

Are Employers Providing Enough Training? Theory, Evidence and Policy Implications

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Introduction

Skills drive productivity, competitiveness, and incomes. Economic growth is heavily dependent on the growth in human capital. According to Eric Hanushek and Ludger Weissmann (2015), raising the quality of skills of a workforce can generate a substantial payoff in economic growth. What is important is the rise of cognitive skills and not simply increases in schooling. Moreover, education and skills must keep pace with the growth in technological change to raise incomes and to limit economic inequality (Goldin and Katz 2008).

Notwithstanding the broad consensus connecting skills and economic growth, there is less agreement on whether the current work force is sufficiently skilled for current and future jobs and careers. Some academics, consulting firms, and managers argue that the weak skills of many American workers are leading to skill shortages and limiting potential economic growth (Deloitte 2011; Carnevale, Smith and Strohl 2010). Others reject the skill shortage hypothesis and assert that skills in the United States are not in short supply (Cappelli 2014; Osterman and Weaver 2014). One striking indication of a skills gap or mismatch is that German companies operating in the United States identify job skills as a key challenge to their success in the U.S. and have encouraged the German Embassy to start a “Skills Initiative” to identify and share information about best practices in sustainable workforce development.¹

The presence of a skills mismatch and what skills are lacking are clearly relevant to discussions of employer-led training. After all, if workers with the requisite skills are readily available in the job market, what is the need for employer training or indeed any training?

¹ See <http://www.germany.info/skillsinitiative> for more detail.

In fact, the issue is complex. A common assumption in debates about skill gaps is that the distribution of jobs is fixed, independently of the system for educating and training workers to fill the jobs. Suppose, instead, that the job distribution depends at least partly on the products of the education and training system. In this case, when the emerging skills from the system are weak, firms can respond by developing positions with limited skills, productivity, and wages. Alternatively, a system that turns out workers with high skills can attract employers to offer jobs requiring skills and productivity. The comparative benefits of the skill development approach used in Germany and Switzerland may be responsible for the ability of these two countries to maintain manufacturing employment at rates well above those in the U.S. Thus, while skill gaps suggest a weakness in the training system, education and training might be suboptimal even without significant skill gaps.

In defining gaps, one must ask what is meant by skills. Often, the debate deals primarily with academic skills and educational attainment (Carnevale, Smith and Strohl 2010), when employers are primarily concerned about occupational competencies and such employability skills as communication, teamwork, allocating resources, problem-solving, reliability and responsibility. A Houston staffing agency recently reported that 60% of job seekers are disqualified because of weak basic skills or testing positive for drugs (Campoy 2015).

How best to deal with skill development raises the questions about the respective roles of training sponsored by employers and training provided and funded by the government and individuals. Since the benefits of developing general skills go mainly to individuals and cannot be easily captured by firms, government and individual funding of investments in skills seems appropriate. However, Cappelli (2012) argues that any skills shortage is the result of a decline

and shortfall in employer-sponsored training. From his perspective, a trend away from employer training is inappropriately pushing the burden of financing skills on to individuals and the government.

Cappelli (2014) attributes some of the decline in company training to the erosion of lifetime employment and the reduced job tenure, limiting the ability of firms to recoup their training investments. An older literature (Piore and Doeringer 1971) looked closely at segmented labor markets, where some employers choose to train, hire from within, and keep workers for long periods, while others operate mostly on the spot market, hiring and firing frequently and providing little training. Subsequently, many authors have highlighted that businesses have the choice to become “high road” vs. “low road” employers. Osterman and Shulman (2011) find examples of firms producing the same good or service using technologies that generate more or fewer skilled jobs paying good wages.

In a country as vast as the U.S., examples of high quality employer-led training abound. The key question is: what types and amounts of skill development and especially employer-sponsored training are taking place in the U.S. overall? Is it increasing or decreasing? What are the implications for public policies aimed at promoting skilled jobs, rewarding careers, and the competitiveness of U.S.-based firms? Training is a straightforward concept, but the nature of training, including employer-led training, is highly variable. It can encompass organizational orientation and training in organization procedures and practices, safety training, skill upgrading, informal and on-the-job training, and general skills training, including academic courses, computer training, and occupational training. This paper begins by reviewing theoretical perspectives on employer-led training. Next, it examines the empirical evidence on

employer-sponsored training in the U.S. as a whole. The paper then highlights recent developments in employer-sponsored training in particular companies and geographic areas. The final section builds on the evidence to draw implications for policy and recommendations concerning employer-sponsored training.

