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UNIVERSITY of WASHINGTON

Technology for Employability in Washington State: The Role of ICT Training on the Employment, Compensation & Aspirations of Low-Skilled, Older, and Unemployed Workers

MARIA GARRIDO, CHRIS ROTHSCHILD, THIERNO OUMAR

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CONTACT

Technology & Social Change Group
University of Washington
Information School
Box 354985
Seattle, WA 98195
Tel: (206) 616-9101
Email: tascha@uw.edu
Web: tascha.washington.edu

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ABOUT THE AUTHORS

Maria Garrido is a Research Associate with the Technology & Social Change group. Her research explores the role of information technology in fostering economic development in low-income and underserved communities in Latin America, the United States, and Europe.

Chris Rothschild is a Research Analyst with the Technology & Social Change group. His research focuses on the social and economic impacts of access to information on both users and non-users of technology. Chris has a particular interest in combining both qualitative and quantitative research methods.

Thierno Oumar served as a Research Affiliate with the University of Washington's Technology & Social Change group in 2008, working with the Employability research team. Theirno came to TASCHA as a Hubert Humphrey Fellow at University of Washington's Evans School of Public Affairs.

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ABSTRACT

Do information and communication technology skills training programs improve employment opportunities for low-income, older, and unemployed workers? Do they improve wage levels? Aspirations? To answer these questions, researchers surveyed 454 people enrolled in programs provided by non-profit and public workforce-development organizations in Washington State between 2007 and 2008. The research revealed that programs that combined ICT training with soft skills and employment support services are more likely to reintegrate people into the labor market — even amid the early signs of an economic recession. After attending training, the percentage of participants with employment increased from 17 to 58 percent, with higher levels of ICT skills correlated to increased employment outcomes. Simply having access to a computer or the Internet at home (*without* training or support) had no effect on employment outcomes. Participants employed after attending training experienced on average a 20 percent increase in wages compared to average overall pre-training earnings; ICT skill level and frequency of ICT use at work were two of the most important factors correlated to wage increases. People with intermediate or advanced ICT skills experienced the largest increase in wages. Age also played a role: the older the worker, the lower the increase in wages. Finally, researchers found that ICT training programs influence aspirations — even for participants who remained unemployed. The vast majority judged the training as "important" to advance their employment situation and reported both an increase in self-confidence and a need for additional ICT training.

KEYWORDS

employability, employment, workforce development, technology, ICTD, ICT, ICT training, ICT skills, wages, aspirations, Washington, e-inclusion, e-skills

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Executive Summary

This research surveyed 454 low-income and unemployed clients of sixteen state and not-for-profit workforce development organizations, in five metropolitan areas of Washington State (Seattle, Bellingham, Mount Vernon, Spokane, and Tacoma). All participants received training in information and communication technologies (ICT) between 2007 and 2008. The objective of the study was to analyze the effects of computer skills training on employment status, wages, and aspirational outcomes for these participants.

1. Participant profile:

- Most of the people who responded had a high-school diploma or less (47%); the rest had continued on to either two-year college (23%) or four-year college (22%).
- The vast majority were women (73%); average age was 48 years old.
- More than half reported having basic ICT skills before the training, but 20% reported having no ICT skills at all.
- 83% were unemployed before the training (for an unknown period of unemployment). The median hourly wage before the training was $10.00 for the whole group, with a wide range in wages.

2. Training programs

The workforce development programs have an integrated approach; they provided their clients a package of resources that included ICT training as just one component. Other areas of support included training in general job-seeking skills (e.g., punctuality, interviewing, appropriate attire) and assistance with practical steps (e.g., job search, application process, transportation). Therefore, we analyzed the data to identify the contribution of these components of training and support.

- The most significant elements contributing to positive employment outcomes were **basic ICT skills training *combined with* assistance with both the job search and application process**.
- Clients who received **all three elements of training** experienced higher success rates than those who only received basic ICT skills training.

These findings point to the need to design workforce development programs that integrate various elements: ICT training, soft skills training, and a bridge to navigate the job search process. This is especially significant for low-skilled and older workers, but it is also relevant for younger workers without experience in the labor market.

In interpreting the study results, therefore, the positive results for ICT training must be understood broadly, taking into account the additional job-related support that accompanied the training.

3. Major findings on ICT skills and employment

Training programs **increased participants' ICT skill levels significantly**. The training programs also had a **positive effect on employment outcomes:**

- Of the 454 survey participants, **58% either found a new job after training, or kept the jobs** they had prior to training.
- Of the people who found employment, **75% did so within four months** after completing the training.
- **Education and gender were not significant factors** for finding a job after the training. Women were just as successful as men; and high-school graduates were just as successful as two-year and four-year college graduates in finding a job after the training.
- **Age did have a significant effect.** The younger the worker, the higher the likelihood of finding a job after the training. The converse is also true: the older the worker, the higher the rate of unemployment.

Participants' (self-reported) **ICT skill level correlated significantly with a positive outcome, i.e., finding (or keeping) a job**. The "successful" group of participants (N=246) was defined as those who either found a new job after the training *or* stayed in the same job or the same company.

- **ICT skill level correlates with positive employment outcomes,** when other factors such as location and age are controlled for. The successful group generally had higher ICT skills after the training than those who remained unemployed.
- In general, **participants who reported intermediate ICT skills after the training** were more successful at finding or keeping a job than any other skill level group.
- Regardless of employment outcome after the training, **86% of participants perceived as "very important" or "important" the contribution of the training to improving their employment situation.**
- **The four main sectors where people found a job after the training** were: health & social services, wholesale and retail, government, and professional and business services.

4. ICT skills and the effects on wages

- **The median hourly wage for the "successful" group increased by 20%,** from $10 to $12 (with some regional and age differences).
- **The wage change did not affect everybody equally.** Only a minority of the group employed after training experienced an increase in wage (38%). 22% experienced a decrease, and 24% had no change.

We further separated out four broad variables to assess the effects of ICT skills on wage level: 1) Age, gender, and education; 2) The ICT skill level of the individual; 3) Frequency of ICT use at work ; and 4) Other generic skills required for the job.

- **Gender was only moderately correlated with wage differences after the training.** Women (who make up the majority of our sample) experienced a 20% increase in wage compared to a 22% increase for men.
- **Age is more significant**: the older the worker, the lower the wage increase.
- **Participants with intermediate and advanced ICT skills after the training saw the largest wage increase** — 20% and 24% respectively, as compared with a 12% wage increase for participants with only basic ICT skills.
- **Education level also affected the outcome**. Individuals with a high school education with intermediate ICT skills experienced a 20% increase in wage, compared to a 24% increase for people with a two-year college degree and the same ICT skill level.
- Frequency of ICT use at work is another important indicator for wage increase, after controlling for the sector of employment. **People who use office applications, the Internet, and e-mail at work every day had a salary increase ranging from 20% to 31%.** (There may also be other requirements of those jobs that explain this wage difference.)

Putting wages in perspective: although most of the study participants who had a job after the training experienced an increase in wage, **half of them were still not earning a living wage, based on their family structure and needs**. Within this group, 38% are fully financially responsible for their household, in many cases including children.

5. Do ICT skills and ICT skills training promote aspirational outcomes for people with high barriers to employment?

Aspirational benefits may be defined as increased self-confidence, motivation, and capacity to persevere. In the case of ICT training, enhanced aspiration includes a new interest in obtaining further ICT training, reflecting the newly expanded horizons of participants.

We found evidence of aspirational benefits even for those who remained unemployed after the training. The overwhelming majority of respondents judged the contribution of the training to advance their employment situation “important” or “very important.” For those without jobs, the percentage of positive responses was only slightly lower. Similarly, even among the unemployed, most agreed that their self-confidence improved after the training. **The overwhelming majority consider ICT skills important to improve their employment situation—and they express an interest in strengthening those skills**.

Why is this research important?

As this report was going to print, Washington State had lost 1 in 20 jobs since the beginning of the recession in 2008. The unemployment rate had climbed to 9.3%, losing 145,400 jobs since February 2008.[1] The problems that lower-skilled, unemployed, and older workers face are all the more daunting in this difficult economic climate. Programs to enhance the job-related skills for these individuals—including training in computer technology—have demonstrated positive results in assisting them to find employment. This research makes evident that people with high barriers to employment require a combination of training programs and employment services to improve their employability and their ability to earn a living wage.

For the economy as a whole, an increase in the overall skill level of the labor pool is an important objective. Having a skilled workforce is a competitive asset, and it is a government policy objective of Washington State, as affirmed in the "High Skills, High Wages 2008–2018 Strategic Plan."[2] The objectives of the plan include: improving access to career and technical education in high schools; reducing the high school dropout rate; providing educational opportunities for adults to upgrade skills and career paths; coordinating the efforts of agencies in the workforce development system; and establishing strong collaboration with employers (e.g., in industry panels).

An aging and more ethnically diverse workforce presents special challenges, but also presents the opportunity to implement pioneering, comprehensive strategies that can place Washington at the forefront of innovation and economic competitiveness.

1 Desilver (2009)

2 Workforce Training and Education Coordinating Board (2008a)

Preface

Recently I noticed my daughter (who works an early-morning shift) asleep on her bed before dinner. Adjusted at eye level was her open laptop; her hand clutched her Blackberry. She was staying connected—ready for a call, text, e-mail or post.

Technology creates a means; *communication* is the message. Information Technology (IT) has morphed into Information and Communication Technology (ICT). Smaller, more powerful devices increase the frequency of sharing thoughts, purchases, activities and locations.

