

6. The Diminished Role of Training And Education in Manufacturing And the Imperative for Change

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As the American economy tumbles into a severe recession, there is, perhaps, one bright spot: Americans might soon realize that an economy cannot be based upon fictitious financial products, and that the only escape is through a rebirth of innovation and production. Both are dependent upon creating a new generation of skilled and knowledgeable workers. Within this context, there is new hope that the United States will finally create a manufacturing policy that includes education and training for the millions of American workers who rely on healthy and innovative manufacturing companies for their jobs.

A renewal of manufacturing in America will be predicated on whether the appropriate skills for the economy are still present when the nation emerges from its current economic nightmare. Currently, much of the manufacturing infrastructure and the skills associated with manufacturing have disappeared.

Yet even within an unfavorable business climate, companies have been faced with shortages of skilled workers. In the state of Michigan with over 300,000 manufacturing jobs lost in the past eight years and an official unemployment rate now above 12 percent (the highest in the nation) there are still help-wanted signs in small- and medium-sized plants for skilled CNC machine-tool operators. These manpower shortages constrain the ability of manufacturing to recover.

Creating a highly skilled workforce is an important public policy issue that is, sadly, not a new topic. Twenty years ago, training and education of manufacturing workers was considered to be a pillar of U.S. global economic power. Yet, for reasons discussed in this chapter, attention to improving the technical and management skills of workers has largely disappeared. If there is to be a revitalization of the manufacturing sector — and there has to be — there will be a need to revisit these issues and learn from previous mistakes.

The manufacturing sector accounts for 11 percent of America's

gross domestic product, providing 12 million Americans with jobs that pay 20 percent higher than the national average. The importance of manufacturing jobs to the income of ordinary Americans is underappreciated. A strong manufacturing base produces a stable, broad middle class and a more equitable society. It should be made very clear that human resource issues are the key to improvements in productivity, innovation and new capacity. Training a highly skilled manufacturing workforce is one of several policies that must be implemented to revive the American economy.¹

Workforce Development in Manufacturing

A “traditional” manufacturing company — one that has had difficulty surviving repeated economic downturns — does not care about hiring front-line workers with formal educational experience. For decades, a high school education or postsecondary degree was never a major condition for being hired or for advancement within most American manufacturing enterprises.

In 1973, half of all manufacturing workers had not completed high school. Only 8 percent of production workers had any postsecondary educational experience.²

Large manufacturing companies in automotive, steel and other traditional industries hired engineers and other white-collar workers with college degrees, but many small- and medium-sized companies were led by individuals with modest educational achievement. These people either inherited the company from family members or created their company based on the skills they learned from experience in other factories.³

Throughout most of the 20th century, workers were hired under the operating principles articulated by Frederick Taylor, who said that a fragmented manufacturing process should consist of specific patterns of repeated physical activity. For most workers, on-the-job training essentially meant watching others work.⁴ The one exception was in the training of skilled workers.

Some of these individuals honed their skills in corporate “training schools” such as the Henry Ford Trade School established by Ford Motor Company in 1916. These private facilities provided selected workers with advanced skills and management training. Most skilled workers, however, learned their trade on the job in the first half of the 20th century, either through formal apprenticeship programs run by senior craft workers (a common source of training among immigrant

workers from Europe), or through the informal process of “stealing a trade” by moving from machine to machine and shop to shop until one acquired the threshold skills to work in the tool room. Little of this would apply to production workers, who were taught a single set of repetitive motions as assemblers or machine tender.⁵

The opportunity for many workers to move into the skilled trades was opened up by the unions in the mid-20th century through the adaptation of the apprenticeship system similar to that in the construction industry. Trained workers were segmented by their different specific skill sets — pipe fitters, electricians, carpenters — just as they would be organized on a construction site. Each had detailed and specific information they were required to learn. Contracts negotiated with the unions often specified the number of skilled trade workers needed.

New workers were selected through competitive tests and formal training programs that combined some classroom instruction and an assignment to work with a skilled worker on the job. When individuals became classified as being “skilled,” they usually received higher pay, had greater access to overtime and achieved a higher level of job security. Access to skilled trades was an important part of the upward mobility of workers within manufacturing. Organizations such as the United Steel Workers and the UAW played a major role in developing technical training for front-line workers.⁶

In the system of mass production that developed after World War II, the workplace was dirty and filled with unskilled workers who followed strict rules created by management. “Park your brain at the door” was a common understanding among production workers at traditional manufacturing plants. The exception was the small number of skilled workers who were required to maintain and repair machines and equipment.⁷

The picture of the manufacturing workforce began to change as American manufacturers were forced to adjust to the first wave of imported products in the late 1970s and early 1980s. Increased competition came from European and Japanese manufacturers that did not organize their production systems or utilize technology in the same manner as American companies. Yet these foreign competitors managed to produce high-quality products that won substantial portions of U.S. market share. Their success raised fundamental questions as to whether traditional American manufacturing processes and work structures were worth maintaining.

