

Expanding Washington State Apprenticeships for the 21st Century: Summary of the Benefits to Individuals, the Public and Employers

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Research Summary

Introduction

The apprenticeship learning model has an extensive history and has been applied world-wide. In the U.S. and Washington state, new public investment is helping to increase apprenticeship and expand its use beyond traditional industries and occupations to many new industry sectors and jobs.

Apprenticeship models in use today can vary widely by industry, occupation and through agreements among public sponsors, employers and employees. Apprenticeship typically combines classroom studies with extensive on-the-job training under the supervision of a journey-level craft person or trade professional. Usually, apprentices receive progressively increasing wages and may receive health, pension, and other benefits while learning occupational skills. This “earn while you learn” model has proven successful across a range of industries. Overall, evidence of the benefits of apprenticeship for workers, industry and the public is generally positive and pervasive.

Renewed interest in expanding apprenticeship is occurring for many reasons:

- An expanding economy marked by increased demand for products and services, and for qualified employees to help meet this demand.
- Deep and long-standing labor shortages in key industries and occupations
- Increasing retirements among baby boomers, and population trends causing a smaller, more diverse labor force across industry sectors
- Rapidly-changing technologies and work processes that call for new and higher-level knowledge and skills

Although research on apprenticeship generally attests to its effectiveness on many levels (wages, employment, skills, etc.), the evidence varies considerably due to differences in research designs, apprenticeship models, and other factors. Research on the benefits to apprentices and return on investment (ROI) to public support are usually very positive, however until recently much less systematic research has demonstrated the level of ROI for employers. Since the number of apprenticeship applicants far exceeds the number of apprenticeship training slots available in industry, a key challenge is to expand the number of apprenticeship positions that employers offer. Providing compelling research and economic evidence of the ROI of apprenticeship to employers, therefore, is an important element for increasing employers’ engagement and for expanding apprenticeship within and across industry sectors.

The Case for Apprenticeship (the Evidence)

As noted above, evaluating the return on investment for apprenticeship to individuals, society or individual firms entails very complex research and economic analyses that pose many technical and

methodological challenges.¹ The number of rigorous studies on the ROI of apprenticeship has increased, especially regarding the benefits to workers and the public. There is also growing research evidence showing that apprenticeships are also smart investments for employers.

Benefits to Workers and the Public

The largest body of research on the benefits to workers and society comes from studies of programs in countries that have well-developed apprenticeship systems, including several in Europe and Australia.² In general, the research indicates that the benefits of apprenticeship to workers and the public are substantial and pervasive. One study found that the earnings premium paid to apprentices (compared to individuals without apprenticeships) typically ranged from a low of 8 percent to a high of 22 percent, depending on the level and length of the training.³ Other reviews of apprenticeship ROI to participants have documented similar wage premiums.⁴

Since firms or public programs usually cover most of the cost of training, apprenticeships are generally considered excellent investments for participants, especially for those who complete them. A 2013 report for the U.S. Department of Labor found that nationally, the average starting wage for registered apprentices was \$16.50 per hour, and that completers earned an average of \$59,900 per year.⁵ The report also noted that 91 percent of registered apprentices retain their employment once they have completed their programs.⁶

One widely-cited 2012 study of apprenticeship in 10 U.S. states found that workers who completed a registered apprenticeship program earned, on average, over \$240,000 more than non-apprentices in total wages and benefits over the lifetime of their careers.⁷ The study reported earnings gains of more than \$123,000 over the career of the apprentice, including employer-sponsored health insurance and other benefits. Moreover, the net societal benefits were found to outweigh the social costs by \$49,000 over an apprentice's career.

In Washington state, past performance reviews conducted by the Workforce Training and Education Coordinating Board have confirmed the economic and employment benefits of apprenticeship for

¹ For a detailed discussion of the challenges of evaluating apprenticeship outcomes, see: Bajgar, M. and C. Criscuolo (2016), "Impact of apprenticeships on individuals and firms: Lessons for evaluating Modern Apprenticeships in Scotland", *OECD Science, Technology and Industry Working Papers*, 2016/06, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jlpq84v57kg-en>

² Koch, J.V. (2017). "Rates of return on investments in apprenticeships: Summary of the empirical evidence." American Institute for Innovative Apprenticeships: <http://innovativeapprenticeship.org/wp-content/uploads/2017/03/Rates-of-Return-to-Investments-in-Apprenticeships-copy.pdf>.

