from the STEM pipeline has the potential to exacerbate this labor market imbalance. An additional national-level concern involves the reduced benefits that arise with workplace diversity (Blickenstaff, 2005; Carnevale, Smith, & Melton, 2011), which is critical for facilitating effective organizational decision making (Yellen, 2014). The participation of students with LDs in STEM fields has the potential to diversify perspectives within organizations, and because of this and the already documented “skills gap” in STEM fields, the exclusion of students with LDs from the STEM pipeline could foster a less vibrant and innovative STEM economy (Moon et al., 2012).

#### The plan on STEM education does not increase enrollment of students with disabilities – does not substantially improve education for students with disabilities

Gottfried, PhD University of California, Santa Barbara, USA , and Sublett, PhD University of California, Santa Barbara, ‘17

(Michael A., and Cameron. "Does Applied STEM Course Taking Link to STEM Outcomes for High School Students With Learning Disabilities?." Journal of Learning Disabilities (27 February 2017): 0022219417690356., RV)

In sum, the current study was the first to describe the link between applied STEM course enrollment early in high school and STEM outcomes for students identified as having unique learning needs. While the findings presented here revealed much-needed insights into the efficacy of programs like the Perkins Act intended to promote student STEM interest, retention, and success, additional research is needed to assist policy makers, such as the National Science Foundation, wanting to broaden STEM participation. Students with LDs appear less likely than their non- LD counterparts to enroll in applied STEM coursework in early high school years. Additionally, there is no statistically significant improvement in the likelihood of advancing to rigorous math and science coursework among students with LDs who do enroll in applied STEM courses. These findings represent a valuable contribution to the literature and, as such, may inform STEM policy moving for- ward in order to increase the number of STEM-interested and proficient students from diverse learning backgrounds.

## Tradeoff DA

#### STEM education puts a strain on the economy – not only does it cost too much upfront, but it doesn’t pay off in the long run.

Kiesel, Education writer, 14

(Laura, *The Street*, “Why Emphasis on Math And Science In Schools Is Hurting Our Economy,” 10-1-14, <https://www.thestreet.com/story/12899236/4/why-emphasis-on-math-and-science-in-schools-is-hurting-our-economy.html>, 7-19-17, APW)

NEW YORK (MainStreet) — There’s been a lot of buzz about the surge of STEM (science, technology, engineering and math) fields as hot career tracks that can ensure better financial security while bolstering our overall economy. But, counterintuitively, the stress on STEM curricula in schools is heightening high school drop-out rates -- a trend that could actually have adverse effects on the economy.

According to the U.S. Department of Labor, the average starting annual salary is $62,655 for an engineer and $59,221 for those with a computer science degree. By comparison, those who graduate with degrees in the humanities and social sciences are earning an average annual salary ranging from $36,988 to $40,668 -- that is, if they are lucky enough to even find a stable job. Analyzing unemployment among 2007-08 graduates, the Bureau of Labor Statistics also found that those with degrees in computer and math had some of the lowest unemployment rates at 6%.

These findings are partially what prompted the Obama Administration to commit $3.1 billion to improve national STEM education efforts, with roughly $450 million directed toward increasing the number of trained STEM educators and developing new STEM programs.

That strategy, of course, is at odds with new research indicating that STEM emphasis in schools is raising drop-out rates. The study—which was conducted at Washington University in St. Louis, funded by the National Institute on Drug Abuse (NIDA) of the National Institutes of Health (NIH) and published this summer in the journal Educational Researcher—found that dropout rates increased by three percentage points in those schools that required six math and science courses, from 8.6% to 11.4%.

“There’s been a movement to make education in the United States compare more favorably to education in the rest of the world, and part of that has involved increasing math and science graduation requirements,” Andrew D. Plunk, PhD, a postdoctoral research fellow in the Department of Psychiatry at Washington University School of Medicine and lead author of the study, said in a press release. “There was an expectation that this was going to be good for students, but the evidence from our analyses suggests that many students ended up dropping out when school was made harder for them.”