Many of the European countries based their industrial work sys-

tems on strong apprenticeship systems. A report from the U.S. Office of Technology Assessment in 1990 on manufacturing training noted: "In their pre-employment screening, Japanese automakers value willingness and ability to learn more highly than previous experience or specific skills. Their training programs emphasize individual and group responsibility along with job skills. U.S. automakers look for more experience and their training tends to stop with narrow technical skills for craft workers, and brief on-the-job sessions for unskilled workers."⁸

Questions about the industrial work systems in traditional American manufacturing have been raised before. While a growing number of psychologists and organizational experts called for changes in the workplace to encourage more rank-and-file participation and change, these were not taken seriously until the early 1980s as the first major wave of imports challenged manufacturers. During this period, the concern was to improve the international competitiveness of American industry, and the strategies to do so took two main courses. First, there were calls to utilize computer-based manufacturing technology to increase productivity and lower costs. Second, there was the need to develop a higher trained workforce that could deploy and utilize the new digital production technologies.⁹

As a result of international competition, significant numbers of unskilled production jobs disappeared as computer-based technologies replaced hands-on labor. Large firms from the auto, steel and electronic components industries downsized considerably. In the 1950s, a factory producing engines might have 3,000 to 4,000 workers. By the late 1980s, such a plant could be run with fewer than 1,500 workers. However, of the remaining jobs, there were more skilled positions required to maintain, repair and program the equipment.

New digital production technology fundamentally changed the structure of industry through the rise of decentralized factories making modular parts. Production processes began to be distributed to supplier companies. Whereas in the past, economies of scale were realized through centralization of production of one product, it was now possible to remain profitable by producing many variations of a basic product on the same manufacturing line. The experience of some European companies proved that small firms working in clusters could effectively bring high-quality and innovative products to market.¹⁰

With the adoption of digital production processes many of the most physically demanding and difficult jobs were eliminated. The

use of computer-based equipment demanded a much cleaner production environment. Factory floors changed their physical appearance. The assembly line was supplemented by work cells and production workers were organized into teams. Workers learned to operate different sets of machines and rotated from task to task. In many cases, repairing and maintaining computer-based equipment cut across the traditional skilled jobs, forcing a reconsideration of how trades were developed.¹¹ Front-line supervision was often eliminated and workers were made responsible for operational outcomes. The manufacturing workplace became a very different physical environment that remained demanding and stressful, but no longer resembled the traditional mass production model.¹²

All of these changes elevated the need to train and educate manufacturing workers. To make the manufacturing operations productive and profitable there was a belief that front-line workers needed to possess formal skills that were necessary to utilize new technologies. Companies developed training and education as an important new part of their enterprise.

A study by the Industrial Technology Institute, a state-initiated center in the 1980s to advance the rapid adoption of computer based manufacturing technologies, found that training in all skill categories increased as a result of the introduction of new technology. Not only were technical skills important, but companies also devoted additional resources to raising the basic skills of all employees. They also encouraged them to return to school through the establishment of company-paid tuition programs.

For the first time, manufacturers began paying attention to the training and education needs of their hourly workforces. Larger companies established formal in-house training; smaller firms tended to rely on informal job training.¹³ In unionized workplaces, this resulted in the development of joint company-union administered training funds that were established to provide continuous training in health, safety and such “soft” skills as problem solving and total quality management. In their 1982 contract negotiations, the United Auto Workers and the Big Three automakers established joint education and training organizations that were funded from money diverted out of the contract settlement. Because of the size of the domestic OEMs and the number of unionized workers, substantial sums of money were amassed to create some of the largest private training organizations in the United States.¹⁴

In addition, many states initiated customized training programs for workers as a strategy to retain existing companies and attract new ones. Most of these programs were directed at manufacturing companies and accounted for the majority of funding for training hourly workers. Many were administered through community colleges that developed and implemented custom training programs for companies deemed to be important to local and state economies. By the late 1990s, a survey of community colleges indicated that the automobile companies were the largest private-sector “customers” of contracted training programs.¹⁵

In late 1989, the first Bush administration introduced the Manufacturing Extension Partnership (MEP), the first federal program aimed at promoting the growth and development of manufacturing. This organization was designed to assist small- and medium-sized manufacturers in the deployment of new technologies. Its creation was justified by the need to foster the competitiveness of U.S. manufacturers against their Japanese and German rivals.¹⁶

Through the 1990s, both Republican and Democratic presidential administrations considered training and education of the workforce to be a national priority. Under the first Bush administration, the Department of Labor initiated the Secretary’s Commission on Achieving Necessary Skills (SCANS), which defined the skills necessary for a successful workplace. Building on these endeavors, the Clinton administration supplemented existing apprenticeship programs under a new education policy entitled “School-to-Work,” which was based on the experiences of the “dual system” of worker training as practiced in Germany. The Department of Labor also developed an on-the-job apprenticeship program for young people. It created the National Skill Standards Board (NSSB) to establish appropriate skills for various key sectors of the American economy. This board helped form the basic principles needed for educational institutions, community organizations, labor unions and others to provide world-class training to the American workforce.¹⁷

In a major shift of federal training policy, schools and educational institutions were considered essential in driving a competitiveness agenda for America. Education was seen as the critical aspect of creating high-skilled jobs with high wages.¹⁸ Much of the new agenda called for reform of the K-12 educational system and integrated workplace learning by using the “dual system” common in Western European countries.¹⁹

This large-scale national education response to the global com-

petitive challenge produced significant interest in and expansion of training and educational activities within state and local governments. Governors developed new economic development programs based on improving the skills of the local workforce combined with the age-old practice of providing companies with financial incentives and tax abatements on land. Many states initiated aggressive customized training programs that doled out state funds to companies promising to add new jobs or to protect existing ones.

