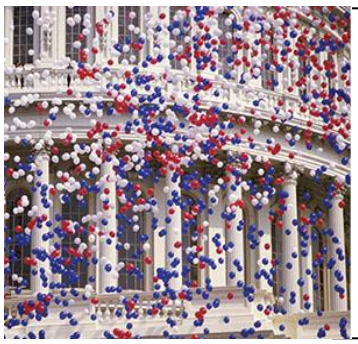

U.S. Manufacturing and Public Policy Conference:

"What the Next President Should Do About U.S. Manufacturing: An Agenda for the First 100 Days"

National Press Club, September 14, 2016

How to Address the Skills Gap in the Manufacturing Economy

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Senior manufacturing executives consistently report that the most important barrier to building or expanding their firms is a lack of adequately trained workers for production jobs in the modern factory.[1] In addition to basic mathematics and verbal skills, candidates often are deficient in such "employability" factors as communications, teamwork, time management, problem solving and reliability. Hard skills such as specialized training in machining, operating computer-controlled machines, metalworking and even welding are not even taught in most schools.[2] A skills gap for engineers and researchers is less evident, but nonetheless real as American universities produce inadequate numbers of degrees in the fields relevant to manufacturing, including the physical sciences.[3] Retirements alone among the aging workforce in this sector account for about 25% of the total workforce that must be filled in the next decade, and Deloitte estimates over 2 million jobs could go unfilled due to a dearth of trained workers.

German and Japanese companies producing in the United States regularly lament the lack of skilled workers, and frequently locate their plants in areas that work with them to establish the training programs they require. Economic research and survey data indicate that efforts to meeting changing customer demand, and raise productivity and production levels are hampered by insufficiently skilled and adaptable workforces. The number of new plants foregone (or sited elsewhere) because a skilled workforce is simply not available is unknown.

Some economists argue that the skills gap can be met simply by raising wages. This begs the question of a timely emergence of candidates with well-grounded mathematics and verbal skills as well as employability tools. Our K-12 schools are less than proficient in teaching basic skills from the start, and, with the decline of vocational education, even worse at helping develop employability characteristics. American culture, to a large extent, devalues the types of work and skills needed in factories in favor of guiding all young people toward a four-year college education. Educational institutions, in turn, do not have

confidence in the future of American manufacturing, have few lasting ties to industry, and often few specialized skills-training courses or teachers. At the engineering and research level, women, who already constitute the large majority of higher education graduates, are not incentivized or otherwise attracted to these professions.[4] Employers often must turn to foreign degree holders to meet their needs for highly trained researchers and engineers. Additionally, a national survey done for the National Association of Manufacturers (NAM) revealed that only 37 percent of parents would encourage their children to enter manufacturing, and hence acquire the necessary skills in their educational paths.[5] The cultural bias (buttressed somewhat by ambiguous economic data) is exacerbated by notions of "secular stagnation" and by lack of confidence in American manufacturing by elites in government, business and education.

In recent years, fortunately, a number of successful new initiatives to reshape the skills training, Science, Technology Education and Mathematics (STEM) open some paths to addressing the problem. Apprenticeship programs, with the close involvement of manufacturing firms, unions and trade associations are now flourishing in the Carolinas, Wisconsin, Georgia, Florida, Tennessee and Michigan. German, Swiss and Austrian firms with factories in the United States are leaders of these initiatives, adapting their expertise in apprenticeships to American shores. Long-established apprentice pipelines for the naval and nuclear industries in Newport News, VA; for aerospace in the Pacific Northwest, and for metalworkers, utility linesmen, and construction workers are still effective. But overall, despite the promise of these programs, the number of apprentice programs fell by 40 percent between 2003 and 2013.[6] The most effective of these new programs combine the support of companies, local high schools and community colleges, and local and state governments. Of the total number of nearly 448,000 apprentices in the United States, only 13,532 (3 percent) are in manufacturing-related programs. And nearly 96,000 apprentices are educated in active military duty.[7] The success of the United Kingdom in more than tripling its apprenticeship programs in less than a decade shows that concerted public-private efforts can make major strides in skills training.[8]

Although much effort to promote and revalue STEM education has been expended in recent decades, most results indicate modest to scant progress. Attracting women to manufacturing-related fields, despite the efforts of the National Science Foundation and the Association for Women in Science, also have met with limited success. Programs like First Robotics and other science competitions have a profound impact on attracting young people to manufacturing fields, but the scope of participation remains small. Efforts by manufacturing firms to address the skills gap have been hampered by shrinking profitability in the face of growing global competition and fears that investments in human capital would be "poached" by competing firms. Company efforts to automate and lower labor costs are often not accompanied by training workers to maintain equipment and troubleshoot production problems.[9] State and local programs to promote job-related skills, along with federal support for new apprenticeships and manufacturing research centers, are a start toward a more systematic approach to the skills gap issue, but these efforts pale in comparison to the push for "college for all" and specialized programs for health care and even agriculture.