Theoretical Perspectives and Empirical Evidence on Employer-Led Training

Employers want workers who can undertake relevant tasks, can work well with others, and ideally can improve operations and raise productivity over time. Training is one means to these ends. Nearly all employers provide training related to orientation, safety, employee benefits, and other specific aspects of the organization and operations. But, to staff a work force with occupational and other key skills and knowledge, firms decide on a “make or buy” approach. Some choose to buy by hiring workers who have the desired qualifications as a result of prior education, training, and work experience. Others choose to deliver and to sponsor training that helps workers achieve high-level qualifications.

In understanding these decisions, the standard Becker typology (Becker 1964) suggests firms will only pay for firm-specific training. Financing general training will not be cost-effective because of the risk the firm will not accrue sufficient benefits to offset training costs before other firms hire away the trained workers. Since the added productivity makes workers more valuable both inside and outside the firm, firms financing the training will be unable to recoup their investment by paying the newly trained worker a wage less than his or her newly enhanced level of productivity. Competitors will hire the worker away from the company providing training or bid up the trained worker’s wage to the new productivity level. Employers may finance “general” training costs by paying lower wages, as suggested by Becker’s theory,

although past studies find little or no wage sacrifice with many types of training. Becker's typology is instructive but limited. As Becker suggested, firm-specific training is common; however, many employers also train workers in general skills that are useful in other organizations.

One rationale for providing general training is the role of imperfect and asymmetric information. Employers providing training are often in a better position to judge the worker's productivity than are outside employers (Katz and Ziderman 1990). In their landmark article, Acemoglu and Pischke (1999) provide a theoretical rationale for employer occupational training, demonstrating how firms can optimize their hiring and training strategies in several ways, depending on the structure of the labor market and the potential permanence of the jobs. They also cite imperfect information and other market imperfections that can allow employers to pay trained workers less than the gain in their productivity without losing them to other firms. One reason is that the employers providing the training are in a better position to judge the worker's productivity than are outside employers. An employer knows only a modest amount about workers when they enter the firm. One way of learning more is to observe how they learn, especially on the job. Another possibility is that general skills complement specific skills. As a result, increasing general skills raises workers' ability to use their specific skills. Interestingly, transparent skill standards could erode the information advantage for employers (Greenhalgh 2002).

Another example of how providing general training can benefit firms comes from Cappelli (2004), who argues that imperfect information might be a reason to offer tuition benefits. It is difficult to sort workers whose qualifications are similar on paper. But when

tuition benefits are offered, the applicants with more interest in learning relative to other applicants with the same paper qualifications are more likely to apply and use the general training. These workers may have more motivation and an unmeasured skills advantage. Cappelli (2004) finds evidence to support the notion that workers who take up tuition benefits are more effective than other workers with the same observed characteristics.

With respect to skill upgrading, employers can limit training to workers most likely to benefit and to stay with the organization. Recognizing that some critical occupational skills can only be learned at the workplace, employers may choose to undertake some training while collaborating with educational institutions and coalitions of organizations in the same industry. Because hiring costs, skill requirements, and the best methods for learning relevant skills vary across occupations and industries, we would expect training patterns differ as well.

Still another issue is risk and uncertainty. Typically, employer investments in training are generally irreversible. Employers cannot take back knowledge or require reimbursements from workers after the fact. This irreversibility, combined with uncertainty about productivity outcomes from training, has implications for evaluating employer returns to training investments (Jacobs 2007). In particular, the standard present value calculations do not necessarily serve as the correct guide. Instead, in an investment decision under uncertainty and irreversibility, one should take into account the option value of the additional trained worker. When the training is completed, the firm has the option but not the obligation to hire the trained worker and/or utilize the skills learned from training. This option value raises the firm's returns and increases the likelihood that they will invest in training. Leuven and Oosterbeek (2001) consider firm-specific investments in on-the-job training. Given uncertainty about the

productivity returns from irreversible investments in particular workers, the firm's investment creates a real option that is especially valuable.