³ *Review of Apprenticeship Research: A Summary of Research Published Since 2010*, Institute for Employment Research University of Warwick, U.K. (July 2012).

⁴ Muehleman, S. and Wolter, S. (2014) "Return on investment of apprenticeship systems for enterprises: Evidence from cost-benefit analyses." *IZA Journal of Labor Policy*, (November, 03:25): <https://izajolp.springeropen.com/articles/10.1186/2193-9004-3-25>

⁵ Employment and Training Administration, *The Federal Resources Playbook for Registered Apprenticeship* (U.S. Department of Labor): <https://www.doleta.gov/oa/federalresources/playbook.pdf>

⁶ Employment and Training Administration, *The Federal Resources Playbook for Registered Apprenticeship* (U.S. Department of Labor): <https://www.doleta.gov/oa/federalresources/playbook.pdf>

⁷ Reed, D. et. al. (2012) "An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States" (Washington: Mathematica Policy Research), July. Available at <https://www.mathematica-mpr.com/our-publications-and-findings/publications/an-effectiveness-assessment-and-costbenefit-analysis-of-registeredapprenticeship-in-10-states>.

See also: Hanks, A. (2016). "Now is the time to invest in apprenticeships." Center for American Progress, (November): <https://www.americanprogress.org/issues/economy/reports/2016/11/18/292558/now-is-the-time-to-invest-in-apprenticeships/>

participants, and show that there is also a positive return on investment for the public.⁸ The Workforce Board's 2014 report, for instance, estimated that program completers earned a median hourly wage of \$36.46, and that each dollar invested in state apprenticeship generated a return of \$23 to the public in the form of higher employment, wages, spending, taxes and other factors.⁹ A more recent analysis projected that the lifetime net benefit to taxpayers has increased: for every dollar invested apprenticeship generates an estimated return of \$36 to the public.¹⁰

The Workforce Board reports confirm that there are large and multi-faceted benefits for the apprentices themselves. In its 2017 report, the analyses showed that compared to a control group of non-apprenticeship participants with similar demographic characteristics, apprenticeship participants earned hourly wages that were \$7.44 higher, on average, than control group participants who were employed. The average annual earnings of apprenticeship participants was \$13,934 higher than the control group.¹¹

Moreover, the analysis showed that while all apprenticeship participants benefitted economically in 2016, those who completed their programs benefitted even more: Completers had a higher employment rate (94 percent compared to 76 percent for all participants) and they were also more likely to work full-time (74 percent versus 53 percent). Completers also had much higher median earnings (\$74,785 versus \$48,785), and this earnings premium increased annually, growing 21 percent between 2011 and 2016.

Benefits to Employers

Most empirical evidence on long-term benefits to firms is based on self-reports by employers. The most commonly cited benefits reported by employers include improvements in productivity, work quality, staff morale, staff retention and public image. In his extensive review of the research on the costs and benefits of apprenticeship to firms, researcher Robert Lerman concluded that apprenticeship training is usually a profitable investment for firms as well as workers.¹² His key findings included the following Pros and Cons of apprenticeship:

⁸ Past WTECB reports regarding the results for apprenticeship can be found here:

<http://www.wtb.wa.gov/SearchResults.asp?q=Apprenticeship>

⁹Washington Workforce Training and Education Coordinating Board (2014), "Apprenticeship," http://wtb.wa.gov/Documents/2-Apprenticeship_2014.pdf

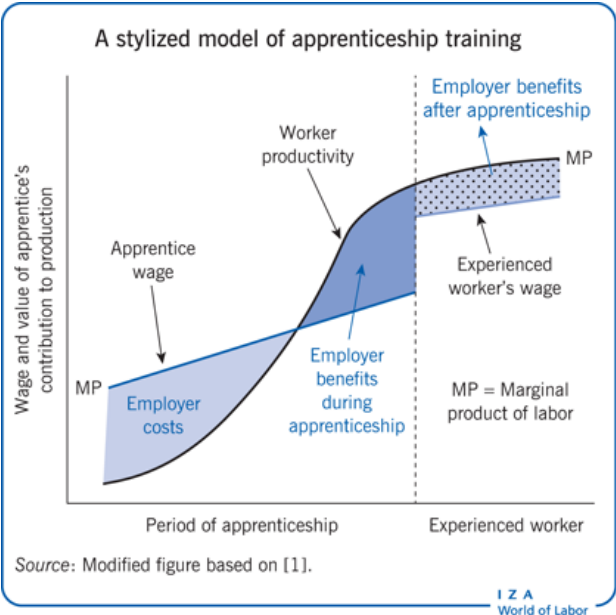
¹⁰ Washington Workforce Training and Education Coordinating Board (2017), "Apprenticeship." <http://www.wtb.wa.gov/Apprenticeship2017dashboard.asp>

¹¹ Some comparisons were not found to be statistically significant (employment rates and hours worked).