People who lack the resources and skills to use ICT are missing out on more than chatting with friends. They are held back in education, societal inclusion, and employment. Opting out of ICT is not a choice anyone should be forced to make.

Because job search has become electronic, simply looking for work requires skills to manage e-mail, navigate websites, and create, maintain and send electronic documents. Finding job openings requires effective web-related searches and networking. Networking is still the most effective job-search strategy—and the use of computers and cell phones effectively broadens networks. Accordingly, there are efforts across Washington State to help people increase their ICT skills. Drawing on a patchwork of funding sources, community technology centers and WorkSource employment centers are delivering a wide variety of ICT courses to a wide variety of people.

In Washington State, jobseekers have the opportunity to benefit from Microsoft investments in ICT training, at WorkSource and other community centers. Through the Workforce Development Council of Seattle-King County, I have worked with Microsoft's Community Affairs division to establish free computer-training courses for King County jobseekers at two WorkSource sites. 6,423 jobseekers have completed a one- or two-day computer course since the program began in 2005. Preliminary results indicate that over 70% of the jobseekers reported "significant improvement" in their computer skills following the training.

Through this partnership with Microsoft, we've learned that jobseekers have both great need and great interest in keeping their workforce technology skills current. Unfortunately, no systemic funding infrastructure exists to support ICT training. The report of the University of Washington's Center for Information and Society reflects the current ICT training investment within a variety of agencies throughout our state. Clearly, these workforce development programs make a difference — not only in the employment opportunities of individual jobseekers, but also in the skill level of the Washington State labor force. Now is the time for our state agencies and employers to build on this investment and to integrate ICT training into all levels of public education and workforce training.

Beth Blanchard

Project Manager

Workforce Development Council of Seattle-King County

Beth has worked in employment and training programs for 30 years with youth, adults and dislocated workers. Currently, Beth's job as a Project Manager at the Workforce Development Council of Seattle-King County focuses her energies on quality One-Stop system development. In the past several years, Beth has coordinated initiatives in partnership with Microsoft to upgrade job seekers' technology skills.

Chapter 1: Introduction

The contribution of basic ICT (Information and Communication Technologies) skills to improve the employment prospects, especially for low-income and older individuals, has been thoroughly debated within academic and public policy circles. The increased penetration of ICT across all economic sectors is placing new demands on workers' skills; while, arguably, it has at the same time expanded employment and economic opportunities — even for those who face high barriers to employment. In today's job market, basic ICT skills are considered crucial for people entering the workforce, and even more so for those trying to find a better-paid job. An ICT-skilled workforce is seen as a strategic asset for localities, to spur economic growth, competitiveness, and business productivity. The penetration of ICT cuts across all employment sectors and employment categories. Basic ICT skills were once seen as an entry ticket for employment only in IT-intensive industries; today, ICT skills are becoming increasingly important in such non-IT sectors as agriculture, health, construction, manufacturing and micro-entrepreneurship.

As the diffusion of computers and computerized machinery accelerates, workers in a wide variety of fields have had to learn new skills as they incorporate ICT into their jobs.[3] In addition to ICT skills, other skills are often required in today's labor market, including communication skills, team work, collaboration, critical thinking, decision-making, and general social skills. Nevertheless, ICT skills can potentially play a unique role in employment training and preparation. ICT skills are not only valuable in their own right, but can also function as a catalyst to improve these other skills.

In this changing work environment, low-skilled, long-term unemployed and older workers are particularly vulnerable to skill obsolescence, facing higher barriers to obtaining and keeping jobs. In times of economic downturn, moreover, these workers suffer a further deterioration in value of their human capital: they are now competing with higher-skilled workers who are suddenly willing to take lower-paid jobs. Lower skilled workers face larger risks of being "crowded out"[4] of the labor market or trapped in dead-end, low-wage jobs, since they lack the skills to compete and perform in this new work environment.

In sectors where employment is growing thin, workers face a situation of serial unemployment—repeatedly losing a job, often through layoffs. Organizational changes have created greater flexibility in hiring practices, further eroding job security. Workers need to be more adaptable, more flexible, and more willing to pursue training and to make career changes throughout their working years.

Providing access to channels for re-skilling and up-skilling our workforce is not only necessary but critical in the current climate. Investing in additional training for people who face higher barriers to employment could reduce unemployment levels while better positioning the country to compete globally.

[3] Workforce Training and Education Coordinating Board (2008a)

[4] De Grip & Zwick (2005: 4-5)

The role of non-profit and government workforce organizations is more important than ever in meeting the need for training and job-seeking assistance for low-skilled, long-term unemployed, and older workers. These programs may be valuable also for those seeking to improve their job skills and thus their opportunities, as "in-house" employee development programs become increasingly rare. With greater flexibility in hiring, corporations have substantially reduced their investment in training current or prospective employees.

These workforce intermediaries offer:

- Programs that are affordable or free
- An enabling environment for learning
- Partnerships with employers
- Partnerships with community colleges
- A combination of ICT skills, soft skills, and support services
- Flexible class schedules

ICT skills (and other job-related skills) are a necessary but not a sufficient condition to find, keep, and progress in a job. Basic ICT training may make people more employable, but it does not guarantee that they will be employed (Brown 2003). Employment trends have a large impact on the individual's employment opportunities, regardless of skill-set.

Low-skilled and long-term unemployed workers typically face multiple barriers to employment—social, cultural, and psychological as well as educational. Job-seekers need a range of "soft skills," as well as solutions to such challenges as childcare, transportation, and appropriate attire. Homeless and immigrant populations operate under additional constraints.[5] Thus, the balanced design of the workforce assistance programs we studied represents a sound model for employability initiatives.

The Scope of the Research

The research project was conducted in Washington State, working with non-profit and state workforce organizations that provide ICT skills training and other employment-related services to help low-skilled, long-term unemployed and older workers improve their employment opportunities and access to better-paid jobs. (See Appendix 1 for a list of the organizations that participated in the research.)

Three main research questions guided this study:

- Does ICT skills training improve employment opportunities for these groups?
- Do ICT skills and use of ICT at work have an effect on wages, for those employed after the training?

[5] Garrido, et al. (2009)

- Are there any aspirational benefits as a result of the training that contribute to employability outcomes?

Note, again, that the research method did not allow us to separate out the effect of ICT training from that of related job-assistance training and assistance. Nor did we have independent confirmation of participants' self-reported ICT skill level. The positive results we obtained in all three of these areas nevertheless suggest that the typical package of assistance, combining ICT training with other support, is indeed effective in helping to close the employability gap.

Table 1. Research questions and variables

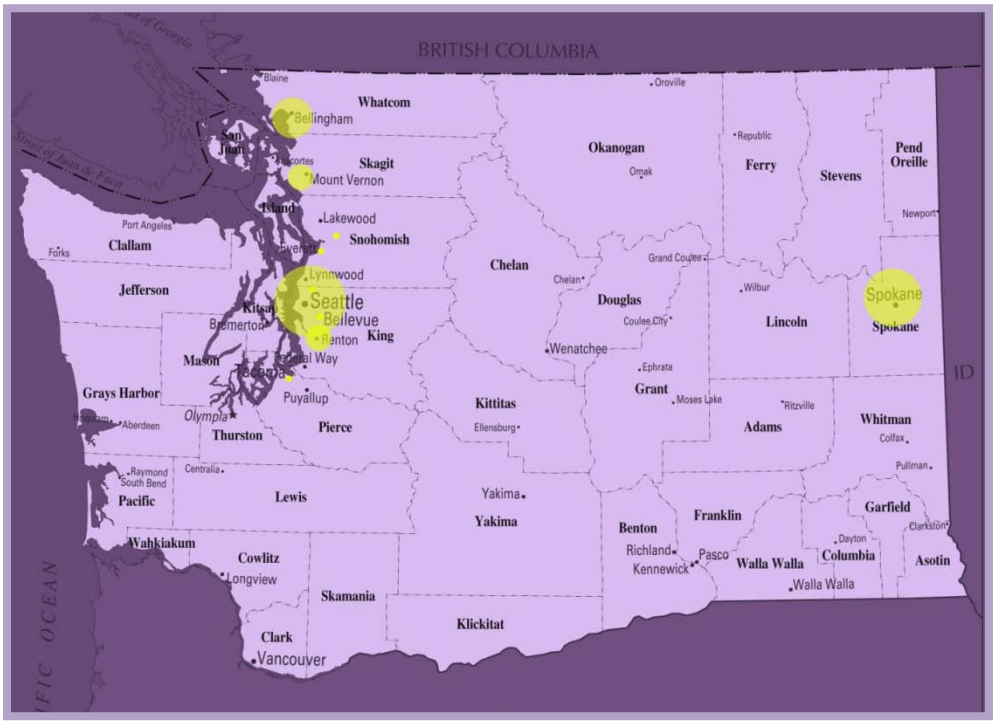
Research Question	Variables
Employment Outcomes	1. Significance of ICT skills training 2. Significance of other employment-related training and services 3. Individual ICT skill level *before* and *after* training 4. Trainees 'perception of the importance of training to improve employment status 5. Regional and sector dynamics 6. Demographic factors: Age, gender, and education
Wage Differential (for those employed after the training)	1. Individual level of ICT skills *after* the training 2. Frequency of ICT use at current job 3. Sector dynamics 4. Perception of living wage before and after the training 5. Skills required for the job 6. Demographic factors: Age, gender, and education
Aspirational Outcomes	1. Changes in perception of the *importance of ICT skills* to improve employment status 2. Effects of the training on self-esteem (self-reported) 3. Satisfaction with current job (if employed) 4. Individual's perception of additional training/education needs 5. Plans to pursue additional ICT training

How was the research conducted?