Several studies are consistent with theoretical insights about the impacts of organizational attributes and strategies on worker training. For example, the incentive to train should be higher for those organizations that have to delegate decision-making, that are large and have high monitoring costs, and that promote from within instead of hiring from the labor market for high-level positions. Knoke and Kalleberg (1994) find that organizations that are large, promote from within, and have formalized job structures provide more worker training. Osterman (1995) shows that organizations make tradeoffs between training existing workers and hiring workers with previously developed skills and that organizations train more when they use flat hierarchies, worker involvement, and teamwork and devolve decision making to the line level. Surprisingly, his estimates reveal no increase in training related to job ladders.

A recent paper by Blatter et al. (2015) highlights the incentive to train stemming from hiring costs that are high and that rise with the number of hires. The authors cite evidence that the costs of a skilled hire can be one to two quarters of wages. Using data from Switzerland, they find that a one standard deviation increase in average hiring costs is associated with more than half of a standard deviation increase in internal training in the form of added apprenticeship positions.

Evidence from Britain links the incidence of training to union membership, longer job tenure, and a compressed wage structure (Almeida-Santos and Mumford 2005). According to Weil (2014), large employers have been outsourcing activities that were formerly conducted in house to small firms. Such moves tend to reduce the incidence of training because large firms

offer more extensive training than small firms do and because internal labor markets become smaller within large firms.

Employer-led training helps deal with the gaps between what is learned at school and how to apply these and other skills at the workplace and in the context of particular occupations. An extensive body of research documents the high economic returns to workers resulting from employer-led training (Bishop 1997; Veum 1999; Booth 1991;, Booth 1993). Transferring skills to the workplace works best with supervisory support, interactive training, coaching, opportunities to perform what was learned in training, and keeping the training relevant to jobs (Pelligrino and Hilton 2012). Several studies find training usually benefits firms and yields external benefits, including gains for subsequent employers and for the public in avoidance of disasters as well as network externalities (as more are training in a common means of communication). In Britain, for example, a sophisticated panel study found that a 1% point increase in training is associated with about a 0.6% increase in industry productivity and a 0.3% increase in hourly wages. The productivity effect of training is twice as large as the wage effect, implying that existing studies have underestimated the benefits of training by focusing on wages. Moreover, the government generally gains by paying little for the training while reaping tax benefits from the increased earnings of workers.

Firms can benefit in several ways from employer-led training. At least as far back as 1962, learning by doing has been incorporated into models of economic growth (Arrow 1962). Bauernschuster, Falck, and Heblich (2009) document one mechanism affecting the firm and the economy: a positive impact of employer-led training on innovation. Using data on other firm characteristics as well as an identification strategy for causal inference, the authors find that a

10 percentage point increase in training intensity translates into an 11 percentage point higher propensity to innovate. Several studies show positive impacts of general training on firms' productivity and profitability (Barrett and O'Connell 2001; Bassi and McMurrer 2004; and Hanssen 2007).

Given the apparent benefits of employer-led training, why don't employers do more of it? The Becker theory highlights the rational fear that firms will lose from their investments because of other firms will bid up the worker's wage, once the worker becomes well trained and more productive. Another barrier is the difficulty of measuring the costs and benefits of training. When a skilled worker spends time training a less-skilled worker, the lost production is not always clear. Measuring benefits is often even harder. Even the category of gains may vary by firm. For some, the gains may take place when fewer serious accidents or medical errors take place; for others, in the form of lower expenses on maintenance; and for still others, through higher profitability attained through innovation.

