Dow's recommendations on education and manufacturing workforce development policies

2022







Overview

Dow believes that the long-term viability of the manufacturing sector requires a workforce with advanced skills in the fields of science, technology, engineering and mathematics (STEM). However, the U.S. is far from being on track to fill the projected number of STEM jobs of the future. If the talent development system is not reinvented, current figures of 8-9 million jobs unfilled in the United States may not be solved in the short and longterm.¹ In addition a good high school education, these jobs may require specialized postsecondary career education, two- or four-year college degrees, one- or two-year college occupational certificates, or a two- to three-year apprenticeship education.

The STEM talent gap is hurting domestic manufacturers now and will continue to do so over the coming years unless the underlying issues are tackled, and negative trends are reversed. In fact, 69 percent of employers report being impacted by the talent shortage and overall, an all-time high in the U.S.². In the manufacturing industry, the gap is imposing significant challenges: 77% of surveyed manufacturers say they are having ongoing difficulties in attracting and retaining workers in 2021 and believe that filling vacant jobs is now 36% harder than it was in 2018.³

The STEM talent gap is multi-faceted, complex and is inextricably linked to social issues such as poverty, education, societal inequality and youth unemployment. Addressing this gap will take a concerted effort from all stakeholders and a comprehensive, integrated approach to ensure a steady stream of STEM talent to help build the future of advanced manufacturing and innovative solutions.





¹⁴JOB OPENINGS AND LABOR TURNOVER," by Bureau of Labor Statistics - 2021
²⁴Closing the Skills Gap: What Workers Want" 2020 Report from The ManpowerGroup

Issues

Introduction:

From weaknesses in K-12 education and post-secondary training to the unfavorable image of manufacturing jobs, several issues come into play, essentially harming the U.S. workforce's competitiveness on a global level, which threatens the success of advanced manufacturing industry in the U.S.

Lower overall achievement in K-12 mathematics and science:

Compared to other member countries of the Organization for Economic Cooperation and Development (OECD): OECD 2018 comparisons show that the U.S. performed below average in mathematics and performed close to average in science.⁴ This poor performance is partly attributed to poor K-12 standards for mathematics and science, shortages in qualified STEM teachers and significant achievement gaps for minorities and students from low-income families. While many states have made progress over the last few years in adopting and implementing higher standards, given the scale and political nature of education reform, it will be a while before these efforts pay off.

Less than optimal high school graduation rate:

High school graduates are more likely to be employed, make higher taxable income, and aid in job creation. However, far too many students are still dropping out of high school. Although the national high school graduation rate hit a record high of 85.8 percent in 2019⁵, it remains to be seen whether the nation achieved its goal of 90 percent on-time graduation. If the national rate reaches 90 percent, the additional graduates from a single class would earn an estimated \$5.3 billion more in income, generate more than 37,000 jobs and increase the GDP by \$6.6 billion per year.⁶

Low college readiness with the need for remediation before credit-earning college courses:

Equally important to increasing the high school graduation rate is ensuring that graduates are ready for college or a career. Of the U.S. students that took the ACT test in 2021, only 36 percent met the readiness benchmark for mathematics, while only 35 percent met the readiness benchmark for science – an all-time low for both benchmarks.⁷ Our recruitment efforts for the Dow Apprenticeship Program have also revealed that in some cases, students lacked basic mathematics skills that are necessary for technical roles.

Not enough domestic STEM graduates:

India, one of the world's largest academic powerhouses, had 2.6 million new STEM graduates while the U.S. had 698,734 in the same period.⁸ Shortages of domestic students graduating with STEM degrees are linked to decreased interest in pursuing STEM degrees. Additionally, high tuition costs, which have risen at twice the inflation rate over the last decade, and the fear of amassing graduate debt (\$1 trillion nationwide and growing) are increasingly deterring many low-income students from pursuing a college education.

Reduced focus on vocational training:

Over the last two decades, reduced focus on apprenticeships and Career and Technical Education (CTE) has led to shortages in the skilled trades. Even though the number of apprentices in the country has risen 50% in the last seven years⁹, there is still room for improvement. Germany, which is considered the model country for apprenticeships, trains over two-thirds of its working population in the programs each year and has a low level of youth unemployment (7.5 percent in 2020).¹⁰

Unfavorable image of manufacturing:

The U.S. manufacturing sector is often perceived as offering little job security and few advancement opportunities. However, the reality is quite different. Manufacturing jobs of today are high-wage and high-skilled. As of 2020, the average U.S. manufacturing worker earned \$92,832 annually, including pay and benefits.¹¹ It is critical to change inaccurate perceptions in the minds of children, parents and educators to ensure a sustainable talent pipeline into the future.