¹² Lerman, R. (2014). "Do firms benefit from apprenticeship investments?" IZA World of Labor (55). See also: Rauner, F., L. Heinemann, D. Piening, and R. Bishoff (2010). "Costs, benefits, and quality of apprenticeships: A regional case study." In: Rauner, F., and E. Smith (eds). *Rediscovering Apprenticeship: Research Findings from the International Network on Innovative Apprenticeship*. London:Springer Science + Business Media.

Pros	Cons
The apprentice's contribution to production is large enough to offset most costs to firms.	Most firms in advanced economies do not offer apprenticeships.
By retaining most apprentices, firms benefit substantially from low recruitment and training costs.	Firms perceive weak returns because they fear trained apprentices will be hired away by other firms.
Knowing that all trained apprentices have mastered a common set of skills is valuable to firms.	Some estimates show firms recover only modest parts of their investment during the training period.
Apprenticeship training enhances subsequent innovation within the training firm.	Quantitative estimates of gains for employers are uncertain, based on only a few studies.
Treating apprenticeship expenses as capital investments would improve measured gains.	It is difficult for firms to assess the long-term benefits of apprenticeship investments.

Lerman emphasized that by providing firms with information on economic returns, by helping them set up apprenticeships, and by funding off-site training, policymakers can promote the expansion of effective career training and increased worker earnings with only modest public expenditures.¹³ In his report, Lerman adapts a model for apprenticeship (below) showing the benefits to workers and employers. The model is based on a detailed case study of apprenticeship costs and benefits in England.¹⁴



¹³ Lerman, R. (2014), "Do firms benefit from apprenticeship investments?", *IZA World of Labor* 55. Also: <https://wol.iza.org/articles/do-firms-benefit-from-apprenticeship-investments>

¹⁴ Gambin, L., Hasluck, C., Hogarth, T. (2010). "Recouping the costs of apprenticeship training: Employer case study evidence from England" *Empirical Research in Vocational Education and Training* 2:2: 127–146.

The model offers a useful depiction of the general pattern of costs (investments) to employers and the growing benefits that accrue to workers and firms over time. Generally, the first year of apprenticeships involves significant costs, but subsequently, the apprentice's contributions exceed his/her wages and supervisory costs. Once the apprenticeship is completed, employers (and journey workers) benefit even more. Lerman noted that beyond productivity and other direct cost-related benefits, participating firms view apprenticeships as offering certainty that all workers have the same high level of expertise, helping to ensure a supply of well-trained workers during sudden increases in demand, and to fill leadership positions informally and through promotions, as the need arises.

Lerman's review is instructive because it included numerous international and U.S. studies on the cost-benefit returns of apprenticeship. Although the results of these studies varied considerably, and the costs and benefits to firms were found to depend on many factors, Lerman concluded that apprenticeship training is usually a profitable investment. He also noted that often, firms can recoup all or most of their costs within the apprenticeship period, often by the mid-point of the apprenticeship period.¹⁵ Other large-scale studies generally support these findings.¹⁶ One review of apprenticeship in the U.K. estimated the payback period was only three years for construction and four years for engineering apprenticeships.¹⁷ Other reviews of firm-level studies overwhelmingly find a positive effect of training on firm productivity and, somewhat less robustly, also on wages. Findings from three separate studies using comparable measures of training suggest that a 1-percentage-point increase in the share of workers trained over a one-year period corresponds to a 0.05%-0.32% increase in productivity and a 0.025%-0.17% increase in wages.¹⁸

Analyses of the ROI of apprenticeship to employers are more common among European and many international employers, probably because formal apprenticeship systems in those countries are larger and more widely used than in the U.S. One analysis of apprenticeships in the UK examined the returns to employers in the engineering, construction, retail and business administration sectors, and concluded that employers in all four industries at least break even, and some begin earning positive returns, during the early post-apprenticeship period due to productivity gains.¹⁹ Other studies in the UK find that firms that invest in apprenticeship nearly always realize a return, and that the ROI to firms typically ranges from five to 25 percent.²⁰

¹⁵ Lerman, R. (2014). "Do firms benefit from apprenticeship investments?" IZA World of Labor (55). See also: Muehleemann, S. and Wolter, S. (2014) "Return on investment of apprenticeship systems for enterprises: Evidence from cost-benefit analyses." Also: Rauner, F., L. Heinemann, D. Piening, and R. Bishoff (2010). "Costs, benefits, and quality of apprenticeships: A regional case study." In: Rauner, F., and E. Smith (eds). *Rediscovering Apprenticeship: Research Findings from the International Network on Innovative Apprenticeship*. London:Springer Science + Business Media.

