**AFF Case**

#### Northwest Affirms Resolved: The United States federal government should increase its quota of H-1B visas.

**Contention 1 is STEM Jobs**

**USA Today quantifies that by 2020, the number of unfilled U.S. jobs in computing and information technology could exceed 1 million.**

**Already a report by the New American Economy found that in 2018 there is a shortfall of more than 223,000 workers in STEM fields. The propensity of jobs is so great that even during the worst years of the Great Recession, from 2009 to 2011, 1.9 STEM jobs were posted online for every unemployed STEM worker looking for work in the United States.**

**The inability to fill these jobs is only made worse by the abysmally low visa quota of 85,000 per year for skilled workers in “specialty occupations” that require at least a bachelor’s degree in fields such as mathematics, engineering, and technology.**

**Expanding the number of H-1B visas granted to highly skilled foreigners would have four positive effects.**

**First, is STEM Education**

#### According to a 2017 report by Cornell University every H-1B visa carries with it a high application fee that is paid by the company sponsoring the foreign workers. Combined, the 85 thousand visas issued annually generate 190 million that goes to fund universities providing STEM education as well as 320 million to training programs that provide technical skills to low-income workers; which to date have already supplied 87 thousand workers. An expansion of this program could at least double the amount of funds, putting us on a path to close the education gap and put Americans to work.

**Second, is Stemming the Flow**

**American tech jobs are moving overseas in record numbers. Michael Murray of Forbes finds that American companies requested 300,000 H-1B workers last year but were granted only 85 thousand.**

**Faced with the inability to fill jobs at home, companies like google, facebook, amazon, and most importantly startups that seek to build the companies of the future are looking abroad to set up shop. That's why Nell of the Heritage Foundation in 08 reports that a survey of high-tech companies found that 65 percent had expanded their hiring outside of the United States, creating jobs in Canada, Europe, India, and China, instead of in the states.**

**Luckily a change to the Visa program could reverse this trend with the American Immigration Council estimating that an increase to meet demand will add around $158 billion to the American GDP by 2045.**

**Third, is long term growth**

**Peri of the Journal of Labor Economics writes in 2015 that the research and development that comes out of scientists and engineers is responsible for 50% of long-run US productivity growth.**

**When the overall economy grows, there are more jobs available for native workers. Wright writes in 2017 that every job in the high-tech sector creates five jobs outside of high tech.**

**Not only does this growth increase the amount of jobs available for native workers, but it also increases their wages. Peri continues that a 1% increase in the foreign STEM share of a city’s total employment increased the wage growth of native college-educated labor by 8% and non-college educated natives by 4%.**

**Fourth is Indian Education.**

**Morales 17 of the CGD reports that the H1-B visa program has incentivized more people from other countries to go into pursuit of a degree in information or computer science, so that even if they aren’t chosen in the H-1B program, they are in a comparatively more prosperous sector of their economy than they would be without the degree. Morales quantifies that this caused the Indian IT industry to grow by 525% relative to India’s GDP. The higher the quota, the more Indians will be getting a STEM education.**

**Contention 2 is Rural Medicine**

**Jordan of the New York Times articulates that The US federal government has recently enacted several measures that make it far more difficult for foreign doctors to work in the US.**

**This measure especially harms rural areas, as Jordan continues, “In most rural America, 60 percent of the doctors who specialize in hospital care, are foreign doctors on H-1B visas.” Already, this measure enacted by the federal government is having disastrous consequences for rural areas. Yasmin of the Scientific American explains, already, many rural communities are struggling to find any doctors to fill vacant positions, undeniably laying the foundation for a crippling medical crisis.**

**Luckily, affirming the resolution and increasing the quota of H-1B visas solves this pressing issue. Mautino of the Journal of Immigrant Health finds that “Increasing the quota on H-1B visas provides more opportunity to foreign physicians to practice in America, and thus increases the flow of foreign doctors into America’s medical field.” Clearly, expanding the quota of H-1B visas solves our current medical shortage. This is incredibly important, as if nothing is done soon, The New York Times finds that, “This crisis could leave 230,000 people in rural areas without proper medical care.” Critically, Medscape reports that understaffing in hospitals creates a 7% higher mortality rate – inevitably leading to thousands of deaths.**

**Thus we affirm.**

**CONTENTION 1 CARDS**

#### A joint report by the US Bureau of Labor Statistics and the National Science Foundation find that there will be an estimated 1 million vacant computing jobs by 2020

Jon Swartz,, 3-28-2017, "Businesses say they just can't find the right tech workers," USA TODAY, https://www.usatoday.com/story/tech/talkingtech/2017/03/28/tech-skills-gap-huge-graduates-survey-says/99587888/

Jobs creation has been the mantra of President Trump. But in some industries like tech, the U.S. doesn't need more jobs — it needs workers with more of the right skills. There will be an estimated 1 million more computing jobs than applicants who can fill them by 2020, projects Code.org, based on estimates from the U.S. Bureau of Labor Statistics on job creation and separately, estimates of college graduation rates by the National Science Foundation. The problem: a "perception gap" between educators and employers has left scores of jobs unfilled, according to new research from the Career Advisory Board, which closely tracks the jobs market. Only 11% of employers believe higher education is "very effective" in readying graduates to meet skills needed in their organizations, according to the January survey of 501 U.S. hiring managers, human resource specialists and executives. Some 62% said students were unprepared. The jobs' gap is especially pronounced by age: 72% of respondents agreed that millennials are keeping pace with technology but only half of baby boomers are, said the survey.

#### 1.9 STEM JOBS

New American Economy, 2012, " Help Wanted The Role of Foreign Workers in the innovation Economy" New American Economy, http://www.newamericaneconomy.org/wp-content/uploads/2013/07/stem-report.pdf

In February of 2011, President Barack Obama attended a small dinner with several Silicon Valley executives. Seated between Apple founder Steve Jobs and Facebook founder Mark Zuckerberg, the conversation quickly turned to the large shortage of trained engineers in the United States, according to Walter Isaacson’s biography of Steve Jobs. Jobs reportedly put the case bluntly to the President, stating that he employs 700,000 factory workers in China because he cannot recruit 30,000 engineers in the United States.1 Similar stories of skills gaps are found at companies large and small all over the US economy. Microsoft currently has 3,400 job openings for engineers, software developers, and researchers that it cannot fill, an increase of 34% over its openings from last year. 2 A June 2011 study by McKinsey & Company found that more than one in every four science and engineering firms report difficulty hiring. 3 And a recent survey of national job posting data revealed that there are currently 1.9 job openings for every unemployed worker in science, technology, engineering, and mathematics (“STEM”).4 The US government estimates that jobs in STEM fields have grown three times faster than jobs in the rest of the US economy over the last 10 years, and expects STEM job creation to continue to outperform over the coming decade

#### 223,000

THE PARTNERSHIP FOR A NEW AMERICAN ECONOMY & THE PARTNERSHIP FOR NEW YORK CITY, MAY 2012, "," No Publication, <https://www.itic.org/dotAsset/66be841e-598d-46d2-9a6b-a7800f8b10fc.pdf>

Jobs requiring STEM knowledge take significantly longer to fill: Nationally, 43 percent of job vacancies for STEM occupations with H-1B requests were still posted after one month, as opposed to 38 percent of vacancies in non-STEM occupations requiring a bachelor’s degree, and 32 percent of non-STEM vacancies.10 • As STEM fields grow, this problem will likely get worse: STEM occupations will see the fastest growth of any field between 2010 and 2020.11 By 2018, the United States will face a shortage of more than 223,000 people in STEM fields.12 • Recent STEM wage growth indicates a scarcity in STEM fields: Wages are increasing for STEM jobs requiring higher levels of education, indicating the demand for qualified workers is greater than supply,13 and across the country, high-tech workers have seen notable wage increases in recent years.14

#### 500k open computing jobs nationwide but only 43k yearly grads

Jon Swartz,, 3-28-2017, "Businesses say they just can't find the right tech workers," USA TODAY, https://www.usatoday.com/story/tech/talkingtech/2017/03/28/tech-skills-gap-huge-graduates-survey-says/99587888/

There are more than 500,000 open computing jobs nationwide, but less than 43,000 computer science students graduated into the workforce last year, according to Code.org, a non-profit backed by the tech industry that's dedicated to expanding access to computer science. Last year, the White House claimed the federal government alone needed an additional 10,000 IT and cybersecurity professionals.