As part of the plan to address international competition, there were calls by policymakers to develop “high-performance” workplaces that required greater education and worker participation in corporate operations and improvement. The growth of noncredit customized training courses among the 1,200 American community colleges was driven by new demand from manufacturers. Unions also started developing their own training programs for workers, deploying technologies that would help companies maintain their competitive edge and help retain good-paying jobs in American communities.²⁰

By the late 1990s, there was even more interest in creating manufacturing jobs that paid well and demanded new skills. A new infrastructure of training providers was created to prepare people for these jobs. Although there remained differences between labor and management and the political parties on specific strategies to create a trained workforce, most plans were focused on the activities of the 1,200 American community colleges. These institutions had already developed large and influential programs with local manufacturing companies through the 1980s and 1990s.²¹ They were considered to be the backbone of the national training and retraining system for most adult workers, even though they were funded by local and state governments.²²

But the infrastructure was even broader and deeper. Community-based organizations were created in urban centers to provide inner-city residents with manufacturing skills. These programs enjoyed significant support from local businesses that turned to them as suppliers of front-line workers. Organizations like Project Quest in San Antonio were able to partner with community colleges and develop programs for manufacturers in their community. Focus Hope in Detroit created a major machinist training center that supplied skilled workers to auto suppliers in the Detroit metropolitan area. In Milwaukee, the Wisconsin Training and Education Partnership provided training programs for a collective group of manufacturers that were seeking entry-level workers.²³

These new “intermediary” organizations were created outside of the traditional private training system. They were based on the concept that preparing a skilled manufacturing workforce was too important to be left to the private sector. A trained workforce would help foster a modern manufacturing system and was necessary for the success of local and state economic development initiatives. They also helped stabilize economically troubled local communities. This nationwide effort was based on the assumption that there was a “high road” in manufacturing that needed to be created and sustained so that workers would receive good wages and the communities in which they lived would prosper.²⁴

As a result of these activities, national surveys of firms and analysis of census data indicated substantial increases in training activities within manufacturing firms. About 80 percent of all firms possessed formal training programs. Ninety-one percent of companies with unionized production workers experienced growth in training programs.²⁵ Education and training programs were 35 percent more likely to be found in “high-performance” manufacturing firms than other firms of equal size.²⁶

Education and training gained traction deep within manufacturing companies. Much of the training went beyond technical issues or even health and safety. A good deal of what was offered to workers was in both basic skills to improve reading and writing, total quality management techniques such as Six Sigma and lean, and international quality standards such as ISO 9000 that were being adopted by companies exporting goods overseas and selling to foreign transplants in the United States.

Much of the new emphasis on training was tied to a need to involve workers in the process of work organization and decision-making. One of the most heralded new ventures was GM’s creation of Saturn as “a new kind of car company.” Developed as a response to lessons learned from Japanese manufacturers, GM poured billions of dollars into a separate division within the company designed by joint teams of managers and union representatives. New processes and worker participation were added to all aspects of the production process. Workers were even given responsibility for selecting employees for the new Saturn plant in Springhill, Tenn. In addition, every Saturn non-union worker was obligated to develop an individual training plan and was evaluated on whether they fulfilled their training assignment.²⁷

By the late 1990s, the preparation of the workforce for a modern manufacturing enterprise had emerged as an important public policy issue. There was an understanding of the need to preserve a manufacturing base for America's economic growth and stability. There was a belief that a well-trained and educated workforce would be the decisive reason for companies to maintain production in the United States and that it would act as a magnet for foreign company investment.

In hindsight, this view failed to comprehend that the same factors contributing to the focus on training — the application of computer and communications technologies that allowed for distributed work organizations — were leading to a new global manufacturing order that would result in millions of America's highest skilled production jobs being sent overseas. The myriad of training and education programs just described were about to be altered by new corporate interest in overseas investment.

Globalization Puts an End to the Era Of Workforce Training

The renaissance of American manufacturing abruptly ended in the late 1990s. What emerged was an economy that was not based on a national renewal of U.S. production capacity, but on the globalization of production to remote parts of the world where there were no skilled workers and plenty of cheap labor. The “high road” strategies of the 1990s deftly articulated by policy wonks were jettisoned in favor of earning tons of money from easily exploitable low-wage workers. Indeed, the ability of American corporations to quickly globalize their supply chains refuted the argument by corporate executives and their political patrons that a skilled and highly educated workforce was the essence of a world-class manufacturing capability.

In many respects, the trends promoting globalization and ending U.S. support for programs aimed at improving U.S. competitiveness resided deep in the American economy from the end of World War II. Additional momentum for free trade policies promoting the shift of production offshore was generated by the collapse of the Soviet Union and the opening of China.²⁸

American corporations continued to expand their investments under the banner of “free trade” all over the world. One important signal was the passage of the North America Free Trade Agreement,

which revealed to the American public and workers that there was consensus among leaders in corporate America and the U.S. government that pursuing free trade was the country's primary economic strategy. The central question today is whether that sole economic pursuit has backfired on America.