Working in partnership with seventeen organizations in five metropolitan areas of Washington State, we surveyed trainees participating in ICT training programs between 2007 and 2008. In total, 5000 surveys

were sent between September and December of 2008, and we received **454 responses** (a roughly 13% response rate, accounting for undeliverable surveys). Figure 1 shows the distribution of the sample by city. To protect the privacy of the organizations' clients, the research team prepared the envelopes to be mailed by the participating organizations, containing the survey along with a letter from the organization and a self-addressed, stamped envelope for returning the survey to the University of Washington (see Appendix 2 for the Survey in English and Spanish). To further protect the privacy of the survey participants, the analysis presented in this report aggregates the data of all participants without making any identification or reference that could link the survey participant data with the organizations.

Figure 1: Distribution of the sample by city



City	Participants	% of total
Seattle	130	29%
Spokane	105	23%
Bellingham	74	16%
Renton / Auburn	47	10%
Mount Vernon	43	10%
Bremerton	12	3%
Tacoma	11	2%
Everett	10	2%
Shoreline	9	2%
Marysville	6	1%
Bellevue	5	1%
Total	454	100%

Two types of organizations participated in the research:

1. **Non-profit workforce training organizations:**

   - Twelve organizations participated in both research activities (sending surveys to training program participants *and* joining the researchers for interviews).
   - Two organizations participated in the interviews with the researchers, but not on the surveys.

   These organizations have a wide variety of target audiences and a wide array of services for people seeking to improve their employment situation; their clientele may include the general public as well as targeted populations such as immigrant communities, etc.). They also work in different ways: some provide all the training in-house; some provide part of the training in-house and some through partners; and some act exclusively as intermediaries between clients and a network of organizations.

2. **WorkSource Centres and Affiliates**: As part of the Washington State's One-Stop Career Development System, WorkSource encompasses a network of local and state programs and organizations that collaborate to provide integrated workforce development services.[6]

In addition, the researchers conducted **33 in-depth interviews** with staff and trainers of the organizations and participated in **two focus groups:** one with case managers at Antioch University (organized by Seattle Jobs Initiative) and one with trainees from the welding training program at South Seattle Community College. (See Appendix 3 for the list of people who participated in the interviews.)

Some limitations of the study

The research was conducted with the cooperation of the organizations engaged in employment training and assistance. Due to privacy concerns, researchers had no direct contact with survey participants. Moreover, the sample is not representative of the unemployed population in Washington State, or of the larger population using these services, as it included only those participating in computer skills training. Other limitations relate to data comparability:

- The ICT skills training, although basic, is designed and implemented in varying ways, affecting length of training, content, and teaching/learning approach.
- Individual ICT skills level was ascertained through self-assessment.
- Trainees have different motivations for participating in the training programs: some enroll in the training by choice, others because of unemployment insurance requirements.
- Each organization has a different training approach, services package, and client profile, as well as a different level of coordination with employers.
- Details of employment, wages, and employment history were provided through self-reporting, resulting in some inconsistency and missing data.

[6] For more information on the WorkSource systems in Washington State see: Workforce Training and Education Coordinating Board (2008b).

- The research does not measure aspects of job security and job quality (e.g., benefits, opportunities for upward mobility).

Why is this research important?

As this research was going to print, Washington State had lost 1 in 20 jobs since the beginning of the recession in 2008. The unemployment rate had climbed to 9.3%, losing 145,400 jobs since February 2008.[7] The problems that lower-skilled, unemployed, and older workers face are all the more daunting in this difficult economic climate. Programs to enhance the job-related skills for these individuals—including training in computer technology—have demonstrated positive results in assisting them to find employment. This research makes evident that people with high barriers to employment require a *combination* of training programs and employment services to improve their employability and their ability to earn a living wage.

For the economy as a whole, an increase in the overall skill level of the labor pool is an important objective. Having a skilled workforce is a competitive asset, and it is a government policy objective of Washington State, as affirmed in the "High Skills, High Wages 2008-2018 Strategic Plan."[8] The objectives of the plan include: improving access to career and technical education in high schools; reducing the high school dropout rate; providing educational opportunities for adults to upgrade skills and career paths; coordinating the efforts of agencies in the workforce development system; and establishing strong collaboration with employers (e.g., in industry panels).

An aging and more ethnically diverse workforce presents special challenges, but also presents the opportunity to implement pioneering, comprehensive strategies that can place Washington at the forefront of innovation and economic competitiveness.

[7] Desilver (2009)

[8] Workforce Training and Education Coordinating Board (2008b)

Chapter 2: ICT Skills and Employment Outcomes

2.0 Background

A variety of factors contribute to the employability[9] of low-skilled, older workers and the long-term unemployed. Individual factors include the level of formal education, the extent and diversity of social networks, social class, and learning style. The larger context also plays an important role, including the local or regional economic climate, labor market dynamics, and age and gender stereotypes. The community's social and cultural character also plays a decisive role in attracting and retaining the most competitive workers.[10]

Trying to map all these factors is fruitless, since it is very difficult to pinpoint what factor—or combination of factors—is more influential for achieving positive employment outcomes. Nor can one extrapolate from the experience of one individual as representing an entire group.

In times of economic prosperity, people who face higher barriers to employment enjoy a more competitive position, as access and distribution of jobs is more readily available. Conversely, in times of precarious economic performance, their labor position deteriorates, as individuals with higher skills take lower-paid jobs, "crowding out low-skilled workers from the previous occupational domains because higher-skilled workers have more generic skills and are more flexible in their job choice."[11] Regardless of the performance of the economy, **access to additional training, for people who face high barriers to employment, is critical to enhance their position in the labor market**.

Non-profits and public agencies focused on workforce development usually provide a wide array of services and types of training, to up-skill and/or re-skill unemployed individuals. The basket of services provided depends on the target group, the resources available, the organization's social mission, the locality, and the barriers to employment that their beneficiaries face. For example, a non-profit that serves immigrant communities is more likely to emphasize language training, appropriate housing, and cultural integration than would an organization serving dislocated workers laid off by the closure of a manufacturing plant. The

> *"We serve people that come from many different countries, representing many cultures, and speaking a variety of languages. A core of our mission is to help them find a job but we need to provide a wide array of services that cover not only training but other more basic needs. Access to housing, transportation, services for the children, ESL, etc. are among the most important ones."*
>
> *Amy Kickliter, Employment and Adult Education Manager – Neighborhood House*

[9] Employability is defined as "a set of factors, processes, [and training opportunities] that enable people to progress towards or get into employment, to stay in employment, to move on in the workplace, [or to find entrepreneurial opportunities]."

[10] See for example: Sullivan (2009); Fugate et al. (2003); Brown et al. (2003); Peck & Theodore (2000)

[11] de Grip and Zwick (2005: 13)

hurdles are diverse, and workforce development organizations must offer programs tailored to the local context.

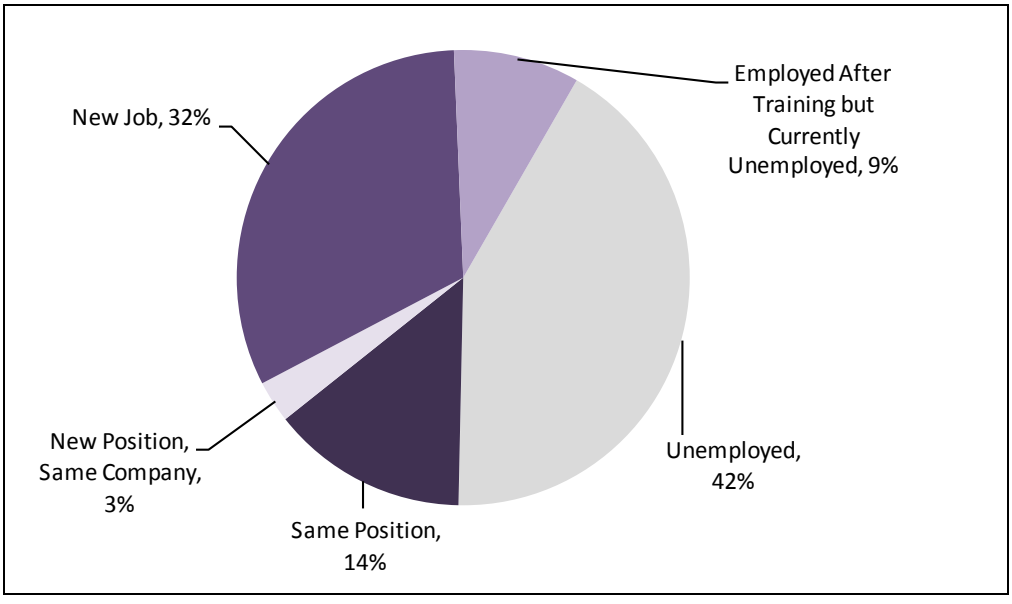
Employability is affected by the complex interplay of all these factors, both at the *individual level* (or supply side) and at the broader *labor market level* (or demand side), making it impossible to isolate a given variable to establish causal effects in relation to employment outcomes. The findings presented in this section must be interpreted with this caveat in mind, as demonstrating one important contribution to employment outcomes.

The three factors we examined in relation to employment outcomes were: 1) ICT skills training; 2) other employment-related services; and 3) ICT skill level before and after the training

2.1 Upgrading the technology skills of Washington's workforce

The most revealing finding of the study was that, after the training, 58% of survey participants either found a new job or remained employed, compared to just 17% before training (N=454). 32% were in a new job; 3% found a new position in the same company where they were working before the training, and 14% remained in the position they held previously. An additional 9% found a job after training, but were again unemployed at the time of the survey. On average, the newly employed group found a job within twenty weeks after completing the training. The remaining 42% of participants did not find a job after the training. (See Figure 2 for employment outcomes breakdown.)