Plunk and his colleagues studied census data that tracked the academic performances of high school students in states with more rigorous math and science requirements as compared to students in states where these requirements were less stringent. The researchers analyzed performances in 44 states where more stringent graduation requirements went into effect during the 1980s and 1990s.

They found that dropout rates varied significantly across gender and racial lines, adding as much as five percentage points.

“As graduation requirements were strengthened, high school dropout rates increased across the whole population,” said Plunk. “But African-Americans and Hispanics were especially affected.”

In particular, the dropout rate increased 2.5% and 2% among Hispanic and African-American males, respectively. Though the overall dropout rate for African-American males is 19%, those who attended schools in states with the most stringent math and science graduation requirements, the dropout rate rose to 23%. Meanwhile, dropout rates for Hispanic females, increased by just over 5.3 percentage points.

“Going forward, state policymakers must understand that students can’t take more math and science courses if they quit school,” said William F. Tate, PhD, the Edward Mallinckrodt Distinguished University Professor in Arts & Sciences and co-author of the report.

Tate also worries about the far-reaching societal impacts of increased dropout rates.

“Individuals who drop out of high school report more health problems and lower quality of life," Tate said. "Higher dropout rates also can strain the welfare system, which can affect people’s health.”

This study isn’t the first to imply that STEM subjects aren’t for everyone or that its emphasis can adversely impact academic performance.

A collaborative study by Ralph and Todd R. Stinebrickner of Berea College in Kentucky and the University of Western Ontario for the National Bureau of Economic Research found that though STEM majors are initially popular with incoming college students, more than half the students who start out majoring in a STEM subject wind up changing over to a social science or humanities-oriented major.

The overwhelming responses of the more than 650 students surveyed at Berea College indicated that those who changed out of a STEM major did so not because of large amount of work, which they expected, but because they were getting poorer grades than anticipated; many switched in order to shore up their grade point averages.

Overall, Plunk believes having a more versatile and flexible education model is preferable to a “one-size-fits-all” method in order to maximize academic success and boost graduation rates.

“I think our findings highlight the need to anticipate there may be unintended consequences, especially when there are broad mandates that, in effect, make high school coursework harder,” said Plunk.

## Federalism

#### No Link—if Federalism is now, it means that the fed is spending a lot of money on STEM now—just not enough to solve like the plan.

Mervis, Science Policy Reporter, 2013

(Jeffrey, ScienceMag, “A U.S. Makeover for STEM Education: What It Means for NSF and the Education Department,” 4-18-13, http://www.sciencemag.org/news/2013/04/us-makeover-stem-education-what-it-means-nsf-and-education-department, accessed 7-18-17, AS).

A proposed reshuffling of federal STEM (science, technology, engineering, and mathematics) education programs in the United States would move the Department of Education (ED) and the National Science Foundation (NSF) to the head of the class. Their new status would be a major change for the federal government, which now spends nearly $3 billion on 226 STEM education programs run by a dozen agencies.

## Disability

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## Neolib

#### STEM only enforces neoliberal ideology as seen in Australia

**CARTER ’16** (Australian Catholic University, Melbourne, Australia) (LYN CARTER, “Neoliberalism and STEM Education”, page #37, EEM)

The role of STEM and STEM education in this national agenda was reiterated by Christopher Pyne in a media release on his website in January this year: “Australia needs to grasp new ideas in innovation and science, identify and capitalise on new opportunities and create new sources of growth to secure our nation’s future,” Mr Pyne said. “The agenda heralds a critical and exciting time for the Australian economy. Its measures support innovative businesses, boost private investment in research commercialisation, fund critical research infrastructure and STEM skills and increase access to capital for high potential startups.” And it shows a need to ‘open the eyes’ of students and parents how science, technology, engineering and mathematics will open doors to new and different career opportunities into the future. (Office of the Industry, Innovation and Science, 2016). I hope to be forgiven for quoting at length from these websites. Their choice of words though, so clearly conveys the ideological positioning better than my paraphrasing. So it seems that in spite of Gee et al.’s (1996) warning, in a neoliberal globalised world, like many other nations, Australia is on a course of economic innovation heavily reliant on STEM and STEM education. Venn’s (2009) paraphrasing Foucault noted earlier and repeated again here is readily apparent:

## Settler Colonialism

### STEM Link

#### The plan’s promotion of a Westernized, “true” science displaces indigenous beliefs that are empirically more true

Snively and Corsiglia, Department of Social and Natural Sciences at The University of Victoria, 2000

(Gloria and John, “Discovering Indigenous Science: Implications for Science Education,” *DISCOVERING INDIGENOUS SCIENCE*, 1-10-2000, 6, RCU).

Indigenous science relates to both the science knowledge of long-resident, usually oral culture peoples, as well as the science knowledge of all peoples who as participants in culture are affected by the worldview and relativist interests of their home communities. This article explores aspects of multicultural science and pedagogy and describes a rich and well-documented branch of indigenous science known to biologists and ecologists as traditional ecological knowledge (TEK). Although TEK has been generally inaccessible, educators can now use a burgeoning science-based TEK literature that documents numerous examples of time-proven, ecologically relevant, and cost effective indigenous science. Disputes regarding the universality of the standard scientific account are of critical importance for science educators because the definition of science is a de facto “gatekeeping” device for determining what can be included in a school science curriculum and what cannot. When Western modern science (WMS) is defined as universal it does displace revelation-based knowledge (i.e., creation science); however, it also displaces pragmatic local indigenous knowledge that does not conform with formal aspects of the “standard account.” Thus, in most science classrooms around the globe, Western modern science has been taught at the expense of indigenous knowledge. However, because WMS has been implicated in many of the world’s ecological disasters, and because the traditional wisdom component of TEK is particularly rich in time-tested approaches that foster sustainability and environmental integrity, it is possible that the universalist “gatekeeper” can be seen as increasingly problematic and even counter productive. This paper describes many examples from Canada and around the world of indigenous people’s contributions to science, environmental understanding, and sustainability. The authors argue the view that Western or modern science is just one of many sciences that need to be addressed in the science classroom. We conclude by presenting instructional strategies that can help all science learners negotiate border crossings between Western modern science and indigenous science.

## Hawaii PIC

#### Hawaii doesn’t need more STEM workers—military spending solves

Downey, reporter on the federal government in Hawaii for Honolulu Civil Beat, 2017

(Kirstin, *Civil Beat*, “Schatz Announces Big Increase In Military Spending For Hawaii,” 07/13/2017, <http://www.civilbeat.org/2017/07/schatz-announces-big-increase-in-military-spending-for-hawaii/>, accessed 07/19/2017, AMS)

Hawaii appears likely to snag at least $266 million in military construction projects in fiscal year 2018, up from $197 million last year, according to U.S. Sen. Brian Schatz, ranking member of the Senate military construction and veterans affairs subcommittee.

In a news conference in Washington on Thursday, Schatz announced that by a unanimous vote, the subcommittee had approved language that would allow a number of major projects on military bases to go forward.

“This is a very good start, and it was done on a bipartisan basis,” Schatz said. “We are obviously in a very near-toxic (political) environment but it’s important for those of us on the Appropriations Committee to continue to do our job, and this committee continued to do its job in terms of construction and veterans, and that will help Hawaii over the next fiscal year.”

Schatz said it is becoming easier to funnel money to Hawaii because of the growing awareness in the nation’s capital that the state serves as the front line of defense at a time of mounting tensions in the Pacific. The North Koreans continue to test missiles and China is building toward a 350-ship fleet in 2020, which would give it more vessels at sea than the U.S. has.

The spending proposal includes $90 million to continue work on a “control-and-command” facility for the Army of the Pacific at Fort Shafter, $73.2 million for sewer improvements at Pearl Harbor and $19 million for landing pads adequate to accommodate Osprey helicopters.

It’s possible that still more funding could be heading Hawaii’s way.