A third potential barrier is lack of knowledge about what type of training will work best for the organization. As Bassi (2011) points out, the characteristics of training programs that yield the highest return on investment (ROI) vary with the size, maturity, industry, and other business needs. Employers thinking about incorporating occupational training, especially formal occupational training in the context of apprenticeships, must determine content standards (what completers should be able to accomplish), a curriculum, the role of courses vs. work-based learning, the effectiveness of mentors, and the methods for determining whether the trainee is achieving sufficient mastery in an occupation to graduate. Measurement and

evaluation of training impacts is difficult, although several approaches have been developed for doing so (Bassi and McMurrer 2006).

One rarely noted issue is the inappropriate accounting treatment of human capital investments. Training investments, like other investments, incur costs in one year, but accrue benefits accrue over several years. In the case of physical investments, the income statement does not assign the full costs of the investment in the year the purchase occurs, but rather only those costs that reflect the amount of the asset used up during the current year's activity. In contrast, human capital investments undertaken in a particular year are fully expensed in that year. This policy reduces the after-tax costs of financial incentives for training. On the other hand, investments in human capital are not reflected in the balance sheet as an asset. As a result, the accounting information shows companies investing in human capital showing lower profits that would be an accurate measure of the performance of firms. To highlight the point, Bassi and McMurrer provide a simple example:

Consider two organizations that are identical in all but one respect: Company A makes substantial investments in skills, while Company B does not. What will be evident to any analyst comparing the companies' income statements is that Company A has higher overhead for selling, general and Administrative expenses, and correspondingly lower reported earnings, than Company B. What will not be evident, however, is that some of Company A's expenses are actually investments in future productivity. Consequently, Company A's stock price would be expected to be lower – at least in the short run – than Company B's. The decision of Company A to invest in employee skills thus occurs despite pressures from financial markets.

Since stock prices depend more on these accounting profits than on real value, the market underestimates future gains in the high training firms but over time, the added profits associated with training materialize, accompanied by a higher stock price.

In 2012, the Society for Human Resource Management (SHRM) and the American National Standards Institute (ANSI) drafted “Guidelines for Reporting on Human Capital to Investors.” The guidelines called for financial statements to include key indicators concerning the work force that are relevant to economic performance. As the report pointed out, “Human capital has a material impact on organizational performance and thus is of interest to investors. Establishing credible and durable measurements of human capital creates a more complete picture of the capability of an organization to create value for customers and shareholders.” According to the report, measuring human capital is a difficult task, but some measures can help investors understand strengths of an organization. Expenditures on employer-provided training represent investments the firm is making in return for future productivity. The report recommends isolating: compensation cost of employees providing and receiving training, the costs for third party trainers, travel costs, facility costs, software and courseware purchases, and tuition reimbursements. The report does not go so far as to count training expenditures as depreciable assets on the balance sheet. Still, the clear presence of this and other employee-related indicators might affect company valuations and thus provide an incentive to top executives to increase training.

Evidence on U.S. Employer Training

The current scale of training in the U.S. is hard to determine. Cappelli (2012) cites a survey of U.S. employees by Accenture in 2011 indicating only 21 percent received any employer-provided training in the prior five years. However, an accompanying survey of employers indicated about 40 percent offered training, 81 percent believed the company placed a sufficient priority on training to meet company needs, and 54 percent viewed

employers or business groups (rather than colleges or governments) as organizations that should be primarily responsible for education and training of workers. Employers viewed employability skills (e.g., motivation, accountability, time management, punctuality, a strong work ethic, and adaptability) as involving the highest deficits between workers' actual skills and the importance of the skills. At the same time, the most important changes in job requirements over the next four years were technical skills and skill qualifications.

Another large and continuing private survey of employer training has been performed by the American Society for Training and Development (ASTD). The ASTD surveys indicate no evidence of a downward trend in expenditures on training. In 2012, the average expenditure per employee in the firms participating in the survey reached \$1,195. The aggregate spending on training by U.S. employers amounted to \$164 billion or 2.7 percent of payrolls, according to ASTD. Although this figure probably overestimates employer training because of the nature of the sample, it is broadly consistent with estimates based on past ASTD employer surveys and indicates no tendency toward a decline in employer training. Tuition subsidies make up about 12 percent of training dollars. Another survey conducted by the consulting firm, Deloitte Consulting LLP, indicated recent growth in training spending, with 35 percent of spending going for leadership training. Deloitte itself recently built a major training center costing over \$300 million.