Figure 2: Employment outcomes after the training (N=454)



The analysis found no difference in employment outcomes based on gender and educational level. This means that women, who make up the majority of our sample, were just as likely as men to find a job after the training (see Table 2 for employment outcomes by gender). Similarly, high-school graduates were just as likely as two-year and four-year graduates to either find a job or remain

employed after the training (see Figure 3 for employment outcomes by educational level). In terms of demographics, age was the only factor that affected trainees' success in finding a job: the older the worker, the higher the likelihood to be unemployed after the training, as discussed below. (See Appendix 4 Table 1 for additional data on employment outcomes by average age.)

Table 2: Employment outcomes after training, by gender

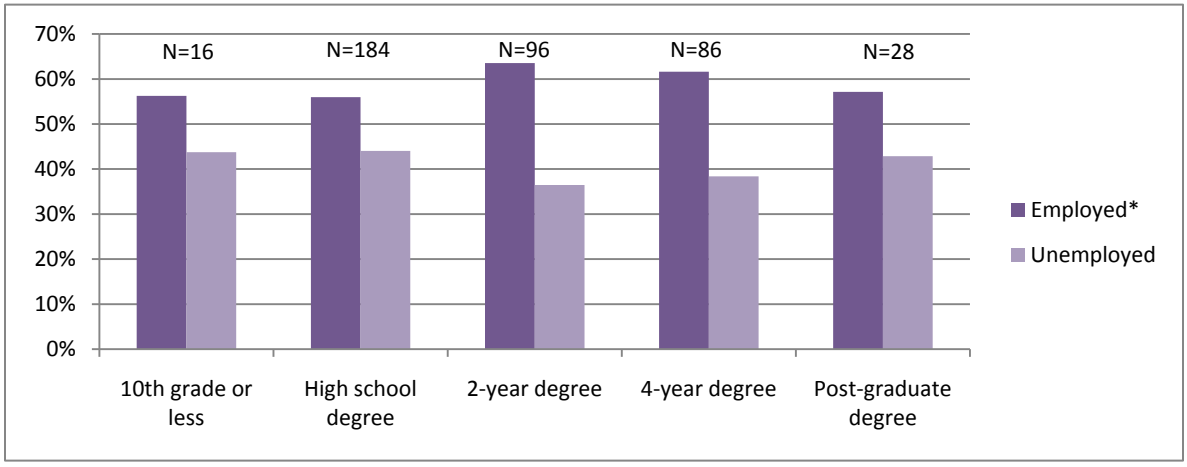
		Gender		
Job situation after training		**Male**	**Female**	**Total**
Same job	N	16	44	60
	% within Gender	14.8%	14.2%	14.4%
New position same organization	N	6	8	14
	% within Gender	5.6%	2.6%	3.4%
New job	N	33	100	133
	% within Gender	30.6%	32.4%	31.9%
Employed after the training but currently unemployed	N	7	30	37
	% within Gender	6.5%	9.7%	8.9%
Unemployed since the training	N	46	127	173
	% within Gender	42.6%	41.1%	41.5%
Total	N*	108	309	417
	% within Gender	100.0%	100.0%	100.0%

* Excludes 37 missing cases

As research in Washington State shows, the participation of women in the labor force has increased steadily since the 1980s, reaching 46.3% in 2006.[12] Higher levels of education and shifts in career expectations contribute to this increase. Moreover, declining real wages make it increasingly necessary to have a second income to support the household. Across all the organizations that participated in the study, women make up the vast majority of the population seeking to up-skill or re-skill themselves in order to strengthen their position in the labor market.

[12] Workforce Training and Education Coordinating Board (2008b).

Figure 3: Employment outcomes after training, by educational level



* "Employed" includes: same job; new position, same organization; new job; and employed after the training but currently unemployed.

2.2 The effects of ICT skills training on employment outcomes

One way of assessing the effectiveness of ICT skills training to improve the skills of unemployed workers is to compare individuals' skill levels before and after the training. Survey participants self-assessed their ICT skills before and after the training to indicate 1) whether there was an increase in the level of ICT skills, and 2) whether the level of ICT skills after training correlated with employment outcomes.

Across all the organizations that participated in the study, the ICT skills of training participants improved significantly. This was particularly true for people who found a new job or were promoted to a new position in the same organization, as shown in Figure 4.

Figure 4: Participants' self-assessed ICT skill level and employment outcomes

ICT skill level had a positive correlation with employment outcomes[13] after controlling for age and regional labor differences. Participants who were employed after the training (including those who found a job, those who stayed in the same job, and those who found a new position in the same company) generally had higher ICT skills than those who remained unemployed. Figure 6 shows the proportion of survey participants in each skill level category by employment outcome after training. (A more detailed breakdown is given in Appendix 4, Table 2 and Figure 1.) Generally, participants with intermediate ICT skills were more successful at finding or keeping a job than any other skill level group.

Figure 5: Participants' self-assessed ICT skill level before and after training

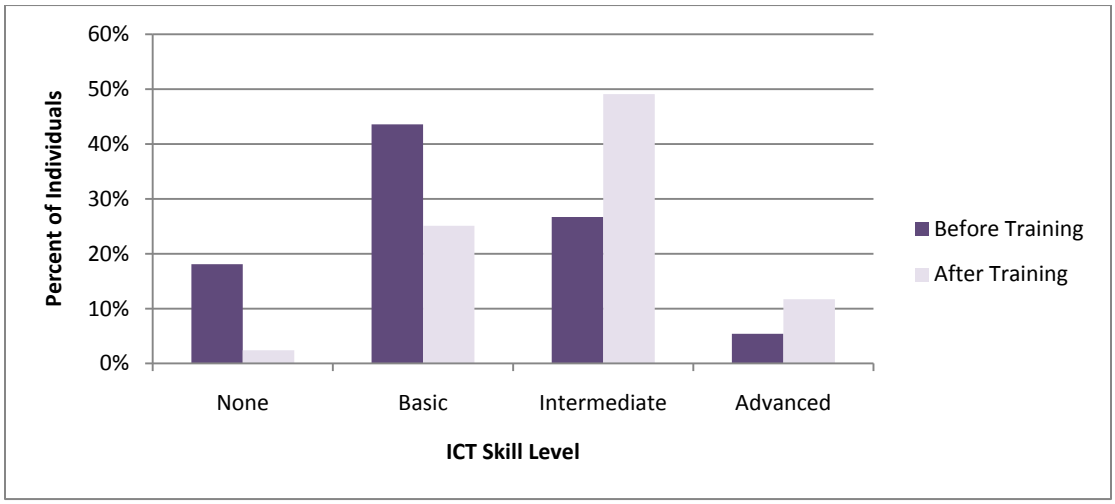
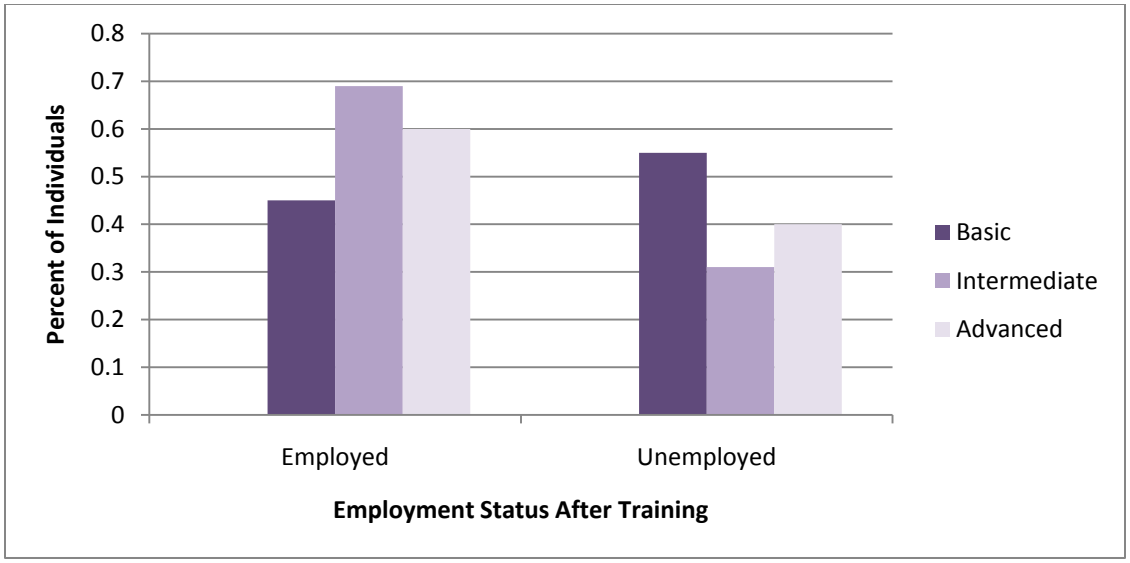