The shift to investing offshore was not new, but it was justified by American manufacturers in an entirely different way. Instead of viewing national competitiveness as dependent upon an educated and trained workforce, policymakers became more focused on how they could assist American companies improve profitability through overseas investments. The economic justification for this change in strategy was the production of cheaper goods for American consumers. The goal was to allow the United States to become the technical and administrative hub of a global manufacturing enterprise. In this view, front-line manufacturing workers were expendable because of the inevitable move toward low-wage countries. They were not considered to be a value-added resource, and were viewed as an unnecessary and bothersome expense. Axing them was justified under the banner of creating much better "knowledge" jobs, which, it was further assumed, would remain in the United States.

Coupled with this was the extreme "financialization" of the economy, where short-term profitability, quick investment decisions, manipulation of stock prices and the development of esoteric financial instruments became the dominant concerns of the large companies. Manufacturing was not an industry for aggressive young entrepreneurs. Instead, the production of goods was left to non-American, low-cost contract manufacturers who could generate record profits for U.S. companies and their investors. The initial focus on sending production to Mexico soon widened to include China, Eastern Europe and Southeast Asia.

Central to this policy shift was the belief that new computer-based technologies had "leveled the playing field." The ability of rural areas in China to apply new production technologies and compete with manufacturing facilities in the Midwest was celebrated as a process that would more efficiently and effectively utilize the scarce resources of the world.²⁹

As economic policymakers and commentators discussed how the American economy should concentrate on high-tech and service industries, there was a profound silence over the increasing number of industrial jobs being lost to outsourcing. These losses were not driven

by technology but by decisions made by companies to remain profitable by finding cheap labor and places to exploit all over the world. As more jobs were permanently lost, the level of public unease grew, yet policymakers refused to change.

The significant loss of manufacturing jobs created a new ethic surrounding education and training. Millions of displaced manufacturing workers, who would never again work in the manufacturing sector because it was being outsourced overseas, were sent to “retraining programs” for jobs that would never provide them with the wages or benefits they previously received in manufacturing.³⁰ Other high-tech workers were even involved in training their own permanent foreign replacements.

Over the past eight years, there has been a significant shift in the human resource policies of many U.S. manufacturing companies. Borrowing from their Japanese competitors, American manufacturers began adopting the idea that the development of skills was no longer the responsibility of the company. Workers should be selected from pools of people with specific skill sets. Individual workers would be responsible for improving their skills or learning new ones that were in demand. The companies only needed to create new programs to assess workers who possessed the appropriate skills. They would train workers in the proprietary features of their products and processes, but they expected individuals to come to the job having paid for and mastered their own foundation and technical skills.

What is important to emphasize here is the abrupt shift taken by companies to provide less training to incumbent workers, and to stress more hiring of “necessary skills” through elaborate processes of assessing potential workers. In some ways, this approach attempted to emulate the Japanese practice of carefully selecting all front-line manufacturing workers. Public training dollars intended to be used by companies were diverted to develop assessment criteria that would hone down the applicant pool. Training a workforce was no longer necessary. In some instances, the costs of assessing the skills of an individual production worker were as high as \$10,000.³¹

In selecting workers, more emphasis was placed on individuals with basic skills who could be “trained” for jobs when they were hired. The goal was to find the appropriate worker for the job — a concept called “skills on demand.”³² If manufacturing was dominated by “supply chains” of companies providing parts to each other, why couldn’t there be a supply chain of humans who could be delivered whenever

they were needed by companies? This perspective fit well with the demands of lean manufacturing and just-in-time delivery. Training and education were less important than the ability to access skills when required.

These strategies impacted large manufacturing companies that were traditional centers of organized labor. These were often the companies that had adopted the “high road” worker training strategies of the 1990s. The once-prevalent “high-performance” work organization fell out of favor as companies re-engineered themselves for the entirely new era of globalization. Companies trained relatively few workers and they were less interested in seeing training and education as a means of mobility for those within their companies. They sought to find their skilled workers in the marketplace, and no longer developed or even maintained talent from within. They continuously monitored international competition with the sole focus on whether they could match their prices. If not, plants were moved out of the country with frightening speed and wide-scale dislocation of hundreds of thousands of workers. Between 1998 and 2007, manufacturing employment in the United States declined by 20 percent, with losses increasing substantially in 2008.³³

The unrelenting pressure from Wall Street for companies to increase their quarterly profits had a significant impact on training and U.S. education policies.