The following policy proposals and guidelines are designed to meet some of these shortcomings.

Policy Proposals

Changing the Cultural Perception of Manufacturing

- Starting with the president, national leaders should visit modern factories and research centers to highlight exciting new technologies, production processes and products.
- Consider a major push for new space exploration program (Mars?) on the Apollo Project model, as a way to inspire students into STEM and manufacturing fields and spur new technology.
- Senior manufacturing executives, especially, but not exclusively women, should mentor young women on careers in manufacturing and visit schools to tout opportunities and show new technology.
- State and local leaders should actively promote apprenticeships to companies and students starting in high school, based on models of North and South Carolina and the United Kingdom.
- Government and business leaders should highlight the value of skills training in the U. S. military and promote career opportunities for those leaving the military for civilian life.

Adapting Skills Training by Education Institutions

- Support the revival of career education and training at high schools; inform teachers and guidance counselors on economic benefits of specialized skills training.
- Community colleges should work closely with local manufacturing firms to build partnerships for skills training for the local community: programs in the Carolinas, Kentucky, the Pacific Northwest and Tennessee provide good models.
- Work with industry associations and companies to build standardized training and certification programs at the local, regional or even national level to the extent possible, as means to build credibility for certifications and portability for those who receive them.
- Work with military to give credit where possible to training obtained by active duty military when transitioning to civilian economy.

Government Programs

- Support rigorous research on economic value of skills training both to individual career and to company success, and on the best methods for delivering such training; disseminate results widely to guidance counselors, parents and civic leaders.

- State and local officials should, where opportunities exist, promote partnerships with industry and development authorities appropriate to needs of local and regional economies.
- States should consider tax credits to employers for building apprenticeship programs, as done successfully in South Carolina (and the United Kingdom). Federal authorities might consider tax credits as an alternative to the plethora of job training programs as well.
- The incoming administration, with presidential backing, should undertake a comprehensive review of the nearly 50 separate federally-funded jobs training programs. A high-level review commission should consider converting most programs into block grants to states, and/or grants to public and private education institutions (including schools, unions and industry-specific training entities) offering apprenticeship or other skilled training programs.
- Consider changing accounting standards for expenditures on training from current expensing to capital investment treatment as a means of incentivizing such expenses.

Manufacturing Companies

- Work with trade associations and educational institutions to develop standardized and portable skills requirements for certifications where possible.
- Work with local educational institutions to develop cooperative programs to improve STEM based education and offer specialized training, including apprenticeships, appropriate to local industry.
- Conduct research on value to company (response times, productivity and production levels) of skills trails training; disseminate to schools, opinion makers and government officials.
- Expand tuition reimbursement programs for skilled and professional workers.
- Deploy executives to local K-12 schools to educate students and teachers about new technology and new career opportunities in manufacturing.
- Invest in apprenticeship programs, starting in high schools in some circumstances, to meet pipeline for skilled workers.

Endorsed by:

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[1] See Deloitte and The Manufacturing Institute: (2015). "The Skills Gap in Manufacturing: 2015 and Beyond." (Washington: NAM). Available at: http://www.themanufacturinginstitute.org/~/media/827DBC76533942679A15EF7067A704CD.ashx.
[2] See Robert Lerman, (2015). "How Can we Develop Enough Skills for a Robust Manufacturing Economy?" Paper presented to the Workshop on U. S. Manufacturing and Public Policy: Road Map for the Future." (Indianapolis, IN; October).
[3] See Laura Putre (2016). "Building a Better Advanced Manufacturing Workforce," ***Industry Week,*** May 17, 2016. Available at: http://www.industryweek.com/education-training/building-better-advanced-manufacturing-workforce?code=UM_June16TrafficNL0529&utm_rid=CPG03000004499320&utm_campaign=12350&utm_medium=email&elq2=ebe26855b3ad4645b2352ea21aa741ca
[4] See Thomas J. Duesterberg (2014). "Manufacturing Skills and The Untapped Resource," ***Huffington Post***, (May 11). Available at: http://www.huffingtonpost.com/thomas-j-duesterberg/manufacturing-skills-shortages-stem_b_4935255.html
[5] See NAM
[6] See Deloitte, op. cit., p. 14.
[7] U.S. Department of Labor,"ApprenticeshipUSA,," Available at: https://www.doleta.gov/OA/data_statistics.cfm
[8] See Lerman, op. cit., pp. 20-21.
[9] See Michael Collins (2015). "Why American Has a Shortage of Skilled Workers," ***Industry Week,*** (April 16). Available at: http://www.industryweek.com/skilled-workers?code=UM_June16TrafficNL0529&utm_rid=CPG03000004499320&utm_campaign=12350&utm_medium=email&elq2=ebe26855b3ad4645b2352ea21aa741ca