¹⁶ See: Canadian Apprenticeship Forum (2009). "It Pays to Hire an Apprentice: Calculating the Return on Training Investment for Skilled Trades Employers in Canada." <http://caf-fca.org/wp-content/uploads/2014/08/It-pays-to-hire-an-apprentice.pdf>

¹⁷ *Review of Apprenticeship Research: A Summary of Research Published Since 2010*, p. 60

¹⁸ Konings, J. and S. Vanormelingen (2014), "The impact of training on productivity and wages: firm-level evidence", *Review of Economics and Statistics* 97: 485–497.

¹⁹ Gambin, L., C. Hasluck, and T. Hogarth (2010). "Recouping the costs of apprenticeship training: Employer case study evidence from England." *Empirical Research in Vocational Education and Training* 2:2 (2010): 127–146

²⁰ Cited in Koch, J.V. (2017). "Rates of return on investments in apprenticeships: Summary of the empirical evidence." See also: Hasluck, C. and Hogarth, T. 2010. "The Net Benefits to Employers' Investments in Apprenticeships: Case Study evidence from the UK." *Canadian Apprenticeship Journal*, 2 (Summer).

An extensive study of 433 Canadian employers found that for all 15 occupations studied, the average benefit to firms was 1.38 times the average cost of apprenticeship investments. That is, for every dollar invested in apprenticeship, companies averaged a net return of 38 cents.²¹ And, in an expanded update to this study, analyses of data from nearly 1,000 employers for 16 trades revealed that for every dollar spent in apprenticeship training, employers received a benefit, on average, of \$1.47, for a net return of 47 cents.²² The benefits were highest for employers who trained apprentices in certain trades--such as construction millwrights, and equipment and industrial mechanics--where the revenue generated by an apprentice far exceeded the total cost of training. In fact, over 30 percent of employers reported that the benefit of training exceeded the costs by the end of the second year of the apprenticeship. Interestingly, 60 percent of Canadian employers said they consider a journey-level worker to be more productive relative to an externally-trained journey person. Further, they estimated that a 'homegrown' journey person they trained in-house was 29 percent more productive than workers hired externally. Similar conclusions regarding the productivity-enhancing effect of apprenticeship have been found in other countries as well.²³

One report cited large increases in the number of firms in England and Wales that now offer apprenticeships (well over 100,000 firms). The report cited results from a survey of more than 4,000 firms showing that nearly 80 percent of firms were satisfied with their apprenticeship program and plan to continue offering them, while only six percent were dissatisfied.²⁴ Nearly three quarters of employers reported improved productivity as a main benefit of apprenticeship, with most describing other benefits to business operations, staff retention and profitability.

Several researchers have noted that while post-apprenticeship benefits are very difficult to quantify and few systematic studies exist, there are many long-term benefits to employers who invest in apprenticeship, including higher retention, increased worker skills, staffing flexibility, and more innovation by in-company trained workers who made product and process improvements.²⁵ These findings suggest that for employers the true economic benefit is understated because apprentices usually remain employed and continue to add value through their expanded productive capacity and potential. Firms also benefit through avoided recruitment and training costs.

In the U.S., evidence from a survey of more than 900 employers show that most firms believe that their programs are valuable and generate net gains.²⁶ Nearly 87 percent of firms sponsoring apprenticeship reported that they would strongly recommend registered apprenticeships, and nearly all firms reported that their apprenticeship program helped them meet their skill demands. Only a quarter of sponsors

²¹ Canadian Apprenticeship Forum (2006). "Apprenticeship—Building a Skilled Workforce for a Strong Bottom Line": http://en.copian.ca/library/learning/caf/study_15_trades/study_15_trades.pdf

²² Canadian Apprenticeship Forum (2009). "It Pays to Hire an Apprentice: Calculating the Return on Training Investment for Skilled Trades Employers in Canada." <http://caf-fca.org/wp-content/uploads/2014/08/it-pays-to-hire-an-apprentice.pdf>

²³ Cappellari, L., C. Dell'Aringa and M. Leonardi (2012), "Temporary employment, job flows and productivity: a tale of two reforms", *Economic Journal* 122: 188–215.