Data from government surveys offer a mixed picture of both levels and trends in training. Unfortunately, despite the importance of employer training, the last federally-sponsored, nationally representative survey of employers about their training activities took place in 1995. At that time, employers generally offered at least some training, especially for

new employees. About 93% of establishments with 50 or more workers provided formal training in 1994 (Lerman, McKernan, and Riegg 2004). Although the rate was lower for smaller establishments, 72% of those with 20 or more workers offered formal training. An even higher share (97%) provided some form of informal training. Much of the training was orientation and safety training that takes place when workers start their jobs. Over 90% of recently received at least some on-the-job training (Barron, Berger, and Black 1999). Employers reported in 1992 that their most recent hire averaged 19 hours of formal training, 59 hours of informal training by managers, 34 hours of informal training by co-workers, and 41 hours of informal training by watching others (Bishop 1997). Although training for new hires may have declined since 1992, these results highlight the importance of informal training.

Between the 1980s and mid-1990s, surveys of workers show gradual increases in the incidence of employer-led training. The percentage of workers reporting receiving training in the Survey of Income and Program Participation (SIPP) rose from about 6% in 1984 to about 20% in 1996. Training is defined in the SIPP as lasting more than a week and intended to help search for or train for a new job or any training to improve job skills on one's current or most recent job during the past year.

Using a somewhat different question on training, the National Household Education Surveys (NHES) estimated that the incidence of training increased from 19% to 27%. The main NHES questions ask about any work-related course, apprenticeship program, or vocational degree/diploma program taken in the prior 12 months. Unlike the SIPP, the NHES survey instrument reminds workers by mentioning "work or career-related courses, seminars, training, or workshops whether or not you had a job when you took them." By far the most frequent

participation was work-related courses, which involved 40% of all full-time workers in the 2004–05 survey. Employers provided financial support for nearly all of these courses, including tuition and materials (86% of cases), worker salaries during the training (81% of cases), and programs offered at workplaces. Training incidence as measured by the NHES was consistently higher than that in the SIPP. However, the highest figure of all sources comes from the 1995 employer survey, where 70% of workers in establishments with 50 or more workers reported receiving training.

Table 1 reveals the wide variation in the reported incidence of training in the 2000s. As of 2003-2005, the share of workers receiving job training in the prior 12 months ranged from 56 percent in the National Assessment of Adult Literacy (NAAL), to 42 percent in the National Household Education Survey (NHES), to 21 percent in the Survey of Income and Program Participation. The SIPP show a downward trend from 1996 to 2004 and then a leveling off until 2008. The NHES, a survey specifically geared to adult education and training, showed an increase between 1999 and 2005. For all surveys, training is more common at higher levels of educational attainment, at larger firms, and slightly higher among women than men.

In examining the SIPP data on the 2001 to 2009 decline in the worker-reported incidence of employer training, Waddoups (2015) finds several interesting patterns. About 13 percent of the decline can be attributed to the rising share of part-time workers, workers who generally receive less training than full-time workers. The fact that educational attainment rose during the 2001-2009 period should have led to more training overall. Instead, training rates declined partly because the correlation between education attainment and training fell. A key result is the decline in the training gap between large and small firms; put another way,

workers in large firms saw higher reductions in training than did workers in small firms.

The government surveys differ on the intensity of training as well (Lerman 2010). The SIPP data show that the most recent spell of training lasted less than one day for over one-third of workers (Waddoups 2015). Less than 10 percent reported more than one week of training for their last spell. However, most workers reporting training had more than one spell and over 20 percent reported five or more spells of training. Tuition subsidies are quite common, indicating that many workers do not take advantage of existing opportunities for training. A 1997 employer survey found that over 80 percent offered tuition subsidies for managers, supervisors, and administrators and 69 percent for frontline workers (Lerman 2010).