Figure 6: ICT skills level before and after the training by employment status

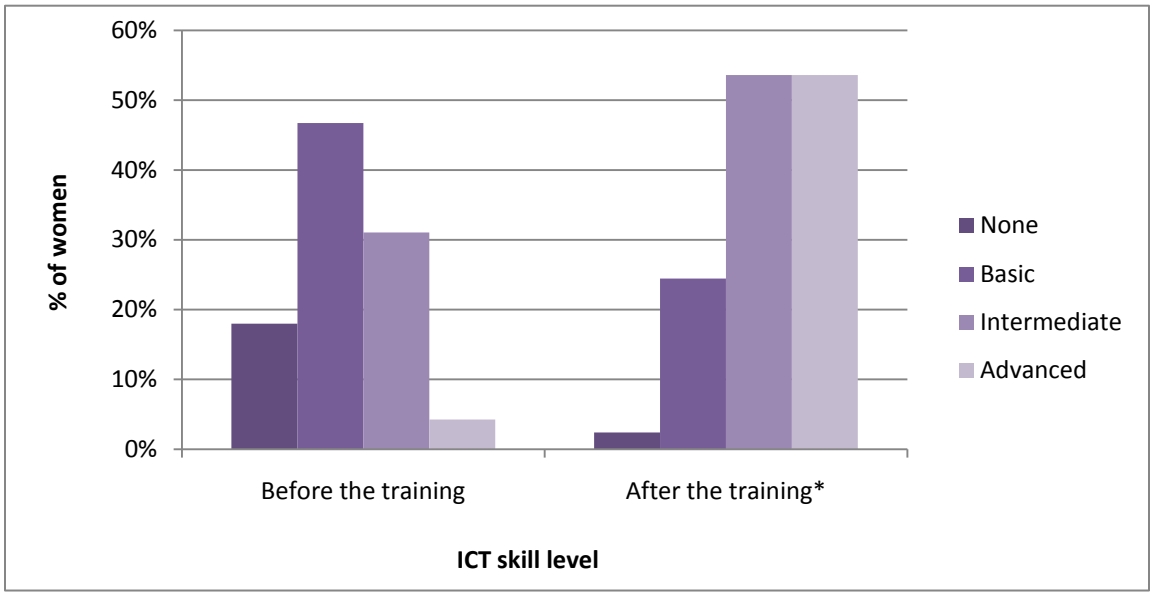


* Employed includes: Same job, new position same organization, new job, and employed after the training but currently unemployed.

[13] $P < 0.001$

The improvement in ICT skills was significant across gender and educational level. As expected, people with at most a high school diploma represented the highest percentage of people with *no ICT skills* before the training. Self-reported ICT skills improved after training (see Appendix 4, Tables 3-4). Similarly, 18% of women had no ICT skills before the training, and after training that percentage decreased to 2.4% (see Figure 7).

Figure 7: Women's ICT skills level before and after training



* Excludes 33 missing cases

Why did a large portion of the sample remain unemployed after the training program?

We also found, however, that more than 42% of the group who were *unemployed* after training also had intermediate ICT skills. Why did they remain unemployed? And why did most of the group with *basic* ICT skills remain unemployed?

Among other factors, the individuals with improved ICT skills may have been unable to demonstrate their skill level in the job application process. Many non-governmental and public workforce organizations provide ICT skills in a non-formal educational environment, which may or may not include certification. There are two types of certification: 1) certification of skills, and 2) certification of participation. Most of the training programs included in the study provide only certification of participation, if they award any certification. While these participation certificates are

> *"The biggest challenge we face is on the certificate situation. The students think they are getting more out of the ICT skills training than they really are. We can't back up what our students learn and employers may judge harder if you don't have a way to prove what you know. We need the most basic certification for them."*
>
> *Mark Hill, Instructor – WorkSource Renton*

important, they do not demonstrate to a prospective employer exactly what skills the individual has mastered. Unfortunately, the survey did not include a question regarding the type of certification (if any)—information that would be important to consider when discussing ICT skills effects on employment.

Moreover, the study was put in place just before the onset of the severe recession of 2008 that affected the entire U.S. (and the world) and that had broad impacts in Washington State. The group of survey respondents had completed their training, in most cases, at the same time that the employment situation was worsening. In fact, half of the participants were unemployed because they had been laid off from jobs in construction, manufacturing, and financial services. For those who found a job after the training, the average work week was only 32.95 hours, reflecting limited opportunities.[14]

Another 10% had lost their jobs due to a health condition or disability—a circumstance which tends to delay reintegration to the labor market. Factors which seemed to have *no* impact on the chances of employment were gender and education level. There were some regional differences in employment outcomes (discussed in 2.3).

Finally, the group that remained unemployed was slightly older than the group employed (52 years old on average). For ICT in particular, there is a fundamental divide between older and younger generations, and it is commonly thought that the older the individual, the more difficult it will be to acquire or improve ICT skills.

2.2 The role of complementary training and services in employment outcomes: ICT skills training as one piece of the puzzle

When ICT skills training was combined with *other* training—job search tools and strategies, preparing job applications, and to a lesser extent English skills—the correlation with employment outcomes was even more significant.[15] For those who participated *only* in ICT skills training, 47% remained unemployed, compared to 32% of people who received additional employment training (see Table 3).

Overall, the participating organizations offered three different types of service provision:

1. All training and services provided in-house
2. Intermediaries or referrals to partner organizations for all training and services
3. Some training in-house and some provided by other organizations

[14] Current labor data shows a decline in hours worked: people are forced to reduce their hours, or take part-time jobs even though they want to work full time.

[15] Statistical significance of each variable: 1) ICT skills training ($p < 0.001$); 2) Job search tools and strategies ($p < 0.001$); 3) Preparing applications/resumes ($p < 0.001$); and 4) English language skills ($p = 0.003$).

Even organizations that provide a full array of training and services in-house may in addition develop partnerships with community colleges (for example), to provide longer-term career paths to unemployed individuals.

Table 3: Employment status after training by type of training

	Only ICT skills training	ICT skills training & job search tools	ICT skills training & job search tools & job application assistance
Same position	24% 31	8.2% 19	8.1% 15
New position same organization	-	5.2% 12	5.1% 10
New job	21% 27	41% 95	42% 78
Employed after training but currently unemployed	7.8% 10	12% 27	12% 22
Unemployed	47% 61	34% 79	32.4% 60
Total Number of participants	141	245	195

Regardless of the channels used, certain forms of employment training and services were made available across all the organizations. The most commonly available services included: basic adult education; basic ICT skills training; job search tools and online applications; preparation of CVs and interviews; language training; industry-specific training (welding, office assistant, bank teller, etc.); and alternative ways for connecting to employers.

While ICT skills—computer, internet, and e-mail—are indeed critical for participants' personal development and performance in a job, **assistance and training in other employment-related areas may also be crucial**. *Social services* support may also play a significant motivational role**,** encouraging applicants to complete training and to pursue internship or on-the-job training opportunities. Participants may also require *enabling services*, such as transportation, housing, and childcare assistance, often critical to employability—especially in the case of low-wage workers who want to attend training or find employment farther from home. In some cases, access to a food bank or health care is needed.

Three clusters of relevant services (apart from ICT skills) are:

1. Job search preparedness (interviewing practice, resume writing, etc.)
2. Job search assistance and placement services
3. Enabling services that provide transportation, childcare, clothing, etc.

Finally, embedding ICT training within a larger array of employment services can improve the effectiveness of the training itself, by employing these skills in the context of significant tasks. Resume

writing, job search, budgeting for entrepreneurs, business plan writing, and e-mail with mentors or family members living abroad are examples of integrated ICT training that presents valuable skills in an engaging, applied manner.[16]

In addition to ICT skills, employers also emphasize the importance of other competencies that increasingly play a role in hiring and promotion decisions in the workplace. Skills such as teamwork, collaboration, communication, etc., are valued by employers. "Soft skills" (that is, interpersonal skills) "pertain to personality, attitude, and behavior rather than to formal or technical knowledge."[17] Not-for-profit and government workforce intermediaries are becoming increasingly aware of the need to complement ICT skills training with soft skills training. In Washington State, a 2007 employer survey showed that a high percentage of firms experienced difficulty finding workers who could demonstrate general strengths, including problem solving (63%), communication (58%), and lifelong learning skills (the ability to take responsibility for learning) (62%). In comparison, only 39% reported difficulty hiring workers with ICT skills.[18]

These complementary interventions can have an important effect on employability outcomes by allowing trainees to develop pivotal social skills. The interpersonal skills emphasized in a training program are usually tailored to the target population and the particular training approach. For example, an organization that targets young adults who are entering the labor market for the first time may emphasize the importance of punctuality, team-work, and communication. An organization that provides industry-specific training for the tourist sector or for micro-entrepreneurs will probably include customer service training as a central component of social skills development.

Non-formal education is critical to promote human capital and lifelong learning among low-skilled, long-term unemployed and older workers. For people who have been away from formal education for many years, an environment that nourishes their capacity to learn is critical, and the organizations involved in the study focus on making that environment possible. Formal education can be intimidating for these groups, especially if there is a wide difference in age—as in most college and university programs—and especially if the approach to learning demands a certain pace, previous knowledge, and familiarity with coursework

"In addition to our custodial, retail, and entry level office work training programs we offer other programs that help students maximize their potential (soft skills, job hunting, conflict resolution, etc). We find that the people who do not succeed in our program not because they can't learn a job skill but they are not dependable—they don't arrive at work on time, don't get along with co-workers.

We work with a very diverse population from people with physical or mental disabilities, to people with a criminal background, and people with low educational level. We really need to tailor the training program to their very specific needs."

John Tye, Custodial Skills Training – Tacoma Goodwill

[16] For example: Chapple (2005); Garrido and Coward (2006)

[17] Moss and Tilly (2001: 44)

[18] Hu and Wolfhagen (2007)

requirements. Non-formal learning can be a marvelous bridge towards formal learning.