“We’re going to continue the negotiations,” Schatz said. “We believe this is a floor, not a ceiling. We think we can do slightly better than this through the conference committee process.”

Schatz said Hawaii’s buildup is getting the support of subcommittee chairman Sen. Jerry Moran, a Republican from Kansas who generally favors defense spending. Schatz added that he and his staff have sought to ensure that legislators who serve on the Appropriations and Armed Services committees and key members of their staffs stop off in Hawaii when they do military inspections tours in Asia. They are invited to visit Hawaii’s bases and installations to see where the dollars will be spent.

“When it comes to veterans and the military and their needs, we have a nice collaboration,” he said.

He expects to see additional funding coming to the state as it strengthens its position as a hub for cybersecurity efforts.

“Cyber is an increasing need across the Department of Defense and across our security agencies and Hawaii has developed a lot of expertise,” he said. “We are actually able to provide a significant amount of the workforce for the work that we do, so this is a growth area for us in the defense space and also among the civilian defense agencies.”

So far this year, according to [usaspending.gov](https://www.usaspending.gov/transparency/Pages/StateSummary.aspx?StateCode=HI&fiscalyear=2017), a government website that tracks federal expenditures, top military contractors include Manu Kai, BAE Systems Hawaii Shipyards, NOVA Group, Aqua Engineers and Allied Pacific Builders.

Military spending is viewed as having a cascading effect on the local economy. According to the [Hawaii Data Book](http://dbedt.hawaii.gov/economic/databook/2015-individual/_10/), based on estimates made in 2012, $1 billion in military expenditures translates to $1.7 billion in total spending, as contractors and their employees purchase goods and services during the time the work is underway. The state estimates a $1 billion expenditure generates 11,842 jobs locally.

The $266 million in spending, if it materializes, would exceed the amount of military spending brought to Hawaii by Sen. Daniel Inouye in fiscal year 2010. In December 2009, Inouye, who also served on the Senate appropriations committee, announced [$199 million in spending on defense projects](http://dbedt.hawaii.gov/economic/databook/2015-individual/_10/). That would be about [$225 million](https://www.bls.gov/data/inflation_calculator.htm), adjusted for inflation.

#### Throwing money at STEM uniquely in Hawaii fails—cultural blocks

Hadfield et al., Research Professor at the Pacific Biosciences Research Center and Professor of Biology Emeritus at the University of Hawai’i at Mānoa, 2016

(Michael et al., “Recognizing and removing barriers to STEM careers for Native Hawaiians and Public Islanders: report on a workshop at the University of Hawai’i at Mānoa,” 09/27/2016, <http://www.pbrc.hawaii.edu/stem/Final%20Draft%209-27-16.pdf>, accessed 07/19/2017, AMS)