The training market for front-line hourly employees has subsequently shriveled, as the number of these jobs continues to rapidly decline in the United States. Much of the training budget of firms has shifted to white collar and technical training.³⁴ In the 1990s, many of the largest customized training programs were in industries such as auto, steel and aerospace that were “modernizing” to deal with international competition. Today, many of these firms have closed their U.S. operations or, when they expand their facilities, hire only workers with specific skills and educational credentials. There are few large-scale public training programs left in the United States.³⁵ Instead, there have been significant increases in training programs for displaced workers. These have been created under the new guidelines in the Workforce Investment Act and Temporary Assistance for Needy Families programs. The new era of worker training is short-term and concentrates on resume writing and techniques for quickly finding a new job. It is aimed at getting workers off of public unemployment insurance benefits as quickly as possible.³⁶

The proliferation of IT certification is now a means by which em-

employers can demand validation of new information skills from individuals as a condition of advancement or hiring.³⁷

Thus, education and training is shifting from being a responsibility of the employers to being the responsibility of the employees. Moreover, as employers shift the responsibility for training to the individual, they are also increasingly demanding four-year college degrees as opposed to favoring applicants with skills learned on previous jobs. Employers in the manufacturing sector perceive the college degree as a means by which workers demonstrate not only their motivation to complete an important milestone, but also as the basis to effectively receive additional training on the job.³⁸ By requiring that applicants have a college degree, companies can concentrate on performing employee background checks and drug testing as a means of weeding out candidates who may cause problems. The corporate emphasis on college degrees motivates both state and federal educational policymakers to further reduce their support for vocational and job training programs for the “middle level” skilled manufacturing and construction jobs that require some postsecondary training, but not necessarily a college education.³⁹

While many states still support corporate training programs to lure new industry into their communities, there has been a decrease in state economic development programs targeting specific companies and industrial sectors. States like Michigan have eliminated their modernization services and replaced them with diminished general training funds that can be used by the governor to attract new companies. Other states, such as Illinois and California, have eliminated their customized job training programs altogether. Increasingly, states have been dropping general industry training programs in favor of “one-time” training projects targeted at specific companies considering new investments within the state.⁴⁰ Not only does this contribute to corporate relocation strategies which play states against one another to achieve the best financial incentive package, but these strategies neglect the need to maintain and nurture the manufacturers within the state.

Even in states where there has been considerable industrial economic growth, workforce development programs are different from the past. The best examples are the southern states such as Alabama and Mississippi that attracted large automobile investments from Japanese and German manufacturers. In these cases, prospective workers are trained at their own expense — or through a major state grant — to qualify a “pool” of workers from which the company can

then select. Most state training money is now being spent primarily on training management, engineers and white collar workers.⁴¹

At the federal level, the Workforce Investment Act (WIA) of 1998 and the Temporary Assistance for Needy Families (TANF) act de-emphasize training in favor of immediate job placement. The result: Many workers find work but are unable to obtain sufficient incomes.⁴² In addition, these programs have been significantly downsized. Total WIA adult funding decreased from \$945 million in 2002 to \$864 million in 2006. Dislocated worker funding decreased 3.6 percent from \$1.23 billion in 2002 to \$1.12 billion in 2006. The number of individuals trained under WIA decreased from 168,223 in 1998 to 72,322 in 2001.⁴³

Most of the training now provided by government programs is short-term and does not promote career pathways or a means to better-paying jobs. In a few states such as Illinois, TANF rules were interpreted to permit attendance at a community college as a means of meeting the training requirements.⁴⁴ Yet, on the whole, state programs are now smaller and less directed at the private sector's needs.

What has increased at the state level is an attempt to coordinate both economic development strategies and workforce development strategies through a focus on degree completion. States now believe that granting more college degrees will give their economies a competitive edge in attracting high-tech companies.

States that have taken this approach have assembled coalitions of public universities and community colleges to emphasize policies such as dual enrollment between high schools and colleges, seamless transition from community colleges to four-year colleges and universities, and helping adults with some college credit to return to school and complete their degrees. The primary emphasis is on preparing students for four-year degree programs. The result is diminished emphasis on technical training programs.⁴⁵

As educational requirements became mandatory for workers, new production facilities being built in the United States demanded post-secondary degrees for all front-line employees. When United Motors opened an engine plant in Dundee, Mich., the selection process required all hourly workers to possess a two-year college degree.⁴⁶ More formal education was considered a major plus. Sadly for tens of millions of smart, capable American citizens, manufacturing no longer provides an entry-level job for workers without a college degree.

The conventional explanation for this change was that advanced

technology was available to workers throughout the world and that motivated workers overseas were undercutting American companies. The defenders of outsourcing argued that this was a natural process and that a small segment of America — manufacturing workers — would have to suffer for the remainder of the society to benefit. To survive, American workers were told to sharpen their skills and find jobs in career areas outside of manufacturing.⁴⁷ There was nothing anyone could do about the loss of their good-paying factory job except to retrain for a different economic future — a future in the services sector that, as it turned out, paid lower wages and provided fewer benefits.

The “inevitability” of manufacturing’s demise produced a ubiquitous lack of concern for American industry and its workforce, which was (and continues to be) blamed for being part of the problem. If manufacturing was to remain at all, the winning strategy was to aggressively pursue and ask for significant concessions from “overpaid workers,” despite significant data clearly indicating that labor was only a very small portion of the total cost of any finished product.

Given these changes in perception, which were being promulgated by thousands of economists supported by corporations and government agencies, training and education in manufacturing began to atrophy. Instead of being viewed as being an important input that could improve productivity and flexibility, training was now considered to be an overhead cost that needed to be eliminated. Attitudes toward work and other “noncognitive” skills such as taking orders, showing up on time and listening to supervisors became more important than possessing technical skills to perform a job. A trained workforce was less important than a “virtual” company that was able to create a process for obtaining “skills on demand.”⁴⁸

Federal policies for employment and training began to mirror this view. Instead of looking for ways in which federal skill development programs could be fashioned to protect and preserve American manufacturing, the Department of Labor emphasized the creation of programs that would be “demand driven.” This meant training people for jobs that were already available. Companies with low-wage jobs that had high turnover were able to utilize the federal system for entry-level hires.