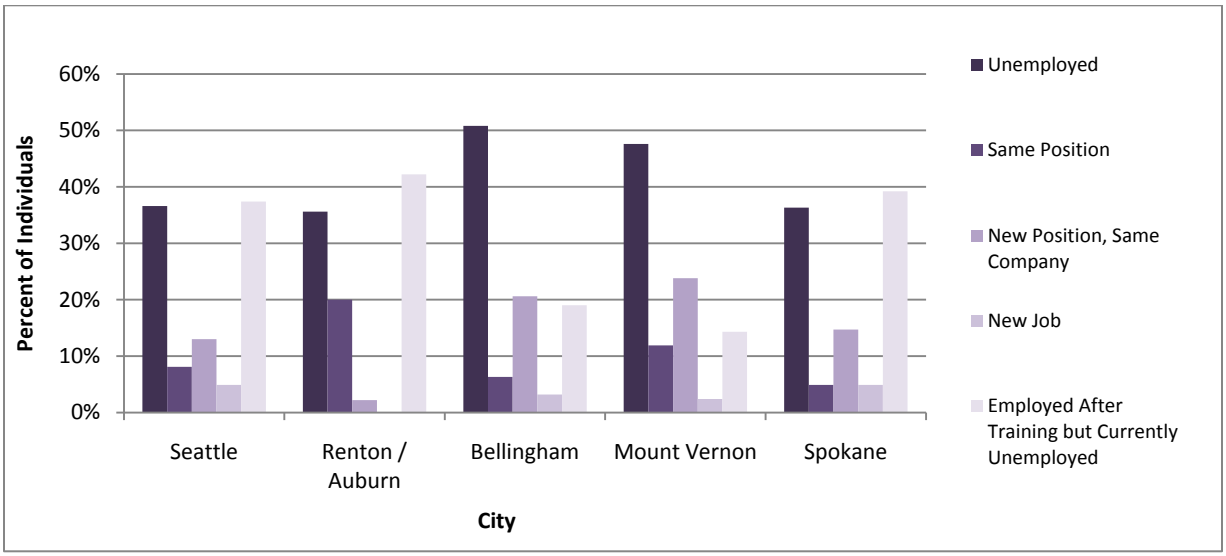
In summary, we found that ICT skills training had a positive correlation with finding employment after the training (especially for finding a new job, rather than continuing in the same job or with the same employer). **And, for the group who found a new job, the contribution of ICT skills training *combined with other employment-related training* proved most significant**.

ICT skills training is thus a necessary—but not sufficient—factor to enhance individual employment opportunities. The impact on employment outcomes is higher when ICT skills training is combined with "soft skills" training supplemented by employment services.

2.3 Regional variations in employment outcomes: Local labor market matters

Outcomes were far from uniform across the region. Figure 6 shows the widely varying percentages of the sample from each city that fall into each of our employment categories. For example, only 14% of the Mount Vernon sample found a new job, compared to 42% of the Renton/Auburn sample. However, Mount Vernon and Bellingham had the highest percentage of individuals who were employed while participating in the training (21% and 24% respectively, compared to 13% in Seattle and 14% in Spokane). Figure 8 provides the breakdown in employment outcomes by city.

Figure 8: Employment outcomes after training, by city*



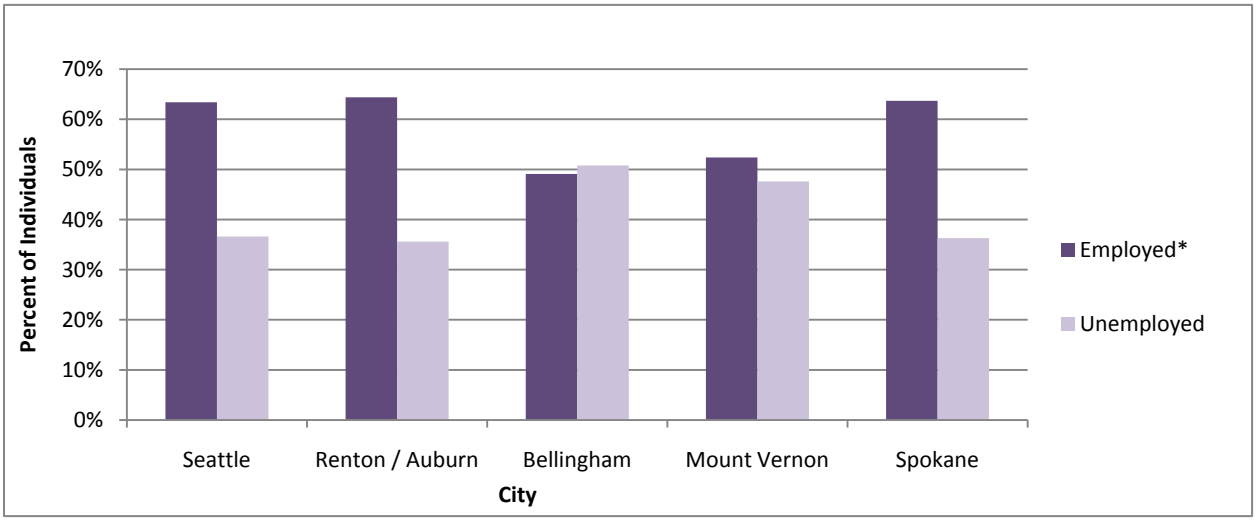
* Excludes Tacoma (N=10)as too small a sample for any significant statistical analysis

All the cities had high percentages who remained unemployed—ranging from 36% in Renton/Auburn and Spokane to a high of 51% in Bellingham. Job losses in Bellingham were concentrated in two sectors: manufacturing and mining, and logging and construction. Manufacturing employment declined by 600

positions in 2008; mining, logging and construction lost 800 jobs in 2007–2008. [19] (See Appendix 6 for a detailed analysis of labor dynamics in the different cities.)

If we sort our five employment outcomes into a yes-or-no array—*currently unemployed* (including those who found a job after the training but were again unemployed when responding the survey) and *currently employed*—the regional contrasts emerge more clearly (Figure 9). Spokane shows the largest positive spread between unemployed and employed percentages, followed by Seattle. The other three cities all show a negative spread, with a significantly higher percentage of unemployed respondents. (See also Appendix 4, Table 5 for a breakdown of employment outcomes by city).

Figure 9: Percent employed after training, by city**



* Employed includes: Same job, new position same organization, new job, and employed after the training but currently unemployed. **Excludes Tacoma (N=10): too small a sample for any significant statistical analysis

2.4 Training matters: Access and exposure to ICT is not sufficient to improve employment outcomes

Access to computer and Internet at home was surprisingly high for participants—averaging higher than 80% for computer access and 75% for Internet access at home. Clearly, access by itself is not effective in improving skill levels; it is not by itself a significant asset in pursuing employment (See Figure 10).

Training, however, can be key. Learning new skills—ICT and others—even at a basic level can provide the initial opportunity and motivation for workers with high barriers to employment to continue investing in their human capital and to make better use of their assets. The first legislation passed during the Obama administration (the American Recovery and Reinvestment Act of 2009, H.R. 1) included up to $7.2 billion in funding to provide broadband access and bridge the digital divide—a potentially far-reaching initiative. It is clear from our findings, however, that an important component of the effort to

[19] Giannamore (2009)

bridge the digital divide must be the provision of ICT *training*, in partnership with NGOs or state agencies. Table 4 shows the breakdown for access to computers and the Internet at home, by employment status after training.

Figure 10: Access to computers and the Internet at home for all survey participants

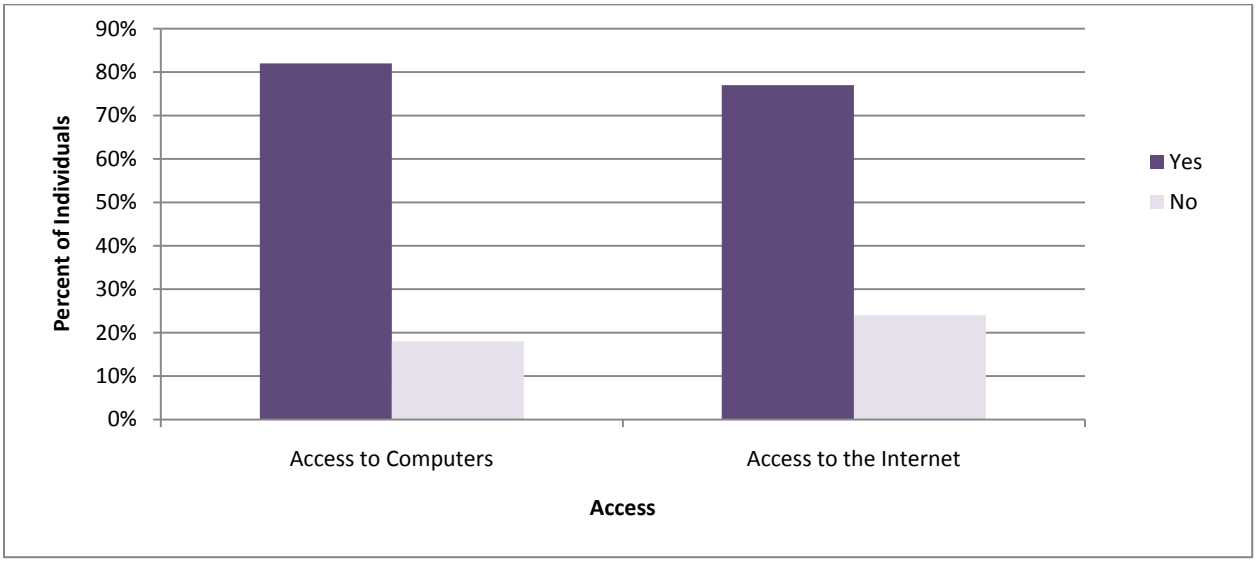


Table 4: Access to computers and the Internet by employment status

Since training, employment situation		Access to computer at home		Access to internet at home	
		Yes	No	Yes	No
Same position	% employment situation	81.7%	18.3%	76.7%	23.3%
New position same organization	% employment situation	78.6%	21.4%	78.6%	21.4%
New job	% employment situation	85.1%	14.9%	80.6%	19.4%
Employed after training but currently unemployed	% employment situation	81.1%	18.9%	73.0%	27.0%
Unemployed since training	% employment situation	82.3%	17.7%	76.0%	24.0%

2.5 ICT and Employment in a nutshell

The balanced training packages offered by the participating organizations were successful in assisting the majority of their clients to find employment, even in a forbidding economic climate (exacerbated in certain regions of Washington State). The portion of participants with employment was raised from 17% to 58% after the training. Surprisingly, gender and education level did not affect the employment outcomes; the individual's level of ICT skills did, however, show a moderate correlation with positive employment outcomes.