#### Demand for visas is extremely high

Guinevere Nell, 04-3-2008, "More H-1B Visas, More American Jobs, A Better Economy," Heritage Foundation, <https://www.heritage.org/immigration/report/more-h-1b-visas-more-american-jobs-better-economy>

H-1B Visas for Skilled Workers. Congress created temporary H-1B visas for non-immigrant workers to prevent a shortage of skilled workers from hurting the economy. This visa allows foreigners with advanced skills to work in the United States for three years, and it can be renewed for another three years. After that, these workers must leave the country. Congress permits U.S. Citizenship and Immigration Services (USCIS), an agency within the U.S. Department of Homeland Security, to issue 65,000 H-1B visas a year to workers with at least a bachelor's degree and an additional 20,000 to workers with at least a master's degree.[1] This represents far fewer people than American high-tech employers need. **USCIS received 163,000 applications for these limited visas within a week of accepting applications for FY 2009[2] and reached the cap within hours of accepting applications** for FY 2008.[3]

#### Visa increase does not take away American jobs

Guinevere Nell, 04-3-2008, "More H-1B Visas, More American Jobs, A Better Economy," Heritage Foundation, <https://www.heritage.org/immigration/report/more-h-1b-visas-more-american-jobs-better-economy>

Over half of all companies seeking H-1B workers need them for **computer and mathematical occupations, a job sector with unemployment just above 2 percent--less than half the national average**. The next-largest occupations for which employers need skilled H-1B workers are architecture and engineering, which have an unemployment rate of 1.8 percent. Economists estimate that the structural rate of unemployment in the United States is between 4 percent and 6 percent.[4] The unemployment that exists at this rate is the natural unemployment that occurs as workers move between jobs and industries. **In occupations with only 2 percent unemployment, there is virtually no one who is unemployed involuntarily-- which means that raising the H-1B cap will not cost Americans any jobs. Virtually every American who wants a job in the high-tech sector has one.**

#### Skill shortage causes companies to expand overseas

Guinevere Nell, 04-3-2008, "More H-1B Visas, More American Jobs, A Better Economy," Heritage Foundation, <https://www.heritage.org/immigration/report/more-h-1b-visas-more-american-jobs-better-economy>

**Without enough skilled workers at home, many American companies must either expand outside the U.S. or not expand at all**. Microsoft, for example, recently opened an office in Vancouver, British Columbia, so that it could employ 150 foreign engineers that the United States would not admit.[5] The shortage of skilled workers here at home prevented those jobs from even being created in the U.S.-- along with the additional jobs that accompany those of the skilled workers. **A recent survey of high-tech companies found that 65 percent had expanded their hiring outside the United States because of the shortage of H-1B workers.[**6] Restricting H-1B visas reduces economic growth.

#### $2,460 fee per applicant

Michael Murray, 12-16-2016, "To Address STEM Shortage, U.S. Employers Need Talented Immigrants," Forbes, https://www.forbes.com/sites/realspin/2017/02/09/to-address-stem-shortage-u-s-employers-need-talented-immigrants/

There are robust protections for U.S. workers in the current H-1B visa regulations. The wages paid to foreign workers may not be lower than those actually paid to U.S. workers in the same position, and a U.S. worker may not be displaced by an H-1B visa holder. Although there has been media coverage of instances where U.S. workers were forced to train their foreign replacements, the current rules clearly prohibit that type of activity and impose stiff fines for violators. However, increased policing of bad actors is welcome and should result in the limited number of H-1B visas going to those companies that truly need them. It is worth noting that the typical government filing fee for private-sector employers to use the H-1B program is $2,460 per foreign employee. These hefty fees are earmarked to fund scholarships for U.S. STEM students, to provide technical training to U.S. workers, and to administer the H-1B visa program.

#### 190 million in scholarships and 328 million for training from H-1B visa fees

Levine [Cornell University], L. (2005). Education and training funded by the H-1B visa fee and the demand for information technology and other professional specialty workers. Washington, DC: Congressional Research Service. https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1186&context=key\_workplace

The 105th and 106th Congresses raised the limit on newly approved H-1B visas in 1998 and again in 2000, from the level of 65,000 set by the Immigration and Nationality Act of 1990, because of a perceived shortage of workers with information technology (IT) skills. A longer term remedy to the seeming mismatch between the qualifications of U.S. workers and the technical skill requirements of U.S. employers also was initiated: the imposition of a user fee on employers who file petitions to bring into the country, to extend the stay of, or to hire from other U.S. employers nonimmigrant professionals to fund programs that prepare U.S. students and workers for computer-related and other high-skilled occupations. Most of the user fees went to the Computer Science, Engineering, and Mathematics Scholarship (CSEMS) program in the National Science Foundation (NSF) and the H-1B Training Grant program in the Department of Labor (DOL). Between 2000 and 2005, the NSF awarded about $190 million through the CSEMS program to colleges and universities to provide scholarships to low-income, academically talented students enrolled in undergraduate and graduate degree programs in mathematics, engineering, and computer science. Between 2000 and 2004, the DOL program awarded some $328 million to local workforce investment boards and businesses to provide training in technical skills to employed and unemployed workers. More than 60,000 individuals had completed their training as of September 30, 2004, out of a total of some 87,000 persons to be trained. Most of the 129 grants have focused on hightech/information technology skills training.

Levine [Cornell University], L. (2005). Education and training funded by the H-1B visa fee and the demand for information technology and other professional specialty workers. Washington, DC: Congressional Research Service. https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1186&context=key\_workplace

The labor market experienced a “jobless recovery” for almost two years following the November 2001 end of the last recession, with the IT sector being especially hard hit. The reduced demand for IT workers was reflected in the number of approved new H-1B visas falling short of the elevated cap in FY2001 through FY2003. On October 1, 2003, the 195,000 cap on newly approved H-1B visas reverted to 65,000, and the user fee that funded education and training programs expired. The 130,000 drop in H-1B visas intensified competition among employers as did the labor market’s rebound, which occurred at about the same time. The limit on H-1B visas was reached earlier in each year: February for FY2004, and October — the very first month of the year — for FY2005.

Michael Murray, 12-16-2016, "To Address STEM Shortage, U.S. Employers Need Talented Immigrants," Forbes, https://www.forbes.com/sites/realspin/2017/02/09/to-address-stem-shortage-u-s-employers-need-talented-immigrants/

As an immigration attorney, I can tell you that the hospitals, universities and technology businesses that I work with across the nation hire foreign workers because they are in desperate need of the skills and training these professionals have. Without these talented immigrants, a patient might not have access to crucial surgery short of traveling a long distance, a critical software project wouldn’t be completed, or a prototype airplane would simply never be designed and manufactured. There is a huge shortage of available talent in the science, technology and engineering fields (commonly referred to as STEM) not just in the United States, but around the world. The technology age that started with President Kennedy’s moonshot in the 1960s and then exploded with the emergence of the Internet in the 1990s is still reshaping and driving the global economy. Technology sectors in India, Australia, the United Kingdom, Canada, China and elsewhere are burgeoning. A college graduate in one of the STEM fields writes his or her own ticket to success. However, our universities cannot graduate enough U.S. citizens to meet the demand. The United States is competing globally for talented individuals in the STEM fields, yet our immigration system severely limits the ability of U.S. employers to hire skilled foreign workers. The primary work visa program for these highly skilled workers, the H-1B visa program, is limited to issuing 85,000 new visas a year. Despite the costly and onerous obligations for employers who use this program, over each of the past several years U.S. companies made 200,000-300,000 H-1B visa requests. Only about a third of these requests were granted. America needs talented, highly skilled U.S. workers and foreign workers to provide technical expertise, innovation and creative energy to U.S. companies rather than to our competitors abroad. Instead of thinking of these skilled foreign workers as an anchor on U.S. jobs, they should be thought of as the high-octane fuel that we could use to rapidly grow our economy. On the contrary, we have created a complex system that denies U.S. companies the workers they need to succeed and discourages talented STEM professionals from even trying to come to the United States. The way I put this in perspective is to ask: Which software programs won’t be finished? Which planes won’t be built? Which patients will receive subpar medical care? And how many jobs were not created when companies were held back because of this huge black hole in our STEM sector persists? Google, eBay, Yahoo and countless other technology companies were started by immigrants. Bill Gates himself asked Congress to lift the cap on H-1B visas during congressional testimony. Ask the CEO of any STEM company, and you will get the same answer: The cap needs to be lifted.