Even when the workforce system responded to the market demand of manufacturing jobs, it did not build capacity or encourage the skill sets necessary for long-term, highly technical manufacturing endeavors. Instead, the system was designed for short-term fixes for

low-wage companies, which helped restore their profitability but did little or nothing to build a competitive long-term and viable economic system. Thus, an area like metallurgy, which required significant foundation skills in mathematics, materials and chemistry, was not found among the training programs supported by the Workforce Investment Act. Yet there was a proliferation of training programs to develop “communications” skills. Some local workforce boards found creative ways to undertake manufacturing training activities, but the general goal of these programs was to achieve employment for individuals at any available job. They did not create the skills necessary for a workforce of the future.⁴⁹

The emphasis on “work first” also contributed to a perverse re-ordering of training priorities. The system was directed away from a focus on incumbent workers because they already had jobs. It also meant that employer training funds that had traditionally been used in partnership with public funding mechanisms could not be utilized to develop programs for the incumbent workforce. Such programs had existed during the Clinton administration, but were discontinued.

The Workforce Investment Act also provided poor-paying industries with a steady stream of unskilled workers. The program was a subsidy for low-wage industries that could neither attract nor find sufficient workers on their own. Meanwhile, the media hyped up the efforts to lower unemployment and welfare rolls without looking at how public expenditures were being used to channel funding into industries that paid lousy wages.

Finally the new Workforce Investment Act focused only on skills that workers needed to obtain a job and on short-term training. This denied potential workers the ability to develop long-term skills necessary for mastering computer-based equipment in the manufacturing enterprise. In most cases, customized training could not be financed under the act, so skill development of incumbent workers inside manufacturing firms could not be supported.

Within these broad outlines, the Bush administration added its own ideological requirements. First was the overwhelming belief that markets determine the demand for industries. If there is no demand for manufacturing within the United States, then this sector ought to just shrink and disappear. Government efforts such as the Manufacturing Extension Partnership (MEP) program should be abolished because they were trying to “pick winners,” an ideological no-no in a

capitalistic system. The Bush administration repeatedly tried to kill MEP. While other nations used aggressive policies to improve the health and expand the global influence of their manufacturers, the only major economic policy of the United States government was to pursue a perverse notion of free trade that shifted production offshore and put U.S. industry at a competitive disadvantage.

A second important policy agenda of the Bush administration related to manufacturing was the dismantling of the American vocational educational system. The administration believed that there was no legitimate role for the federal government to play in vocational education, and that if individuals needed to be trained, it should be up to them or their employers to do so. On another level, many in the Bush administration saw vocational education as a barrier to their effort to implement school reform known euphemistically as “No Child Left Behind.” While this law has many deficiencies, the idea that the federal government bears some responsibility for preparing young people for work in manufacturing was important in producing programs at the local level to support training needed for entry-level manufacturing jobs. In addition, there were substantial funds from that legislation that went to American secondary and postsecondary educational systems. The Perkins Act remains the largest single federal funding program for American high schools.⁵⁰

But from the outset of the Bush administration, there were attempts to kill the Perkins Act. Part of the impetus came from tight budgets caused by the administration’s focus on the war in Iraq; part of it came from the increasingly dominant right-wing ideology that education should focus on teaching the basics of reading, writing and math, and that job preparation should be left to local communities. These arguments were often not expressed directly, but were couched in the widespread view that the goal of the K-12 educational program was to insure that all students were prepared to attend college. The Bush administration de-emphasized any support for training and education of manufacturing skills among the millions of young people who would never go to college either because they weren’t good students or because they could not afford it. The misbegotten belief among America’s governing elite was that the future would be dominated by high-tech jobs and that mid-level (and essential) jobs like machinist maintenance and repair workers were “low-tech,” low-skill, and unworthy of the economic attention of the nation.

In addition, the Bush administration continued to slash expen-

ditures in all federal programs aimed at developing a skilled workforce. According to the Workforce Alliance, funding for federal training and education programs has declined by 29 percent during the past eight years. The United States spent a paltry 0.02 percent of GDP on workforce training and education in 2007, the lowest among all 20 OECD member countries.⁵¹

The retreat of support for manufacturing skills training and education was not limited to the federal government. In the late 1990s, states started to slash training programs for incumbent workers. They eliminated most efforts at job retention in favor of “big bang projects” — the luring of major investment — mostly from foreign producers into their states. The new paradigm was embodied in the massive subsidies provided by southern states to lure European and Japanese manufacturers.⁵²

As a result, interest in training a skilled manufacturing workforce over the past five years has diminished substantially. There are now few state programs left that promote the development of a skilled manufacturing workforce. Instead, states try to target industries such as biotechnology, information technology and health care that offer the promise of “job growth,” even though entry-level wages in these industries are considerably lower than in the manufacturing sector. Lacking demand, manufacturing programs at community colleges are now evaporating. Even highly touted community-based initiatives are less involved in training manufacturing workers and are focusing instead on opportunities in areas such as construction and health care.⁵³

Most states now promote the idea that the number of workers with a college degree is the best measure of a trained workforce. Mature programs for developing specific manufacturing skills have disappeared, except for those that concentrate on total quality management. Colleges are not focused on programs aimed at increasing the productivity of manufacturing processes or companies.

