THE U.S. MANUFACTURING SECTOR’S SKILLED WORKER GAP

WHAT ARE THE EMERGING HUMAN RESOURCE DEVELOPMENT STRATEGIES?

BY THOMAS A. HEMPHILL, WAHEEDA LILLEVIK AND MARK J. PERRY
Following the release of a report on the nation’s manufacturing employee skills gap by The Manufacturing Institute and Deloitte in October 2011, concern among American manufacturers has focused on how to resolve this seemingly persistent human capital problem. The good news is that there are nationwide human resource development initiatives now underway to address this manufacturing sector employee skills gap. In this report, we describe some of the key training initiatives that have emerged recently to close the critical skills gap. To address the more immediate short-term demands for skilled factory workers, certification programs like the “Right Skills Now” program are training workers in accelerated, fast-track programs. Additionally, some manufacturers have renewed their own traditional company-focused programs to train skilled workers internally. For the longer term workforce needs of U.S. manufacturers, applied training programs that include industry internships are being actively developed by community colleges around the country.

In the report, “Boiling Point? The Skills Gap in U.S. Manufacturing,” 82% of American manufacturers surveyed reported a moderate or severe shortage of high-skilled workers—translating into approximately 600,000 high-skilled manufacturing positions that are currently unfilled. In October 2012, the Boston Consulting Group (BCG) released a study, “Made in America, Again: Understanding the U.S. manufacturing Skills Gap and How to Close It,” which estimated that the present high-skills gap in the United States, while much smaller than 600,000, is still currently 80,000 to 100,000 workers nationwide.

In the long term, the manufacturing skills gap is forecasted to get even worse. The Society of Manufacturing Engineers predicts that the shortfall of skilled factory workers could increase to three million jobs by 2015 due to pending retirements of older workers and a manufacturing rebound. The BCG study forecasts a high-skills gap in manufacturing that could approach 875,000 machinists, welders, industrial engineers and industrial machinery mechanics by 2020. Nevertheless, whether on the high end or low end of the estimated manufacturing high-skills gap, in a 21st-century American economy built on “advanced manufacturing,” high-skilled employees are the key to a successful enterprise.

From 2010 through January 2013, U.S. manufacturing employment has increased by almost 500,000 jobs, as factory payrolls have grown from 11.46 million to 11.95 million. This recent expansion in manufacturing employment has played a critical role in helping to support and strengthen the overall economy as it has emerged from the 2009 recession. In fact, there is ample evidence that manufacturing has been at the forefront of the economic recovery over the last several years. Yet, according to the U.S. Department of Labor, the percentage of manufacturing workers aged 55-64 years old and the share of workers older than 65 have both significantly increased since 2000. With a pending wave of retirements in the manufacturing sector, the looming demand for high-skilled factory workers adds urgency to the already existing employment shortage of American manufacturers during a fragile and sub-par economic recovery.

In July 2012, the President’s Council of Advisors on Science and Technology, an advisory group of scientists and engineers appointed by the president,
through its Advanced Manufacturing Partnership (AMP) Steering Committee, issued a report that broadly addresses the advanced manufacturing employee skills gap under “Securing the Talent Pipeline,” one of three identified “pillars.” Two of AMP’s recommendations directly address developing partnerships with educational institutions to provide formal skills certification and accreditation:

The community college level of education is the “sweet spot” for reducing the skills gap in manufacturing. Increased investment in this sector is recommended, following the best practices of leading innovators.

Portability and modularity of the credentialing process in advanced manufacturing is critical to allow coordinated action of organizations that feed the talent pipeline. The AMP Steering Committee supports the establishment of stackable credentials.

While efforts to credential and accredit formal education of advanced manufacturing skills and knowledge is underway, the issue of meeting the supply-and-demand of hiring new skilled workers is so critical that members of the Manufacturing Leadership Council reported in August 2012 that few manufacturers are willing to require skills certification when considering new job applicants. As Jeff Moad wrote in the Manufacturing Executive on August 24, 2012:

The situation provides something of a Catch-22 situation for certification programs and competency models. Unless manufacturers take them seriously, students and educators won’t. But, without robust competency models and certification programs attracting more educators and students to manufacturing, the supply of new skilled workers will continue to lag and employers may continue not to require certification.