Torres, Nicole. “The H-1B Visa Debate, Explained.” Harvard Business Review. Harvard University, 4 May 2017. Web. Accessed 19 March 2018. <<https://hbr.org/2017/05/the-h-1b-visa-debate-explained>>

H-1B visas are granted through an employer-driven system, meaning employers petition the government for visas tied to specific roles. These must qualify as [“specialty occupations,”](https://www.uscis.gov/working-united-states/temporary-workers/h-1b-specialty-occupations-dod-cooperative-research-and-development-project-workers-and-fashion-models) which typically require a bachelor’s degree (or the equivalent) and are found in fields such as science, engineering, information technology, medicine, and business. Companies have to [attest](https://www.foreignlaborcert.doleta.gov/pdf/ETA_Form_9035CP.pdf) that they will not pay an H-1B worker less than they would an American, and that H-1B workers will not “adversely affect the working conditions” of other workers — but it’s often said that this hardly functions as a rule and is not strictly (if at all) enforced. There is also criticism that it opens up various loopholes that firms can exploit. For example, as a Kellogg Insight [research summary explains](https://insight.kellogg.northwestern.edu/article/does-the-h1-b-visa-program-hurt-american-workers):

The standards for determining prevailing wages are shaky, and companies can take advantage of loopholes, such as hiring the person through a third-party service. In addition, increasing the supply of workers might drive down everyone’s pay over time because employers have more potential employees to choose from and thus do not have to offer high salaries or raises to attract and retain staff.

The program is most often associated with the tech industry, where H-1B workers hold about [12%–13% of jobs](https://www.nytimes.com/2017/02/05/business/h-1b-visa-tech-cheers-for-foreign-workers.html), according to a Goldman Sachs report. (For comparison, they hold around 0.6%–0.7% of U.S. jobs overall.) Being able to recruit globally is supposed to help tech powerhouses like Facebook and Amazon find the talent they need.

The companies that bring in the most H-1B workers, however, are not Silicon Valley tech firms but IT services firms, many based in India, that specialize in consulting or outsourcing. These companies, which include Tata Consultancy Services, Cognizant, Infosys, Wipro, Accenture, IBM India, and Deloitte, are contracted by other companies to do IT work. According to an analysis by Ronil Hira, a professor of public policy at Howard University, in 2014 nearly [one-third of new H-1B visas](https://www.nytimes.com/interactive/2015/11/06/us/outsourcing-companies-dominate-h1b-visas.html?_r=2) went to 13 of these s

Torres, Nicole. “The H-1B Visa Debate, Explained.” Harvard Business Review. Harvard University, 4 May 2017. Web. Accessed 19 March 2018. <<https://hbr.org/2017/05/the-h-1b-visa-debate-explained>>

There is other evidence of a [strong demand](https://www.bostonglobe.com/business/2016/02/19/the-war-for-tech-talent-escalates/ejUSbuPCjPLCMRYlRZIKoJ/story.html) for workers with tech skills. The Economist [has reported](http://www.economist.com/news/science-and-technology/21711632-blueprint-getting-more-women-information-technology-high-techs-missing-xx-factor) that the number of unfilled U.S. jobs in computing and information technology could top one million by 2020: “The number of young Americans graduating with qualifications in IT subjects is rising, but nowhere near fast enough to satisfy the burgeoning demand for their skills. Last year, American campuses produced fewer than 56,000 graduates with the sort of qualifications sought by information technology (IT) firms.”

Wingfield, Nick. “Fostering Tech Talent in Schools.” The New York Times. The New York Times, 30 September 2012. Web. Accessed 19 March 2018. <<http://www.nytimes.com/2012/10/01/technology/microsoft-sends-engineers-to-schools-to-encourage-the-next-generation.html?mtrref=undefined>>

In doing so, Microsoft is taking an unusual approach to tackling a shortage of computer science graduates — one of the most serious issues facing the technology industry, and a broader challenge for the nation’s economy.

There are likely to be 150,000 computing jobs opening up each year through 2020, according to an analysis of federal forecasts by the Association for Computing Machinery, a professional society for computing researchers. But despite the hoopla around start-up celebrities like Mark Zuckerberg of Facebook, fewer than 40,000 American students received bachelor’s degrees in computer science during 2010, the National Center for Education Statistics estimates. And the wider job market remains weak.

“People can’t get jobs, and we have jobs that can’t be filled,” Brad Smith, Microsoft’s general counsel who oversees its philanthropic efforts, said in a recent interview.

Big technology companies have complained for years about a dearth of technical talent, a problem they have tried to solve by lobbying for looser immigration rules to accommodate more foreign engineers and sponsoring tech competitions to encourage student interest in the industry. Google, for one, holds a programming summer camp for incoming ninth graders and underwrites an effort called CS4HS, in which high school teachers sharpen their computer science skills in workshops at local universities.

Associated Press. “Backlash Stirs in US Against Foreign Worker H-1B Visas.” The Mercury News. The Mercury News, 6 July 2014. Web. Accessed 19 March 2018. <<https://www.mercurynews.com/2014/07/06/backlash-stirs-in-us-against-foreign-worker-h-1b-visas/>>

A company spokeswoman said Infosys has about 17,000 employees in the U.S., about 25 percent U.S. hires. In filings to the U.S. Securities and Exchange Commission, the company said it has more than 22,000 employees with valid temporary work visas, some not in the U.S.

Stanford University Law School fellow Vivek Wadwha, a startup adviser, said firms are so starved for talent they are buying up other companies to obtain skilled employees. If there’s a bias against Americans, he said, it’s an age bias based on the fact that older workers may not have the latest skills. More than 70 percent of H-1B petitions approved in 2012 were for workers between the ages of 25 and 34.

“If workers don’t constantly retrain themselves, their skills become obsolete,” he said.

Norm Matloff, a computer science professor at the University of California, Davis, agreed that age plays into it — not because older workers are less skilled but because they typically require higher pay. Temporary workers also tend to be cheaper because they don’t require long-term health care for dependents and aren’t around long enough to get significant raises, he said.

**U.S. DEPARTMENT OF COMMERCE**, January **2012**, “The Competitiveness and Innovative Capacity of the United States,” National Economich Council, U.S. Department of Commerce. Web. Accessed 20 March 2018. http://www.esa.doc.gov/sites/default/files/thecompetitivenessandinnovativecapacityoftheunitedstates.pdf

Innovation is the key driver of competitiveness, wage and job growth, and long‐ term economic growth. Therefore, one way to approach the question of how to improve the competitiveness of the United States is to look to the past and examine the factors that helped **unleash** the **tremendous innovative potential** of the private sector. Among these factors, three pillars have been key: Federal support for basic research, education, and infrastructure. Federally supported research laid the groundwork for the integrated circuit and the subsequent computer in‐ dustry; the Internet; and advances in chemicals, agriculture, and medical science. Millions of workers can trace their industries and companies back to technologi‐ cal breakthroughs funded by the government. The U.S. educational system in the 20th century produced increasing numbers of high school and college graduates, more so than anywhere else in the world. These highly skilled workers, in turn, **boosted innovation**. The transformation of infrastructure in the 20th century was nothing short of amazing: the country became electrified, clean water became widely available, air transport became ubiquitous, and the interstate highway system was planned and constructed. All of these developments helped busi‐ nesses compete by opening up markets and keeping costs low.

TEConomy Partners LLC, research, analysis, and strategy firm for innovation-based economic development, “Enhancing Today’s STEM Workforce to Ensure Tomorrow’s New Medicines: Biopharmaceutical Industry Partnerships with U.S. Colleges and Universities,” June 2017, http://phrma-docs.phrma.org/files/dmfile/TEConomy-PhRMA-STEM-Report-Final.pdf

Looking across the U.S. talent pipeline for both today’s and tomorrow’s STEM educated and skilled workforce, *one sees troubling signs*. Achievement among U.S. students is *middling in science and math* relative to their international peers and falls further behind as students reach high school. At the postsecondary level, there is less interest among U.S. students in pursuing degrees in science and engineering relative to other large and leading global economies. At the same time, the current and projected demand for workers with STEM education and skill sets is outpacing non-STEM areas, and studies indicate *STEM-related job openings are going unfilled.* As one would expect, this dynamic is placing a strain on the ability of U.S. companies and science and technology–driven industries to meet customer demand, to drive innovation, and more broadly, to compete effectively today and into the near future.