The situation is far different outside the United States. European countries such as Germany have significant efforts aimed at preventing manufacturing job erosion. An example is in the use of computers in manufacturing processes. Not only could vast reams of data be stored and utilized to adjust and improve production processes, but digital technologies provide new ways in which workers redesign processes to alter products quickly and efficiently for changing market demands. The challenge facing all nations is how quickly new technologies can be implemented within both products and manufactur-

ing processes so that companies can stay competitive by substantially improving quality and efficiency.

In the United States, the National Skill Standard panel on information technology issued one report on this important subject. It then ceased to exist. Individual information technology companies created their own proprietary skill certification programs. Their goal was to create a base of skilled workers and establish a market for their new software platforms and increase their own profitability. These proprietary IT training programs quickly migrated into the public education system as a source of revenue. What resulted was a crazy quilt of certification programs for every imaginable proprietary technology and software program. Most of these certification courses were very expensive for students, shutting out many lower-income workers who could not afford to pay for them.⁵⁴

This is not how things progressed in Germany. In contrast, the Germans integrated these new skill requirements into their training system by creating apprenticeship programs for information technology. Companies, students, labor unions and training institutes — all of the social partners involved in job creation and retention — were brought together to discuss the needs of employers and to work out a solution that benefited the entire society, not just the technology providers.

In addition to apprenticeship training in Germany, unions and corporate management agreed upon specific short-term technology classes that required immediate support in addition to the traditional apprenticeship programs. With government funding and the technical expertise from technology and software providers, German manufacturers began utilizing information technologies to create on-the-job learning systems for workers on the shop floor. In addition, the well-funded and influential German vocational agency, Federal Institute for Vocational Education and Training (known in Germany as the BIB) sought to ensure that the skills they thought important were embedded within European-wide skill standards for information technology. This included a means by which refresher courses could be taught. In addition, Germany tried to develop European-wide standards so that companies operating across borders would benefit from the investment.⁵⁵

The same promising and essential new digital production technologies were unevenly adopted in the United States, especially among many small- and medium-sized manufacturers unable to attract trained workers with the necessary skills in proprietary IT sys-

tems. There was widespread misinformation spread to workers and potential workers over the need to take certification tests. No such confusion existed in Germany, where there were concerted attempts to focus the public education system on providing technological training and dissemination beyond the borders of the country.

The payoff for these policies was impressive. Germany has maintained a competitive manufacturing edge; it remains a manufacturing giant generating a large trade surplus; and it has sustained many good-paying jobs that generate large sums of tax revenues. Because of higher training costs borne by the society, German manufacturing remains an essential part of the economy. Unlike the cavalier attitude that is widespread in the United States, no German policymaker would dare argue that the elimination of manufacturing would be good for the future economic success of Germany. Meanwhile, without understanding the importance of an industrial base and the need for tens of millions of well-paid, well-trained workers, the United States is suffering a massive economic collapse.

Restoring Training and Education in the American Manufacturing Sector

As the American economy struggles, the short-term future for new training and education strategies for manufacturing appears bleak. Yet over the long term, the economic crisis should raise important issues about policy changes required to revive American industry, the American economy and America's prospects. This time, the country needs to be ready with a fresh mindset and programs that regard education and training as a significant contributor to economic renewal. It has to be different from the past.

The federal government must understand that education and training policies cannot be stand-alone issues, but need to be embedded in an overall national policy that views manufacturing as essential to America's future. Manufacturing needs policies that will help it generate positive returns to society. If manufacturing is important as an employer of millions of Americans who did not succeed through the formal educational system (especially for those who live in urban centers), then public efforts must be made to strengthen these firms as an important piece of the economic revitalization of major cities. If manufacturing is essential to the development and production of environmentally sustainable products, then there should be governmental

regulations and incentives that promote the growth of these firms.⁵⁶ Training and education is part of a larger government strategy that also includes technical innovation, new methods of financing expansions, trade laws, labor organizing reform and changes in tax law. It is no longer plausible to argue that education and training alone can be decisive. It should be part of a broad and systematic plan to rescue the American economy.

A second aspect of a renaissance in economic policy is the need to understand that it has to be directed at innovative small- and medium-sized firms that are the heart of industrial communities throughout the United States. Too much of economic and industrial policy has been directed at large manufacturers that have shifted production offshore and show little allegiance to local communities. Big multinational corporations have become less important to most regional economies. Small- and medium-sized firms are often owned by local business people and are funded through local financial institutions. The needs of these manufacturing organizations, and their potential to revitalize America through the introduction of new products, should be a top federal priority. In this regard, the effort of the NIST Manufacturing Extension Partnership — about to celebrate its 20th anniversary — is an important example of the type of program needed to be developed and expanded.