As articulated above by Moad, is this a serious dilemma for American advanced manufacturing? Or is there a “third way” between these apparent contradictory skill development approaches that offers both short- and long-term solutions to this sector’s challenging human capital problem? The evidence appears to support various emerging business and public policy solutions to the latter question.

To bridge this skilled employee gap confronting American advanced manufacturing, the Automation Federation, a global organization of associations and societies engaged in manufacturing and process automation activities, in conjunction with the Employment and Training Administration of the U.S. Department of Labor, in 2009 developed an Automation Competency Model (ACM). The ACM is designed to help individuals prepare for job opportunities in the automation profession and to aid existing professionals in attaining the knowledge and skills for improving job performance. It consists of nine tiers of competencies and knowledge (See Figure 1 on next page). The ACM was also designed to help academic institutions update their education curriculum to incorporate course work necessary to prepare students to enter the professional field of automation. To implement this goal, in May 2012, the Automation Federation and the American Association of Community Colleges announced the creation of the U.S. Automation Community College Consortium to create an automation curriculum that will offer two-year degree programs in specific automation arenas and a four-year college degree program in automation, engineering, and technology.
The Manufacturing Institute, a non-profit affiliate of the National Association of Manufacturers (NAM), is charged with a mission of supporting American manufacturers through solutions and services focused on education, workforce development, and innovation acceleration. In April 2010, NAM, in collaboration with the U.S. Department of Labor, the National Council for Advanced Manufacturing, and the Society of Manufacturing Engineers, updated their Advanced Manufacturing Competency Model (AMCM), which reflects the knowledge and skills required for the 21st-century workforce. To meet its mission, the Manufacturing Institute has developed a NAM-endorsed Manufacturing Skills Certification System (MSCS) of “stackable” credentials applicable to all aspects of the manufacturing sector.

The MSCS includes both technical and non-technical skills, ensuring that employees have both the personal and professional skills necessary for advanced manufacturing. Furthermore, the skill sets, based on the industry-developed AMCM, include four tiers of manufacturing competencies: 1) personal effectiveness competencies; 2) academic competencies; 3) core manufacturing competencies; and 4) industry-wide technical competencies. Figure 2 outlines the MSCS manufacturing-related areas and the partnerships formed with manufacturing certification organizations in order to implement the certifications. With 113 community colleges across the United States using the MSCS, the Manufacturing Institute reported that more than 84,000 skill certifications were issued in 2011, and this is one example of a program that is helping to address the growing demand for skilled factory workers.
In October 2011, the Manufacturing Institute launched the nation’s first fast-track high skilled manufacturing training program built on the MCSC, called “Right Skills Now for Manufacturing.” Right Skills Now allows individuals to earn college credits and national certification for high-demand positions—like Computer Numerical Control (CNC) operators—in only 24 weeks: 18 weeks at community college, with coursework, benchwork, and hands-on laboratory work, followed by a six-week paid internship and one additional class. The Right Skills Now curriculum is closely aligned with standards established by the National Institute of Metalworking Skills. The Right Skills Now training program was first introduced at two Minnesota colleges, Dunwoody College of Technology and South Central Community College, with initial certification programs in CNC. The Manufacturing Institute is planning to replicate the Right Skills Now accelerated training model for other areas of advanced manufacturing like production and welding.

While these competency models and skill certification efforts appear to be promising, can they sufficiently meet the immediate skilled employment demands of America’s advanced manufacturing sector for the 100,000 to 600,000 unfilled skilled positions? In the longer term, the answer is “yes,” but in the shorter term, there needs to be another, accelerated path to meeting the human capital demands of the nation’s manufacturers, who could be facing a shortage of 875,000 to 3 million skilled employees over the remainder of the decade.

What options exist for manufacturers who are currently facing a shortage of skilled workers? One option is to hire workers without the appropriate skills and train them internally. This imposes a substantial cost on manufacturers, not only in terms of the training expenses, but also in the productivity losses incurred until these employees can operate at peak performance. Until colleges and other educational institutions can educate and train...
the number of graduates to meet industry demand—and this situation will not occur for several years—the nation's manufacturers will continue to experience some shortages of skilled workers.