The strain is felt by U.S. manufacturers trying to fill open positions and seeing first-hand a *significant “skills gap.”* In their third assessment of the skills gap in U.S. manufacturing, the Manufacturing Institute and Deloitte find the skills gap is widening.8 For 2015 to 2025, the authors estimate that U.S. manufacturers will need to hire 3.4 million workers and that an estimated 60 percent of those positions, or 2 million jobs, will likely go unfilled due to shortages in talent. Among other factors expected to contribute to this gap is a lack of STEM-related skills in the workforce. Executives agree, with a large majority (84 percent) in the Deloitte–Manufacturing Institute study agreeing there is a talent shortage.

The demand for workers with STEM-related education, skills, and experience goes beyond manufacturing to include a wide swath of the economy, with technical skill sets in demand by numerous industries. For nearly two decades, Bayer has been conducting its Facts of Science Education surveys. Its 2013 survey focused on talent recruiters at 150 larger, Fortune 1000 companies and their experience and thoughts on current and future demand for STEM hires with two- and four-year degrees.9 The survey confirmed findings by others that the demand for STEM skill sets spans both high-R&D or “STEM” companies/sectors as well as increasingly in sectors that are traditionally considered to be “NonSTEM.” Key findings speak to both current and future demand and include the following:

Six in ten (59 percent) talent recruiters say four-year STEM degree graduates are “more in demand” than their non-STEM counterparts today; for two-year degree graduates the tilt toward STEM fields is 44 percent;

• Seven in ten (69 percent) say four-year STEM degree holders will be “more in demand” than their non-STEM counterparts 10 years from now; for two-year degree graduates in STEM fields the share is nearly half (47 percent);

• Two in three (67 percent) recruiters reported their companies are creating more STEM jobs than non-STEM jobs today;

• Just half of recruiters report being able to find adequate numbers of candidates with STEM degrees at both the two-year (55 percent) and four-year (50 percent) levels in a “timely manner.” Of these recruiters 90 percent plus believe it is due to a shortage of qualified candidates.

Federal occupational projections echo these studies, showing *strong demand for STEM workers*—they continue to show STEM-related jobs outpacing the demand for workers overall (FIGURE 2).

Biello, David. “How Far Can Technology Go to Stave Off Climate Change?” Yale Environment 360. Yale University, 18 January 2017. Web. Accessed 21 March 2018. <<https://e360.yale.edu/features/how_far_can_technology_go_to_stave_off_climate_change>>

The U.S. now has two coal-burning power plants that [avoid dumping carbon dioxide into the air](http://e360.yale.edu/feature/can_carbon_capture_technology_be_part_of_the_climate_solution/2800/). [Petra Nova](http://www.nrg.com/generation/projects/petra-nova/) in Texas and [Kemper](http://www.mississippipower.com/about-energy/plants/kemper-county-energy-facility/home.cshtml) in Mississippi use technology to stop CO2 in the smokestack and before combustion, respectively. Unfortunately, that makes two out of more than 400 coal-fired power plants in the U.S., the rest of which collectively pour 1.4 billion metric tons of the colorless, odorless greenhouse gas into the atmosphere each year. Even Kemper and Petra Nova do not capture all of the CO2 from the coal they burn, and the captured [CO2 is used to scour more oil out of the ground](https://www.scientificamerican.com/article/can-oil-companies-save-the-world-from-global-warming/), which is then burned, adding yet more CO2 to the atmosphere. The carbon conundrum grows more complex — and dangerous — with each passing year.

In a world with thousands of coal-fired power plants, nearly 2 billion cars and trucks, and billions of tons of coal, oil, and natural gas mined and combusted, it is no surprise that some 40 billion metric tons of CO2 are discharged into the atmosphere annually. The oceans and the world’s plants absorb some, yet concentrations of CO2 in the atmosphere [inexorably rise year by year](https://scripps.ucsd.edu/programs/keelingcurve/), climbing in 2016 past 400 parts per million, compared to 280 before the Industrial Revolution. This is setting off changes from a meltdown in the Arctic, to thawing glaciers worldwide, to weird weather and rising seas. Indeed, the atmosphere has now accumulated enough CO2 to stave off the next ice age for millennia, and every person on Earth now breathes air unlike that inhaled by any previous member of our species, *Homo sapiens*.

**Patterson**, Jacqui, Fink, Katie, Wasserman, Kimberly, Starbucks, Amanda, Sartorial, Annie, Hatcher, Judy, and John Fleming. “Coal Blooded: Putting Profits Before People.” NAACP. NAACP, n.d. Web. Accessed 8 February 2018. <http://action.naacp.org/page/-/Coal%20Blooded%20Report%2011.15.2012.pdf>

Nearly six million Americans live within three miles of a coal power plant. As noted below, coal power plants tend to be disproportionately located in low-income communities and communities of color:24 People who live within three miles of a coal power plant have an average per capita income of $18,400, which is lower than the U.S. average of $21,587. Among those living within three miles of a coal power plant, 39 percent are people of color — a figure that is higher than the 36 percent proportion of people of color in the total U.S. population. Moreover, the coal plants that have been built within urban areas in the U.S. tend overwhelmingly to be located in communities of color. Living in such close proximity to coal plants has serious consequences for those communities. Coal plants are single-handedly responsible for a large proportion of toxic emissions that directly poison local communities in the United States. Below is a summary of pollutants associated with coal power plants that disproportionately cause negative health effects in low-income communities and communities of color:

Sears, Clara G., and Kristina M. Zierold. “Health of Children Living Near Coal Ash.” *Global Pediatric Health* 4 (2017): 2333794X17720330. *PMC*. Web. 10 Feb. 2018.

[Table 1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5533260/table/table1-2333794X17720330/) contains the prevalence of health conditions. Health conditions that were significantly different between the exposed group and nonexposed comparison group included allergies (74% exposed vs 40% nonexposed, *P* < .001), learning difficulties (26% exposed vs 6% nonexposed, *P* = .005), ADHD (36% exposed vs 16% nonexposed, *P* = .02), emotional/behavioral disorders (38% exposed vs 4% nonexposed, *P* < .001), and gastrointestinal or stomach problems (31% exposed vs 10% nonexposed, *P* = .01). Overall, the parents of children exposed to coal ash reported significantly more health conditions per child than the parents of children in the comparison group (2.4 vs 1.0; *P* = <.001).

Landler, Mark and Alan Rappeport. “Trump Plans Stiff Trade Tariffs and Other Penalties on China.” The New York Times. The New York Times, 21 March 2018. Web. Accessed 22 March 2018. <<https://www.nytimes.com/2018/03/21/us/politics/trump-china-tariff-trade.html>>

WASHINGTON — President Trump on Thursday plans to announce at least $50 billion worth of annual tariffs and other penalties on China for its theft of technology and trade secrets, which administration officials say has robbed American companies of billions of dollars in revenue and killed thousands of jobs.

The measures would mark Mr. Trump’s most aggressive move yet against a fast-rising economic rival that he has accused of preying on the United States.

The measures will be targeted at imported Chinese goods in as many as 100 categories — hitting everything from shoes and clothing to consumer electronics — and will impose restrictions on Chinese investments in the United States, people briefed on the measures said.

Mr. Trump will instruct the Treasury Department to pursue restrictions on certain types of Chinese investments to counter China’s ambitious industrial policy, which aims to dominate cutting-edge sectors like artificial intelligence and mobile technology, officials said.

For Mr. Trump, the steps fulfill a frequent campaign pledge to crack down on China, which he has characterized as an “economic enemy” that has “taken advantage of us like nobody in history.” But the actions will only ratchet up tensions with the Chinese government at a moment when Mr. Trump needs its support for his campaign to curb North Korea’s nuclear program.

Harkinson. Mother Jones. 2013. https://www.motherjones.com/politics/2013/02/silicon-valley-h1b-visas-hurt-tech-workers/

To be sure, America’s tech economy has long depended on foreign-born workers. “Immigrants have founded 40 percent of companies in the tech sector that were financed by venture capital and went on to become public in the U.S., among them Yahoo, eBay, Intel, and Google,” writes Laszlo Bock, Google’s senior VP of “people operations,” which, along with other tech giants such as HP and Microsoft, strongly supports a big increase in H-1B visas. “In 2012, these companies employed roughly 560,000 workers and generated $63 billion in sales.” But in reality, most of today’s H-1B workers don’t stick around to become the next Albert Einstein or Sergey Brin. ComputerWorld revealed last week that the top 10 users of H-1B visas last year were all offshore outsourcing firms such as Tata and Infosys. Together these firms hired nearly half of all H-1B workers, and less than 3 percent of them applied to become permanent residents. “The H-1B worker learns the job and then rotates back to the home country and takes the work with him,” explains Ron Hira, an immigration expert who teaches at the Rochester Institute of Technology. None other than India’s former commerce secretary once dubbed the H-1B the “outsourcing visa.”