Strikingly, the mere fact of access to a computer or to Internet at home bore no relation to employment outcomes; the factor of training clearly plays an essential role. But it is important to emphasize, again, that the ICT training in these programs was complemented by a range of other kinds of training (in "soft skills") and by targeted support services, which appear to be equally important in improving employment outcomes.

Chapter 3: ICT Training and Its Effects on Wages

3.0 Background

All the organizations in the study place consistent emphasis on assisting their clients to find well-paid employment, above minimum-wage levels. Since the population these organizations serve is very diverse—especially for public workforce intermediaries—the wage levels vary depending on the client's work history and education, as well as the opportunities available in the labor market.

Wage level is one of the most important predictors of job quality. Other employment aspects, such as benefits, upward mobility opportunities, and family/work balance policies also have great impact on the well-being of workers. Wage level, however is also a *marker* that reflects how the individual's human capital—skills, knowledge, and education—are valued in the labor market. Of course, wage levels fluctuate according to the economic environment, dropping at times of high unemployment and rising when labor markets are tight.

It is commonly believed that the introduction of information and communication technologies has transformed employment dynamics—affecting not only the kind and level of skills necessary for workers, but also compensation levels and workers' career aspirations. While researchers, policymakers, and employers tend to agree on the importance of ICT skills as a key ingredient in employability, there still exists a fundamental gap in understanding the effects of these technologies on employment patterns, particularly regarding the contribution of ICT skills to wage level.[20]

There is conflicting research regarding the extent to which ICT skills and ICT use at work tend to raise workers pay—and even whether they raise it at all. One group of researchers identified a "wage premium" for using computers at work, amounting to an increase of 10 to 15%;[21] others argue that this wage premium was simply a reflection of "unobserved ability which would have led computer users to receive higher pay anyway, irrespective of the technology."[22] The most innovative research points toward four factors that can help explain the impact of ICT technologies on wages:[23]

1. The ICT skill level of the individual
2. The frequency of ICT use in the job
3. Other generic skills required for the job
4. The importance of using ICT in the job ("centrality of use")

[20] Green et al. 2001; Green et al. 2007

[21] See for example: Krueger (1993); Fan et al., 2006; Johns (2008)

[22] Di Nardo and Pischke (1997); Green et al. (2007:2) provide a thorough review of research addressing the issue of the effects of computer skills on wages.

[23] Green et al. (2007)

This study focused on the first three factors. Here we analyze the wage dynamics for the group of participants who were employed after the training was completed (58% of the total sample). The study also took into account some contextual factors: the individual's educational level, gender, and age; and the sector of employment.

3.1 The role of gender, age and education in wage dynamics for the employed group

The latest statistics on the use of computers and Internet work showed that the percentage of workers in Washington State who use ICT at work was, on average, higher than the national level[24] (43.9% compared to 39.5%), with the financial sector, manufacturing, and general service sectors leading this trend.[25] Workers in Washington State use more technology to perform their jobs; they also perform jobs that on average require higher levels of skills.[26] Similar to the trend in technology adoption at work, the State reported hourly wages 5% higher than the national average in 2001.

Clearly, not all workers benefit from higher wages. Muted wage growth and the rising cost of housing have widened the income gap in the State.[27] A 2007 Seattle Jobs Initiative report shows that 25% of working families have incomes *below* the 200 FPL required to cover basic needs after factoring in work expenses.[28] The economic slowdown of the last year has further deterred wage growth; available jobs are likely to be in the pay range either under $15 or over $30, with critical job loss affecting the middle range of jobs that pay enough to support families adequately. As elsewhere in the country, the recession makes it far more difficult for individuals and families to move out of poverty.

It is especially significant, then, to find that the *median* hourly wage for the employed group increased by 20%, from $10 to $12. (As the official living wage in Washington State for a family of four is $25, the $12 level — assuming two wage-earners — roughly represents a living wage for a couple with two children.) However, not everybody in the group benefited from an increase in wage. We found significant differences in wage

> *"People who face high barriers to employment always live in a recession, in an economic crisis. The difficulty to immediate responses to the current national economic situation is that it targets people that already have on average higher skills. For example, the current strategy and investment on promoting these 'Green Jobs' can really help revitalize middle-wage jobs. Along with this strategy, however, there needs to be a concerted effort to create green jobs that promote not only living wages but also job security and benefits. Green or not, job quality must always be a concern."*
>
> *Juliet Scarpa, Senior Policy Analyst – Seattle Jobs Initiative*

[24] U.S. Census Bureau (2005)

[25] Fan et al. (2006:18)

[26] Ibid.:15

[27] Seattle Jobs Initiative (2007)

[28] Ibid.:1

dynamics based on age, educational levels, and the sector of employment.

In terms of demographic factors, the analysis found that gender was not a significant predictor of changes in salary for those employed after the training. The median wage increase for men was only slightly higher than for women (22% compared to 20% for women); men's median initial wage was also slightly higher ($10.25 compared to $10 for women). Women made up 70% of the sample.

Table 5: Median hourly wage for people employed before and after training, by gender

Gender		Wage before training	Wage after training	% difference
Male	Median	10.25	12.5	22%
	N	56	57	
Female	Median	10	12	20%
	N	159	166	
Total	Median	10	12	20%
	N	215	223	

Further contextualizing gender and wage dynamics, women tended to be single breadwinners of larger families. 40% of the women in our sample were fully responsible for the financial support of their families—a slightly lower percentage than for men. The average number of adults in the women's families was 1.84, compared to 2.09 for men. This finding is clear evidence of the important role served by non-profits and public workforce intermediaries, to strengthen and develop women's human capital and thus their competitive position in the labor market.

In this context, even the modest gender discrepancy in wages can present an insurmountable obstacle for women trying to make a living wage to support their families. Fully 50% of women in the employed group reported that the wage they earned after the training was not providing them with a living wage, as compared with 43% of men (discussed further in section 3.7). This reality makes it all the more critical, as a policy objective, to focus on developing women's human capital to enhance their competitiveness in better-paid areas of employment.

Level of education did contribute to success in raising the wage level after training, though not in linear fashion. The finding is particularly revealing in that it shows that these non-profit and public organizations are successfully serving clients who lack post-secondary educational experience. Participants with a two-year college degree did better (in percentage increase) than those with a four-year degree, and they did almost as well in absolute wage level (see Table 6).

The group with at most a high school diploma made smaller gains than the overall median increase (14% compared to overall 20%), **but they nevertheless benefited significantly**. Table 2 shows wage outcomes by education level. (We exclude the three participants who were lacking a high school diploma and participants with a post-graduate degree, because those numbers were too small to be significant.)

Table 6: Median hourly wage for people employed before and after training, by education level

Education Level	Wage before	Wage after	Wage change	Frequency
10th grade or less	12.00	12.00	0%	7
High school diploma	10.00	11.39	14%	100
2-year degree	10.00	13.00	30%	53
4-year degree	11.00	13.73	25%	46
Total	10.00	12.00	20%	221

Age was the demographic factor that most clearly affected the level of wage increase. We found that the youngest workers on average had higher wages. The group who found a job after training but were currently unemployed were mainly older workers, with a median age of 54 compared to the overall median age of 47. The highest percentage wage increase went to those who found new jobs or new positions, and these two groups had the *lowest* median age among the employed groups (see Table 7).

Table 7: Median hourly wage before and after training by, employment outcome* and age

Since training, your job situation	Hourly Wage Before (Median)	Hourly Wage After (Median)	Average Age	Total Number
Same position	12.25	12.24	51	56
Promoted to a new position in same organization	7.4	11	36.5	10
In a new job	9.35	12.5	46	125
Employed after, though currently unemployed	10	10	54	34
Total	10	12	48	225

* Excludes people unemployed after the training

3.2 Different employment sectors have different wage dynamics.

In addition to demographic characteristics, one of the most important factors that affect wage dynamics is the sector where people are employed and the position or job they perform. For this research, unfortunately, the position and type of job were not captured. However, we have some interesting findings regarding the main sectors that employed the majority of the people in our study. Looking at Table 8, the differences in wages are striking.

Most of the successful job-seekers in our study found employment in four sectors: 1) health and social services; 2) wholesale and retail; 3) government; and 4) professional and business services. Table 8 shows striking differences between sectors, both in wage levels and in the percentage wage increase. Sectors are shown in order, from smallest to largest wage increase. The shaded rows are the sectors

where most of the successful participants found jobs. Note that two of those sectors, wholesale/retail and health, offered wages *at or below* the overall median wage.