These figures and those from most government surveys do not include the large amount of informal training taking place in most workplaces. Most training is for upgrading skill, including training to teach new specific work skills, such as how to use equipment, machinery, or technical processes. Also, many receive training to obtain or keep a state, industry, or company certificate or license. According to a SIPP module administered in late 2012, nearly one in four adults, ages 25-64, report having obtained a professional certificate or license. State governments issue most of the certifications or licenses, but for males, private businesses, industries and professional associations account for nearly one-third of all certificates or licenses issued to men. Among women, seventy percent of licenses and certifications are issued by states. The relatively high rates of licenses and certifications and especially the high rates of private sector certification among men indicate high activity in this space and potentially some extensive training.² More research is required to determine the role of industry training in

² Tabulations by author from the topical module of the 2008 Survey of Income and Program Participation.

achieving these certifications and licenses.³

Comparative data paint a mixed picture of the scale of U.S. employer training. One report found that as of 1995 the incidence of career- or job-related training among 25- to 54-year-old workers is 49 percent in the United States, 38 percent in Canada, 20 percent in Germany, and 58 percent in the United Kingdom (Kletzer and Koch 2004). An OECD analysis of data in the late 1990s shows the U.S. at about 40 percent or close to the middle in the distribution of countries. The OECD analysis reinforces findings from other studies showing significant wage gains associated with employer training in a number of countries. A more recent comparison showed U.S. employer-led training in 2003 at levels similar to those in Canada, but slightly below those in Switzerland and Norway (Rubenson, Desjardins and Ee-Seul 2007). According to these data, about half of 16-64 year-old Americans participated in a course or program and half of these participants received support from employers.

These figures take little account of the variations in the scale and intensity of employer training, especially for the under-25 workforce. Here, U.S. employers fall well short in the provision of occupational training for young people. Apprenticeship programs in Germany, Switzerland, Austria, Australia, and increasingly in the United Kingdom are widespread, often reaching over 50 percent of young people. In the U.S., apprenticeship training registered with the Department of Labor takes place at later ages and for only about 2-3% of a cohort and less than 0.2 percent of the workforce. In sharp contrast, apprenticeships make up 3.7% of the employed population in Australia, 3.7% in Germany, 2.6% in Canada, 1.8% in England, and 1.7% in France.

³ For detailed analysis of the impact of certifications and licenses in the U.S. labor market, see Kleiner (2006, 2013).

U.S. apprenticeships generally involve adults and are concentrated in the industrial and commercial construction industries. Completing an apprenticeship typically requires 3-4 years of work-based learning and classroom instruction. In the construction occupations, employer investments are substantial and apprentices gain highly respected credentials. However, partly because of the decline in construction employment, the number of civilian registered apprenticeships has fallen sharply, from 450,000 in 2007 to 315,000 in 2014. Increases in apprenticeships within branches of the military have partly offset this decline, rising from 52,000 in 2008 to 95,000 in 2014.⁴

Many apprenticeships take place outside the registered system, but national data on these unregistered apprenticeships are minimal. The NHES 2006 recorded the number of individuals who reported participating in an apprenticeship program (registered and unregistered) in the prior year. Although only 90 members of the sample did so, on a weighted basis, they represented 2.1 million apprentices. This figure likely overstates the scale of apprenticeships, but it does indicate that unregistered apprenticeships are at least as popular as are registered apprenticeships.

Youth apprenticeship programs take place in high school and provide valuable work experience, occupational training, related occupational courses, and wages, but operate extensively only in two states. In Georgia, 143 out of 195 school systems currently participate in the apprenticeship program and serve a total of 6,776 students. These apprentices engage in at least 2,000 hours of work-based learning as well as 144 hours of related classroom instruction. The Wisconsin program includes one-to-two year options for nearly 2,000 high school juniors or

⁴ These data come from the Office of Apprenticeship, http://www.doleta.gov/OA/data_statistics.cfm.

seniors, requiring from 450 to 900 hours in work-based learning and 2-4 related occupational courses.