The economic payoffs for MEP interventions with the companies that constitute the backbone of the American economy are vast considering their relatively low cost to taxpayers. The federal government only funds one-third of their operations, with the remainder of funds coming from states and the companies that receive services.⁵⁷

In addition to MEP, there need to be complementary organizations that can train and educate the workforce to help transform these companies. For small- and medium-size firms, front-line workforce education and training is central to their growth and development. Many case studies indicate that firms with greater training and workforce development are more competitive and are achieving higher productivity gains.⁵⁸ It is difficult for most of these companies to find the resources necessary to support these activities.

A third part of the strategy is the need to understand the difference between education and training in manufacturing and the role each will play in the renewal of American industry. There is a clear need for formal classes and organized learning, but there is also need for research into the postsecondary education system to generate the manufacturing knowledge that gets converted into training material

that can be disseminated through four-year colleges and universities. This knowledge is important for the continued innovation both of educational processes and of the manufacturing enterprise.⁵⁹

On the “training” aspect of manufacturing, many manufacturing workers do not continue pursuing post-secondary education, so there needs to be significant attention paid to making sure they acquire foundation skills in high school. Complex machinery costing hundreds of thousands dollars is being maintained by workers without high school degrees who cannot read, much less comprehend, a technical manual. Too often within the secondary schools, “vocational education” remains a dumping ground for students not headed for college. The programs stress “hands-on skills” without insuring basic competence in the learning skills that are critical once a worker is on the job. Without foundation skills, younger workers entering manufacturing find it difficult to improve their skills. In this regard, some of the recent efforts within Chicago schools to create a new type of high school that stresses strong basic skills in mathematics and English — within a manufacturing context — are a welcome development.⁶⁰

For manufacturers, America’s 1,200 community colleges remain the best public option for these activities. Virtually all of these institutions are within 30 minutes of any major manufacturing cluster and they hire a large group of technically trained, experienced instructors familiar with techniques for teaching adults.⁶¹

In June 2005, the Center for Regional Economic Competitiveness (CREC) surveyed 1,013 community colleges and found that more than 94 percent of them offered noncredit specialized courses. CREC estimated that more than 3.45 million students nationally were enrolled in these programs — or about 20 percent of community college enrollment. More than half of all the community colleges — 55.5 percent — offered specialized training in manufacturing skills, and there were about 871,000 students enrolled in these courses, about 6 percent of all manufacturing workers. The majority of the funding for these programs came from contracts or grants with private companies working in conjunction with the states.⁶²

Community colleges can also be important places where under-prepared adults working in manufacturing companies can return to school and learn fundamental math and communication skills. This would help them participate in improving the productivity and growth of their firms and is particularly important for immigrants who need adult education skills to advance in their jobs.

A second major role of community colleges will be to develop career paths for individuals to advance into management at manufacturing companies, and for others to move into technical divisions to help improve corporate innovation. Without an upward flow of people into skilled trades and management, manufacturing enterprises become dominated by individuals with college degrees who have little connection to manufacturing and its significance to the future success of the company.⁶³

A third role for community colleges comes in aiding the development and diffusion of new learning techniques among manufacturing companies and their workers. The development of interactive computer-based learning systems, which are regularly utilized at most community colleges, can be fashioned into expert company training systems. Larger companies can afford to develop these products on their own, but most small- and medium-size firms find it extremely difficult to develop such systems. Community colleges have the technical capability and are in close proximity to manufacturers to undertake these activities. Most front-line workers under the age of 30 are very familiar with computer-based audio and video products. These instructional systems can be utilized by workers for just-in-time training as they encounter issues on the job. In Germany, public funds are available to companies for the development of these products. Not so in the United States.

There also needs to be more emphasis on the development of formal and informal on-the-job continuous training that becomes embedded within companies. Once this happens, it fosters changes in work rules and processes that, in turn, improve productivity and financial returns. While there is no “one way” to effectively organize manufacturing facilities, most empirical examinations of the highest-performing operations note the direct link between changes in the workplace and increased productivity and profits.⁶⁴

Finally, efforts to restore American manufacturing need to have external allies that promote training and education from outside the firms. Community-based organizations, unions, ethnic organizations, literacy groups and other organizations can serve as important intermediaries to ensure that a well-trained, motivated group of workers is able to step into manufacturing facilities. Their involvement in the process will assure that employment of local citizens is an important factor for the economic viability of their communities. Economic sustainability is a serious local issue. People must be prepared to work in a manufacturing enterprise. These organizations must succeed to

maintain manufacturing, wages and opportunities of advancement for millions of Americans.

A rich social network of organizations needs to be developed with an understanding of manufacturers' needs. This will take time and resources, but the payoff in terms of corporate efficiencies and effective recruitment of workers would be enormous. Much of the public workforce system could be built around the activities of these social organizations. In addition, these networks can become potential sources of future innovation and growth of training activities that can restore profitability to the companies and lead to the rebirth of the American economy.

The decline of American manufacturing is not a foreordained conclusion. Education and training will play a vital role in the difficult but essential process of economic renewal. For the past 30 years, manufacturing has shrunk in significance in the American economy. It has lost status among the American people. Even within manufacturing communities, there is widespread belief that it has no future, particularly for young people. Restoring public confidence in American production and innovation is central to changing this defeatist perspective. It will take political leadership and vision, something that — unfortunately — has been in short supply in American life. The future of thousands of American communities rests on whether manufacturing can be restored. This should make us intensify every effort to overcome the challenges ahead.

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