Native Hawaiians and Pacific Islanders (NHPI) are perhaps the least acknowledged of four ethnic groups recognized by the U.S. government agencies as underrepresented in the fields of science, technology, engineering and mathematics (STEM). In fact, the inclusion of Pacific Islanders (including Hawaiians) with Asians in most federal agency initiatives (e.g., Fact Sheet: What You Should Know About Native Hawaiians and Pacific Islanders; White House Initiative on Asian Americans and Pacific Islanders. https://www.whitehouse.gov/aapi) makes it difficultto-impossible to obtain precise and up-to-date statistics on the severity of the situation with reference to Pacific Islanders in STEM careers. However, we can determine that Samoans, Chamorros, Marshallese, Micronesians and Palauans are rarely found in STEM careers for a broad variety of reasons, beginning with training as indicated by data in many recent documents (e.g., Lee and Kumashiro, 2005). One of the most telling is a recent report, “Education in Pacific Island States: Reflections on the Failure of ‘Grand Remedies,’” (Levine, 2015), whose very table of contents suggests a multiplicity of causes for the lack of islanders in STEM careers: “Inadequate funding; Do Pacific Islanders Value Education?; Mismatch with Pacific Culture; Lack of Technical Capacity; Education as a Source of Public Employment; Weak Governance; No Incentives to Improve Efficiency; Weak Civil Society.” Data in this report reveal that the problems for many Pacific Islanders begin far before college admittance: “Around 40% of school children in Pacific Island Countries do not complete primary school, and only 20% graduate from secondary school.” STEM careers will be far from the minds of young people who have not even achieved high-school diplomas. For students of Hawaiian ancestry, it is well documented that there are definite economic barriers to education for many native Hawaiians (e.g., Hawaiʻi Papa O KeAo, a report presented to the UH Board of Regents, 2012, https://www.hawaii.edu/offices/op/hpokeao.pdf; Tran et al., 2010). Unfortunately, the situation of the Hawaiians in their homeland becomes essentially one of class, where they have found themselves near the bottom since annexation of the islands put most land in the hands of powerful Caucasian families and, eventually, corporations. Additionally, the population of Hawaiians was decimated by common diseases brought to the islands by Westerners. Two-hundred-plus years later, Hawaiians living in outlying communities and the smaller islands are still struggling economically. With low incomes, these people find access to STEM careers through higher education nearly impossible to obtain. We find statistics such as these in the White House Initiative on Asian Americans and Pacific Islanders (AAPI) (Tran et al., 2010): • Almost 20% of Native Hawaiians and Pacific Islanders live in poverty (U.S. average living below poverty: 12%) over 16% lack health coverage. • Pacific Islanders have a per capital income 27% below the national average. • 15% of Native Hawaiians and other Pacific Islanders hold at least a bachelor’s degree compared to 28% for the entire population; 5% hold a graduate or professional degree compared to 10% of the entire population. • Pacific Islanders are half as likely to have a bachelor’s degree in comparison with 27% for the total population and 49% of the Asian American population. • Only 29% of Pacific Islanders between the ages of 18 and 24 are enrolled in a college or university, which is comparable to African Americans. In contrast, 39% of non-Hispanic whites and 57% of Asians in the age range are enrolled in college. • Research has found that AAPI’s with higher socio-economic status (SES) were three times more likely to begin college at a selective institution than those in lower SES, with Southeast Asian and Pacific Islanders less likely than Chinese, Japanese, and Koreans to begin college at a selective institution. • The importance of disaggregation of data within the AAPI community can be seen in bachelor degree attainment rates among ethnic subgroups from a high of 69.2% for Asian Indians to a low of 9.4% for Samoans. In an article entitled, “A systematic review of barriers and facilitators to minority research participation among African Americans, Latinos, Asian American, and Pacific Islanders,” George et al. (2014) concluded: “Our review of literature points to the need to learn more about and refine our understanding of barriers and facilitators to research participation among African Americans, Latinos, Asian American, and Pacific Islander groups.”

#### Western science is incompatible with Native Hawaiian learning

Hadfield et al., Research Professor at the Pacific Biosciences Research Center and Professor of Biology Emeritus at the University of Hawai’i at Mānoa, 2016

(Michael et al., “Recognizing and removing barriers to STEM careers for Native Hawaiians and Public Islanders: report on a workshop at the University of Hawai’i at Mānoa,” 09/27/2016, <http://www.pbrc.hawaii.edu/stem/Final%20Draft%209-27-16.pdf>, accessed 07/19/2017, AMS)