Solomon, Michael S. “H-1B Visas: Why They’re Broken And What We Can Do.” The Huffington Post. The Huffington Post, 20 March 2017. Web. Accessed 19 March 2018. <<https://www.huffingtonpost.com/entry/h1b-visas-why-theyre-broken-and-what-we-can-do_us_58d01818e4b07112b6473048>>

[H1B Visas](https://en.wikipedia.org/wiki/H-1B_visa) were created when it became apparent we needed to import specialized technological and scientific talent that we don’t have sufficiently available in the U.S. The concept of this is reasonable. When you need something and don’t have it, you find a way to get it. So far, so good. But there are several inherent problems with the current H1B system, and even more with the Trump Administration proposal being discussed that would reduce the number of such visas issued.

First of all, the impact of reducing the amount of H1Bs issued will go far beyond just the tech sector. Virtually every company in our economy is steeped in technology, and it will be harder and harder for all companies (especially non-tech companies) to get the tech talent they need. The Trump administration and some media outlets talk about H1Bs as a problem unique to the technology industry, but that could not be further from the truth.

Winkler, Matthew A. “California Makes America’s Economy Great.” Bloomberg View. Bloomberg, 6 June 2016. Web. Accessed 22 March 2018. <<https://www.bloomberg.com/view/articles/2016-06-06/california-makes-america-s-economy-great>>

California produces almost all of the country's almonds, apricots, dates, figs, kiwifruit, nectarines, olives, pistachios, prunes and walnuts among dozens of crops that make it No. 1 in the U.S., with an equivalent GDP from agriculture, forestry and hunting totaling more than $37.7 billion, dwarfing No. 2 Iowa's $12.1 billion, according to data compiled by Bloomberg. No state comes close to California in manufacturing totaling $255.6 billion. Texas is next with $239.1 billion. The trailing 12-month revenue from California technology companies totaled $732 billion, or 53 percent of all tech revenues in the U.S.

Winkler, Matthew A. “California Makes America’s Economy Great.” Bloomberg View. Bloomberg, 6 June 2016. Web. Accessed 22 March 2018. <<https://www.bloomberg.com/view/articles/2016-06-06/california-makes-america-s-economy-great>>

No state comes close to California in recognizing the peril of global warming and addressing it with policies that expand the opportunity to develop clean or alternative energy. Among the 127 North American companies in the Bloomberg Americas Clean Energy Index, 26 are based in California, with average revenue growth of 11 percent -- 2 percent more than the average for the rest of the sector across the continent. Texas has three companies in the group, with revenue growth of 2 percent. During the past 12 months, the clean energy companies based in California spent an average 25 percent of their revenue on research and development and a median of 16 percent. Non-California firms spent an average of 13 percent and a median of 1 percent.

The payoff for investors owning the shares of California clean energy companies is huge compared with returns from similar firms outside the state: An average gross margin of 42 percent, turning $100 of sales into $42 gross profit compared to a gross margin of 31 percent for non-California clean energy during the past 12 months. Analysts also say the shares of the California clean energy companies will gain 40 percent during the next 12 months compared with a predicted 23 percent for the non-California firms.

Khalid, Asma. “H-1B Visas: Stealing American Jobs or a Solution to a Tech Shortage.” Bostonomix. WBUR, 23 February 2017. Web. Accessed 22 March 2018. <<http://www.wbur.org/bostonomix/2017/02/23/h1b-visas-debate>>

It's a popular program in the high-tech community. Last year, there were more than a quarter of a million applications. For years, the tech community has been lobbying Congress to increase the number of annual visas, which are capped at 85,000.

But expanding the program seems unlikely at this political moment.

During the presidential campaign, Donald Trump criticized the H-1B program for taking jobs away from qualified Americans. Last month a draft executive order from the Trump administration began circling online. There are also three different pieces of legislation that have already been introduced in Congress — all with the goal of overhauling the H-1B program.

#### STEM professionals vital for economic leadership

**Sahim, Research Scientist at Harmony Public Schools, formerly a Research Scientist at Aggie STEM Center at Texas A&M University, 2016 (Alpaslan, The Fountain, “STEM Education and Why It is Important for Countries’ Global Leadership”, August 2016,** [**http://www.fountainmagazine.com/Issue/detail/stem-education-and-why-it-is-important-for-countries-global-leadership**](http://www.fountainmagazine.com/Issue/detail/stem-education-and-why-it-is-important-for-countries-global-leadership)**, accessed July 1 2017, KMV)**

STEM’s importance grows from the fact that STEM knowledge is diffused to almost each and every part of our lives. If we just look at our environment, we can see how we experience things that are STEM-related. At this point, if a country wants to produce innovative economic leadership, it will depend upon producing STEM professionals (engineers, mathematicians, physicists, etc) who develop inventions and innovations in all areas of the economy. In addition, the 21st century workforce requires an almost entirely new set of skills due to the rapid changes in technology and the internet; we have to prepare our young population for the challenges they are going to face. The 21st century has brought many changes to our lives, from manufacturing to broader dissemination of information and technology. Today’s students know that the future holds jobs that require more advanced skills (Roblin, 2012; National Research Council, 2011) because many traditional jobs have been outsourced or replaced with high-tech tools. Therefore, students must also be prepared for jobs that do not yet exist (Dede, 2010). A lack of a skilled or, a STEM-illiterate, generation is a threat to each and every economy that worries about their future. The Science Pioneers website gives many good examples of how science, technology, engineering, and mathematics are diffused into things happening around us every day. The website defines science as our natural world. We ride a car, fly a plane, or sail a ship, and each has its own system and set of sciences. We also live in the digital age where all types of technology enter our lives via desktops or laptops, iPads or smartphones, and countless other information sources. We witness the construction of colossal structures, as well as engineers’ amazing solutions to today’s challenges of a growing population and global warming. We don’t need to search very hard to see the contributions of engineers to our daily lives. All we have to do is look at the world around us, including the houses we live in and the cars we drive. When it comes to recognizing the use of mathematics, evidence is everywhere. Math is used for such minor tasks as going to a grocery store, bank, or shopping center, or for budgeting or investing. Mathematical calculations are part of our daily routines. Almost every other field (STEM and non-STEM) depends on mathematics. I remember an example one of the STEM teachers gave me. He explained why mathematics is not fully appreciated. He used an analogy of a tray, which represents mathematics. When you serve other subjects – including physics, chemistry, biology, technology, and even reading – on the tray, people pay attention to the things on the tray, but not the tray. But without the tray, you cannot serve anything. In sum, STEM education is a must in today’s economy; it’s very important, because “it pervades every aspect of our lives” (Science Pioneers, p.1). It is better to explain this section with an example. The United States will produce more than 1.8 million STEM jobs by 2018. In fact, it is expected that STEM-related jobs will grow at a faster rate than other fields - 17 percent versus 9.8 percent (Bertram, 2014). Unfortunately, it is estimated that 1.2 million of these STEM jobs will go unfilled. Why? Because the current US workforce does not possess the skills to fill them (Bertram, 2014). Moreover, the World Economic Forum ranks the United States 52nd in the world when it comes to the quality of mathematics and science education, and 5th in overall global competitiveness or innovativeness. Moreover, the United States comes in 27th among developed nations in generating college graduates in science or engineering. Not surprisingly, many graduate students studying in US graduate schools are mostly non-American citizens, including over 2/3 of the engineers who receive Ph.D.’s from United States universities. What’s more, only one third of the annual 1.8 million bachelor graduates in the US choose STEM majors. One very important quote from the US Department of Labor (cited in Vilorio, 2014) summarizes why STEM education is important for the US economy: “The STEM fields and those who work in them are critical engines of innovation and growth: according to one recent estimate, while only about five percent of the US workforce is employed in STEM fields, the STEM workforce accounts for more than fifty percent of the nation’s sustained economic growth.” Therefore, STEM education has a critical role in countries like the US. The importance of STEM education is not limited to only the United States: when you look at the research literature, you will see that many other European and non-European countries have started investing millions of dollars to improve their STEM education and increase their STEM-literate college students (Archer, DeWitt, & Wong, 2013; Ayar, 2015).