²⁴ Lerman, R. (2014). "Do firms benefit from apprenticeship investments?" IZA World of Labor (55).

²⁵ Lerman, R. (2014), Hanks (2016). Also: Beicht, U., and J. Ulrich (2005). "Costs and benefits of in-company vocational training." *BWP Special Edition*: 38–40: http://www.bibb.de/dokumente/pdf/a1_bwp_special-edition_beicht.pdf. Also: Helper, S. et. al. (2016) "The Benefits and Costs of Apprenticeship: A Business Perspective." (Washington: Case Western Reserve University and the U.S. Department of Commerce: <http://www.esa.gov/sites/default/files/the-benefits-and-costs-of-apprenticeships-a-businessperspective.pdf>.

²⁶ Lerman, R., L. Eyster, and K. Chambers (2009). "The Benefits and Challenges of Registered Apprenticeship: The Sponsors' Perspective." Washington, DC: US Department of Labor, Employment and Training Administration: http://www.urban.org/UploadedPDF/411907_registered_apprenticeship.pdf

expressed concerns about the ‘poaching’ of apprentice completers by outside firms, yet even among those firms, 85 percent still highly recommended apprenticeships.

A major U.S. Department of Commerce study released in November 2016 examined the return on investment in apprenticeship at 13 firms from a variety of occupations, industries and regions.²⁷ According to the researchers, each of the firms studied said they valued the program and identified benefits that more than justified the costs and commitments they made to the apprentices. The researchers noted, however, that few firms actively calculated the economic returns on their investment in apprenticeship, or measured only some factors. But in-depth interviews suggest that employers saw the value to the business. They added: “All of the firms we studied believe that apprenticeships improve their overall performance and provide a competitive advantage over other firms. Companies most often turned to apprenticeships because they could not find labor that met their minimum standards.” (p. 2).

Researchers were allowed to analyze detailed production and cost data provided by two companies, including Siemens USA, an international company that manufactures and repairs generators in South Carolina for electric utilities.²⁸ Researchers found that compared to hiring a machinist off the street, Siemens’ apprentices were less likely to be late and achieved a level of productivity that is even greater than other low-experience, pre-trained workers. These direct benefits yielded a positive internal rate of return (the rate of return generated by investing in the apprentice’s training upfront) of about 8 percent over hiring existing labor.

Researchers estimated that the benefits to productivity alone represented an annual return on investment for Siemens of approximately \$23,000 per year.²⁹ Moreover, when factoring in the effects of increased worker flexibility due to apprenticeship training (especially cross-training that enabled production employees to also perform repair work during periods when production output was idle or reduced), researchers estimated that Siemens obtains at least a 50 percent internal rate of return on its apprenticeship program, compared to hiring machinists off the street. Researchers concluded that while more data would help confirm their estimates, Siemens’ positive rates of return on apprenticeship are probably conservative because they do not account for other potential benefits (quality control, lower turnover, etc.), and that the firm likely recoups its training costs within the first year of apprentice graduates working full-time.

Summary

The research evidence suggests that well-designed apprenticeship programs are beneficial investments for participants, the public and for employers. Although the research reviewed for this report suggests that the evidence of benefits to individual participants and taxpayers is more compelling and widespread than for employers, the volume and quality of studies attesting to the benefits for employers has increased in recent years. More research is being conducted that relies on systematic analyses of company-specific data and related measures that show the type and extent of economic as

²⁷Helper, S. et. al. (2016) “*The Benefits and Costs of Apprenticeship: A Business Perspective.*”(Washington: Case Western Reserve University and the U.S. Department of Commerce: <http://www.esa.gov/sites/default/files/the-benefits-and-costs-of-apprenticeships-a-businessperspective.pdf>.

²⁸ Researchers noted that Siemens has apprenticeship programs in 19 countries, and their recruitment, selection and training processes are very rigorous, systematic and are based on high internal standards.

²⁹ Estimate of internal return is based on calculated annual benefit over a 40-year career with the company.

well as strategic ROI for employers. At a fundamental level, the research record shows that many firms are able to recoup most or all of their initial training-related costs during the training period, and those returns typically increase during the early post-apprenticeship period. Longer-term returns to firms who invest in apprenticeship also appear highly-likely, although additional systematic ROI research is needed to estimate the nature, extent and economic value of those benefits to individual firms.