1. ‘Western’ science curriculum has little relevance to the local culture and environment. Improving or modifying the curriculum could be as simple as providing problems or scenarios in an island context. As pointed out by panelist Donald Hess, a book that talks about snow is not relevant on a tropical island. Teaching relevant science to Pacific Islanders requires more placebased texts that explain the rainy and dry seasons, phases of the moon and what that means in terms of fishing, or the king tides, and how they are connected to climate change. Teachers who are both educated in the culture and possess great proficiency in their topic would provide more relevant and effective delivery. This issue is more fully addressed in the section dealing with curriculum. 2. There is little intersection between Western science and indigenous ways of knowing. Western science is based on Aristotle’s scientific method of observation, inquiry and conclusions, yet clearly traditional medicine, celestial navigation, and knowledge of seasonal phenomena, such as sea turtle nesting or timing of harvesting certain reef species, are examples of observation-based science – they are just not usually framed as such by scientists and educators (Johannes, 1992; Miller, 2000; Kelson et al., 2003; see also, Alessa, 2016, “The Other Way of Knowing, Schooling the World.” http://schoolingtheworld.org/resources/essays/the-other-way-of-knowing/). Examples of local science such as these can be easily incorporated into a curriculum that is culturally relevant, recognizes the importance of indigenous knowledge, and demonstrates that observation-based science is universal. What Western science does not recognize or explain are supernatural or religious phenomena that are not falsifiable or testable, or deducible from accepted scientific knowledge. The scientific method cannot test indigenous beliefs, nor can it test Western religious beliefs, and as such, one of its most important theories, evolution, is a conundrum debated in state legislatures and school boards in the U.S.A. As many Pacific Island groups have appropriated various Western religions and retain local beliefs, it is not surprising to find similar misunderstanding of, and even resistance to, Western science. Also, there is a perception that indigenous ways of knowing are inferior to Western science. This must be addressed in the training of STEM teachers at all levels. 3. The methodology used to present science is incompatible with the sensibilities of Pacific Islanders, and many non-native teachers lack cultural sensitivity. Lectures and labs are traditionally used to teach science courses. Teachers expect students to take responsibility for their learning process by asking questions and seeking help if they find that the material is difficult. This approach is fine if the student has been raised in that type of classroom or cultural atmosphere. An explanation of why this type of exchange might not work with islanders is provided by Hezel in his chapter, Deciphering the Unspoken. Hezel discusses how Micronesians will agree with a statement, or say ‘Yes’ to a request, not necessarily because they agree, or intend to comply with the request, but because they do not want to disappoint that person (Hezel, 2013). One can imagine this familiar scenario when a teacher pauses a lecture and asks, “Do you understand?”, or, “Are there any questions?” All heads nod in agreement as they do not want to disappoint the teacher. Also, replying to a question calls attention to oneself, and others would interpret this as trying to ‘stand out’. Volunteering an answer that could be wrong also risks ridicule by others. (Hezel, 2013) Participants provided these comments: • Language can be a major barrier for Pacific Islanders; when I was at the college, I saw that trying to speak English can inhibit or restrict students’ learning. A lot of the foreign instructors don’t see this. Language is a main issue for Pohnpeians, Marshallese, and other islanders and ethnic groups whose first language is not English. The science is felt as not Hawaiian enough, while in Hawaiian culture is felt as not science enough • Strong native Hawai’ian students are coming up. But there is a double standard in Hawai’i of culture vs. science. Students feel, if I want to be a professor, I have to be good at both, and thus have to work twice as hard. • Survival on a Pacific island requires cultural knowledge, which is based on science. (A student) needs to learn both, but it takes more time. • Integration of culture and science – there is an intrinsic bias and value system attached to it. • Science is a human endeavor and is a cultural practice. • There is a tendency to see the local cultures as “less than” (Western science). • Make science relevant and real in our whole lives, but there is a false perception of a separation of science and culture. • Religion sometimes conflicts with science learning. • The way STEM is taught is in a manner that is “western” or linear and hard to connect with culture • Institutions are not culturally responsive – (they) skim talent. • Once, I went to an instructor for help, but he told me to come back during office hours. I never went back to that instructor, or any other, after that. • Native students look to their families first for help. If confronted with academic or financial difficulties, Pacific Island students would rather seek help from family and friends, or even drop out and fail, to avoid approaching a teacher. • Native Hawaiian and local students will not ask for help – it is perceived as a sign of weakness or buying into the colonial administration. They don’t know how to ask or are afraid to appear stupid. • Young children do not talk so much, they just listen; they do not speak in front of elders, so they do not speak in class. They only speak when asked to speak, otherwise they are disrespectful; they do not ask questions (in class) when they really need to do so.