A few studies of the gains to apprenticeship training have examined registered programs. A report for the state of Washington shows that the gains in earnings from various education and training programs far surpassed the gains to all other alternatives (Workforce Training and Education Coordinating Board 2014). A broad study of apprenticeship in 10 U.S. states also documents large and statistically significant earnings gains from participating in apprenticeship (Reed 2012). While no rigorous evidence is available about the apprenticeship's costs and benefits to U.S. employers, research in other countries indicates that employers gain financially from their apprenticeship investments (Lerman 2014; Muehlemann and Wolter 2014). Moreover, reports by U.S. employers who offer apprenticeships strongly suggest the benefits to firms are significant (Lerman, Eyster, and Chambers 2009).

Employer-Led Training and School-Based Vocational Education

One distinctive characteristic of U.S. employer-led training is the weak interactions with educational institutions. Although some community colleges and private training providers offer tailored training to firms, employer-led training is generally not well connected to the educational system, not even to career and technical education (CTE) programs. This is true even for the high share of firms that offer tuition benefits. Nonetheless, employers often expect high schools, community colleges, and career colleges will provide the training individuals require for effective work in specific occupations.

Certainly, large amounts of taxpayer dollars go to support occupational programs in community and career colleges. Yet, as Harry Holzer (2012) points out, the outcomes are often

weak, with low completion rates (especially for low-income and minority students) and too many students stuck in remedial classes. Even when students earn a degree, many are mismatched for jobs in most demand and employers are often dissatisfied with their workplace skills and their ability to apply what they have learned. In a highly school-based system, there are few mechanisms for assuring a close linkage between employer demand and skill development. High school CTE programs have been on a declining path, despite strong evidence for quality programs in Career Academies and some regional vocational schools (Kemple 2008).

The promising models that are emerging offer much closer linkages between employers and education and training providers. One good example is the Year-Up program. It offers up-front and rigorous training in employability skills to 18-24 year-olds from low-income neighborhoods, but quickly moves participants into paid internships involving productive work mainly in the information technology sector. One evaluation (Roder and Elliot 2011) found that one year after the program, the treatment group receiving Year-Up services and placements reported earnings that were on average \$3,461 higher than the control group.

Another good-performing initiative is the sectoral training programs, where training providers and firms in a specific industry come together to specify the skills needed for entry level jobs and upward mobility in the occupation or industry. An impact study of such programs in Boston, New York City, and Milwaukee, Wisconsin found that three to six months of well-targeted training generated large impacts on earnings in the second full year after random assignment (Maguire et al. 2010). Net impacts on earnings were about 4,000 in the second

year. While program costs were about \$6,000 per worker, having the large earnings gains persist only into the third year is enough to make the program cost-effective.

Several German companies with operations in the U.S., in collaboration with Swiss-American and American companies, regional high schools and community colleges, have played central roles in creating high quality apprenticeship programs, mainly in manufacturing (Kamm and Lerman 2015). The occupations range widely, including tool and die maker, welding, CNC machinist, mechatronics engineering. States with significant programs include North Carolina, South Carolina, Florida and Michigan.

Renewed interest in quality high school CTE programs is evident as well, with potential company partners (Brody 2015). In New York City, which recently started 13 occupation-focused high schools, students can learn career relevant skills in areas ranging from police and fire, television production and graphic design, commercial diving, using 3-D printers, freight logistics, culinary arts, welding, and accounting. One serious concern about these schools is the limited emphasis on work-based learning and the achievement of certified mastery in an occupation. A second worry is illustrated by the comments of New York City's deputy chancellor of education that the schools "...are not vocational programs in any way, shape or form", thereby downgrading the objective of helping young people directly enter rewarding careers.

Another example of programs aimed at engaging employers is the apprenticeship initiative in South Carolina. Using a combination of the offer of a modest tax credit, statewide marketing, and direct contacts with firms on a person-by-person basis, Apprenticeship Carolina stimulated the growth of company-operated training programs from 90 to nearly 200 firms. The director of Apprenticeship Carolina reports that once employers fully understand

apprenticeship training, about 70-80 percent move forward to start apprenticeships. The South Carolina experience proves the feasibility of stimulating in-depth employer training in the context of a structure that makes sense and is seamless to enter.

In September 2015, the U.S. Department of Labor announced grants totaling \$175 million to fund 46 projects to stimulate the development of apprenticeship opportunities in non-traditional occupations.⁵ To the extent these programs are successful, employer-led training through apprenticeships may expand significantly.