#### STEM education reform is key to US economic competiveness

**Baker et al., Distinguished Research Professor at University of California, Los Angeles, 2016** (Eva L., Department of Education, “STEM 2026: A Vision for Innovation in STEM Education, Updated 1-18-17, Pg. 1-2, APW)

A strong STEM education—one that results in the skills and mindsets just described and opens the door for lifelong learning—starts as early as preschool, is culturally responsive, employs problem- and inquiry-based approaches, and engages students in hands-on activities that offer opportunities to interact with STEM professionals. The development of and adherence to these types of STEM teaching and learning practices is not widespread, however, and opportunity gaps persist throughout the education system. The inequities in STEM education along racial and ethnic, linguistic, cultural, socioeconomic, gender, disability, and geographic lines are especially troubling because of the powerful role a foundational STEM education can play and because the gaps are so pronounced in STEM. According to the U.S. Department of Education Office for Civil Rights’ Issue Brief Civil Rights Data Collection: Data Snapshot: College and Career Readiness (2014), the STEM fields “are the gateway to America’s continued economic competitiveness and national security, and the price of admission to higher education and higher standards of living for the country’s historically underrepresented populations” (p. 2). Recent analyses indicate that during the next five years, major American companies will need to add a total of nearly 1.6 million employees to their workforce: 945,000 who possess basic STEM literacy and 635,000 who OFFICE OF Innovation and Improvement 2 demonstrate advanced STEM knowledge (Business Roundtable & Change the Equation, 2014).5 Other data suggest that at least 20 percent of U.S. jobs require a high level of knowledge in any one STEM field (Rothwell, 2013).6 Even outside of the traditional STEM job sector, there is a need for STEM competencies and skills. Data show that the set of core cognitive knowledge, skills, and abilities that are associated with a STEM education are in demand in nearly all job sectors and occupations (Carnevale, Smith, & Melton, 2011; Rothwell, 2013).

#### US is losing global competitiveness due to a shortage of STEM education

**McGlynn**, Psychology Professor at Mercer Community College, **2009** (Angela, The Hispanic Outlook in Higher Education, “Needed: More – and More Diverse – STEM Students & STEM Teachers,” 10/05/2009,

<http://proxy.foley.gonzaga.edu/login?url=https://search.proquest.com/docview/219309310?accountid=1557>, accessed 6/20/2017, JME).

Where does America stand in the global picture when measuring educational attainment and research productivity? As we acknowledge an increasingly competitive global environment, is the United States losing its advantage? Once we led the world in the fields of science, technology, engineering and mathematics (STEM) , pushing us into the role of superpower and ensuring a better quality of life for our people. Where are we now? According to the Business Higher Education Forum (BHEF), Securing America's Leadership in Science, Technology, Engineering, & Mathematics (2006), other countries have already caught up with or passed our nation on some key factors used to predict future economic growth. Specifically, we have lost ground in several ways: \* Fewer college degrees earned in STEM fields \* Fewer Nobel Prizes won \* Since Sept. 11, fewer of the world's most talented students and scholars are coming to America to work and study due to stricter immigration policies and the increased worldwide competition for top students. William H. Swanson, chairman and CEO of Raytheon Company, presented this picture in 2006: "As Tom Friedman \New York Times columnist] has written, the world is becoming 'flat.' **The United States will need an adequate supply of engineers and scientists to prosper in this intensely competitive world** that is just a 'mouse-click' away. One of the key challenges we face is to help young students to develop and sustain an interest in math so that they will pursue careers in engineering and related fields. Much is riding on how well we meet this challenge." William J. Baker, president of California Polytechnic State University, added: "**The United States has been in a world leadership position for some time; however, we have now become complacent**. We must move beyond this complacency and commit ourselves to a national collaborative effort to equip each and every one of our teachers and students with the skills needed to take over the vital leadership that is needed in science and technology-driven fields." Back in 2006, BHEF warned that our nation must strengthen its efforts and determination to create a world-class work force, particularly in the critical STEM disciplines. At that time, BHEF, joined in its initiative by corporate and academic groups, set the groundwork for doubling the number of STEM graduates produced by 2015. Its aim was to improve the quality of the nation's future work force and to strengthen the country's research and development infrastructure. The BHEF initiative, known as "Securing America's Leadership" (SAI), was aimed at strengthening the education pipeline that would lead students to STEM careers. Based on data showing that students are not well-prepared for STEM majors, that the teacher turnover in math and science is higher than in other fields, and that few STEM majors complete their degrees, often switching to other disciplines, the SAI Project focused on six areas of priority: 1) Science and Math Culture and Achievement - Increase student awareness, interest, and achievement in math and science. 2) STEM Pipeline - Attract and graduate more students in the STEM disciplines, particularly women and underrepresented minorities. 3) Institutional and Systemic Reform Advance learning methods and systemic reforms that facilitate greater student achievement in math, science, engineering and technology. 4) Teaching Work Force - Foster new methods of recruiting, training, supporting and collaborating with K- 12 teachers proficient in math and science. 5) STEM Policy - Advance policy and programs that enable U.S. higher education, private industry and government agencies to compete in the global search for the best STEM talent. 6) Advocacy and Action - Stimulate national dialogue and local, grass-roots initiatives through alliance building and collaboration among business, education and government. ACI: American Competitiveness Initiative The BHEF 2006 Issue Brief titled "The American Competitiveness Initiative: Addressing the STEM Teacher Shortage and Improving Student Academic Readiness" explores the overlapping issues of STEM teacher shortages and lack of student preparedness to enter teaching and research fields. The American Competitiveness Initiative (ACI) is aimed at addressing these crucial issues. The components of the ACI include an Adjunct Teacher Corps, Advanced PlacementInternational Baccalaureate (AP/IB) Incentive Program, the National Math Panel, Math Now for Elementary Students, and Math Now for Middle School Students. In terms of teacher shortages in STEM fields, the brief expounds on three facts: Fact 1. **The United States faces a critical shortage of highly qualified mathematics and science teachers** that will require an additional 283,000 teachers in secondary school settings by 2015. The shortage is most dramatic in low-income, urban school districts. In "Making a Case for Diversity in STEM Fields," authors Daryl. E. Chubin and Shirley. M. Malcom offer insight into the lack of diversity and the compelling reasons for diversifying the STEM fields both in academia and the work force. Chubin and Malcom say that the STEM fields look the least like America in both arenas. There are smaller proportions of women, African-Americans, Native Americans and Latinos. Even as the overall college student population has become more diverse, these groups are underrepresented among all STEM majors. Chubin and Malcom argue the case for diversity in education and the work force, showing how both students and society would benefit from a more diverse STEM field. As mentioned earlier, **there is high teacher turnover in STEM disciplines**. Add this to the swell of student enrollment and lower studentteacher ratios - this combination of factors contributes to the growing shortage problem.

#### STEM Gives The US An Edge In Global Competitiveness

**Evans** Ex. Dir. of the National Science Teachers Association, and Milgrom-Elcott, Executive director of the STEM teacher training initiative 100Kin1, which trains and supports STEM education teachers, **‘17**

(David, *The Hill*, “STEM education will carry our children in tomorrow’s economy,” 4 April 2017, http://thehill.com/blogs/pundits-blog/education/327195-stem-education-will-carry-our-children-in-tomorrows-economy, 1 July 2017, RV).

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.

David Evans, Ex. Dir. of the National Science Teachers Association. Talia Milgrom-Elcott, executive director of the STEM teacher training initiative 100Kin10, which trains and supports STEM education teachers.

Peri, Giovanni. “STEM Workers, H-1B Visas, and Productivity in US Cities,” Journal of Labor Economics. July 2015. Web. Accessed 23 March 2018. <http://giovanniperi.ucdavis.edu/uploads/5/6/8/2/56826033/stem-workers.pdf>

The importance of STEM innovations has long been recognized by growth economists. Griliches and Jones, for example, have used measures of scientists and engineers to identify research and development R&D contributions to idea production, with the lat- ter study arguing that scientists and engineers are responsible for 50% of long-run US productivity growth. A related literature e.g., Katz and Murphy 1992; Acemoglu 2002; Autor, Katz, and Kearney 2006 has noted that technological innovation during the past 30 years has not increased the productivity of all workers equally. The development of new technologies—especially information and communication technologies (ICT)— significantly increased the productivity and wages of college-educated workers.