Recommendations



K-12 education reforms

- Higher standards in K-12: States should continue implementing higher state standards for Science and Mathematics in K-12 to create a 21st- century workforce skilled in problem-solving, critical thinking and data-based argumentation. Programs and initiatives that develop soft skills such as leadership, communications and teamwork should also be prioritized.
- STEM teacher development and training: States must improve teachers' skills through mentoring and formal training to ensure all students' access to high-performing teachers and hands-on STEM-based curricula. The private sector can further help improve the quality of STEM curricula for K-12 by providing technical expertise and coaching to teachers on a volunteer basis, contributing to the development of technical curricula and inviting teachers into private industries to personally experience STEMrelated jobs.
- Closing the achievement gap, emphasizing diversity across the talent pipeline: States must adopt policies that ensure schools are held accountable for the achievement of all students and that the lowest-performing schools have resources to close gaps. We must ensure no student is left behind and address gender and ethnicity gaps early on.

Spark interest in STEM early on and drive towards STEM careers along the education continuum: States, districts and schools should include hands-on STEM learning in school curricula. Coding camps, robotics programs and engineering groups are great examples of how to introduce students to STEM disciplines early on and demonstrate the importance of an interdisciplinary approach to innovation. Additionally, schools and businesses should partner to engage STEM professionals in the classrooms and open businesses to teachers and students for visits, internships and job shadowing.

Dow's position

Workforce development policies for future workforce needs (three-plus years):

- To prepare students for future careers in science, technology, engineering, or manufacturing, it is essential to start in the K-12 classroom. More effort should be focused on classroom to career programs that help students become interested and prepared for an exciting career path in a STEM field as well as educator empowerment, to support educators as key drivers for student success, particularly in preparing students for STEM careers.
- In addition to direct STEM skills, the uncertainty that automation and emerging technologies brings to jobs of the future will require students to learn how to become collaborative, adaptive and resilient.

²PCAST Report to the President, Accelerating U.S. Advanced Manufacturing, October 2014 ³National Center for Education Statistics



Education-to-employment system reforms

• **Demand-driven apprenticeships**: Partnerships among government, academia and industry are needed to focus on creating the future workforce with an emphasis on workforce training and retraining. This must include the development of partnerships and policies that support demand-driven apprenticeship programs. The recommendations made by the Advanced Manufacturing Partnership provide a blueprint for businesses to implement such programs.¹²

Dow's position

Workforce development policies for immediate and intermediate workforce needs:

- The most critical shortage is in the middle-skills, which we know can be alleviated by methods like apprenticeship and other Earn-While-Learning career pathways.
- At Dow, we find it essential to partner with community colleges in local communities strategic to our operations. We participate on community/technical college advisory boards to develop and sustain relevant curricula.
- For urgent hiring needs, we have utilized local unique programs, like the FastStart program with Delta Community College in Michigan for rapid job placement (16-week program for candidates with an Associate of Science degree) for positions with our manufacturing sites in Midland, MI.
- Our U.S. Apprenticeship Program is a three-year program registered with the Department of Labor, that includes both formal education (associate degree) and on-the-job training to prepare best-in-class operators and technicians for our manufacturing sites.

 Reinvent Career and Technical Education (CTE) and increase pathways to college and careers:

States, districts and schools should seek policies that increase pathways to college and career by reinventing CTE programs. The opportunities should be accessible to all qualified students in a school or district. Programs should merge occupational course sequence, rigorous academic coursework, and career exploration opportunities. These programs become pathways into post-secondary programs that link degrees and credentials to occupations; credentials and accreditations become important examples of on-/off-ramps for students who need to move in and out of the job market and training programs to meet life demands.

• Build a positive image of manufacturing jobs: As efforts to increase pathways from K-12 to college and career take off, all stakeholders must design campaigns that build a positive image and perception of manufacturing as a dynamic, creative and rewarding profession.





- Increase access to higher education: Federal and state governments must pursue policies that support access to Higher Education, including scholarships and grants, support to low-income students and demonstrations of the potential return on investment.
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- Higher education suited to manufacturing needs: U.S. graduate programs should be adapted to deliver the specific skill sets and relevant knowledge required for successful manufacturing careers of all kinds. Increased investment is necessary, particularly in developing relevant curricula and internship/co-op partnerships for high-interest areas of manufacturing.