One reason for the current skills mismatch in the manufacturing sector is that many firms have reduced or eliminated the traditional apprenticeship model. The opportunity for job-specific training and education has been pushed to the job seeker, as it reduces training costs for the employer. Consequently, it also means that employers have to wait for fully trained graduates from programs at community colleges who possess both broad-based and job-specific skills, such as those skills provided by the U.S. Automation Community College Consortium and the MSCS. When there is an adequate supply of job candidates to meet industry demand, and when human resources planning and forecasting for skilled manufacturing is done appropriately, the skills gap will naturally be reduced over the long run. Currently, however, the immediate demand for skilled manufacturing labor is so high—coupled with the impending “baby boomer” retirements—companies probably cannot rely on waiting for workers to acquire job skills on their own and are fully trained for work in manufacturing in the short run.

To address the current skilled-worker shortfall in manufacturing, more immediate measures are needed that can accelerate some level of learning while new employees learn on the job. Initiatives such as the Right Skills Now program can create an immediate candidate pool, or “just in time talent,” from which manufacturers can hire employees and teach them their company-specific skills to get them up to speed in terms of performance. This fast-track, accelerated training program has emerged as one of the most promising skills development approaches to meet industry demand in the short run, and it can readily be expanded to other regions of the United States where there are manufacturing skills shortages.

What else can be done to accelerate the development of work-ready talent for American manufacturers to help close the skills gap? To begin with, limited on-the-job training and apprenticeship programs need to be incorporated more strategically into employee-employer joint efforts of skill acquisition. There is evidence that this approach is returning, as the BCG study found that many companies are revitalizing their in-house training programs and using job placement services to fill high-skill positions. “Train the trainer” programs can also help by having higher-skilled individuals in a company teach other workers how to train new job candidates to ensure an adequate supply of skilled employees. In addition, rotational internships can be made available for short-term work, which will allow community college students to gain a wide variety of experience in different roles while the company can fill short-term demand where needed. These kinds of programs can complement the Right Skills
Now program and can perhaps even serve as an extension of the Right Skills Now program after a job candidate has completed the basic program training.

Additionally, the manufacturing sector needs to consider other concurrent, long-term and ongoing initiatives, such as implementing continuing education, and perhaps (re)certification programs for skilled workers who may need to refresh or update their skills so they can also be part of the new “adaptable” candidate pool for manufacturers. Where appropriate, companies can also consider comprehensive cross-training programs so that as long as they have employees with the soft skills...
necessary to complement technical skills, they can offer job-specific training on an ongoing, as-needed basis. Once again this can be considered a certifiable on-the-job extension to the stackable credits gained through the Right Skills Now program to create a more strategic, comprehensive and career-oriented program of education that satisfies the competency model that the National Association of Manufacturers (NAM) (and its affiliated Manufacturing Institute) has endorsed and developed for the manufacturing sector and at the same time help manufacturers close the skills gap.

**CONCLUSION**

With increased high-skilled training and a change of mindset about the high-paying career opportunities in the now thriving manufacturing sector, it might just be American factories over the next few years that will play a vital role in helping the United States finally recover from the stubborn “jobless recovery” that started three years ago. The very real possibility that manufacturing might help rescue the ailing U.S. economy in the years to come is something that nobody would have imagined or predicted just a few years ago. As the BGG study shows, American companies surveyed indicated that they are nearly five times more likely to move production back to the United States rather than from the United States to access high-skilled employee talent, and we can expect the recent trend of re-shoring factory manufacturing jobs back to the United States to continue in the future.

The shortage of skilled factory workers needs to be a national priority for the manufacturing sector and the national economy to rise to their full potential. Fortunately, the skills gap is finally receiving some much-deserved attention from leaders in industry, government, and higher education. As outlined here, emerging human resource training programs are currently being developed with well-deserved urgency, and we are hopeful that fast-track, high-skilled training programs like Right Skills Now, in conjunction with long-term community college applied associate degree programs, will effectively close the skills gap and meet on-going manufacturing sector demands in the coming years. In that case, manufacturing has a bright future as a vital, job-creating sector of the U.S. economy.

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