Policy Implications

Employer-led training is effective for workers and firms and is widespread in the U.S. Moreover, spending on employer-sponsored training probably dwarfs government outlays on training programs. Nonetheless, the data are sparse with respect to the size, trends, and composition of employer training and to linkages between employers and education and training providers.

Recommendation 1: Collect data from stratified, nationally representative sample of employers on their training practices (including informal training), spending on training, the integration of work-based training with outside training providers, and their expectations of other providers of occupational training. A key objective should be to select firms that offer intensive programs that develop occupational mastery, including unregistered apprenticeship programs.

One potential barrier to expanded employer training is the accounting treatment of intangible training investments. This paper describes how human capital investments are treated quite differently in financial statements from physical capital investments and how this treatment may discourage outlays on training.

⁵ See <http://www.dol.gov/apprenticeship/grants.htm>.

Recommendation 2: Develop thorough analysis of human capital as intangible asset and of treating investments in human capital similarly to investments in physical capital. This is both a valid approach and one that may stimulate more employer-sponsored training.

Employers spend substantial amounts on training their workforce, though precise figures are not available. Yet, on a system-wide basis, the connections between employer training and school-based programs are weak. The evidence suggests that work-based learning can be effective for education programs, especially for men, but that building such programs can be time-intensive in ways that discourage employer participation. Ideally, the U.S. should build structures that allow firms to seamlessly coordinate their training with relevant courses, that provide incentives for firms to provide the work-based components that workers need to gain occupational competence and credentials, and that encourage educational institutions to take account of work-based learning in granting credits for degree programs.

Recommendation 3: Examine the effectiveness of existing approaches to integrating work-based learning into secondary and post-secondary education programs and develop demonstrations to test the most promising strategies. Provide incentives to post-secondary programs, both private and public, to establish programs that combine work-based learning with schooling, pay wages, and involve participants in the production process and yield real value for employers.

The term “industry-recognized” credential is one increasingly used by workforce agencies and school-based occupational programs. Yet, unlike other countries, for many occupations, the U.S. lacks mechanisms to develop and update standards, to conduct research on the desirability of the standards, and to verify performance. Even where initial standards are set, there is little agreement about how to document upgrades from occupational competence to occupational mastery.

Recommendation 4: Experiment with encouraging industry associations to build, monitor, and test for industry-recognized credentials. The government should help develop public-private partnerships to conduct research on occupational standards and on the best mechanisms for auditing and testing to insure the credibility of the standards. In doing so, the partnerships should draw on standards developed in other countries.

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Table 1. Incidence of Training in the last 12 Months of Employed 25- to 64-Year-Olds, by Survey, Year, Sex, and Education

	Survey of Income and Program Participation				National Assessment of Adult Literacy	National Household Education Survey	
	1996	2001	2004	2008	2003	1999	2005
Total	32.8	27.9	21.8	21.6	56.9	31.0	42.4
Male	30.4	25.3	19.7	20.5	53.6	29.4	31.8
Female	35.7	31.0	24.2	22.7	60.6	32.8	46.0
<u>Males by highest education completed</u>							
Less than high school	10.1	6.9	4.8	4.5	20.0	7.2	5.8
High school graduate	20.7	15.4	11.3	13.2	40.8	20.6	18.7
Some college	34.8	NA	22.9	22.9	60.2	29.5	36.1
Bachelor's degree	41.8	35.5	26.5	27.9	70.6	42.7	50.3
<u>Females by highest education completed</u>							
Less than high school	11.2	9.3	5.7	5.6	28.2	7.3	8.4
High school graduate	26.0	19.9	14.7	13.3	47.7	22.3	31.5
Some college	35.7	NA	24.5	22.3	64.2	34.3	49.6
Bachelor's degree	46.8	42.3	31.5	31.6	76.6	47.3	65.1

Source: Tabulations by author from the Education and Training History Modules of the 1996, 2001, 2004, and 2008 panels of the Survey of Income and Program Participation, from the National Assessment of Adult Literacy, and from the National Household Education Survey.