Dow's position

Higher Education Act (HEA) Reauthorization, Pell Grants and Federal Work Study:

- Building a "tomorrow ready" workforce requires modernizing federal policies to strengthen education and training pipelines so America's youth and working adults can secure fulfilling jobs and sustainable career paths.
- Congress can start by modernizing the HEA as part of its reauthorization and incorporating reforms to increase access to high-quality, affordable education and on-the-job training for America's students and workers. The current Higher Education Act was last renewed in 2008 and has been temporarily extended multiple times since expiring in 2013 while Congress has worked on various legislative packages.
- Currently, to be eligible for a Pell Grant, an individual must take 600 clock hours of training. Considering many of today's students are not taking the path from high school to a four-year institution and 58 percent work while enrolled in college, the Pell eligibility requirements must change to expand pathways for working adults. As further evidence of the need for a shift in policy, while nearly 70 percent of all new jobs require some form of postsecondary education, many do not necessarily require a bachelor's or associate degree, nor the 600 clock hours of training for certification required to qualify for a Pell Grant.
- Federal work-study dollars are not being used for valuable off-campus work experiences. Less than 1 percent of federal work-study dollars go to support students working off-campus at a business.
- Congress should reauthorize HEA, including: expanding the eligibility for federal financial aid to students pursuing a certificate and/or industry-recognized certification programs; allowing students who take a minimum of 150 clock hours to qualify for federal Pell Grants; and changing the federal work-study program to allow funds to be used for off-campus work experiences.



 Enable hiring and retention of STEM foreign talent: The federal government should enhance U.S. immigration policies for foreign talent to enable U.S. businesses to hire and retain STEM graduates from U.S. universities: 50% of STEM majors attending U.S. universities are foreign born.¹³ For American companies to fill critical labor gaps we need to modernize our immigration, border security and visa programs.



Dow's position

- Dow partners with 50+ universities to hire top talents. We support efforts to retain graduates of U.S. universities and hire them and we only hire or relocate foreign-born candidates when we don't have enough university candidates to fill our pipeline.
- The top immigration priority for Dow is H-1B/L-1B reform to streamline and modernize the process and reverse the related actions taken by Department of Labor and Department of Homeland Security to increase wage levels of foreign workers.
- Dow is not alone in our use of these visas. Every major U.S. company uses these as well, because they ultimately help enable our competitiveness by supporting our talent pipeline, new projects, product turnovers, etc. Our position is also fully aligned with the U.S. Chamber of Commerce, National Association of Manufacturers, and Business Round Table who have also engaged on this.
- Dow also supports ensuring & streamlining border security, including customs processes.

STEM Skills Gap: Think Nationally, Act Locally

Visit Dow's website (corporate.dow.com) to learn about Dow's partnerships and activities to close the STEM talent gap.

Partnership with Historical Black Colleges and Universities (HBCUs)

Dow is investing more than \$5 million to Historically Black Colleges and Universities (HBCUs) for programming, partnership and support to enhance the Black STEM talent pipeline. This investment is seeded by an initial \$500,000 contribution in 2020, along with an additional \$4.6 million to expand support through 2024, to address systemic racism and inequity in advocacy, community and talent. The company is investing an additional \$4.6 million to expand support through 2024.

FIRST® Robotics

FIRST® Dow is a strategic partner of *FIRST®* (For Inspiration and Recognition of Science and Technology), a robotics community that prepares young people for the future through a suite of inclusive, team-based robotics programs for ages 4-17. The programs implemented by *FIRST®* have helped students excel in STEM while driving a bigger, continued interest in STEM Careers, especially among girls. Dow employees - support the program through mentoring activities in our communities.

Dow Apprenticeship Program

The Dow U.S. Apprenticeship Program supports a major initiative of the Advanced Manufacturing Partnership, a national effort to secure U.S. leadership in emerging technologies by creating high-quality manufacturing jobs and enhancing America's global competitiveness.

Through partnerships between Dow and local community colleges, the apprentices will receive three years of training and on-the-job experience in two of the most sought-after and highest-earning technical specialties in the industry: instrument electrical technicians and process technicians. During this time, the apprentices have their tuition funded by Dow and receive a competitive salary that increases incrementally over their tenure in the program. Upon completion of the program, apprentices will be evaluated for possible employment opportunities at Dow.

Creators Wanted™

Creators Wanted is the manufacturing industry's largest campaign to build the workforce of the tomorrow—and inspire, educate and empower a new generation of creators in the United States today. It's a joint campaign of the National Association of Manufacturers and The Manufacturing. Dow is a Legacy Sponsor of Creators Wanted ™.

By 2025, the campaign aims to reduce the skills gap in the United States by 600,000, as well as increase the number of students enrolling in technical and vocational schools or reskilling programs by 25% and increase the positive perception of the industry among parents to 50% from 27%.

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