Goklany, Indur. [Ph.D, is the Assistant Director for Science and Technology Policy, Of- fice of Policy Analysis, US Department of the Interior, and co-editor of the Electronic Journal of Sustainable Development]. “Have increases in population, affluence and technology worsened human and environmental well-being?” The Electronic Journal of Sustainable Development, 2009.

6.Effects of long term technological change on impacts Table 2 shows for the environ- mental indicators and areas examined in Section 4, long term changes in environmental impact (I), population (P), affluence (A), their product (GDP = P x A), the technology factor (T), and technological change (ΔT). T and ΔT are calculated using Equations 4 or 5, except for mortality, where population is substituted for GDP. The entries for each of the components of the IPAT equation are their values at the end of the period of anal- ysis normalized to unity at the beginning of the period. Thus, the first row indicates that in 2006, U.S. population was 3.22-times its 1910 level; affluence, 6.24-times; GDP, 20.08-times. Nevertheless, the environmental impact of U.S. agriculture, measured by the amount of cropland, was essentially unchanged. T, measured by cropland per GDP, was 0.05 times its 1910 level. Hence, the amount of technological change (ΔT) during the intervening period – the percent change in impact per unit of GDP – is minus 95.0 percent (in the second last column). [The minus sign indicates that the environmen- tal impact per unit of GDP declined, i.e., matters improved.] Finally, the last column provides an estimate of the annual rate of technological change, assuming exponential change (minus 3.1 percent per year). As with all trends, results displayed in Table 2 can be sensitive to the starting and ending years used for compiling the data, particu- larly for episodic events, e.g., extreme weather events. To avoid bias, in these cases I used the longest readily available record. This table indicates that since 1900 affluence has increased faster than population worldwide, and in the U.S., China and India. Sec- ond, but for technological change, impacts would generally have been much higher, in many instances by an order of magnitude or more. For instance, per unit of GDP, tech- nological change reduced the global environmental impact of agriculture by 84 percent from 1950 to 2005. In fact, it has stabilized the amount of habitat converted to crop- land in the U.S. and almost stabilized it globally (Figures 10 and 11). During the 20th century, it reduced death rates from various water related diseases in the U.S. by 99.6– 100 percent. It also reduced the cumulative global death rate from extreme weather events by 95 percent, while reducing U.S. death rates from hurricanes, lightning, floods and tornados by 16–95 percent. Because of technology, U.S. indoor air pollution lev- els are currently 96 to 99 (+) percent lower than they otherwise would be. However, while technology reduced the rate of increase, CO2 emissions, nevertheless, grew sub- stantially. Third, improvements are apparently more pronounced for indicators most directly related to human well-being. Specifically, for each pollutant, indoor air quality improved earlier and faster than outdoor emissions (which comprise the bulk of emis- sions), and mortality rates were reduced more than indicators whose relationship to public health is more indirect. With respect to global warming related indicators, mor- tality rates from total extreme weather events declined substantially, although carbon dioxide emissions increased despite reductions in the carbon intensities of economies. The latter is true even in India and China, where recent improvements in carbon in- tensities coincide with the initiation of economic liberalization, despite generous fuel subsidies to consumers. For the environmental indicators used to characterize the im- pacts on land, air, and water – cropland, indoor air quality, traditional air pollutant emissions, and mortality from water-related diseases – technological change generally more than compensated for any long term increase that might have occurred in impact due to increases in either population or affluence, but not always for the combined effect of the two (i.e., P x A).

Peri, Giovanni. “STEM Workers, H-1B Visas, and Productivity in US Cities,” Journal of Labor Economics. July 2015. Web. Accessed 23 March 2018. <http://giovanniperi.ucdavis.edu/uploads/5/6/8/2/56826033/stem-workers.pdf>

We find that a 1 percentage point increase in the foreign STEM share of a city’s total employment increased the wage growth of native college-educated labor by about 7–8 percentage points and the wage growth of non-college-educated natives by 3–4 percent- age points. We find insignificant effects on the employment of those two groups. These results indicate that STEM workers spur economic growth by increasing productivity, especially that of college-educated workers.

Wright, Joshua. [Writer for Emsi, a labor market analytics firm]. “Measuring Innovation and Economic Impacts in the Tech Industry”. Emsi, April 2017. Web. Accessed 21 March 2018. <<http://www.economicmodeling.com/2017/04/12/innovation-and-economic-impacts-in-the-tech-industry/>>

In his 2012 book The New Geography of Jobs, Enrico Moretti outlines the importance of the innovation sector to the U.S. economy. He called it “America’s new engine of prosperity,” partly because most innovation jobs are part of the traded sector (i.e., they produce exportable goods and services) and partly because these jobs have a large mul- tiplier effect. The innovation sector can be a bit squishy to define, but everyone agrees the tech industry—however you define it—is an integral part of the innovation engine. This is well illustrated by CompTIA in its new Cyberstates 2017 report. In the report’s subtitle, CompTIA—a tech industry association that has issued more than two million IT certifications—calls Cyberstates the “definitive national, state, and city analysis of the U.S. tech industry and tech workforce.” And indeed, it’s hard to imagine a more comprehensive look at the tech economy and labor force. The study delves into tech industry and occupation employment, wages, projections, job postings, business estab- lishments, gender ratios, and self-employment estimates. Cyberstates also examines a few key economic impact and innovation indicators by state and metro, which is what we’ll explore in this post. (For a broader look at the tech economy, the Cyberstates web- site and full report are very much worth exploring.) Ranking the Economic Impact of Tech by State There are several ways to determine an industry or sector’s impact on a lo- cal, state, or national economy. One method is to take a strict workforce perspective and calculate the share of jobs that industry or sector makes up of the total labor force. Cy- berstates does this by isolating a group of tech occupations and industries and ranking each state on their percentage of total and private-sector workers in tech. Massachusetts is No. 1 among all states on both counts, with 8.7% of its total workforce and 9.9% of its private-sector workforce in tech categories. The rest of the top five is as follows: Colorado (7.8% of total workforce in tech) Virginia (7.7%) California (7.2%) Washing- ton (7.1%) Nationally, just 4.4% of the workforce is employed in tech, per CompTIA’s analysis. Another method is to analyze an industry or sector’s multiplier effect, which takes into account downstream, indirect benefits in addition to direct jobs, earnings, or sales. Moretti’s researched revealed that the high-tech sector has a jobs multiplier of 6.0—meaning every new jobs creates five jobs outside of high tech. Cyberstates, which briefly touches on multipliers, reports that the IT services and custom software services category has a jobs multiplier of 4.8. A third economic impact method teases out the economic contribution of an industry or sector by looking at its share of gross regional product. Cyberstates does this by using Emsi and the Bureau of Economic Analysis’ gross state product (GSP) numbers.

Cromwell, Courtney. “Friend or Foe of the U.S. Labor Market: Why Congress Should Raise or Eliminate the H-1B Visa Cap.” Brooklyn Journal of Corporate, Financial, & Commercial Law, 2009. Web. Accessed 23 March 2018. <<https://brooklynworks.brooklaw.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1146&context=bjcfcl>>

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#### In addition to the loss of a well-educated workforce, the H-1B cap prevents the United States from being credited for the innovation of valuable intellectual property. In 2006, foreign nationals residing in the United States filed 25.6% of the international patent applications.183 “Foreign nationals and foreign residents contributed to more than half of the international patents” filed by multi-national companies such as Qualcomm, Merck & Co., General Electric, Siemens and Cisco in 2006.184 Furthermore, “41% of the patents filed by the U.S. government had foreign nationals or foreign residents as inventors or co-inventors.”185 In addition, 16.8% and 13.7% of international patent applications from the United States had an inventor or co-inventor with a Chinese or Indian-heritage name, respectively.186 Finally, one study shows that “for every 100 international students who receive science or engineering Ph.D.’s from American universities, the nation gains 62 future patent applications.”