#### Alt causes—geographical barriers

Hadfield et al., Research Professor at the Pacific Biosciences Research Center and Professor of Biology Emeritus at the University of Hawai’i at Mānoa, 2016

(Michael et al., “Recognizing and removing barriers to STEM careers for Native Hawaiians and Public Islanders: report on a workshop at the University of Hawai’i at Mānoa,” 09/27/2016, <http://www.pbrc.hawaii.edu/stem/Final%20Draft%209-27-16.pdf>, accessed 07/19/2017, AMS)

A significant barrier to students entering into STEM disciplines is the sheer enormity of the geographical area of the Pacific Islands and Hawaii. The Marshall Islands includes 23 inhabited atolls ranging over 750,000 square miles, with villages and elementary schools on all of them. However, there are only five high schools across 23 inhabited islands (prism.spc.int/images/census\_reports/Marshall\_Islands\_Census\_2011-Full.pdf). This means that most students have to leave home to attend high school on a distant island, and there are many factors that impede a student from doing this. The student has to rely on travel either by ship or local airlines, but in the Marshall Islands, there is no regular schedule for ships to travel between islands, and they can be days or even weeks later than they are scheduled. The result is a student will not be able to attend school on time or maybe not at all during a semester. The Federated States of Micronesia (FSM) is comprised of four different states that were originally different countries (Pohnpei, Kosrae, Chuuk, and Yap) that have been incorporated into a single country made up of more than 600 islands. Each state includes a major high island and many atolls scattered across wide expanses of ocean. Most of the inhabited islands have elementary schools (164 across the FSM), but few have high schools (total public high schools, 24), again meaning that all students from the small atolls or islands must leave home, travel significant distances and live with relatives or in a boarding arrangement to attend high school (http://www.fsmed.fm/index.php/public-info/education-statistics1; <http://www.micsem.org/pubs/articles/education/frames/edstatsfr.htm>). In the Republic of Palau, some of the inhabited islands are connected by roads, so that students finishing eleven elementary schools can travel by bus to the single public high school located in the town of Koror. However, students from five other islands not connected by road to Koror must move to Koror and live away from their families to attend high school. (see http://www.micsem.org/schools/palau.htm). There is no possibility for students to commute these distances by boat. Private, parochial high schools are also available, but are, again located only on the main islands. In the Marshall Islands, only one local airline provides service. The airline does not go to all of the atolls and more frequently than not, its planes are not operating due to maintenance issues. Schedules are also subject to change without notice. There are no airlines that travel to the outer islands in the FSM and therefore travel has to be by ship. Most of these ships do not have regular schedules. Travel between the states is only provided by United and their flights are three times a week in one direction and three times a week in the opposite direction. For Kosrae it is only two times per week. Students have a very difficult time in getting to high school by the time school begins. Cost is definitely an issue when a student has to travel to another island to attend high school. Costs include travel, uniforms for school and room and board. Many islanders simply cannot afford this and therefore will not send their child off island to high school. Travel between Pacific Island countries and even within a country is not as simple as travel within the United States. And, it is extremely expensive; e.g., round-trip airfare between the Marshall Islands and Hawaiʻi is currently more than $1,400, and airfare from the Marshall Islands to their closest neighboring population center in Pohnpei (FSM) costs approximately $1,000 (http://www.united.com/us). Geography is a great barrier to STEM education for the students. The island countries in the Pacific are spread out over thousands of miles. Due do this and the reasons cited above, it is very difficult for students to receive a good STEM background to continue in these fields. For most of them, college is the first time they have had any formal education in the STEM disciplines. In the RMI, although there are only 70 square miles of land, the land is spread out over 750,000 square miles of ocean (www.worldatlas.com/webimage/countrys/oceania/mh.htm). FSM consists of approximately 270 square miles of land spread over one million square miles of water (http://www.fsmgov.org/info/geog.html). Palau has 177 square miles of land and 241,000 square miles of ocean. (www.infoplease.com/country/palau.html). The number of islands in these countries is several thousand. The logistics to provide education and in particular STEM education is these areas is extremely challenging.