Michael Murray, 12-16-2016, "To Address STEM Shortage, U.S. Employers Need Talented Immigrants," Forbes, https://www.forbes.com/sites/realspin/2017/02/09/to-address-stem-shortage-u-s-employers-need-talented-immigrants/#36da2cee5c34

There is a huge shortage of available talent in the science, technology and engineering fields (commonly referred to as STEM) not just in the United States, but around the world. The technology age that started with President Kennedy’s moonshot in the 1960s and then exploded with the emergence of the Internet in the 1990s is still reshaping and driving the global economy. Technology sectors in India, Australia, the United Kingdom, Canada, China and elsewhere are burgeoning. A college graduate in one of the STEM fields writes his or her own ticket to success. However, our universities cannot graduate enough U.S. citizens to meet the demand. The United States is competing globally for talented individuals in the STEM fields, yet our immigration system severely limits the ability of U.S. employers to hire skilled foreign workers. *The primary work visa program for these highly skilled workers, the H-1B visa program, is limited to issuing 85,000 new visas a year. Despite the costly and onerous obligations for employers who use this program, over each of the past several years U.S. companies made 200,000-300,000 H-1B visa requests. Only about a third of these requests were granted. America needs talented, highly skilled U.S. workers and foreign workers to provide technical expertise, innovation and creative energy to U.S. companies rather than to our competitors abroad*. Instead of thinking of these skilled foreign workers as an anchor on U.S. jobs, they should be thought of as the high-octane fuel that we could use to rapidly grow our economy. On the contrary, we have created a complex system that denies U.S. companies the workers they need to succeed and discourages talented STEM professionals from even trying to come to the United States.

Gaurav Khanna and Nicolas Morales. 2017. “The IT Boom and Other Unintended Consequences of Chasing the American Dream.” CGD Working Paper 460. Washington, DC: Center for Global Development. <https://www.cgdev.org/publication/it-boom-and-other-unintended-consequences-chasing-american-dream>

We model firm-production, trade and the forward-looking decisions of workers and students in both countries, to closely capture important trends in the data that we first describe in detail. Innovation rapidly expanded the US IT sector in the early 1990s (Bound et al., 2015; Kerr, 2013a), and a few years later the IT sector in India quickly grew from 1.2% of GDP in 1998 to 7.5% in 2012 (NASSCOM, 2012). Indian workers and students responded to these booms and migration opportunities by accumulating computer science skills valuable both at home and abroad. While a fraction of these workers entered the US labor market via the restricted supply of H-1B visas, many joined the rapidly growing IT sector in India. We calibrate our model using data from various sources and countries, and perform out-of-sample tests to show that our model captures these trends. We then conduct counterfactual exercises that change the number of immigrants allowed into the country. Given that 70% of H-1B visas went to Indian workers by 2014, our results indicate that the H-1B program and the tech boom had a powerful impact on IT sectors in both countries. By the early-2000s, many workers returned to India once their visas expired with newly acquired knowhow and connections. This additionally facilitated the US-led boom to spread to India, and by the mid-2000s India surpassed the US as the major exporter of software. Despite various distributional effects, our results indicate that the average worker in each country is better off due to immigration.

**CONTENTION 2 CARDS**

**Harder for foreign doctors to work in U.S./ 60% of rural doctors are on H1-B Visas/ 230,000 people left uncovered**

#### Miriam Jordan

**3-18-2017, "Rural Areas Brace for a Shortage of Doctors Due to Visa Policy," New York Times, https://www.nytimes.com/2017/03/18/us/doctor-shortage-visa-policy.html?rref=collection%2Fbyline%2Fmiriam-jordan&amp;action=click&amp;contentCollection=undefined®ion=stream&amp;module=stream\_unit&amp;version=search&amp;contentPlacement=1&amp;pgtype=collection**

**In Coudersport, Pa., a town in a mountainous region an hour’s drive from the nearest Walmart, Cole Memorial Hospital counts on two Jordanian physicians to keep its obstetrics unit open and is actively recruiting foreign specialists. In Fargo, N.D., a gastroenterologist from Lebanon — who is among hundreds of foreign physicians in the state — has risen to become vice president of the North Dakota Medical Association. In Great Falls, Mont., 60 percent of the doctors who specialize in hospital care at Benefis Health System, which serves about 230,000 people in 15 counties, are foreign doctors on work visas. Small-town America relies on a steady flow of doctors from around the world to deliver babies, treat heart ailments and address its residents’ medical needs. But a recent, little-publicized decision by the government to alter the timetable for some visa applications is likely to delay the arrival of new foreign doctors, and is causing concern in the places that depend on them.**

**Crippling medical industry with doctor shortage**

#### Seema Yasmin

**, 2-1-2017, "Trump Immigration Ban Can Worsen U.S. Doctor Shortage, Hurt Hospitals," Scientific American,****<https://www.scientificamerican.com/article/trump-immigration-ban-can-worsen-u-s-doctor-shortage-hurt-hospitals/>**

**The U.S. could face a shortfall of thousands of doctors, experts warn, because Pres. Donald Trump issued an executive order last week that banned citizens of seven majority-Muslim countries from entering the U.S. for 90 days. The order has created fears among foreign-born doctors and medical students—more than a quarter of the physician workforce in the U.S. comes from other countries, including Syria and Iran—that they will be persecuted in the U.S. or forced to leave. Medical school leaders say that sought-after applicants are likely to move their careers to other countries. The reasons such doctors are in the U.S. in the first place is that America does not produce enough physicians to keep up with demand. A current deficit of 8,200 primary care doctors and 2,800 psychiatrists is expected to worsen as the population grows and ages, according to a report published in 2016 by the Association of American Medical Colleges (AAMC). It estimates the U.S. will face a shortage of up to 94,700 doctors by 2025. Almost a third of the crunch will be primary care physicians.**

**Increasing Quota brings in more foreign doctors**

#### Mautino, K.S. Journal of Immigrant Health (2000)

**2: 115.****<https://doi.org/10.1023/A:1009542118689>**

**The United States, a country that generally welcomes the well-educated of other countries, has a very different approach when it comes to foreign doctors or physicians. Unlike research scientists, physicians who wish to practice patient care face many hurdles in receiving permission to work temporarily or live permanently in the United States. Part of the reason is that there is a conflict between the government’s vested interest in assuring that those treating patients are well qualified and a well-documented shortage of qualified physicians in many rural and urban areas. Those interested in assisting foreign physicians through the labyrinth of immigration regulations must take care to research the area fully, as change is constant. This paper focuses on physicians who wish to practice patient care—those physicians interested in pure medical research, teaching or otherwise using their medical background away from patients, generally do not face the same restrictions or problems. Ironically, it may be easier for a foreign physician to immigrate as a researcher than as a physician.**

**Shortage of workers results in increase deaths and disease**

#### Finnegan, Joanne,

**12-12-2017, "Rural health crisis escalates: Sometimes there’s only 1 doctor in town (if you’re lucky)," Fierce Healthcare, https://www.fiercehealthcare.com/practices/rural-health-crisis-shortage-providers-karen-tomky**

**The shortage of medical providers across rural America has resulted in shorter life spans and higher rates of disease for those living in rural communities, according to The Denver Post. Like Oklahoma, Colorado has the Colorado Health Services Corps that also helps new doctors repay medical school loans if they work in a rural or underserved area of the state. And the University of Colorado’s School of Medicine has started the Rural Track, a program that takes about 20 students per class and prepares them to work in rural communities. But it's not always easy to get them to stay, according to the article. The program has graduated more than 130 new doctors, but fewer than half now practice in rural settings.**

#### [Robert Lowes](http://www.medscape.com/author/robert-lowes), January 28, 2013, "Hospitalist Understaffing Hurts Patient Care, Study Says," Medscape, <https://www.medscape.com/viewarticle/778338>

Using this rule of thumb, 40% of the hospitalists said their typical inpatient census exceeded safe levels at least once a month, whereas 36% said it happened more than once a week.

Unsafe workloads often or very often had consequences, as the hospitalists reported using a Likert scale:

* 25% percent failed to fully discuss treatment options with or answer questions from patients and family members;
* 22% ordered potentially unnecessary tests, procedures, diagnostic imaging, and consultations because they lacked the time to adequately assess the patient in person;
* 19% said patient satisfaction soured;
* 18% said an excessive inpatient census marred the quality of patient hand-offs; and
* 7% committed a treatment or medication error.

In addition, unsafe workloads often or very often led to adverse events:

* transfers to higher levels of care (10%),
* morbidity or complications (7%),
* incident reports filed by the physician or someone else (6%), and
* death (5%).

<http://www.foxnews.com/opinion/2014/03/06/hey-america-here-how-spell-success-s-t-e-m-science-technology-engineering-and.html>