Table 8: Median hourly wage before and after training, by employment sector

Sector*	Median Hourly Wage Before Training	Median Hourly Wage After Training	% Change
Manufacturing (n= 7)	14.35	14.9	4%
Leisure and hospitality (n = 11)	9	9.5	6%
Other private services (n = 13)	9.2	10.5	14%
Wholesale and retail trade(n = 38)	8.75	10.25	17%
Health and social services (n = 45)	10	12	20%
Non-profit (n = 5)	13	16.19	25%
Construction (n = 12)	15.44	19.49	26%
Professional and business services (n = 18)	10.38	13.75	32%
Government (n = 20)	11.5	15.61	36%
Financial activities (n = 7)	12	17	42%
Transportation and utilities (n = 10)	9.78	15	53%
Educational services (n = 7)	12	13	55%
Total (n = 199)**	**10**	**12.31**	**23%**

* Table omits details for agriculture and information sectors (only 3 cases each)

** Total includes the two omitted sectors.

It is important to acknowledge that the organizations in our study all make a concerted effort to match employment training and services to labor market demands. They align their programs to employers' needs in different ways—and with different levels of employer commitment and engagement. They may partner with employers to design the training and guarantee certain number of positions for the graduates each year. Most also closely follow labor dynamics, to provide clients with most-demanded skills in growing sectors of employment. However, matching training programs to labor market demands can be burdensome, as a highly resource-intensive activity for these organizations.

3.3 Wage dynamics: not all workers are remunerated equally

Up to this point, the analysis presents wage dynamics for study participants through the lens of demographic characteristics and the sector of employment. We now try to paint a more comprehensive

and accurate picture, taking into account the effects of ICT use and ICT skills on wage levels. The results of the survey show four possible outcomes of wage dynamics for the people employed after the training (58% of the total sample):

1) Wage increase (N=64)

2) Wage decrease (N=49)

3) No changes in wage (N=54)

4) No wage before training (unemployed) but wage after (N=58)

Table 9 shows the median hourly wage and the percent change for each salary group. See Figure 11 for wage dynamics by educational level and Table 10 for analysis by gender.

1. ***Increase in wage**:* Wages for people in this group increased almost 40%, with those making $14–$16 an hour experiencing the highest increase. In terms of gender, women make up 81% of the group that earned a higher wage after training (note that women are 70% of our sample). This group is on average younger than our median age (43 years). 32% of the people in this group have a high school degree. 72% of this group found a new job after training.
2. ***Decrease in wage:*** Wages for people in this group decreased by 24% compared to their median salary before training. 56% of this group has a high-school degree; median age is 55 years. 22% of this group found a job after the training, but were again unemployed at the time of responding to the survey.
3. ***No change in wage**:* The median wage for this group remained the same as before the training, at $11.24. Of the 54 people in this group, 70% are women and 56% have only a high school degree. 80% of this group remained employed throughout the training.

Table 9: Median wage before and after training, by salary group

Salary Group		Median Hourly Wage Before	Median Hourly Wage After	% Change	Average Age
Not employed before/No wage	N	50	50		
	Median	-	12.18	--	45.50
Salary decrease	N	49	49		
	Median	15.87	12.00	-24%	53.00
No change in salary	N	54	54		
	Median	11.24	11.24	0%	51.50
Salary Increase	N	64	64		
	Median	10.00	13.90	39%	43.00
Total	**N**	**217**	**217**		**217**
	Median	**10.00**	**12.00**		**47.00**

Figure 11: Wage dynamics, by educational level

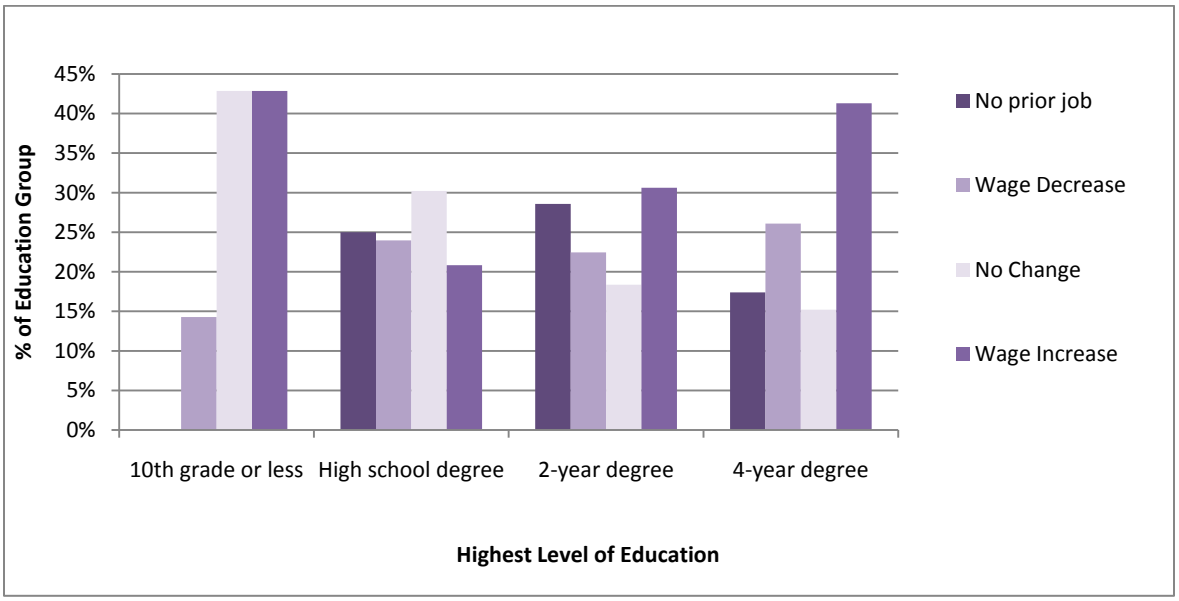


Table 10: Wage dynamics, by gender

Salary Group		Gender		
		Male	Female	Total
No prior job	Count	13	37	50
	% within salary group	26.0%	74.0%	100.0%
Wage decrease	Count	15	33	48
	% within salary group	31.3%	68.8%	100.0%
No Change	Count	16	38	54
	% within salary group	29.6%	70.4%	100.0%
Wage increase	Count	12	51	63
	% within salary group	19.0%	**81.0%**	100.0%
Total	Count	56	159	215
	% within salary group	26.0%	74.0%	100.0%

We also found dramatic regional differences (Table 11), varying from a substantial reduction in median wage (-10%) to an even greater increase (+24%). Mount Vernon, with the highest percentage of still-unemployed, is at the lowest extreme in wage outcomes. Bellingham, with the next lowest wage outcomes (a mere 4% increase), experienced large job losses in the manufacturing sector. This was reflected in the data, with Bellingham showing the highest percentage of respondents who reported any decrease in wages.

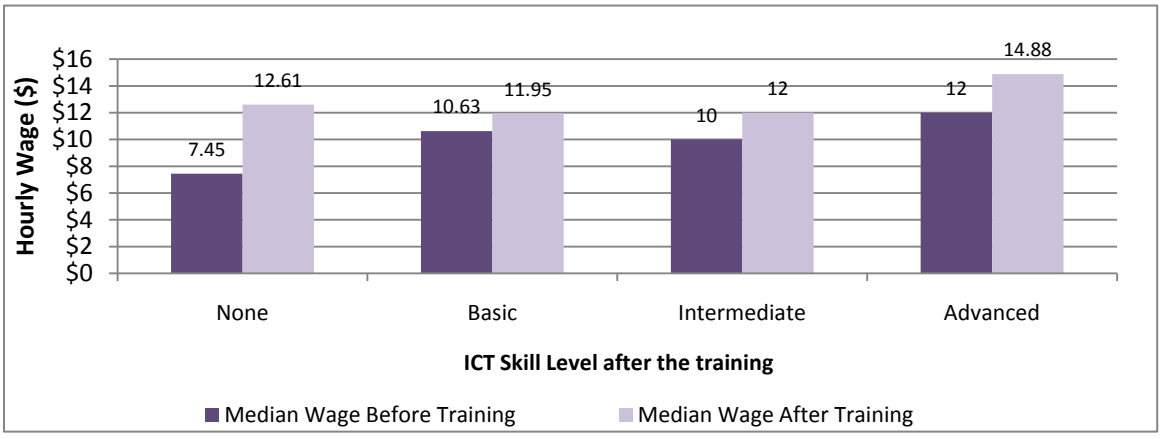
Table 11: Median wage before and after training, by city

CITY	Median Wage Before	Median Wage After	% Change
Seattle	10.50	13.00	24%
Renton / Auburn	12.50	15.00	20%
Bellingham	11.50	12.00	4%
Mount Vernon	12.45	11.20	-10%
Spokane	8.85	11.00	24%
Total	**10.00**	**12.00**	

3.4 Effect of ICT Training on Wages

ICT skill level[29] and the frequency of use of ICT at work[30] were two important factors affecting wage increment after training. Participants with intermediate and advanced ICT skills after training experienced the largest average wage increase. For example, those with intermediate ICT skills earning between $12 and $14 dollars before training saw a 20% increase in hourly wage after training. Among the group who experienced a decrease in wage, those with (self-assessed) basic ICT skills following the training saw a greater wage decrease than those at a higher ICT skill level. It is important to bear in mind, however, that these training programs provided most participants with a broader skill set than simply ICT skills; moreover, the types of ICT skills taught varied considerably between programs. The full research results show that the "recipe" for wage level improvement cannot be limited to a technical curriculum.

Figure 12: ICT skill level and changes in median hourly wage before and after training



[29] ICT Skill level (p<.003)

[30] Frequency of use of e-mail at work (p=0.005); Frequency of use of Internet at work (p=0.002); and Frequency of use of office applications at work (p=0.010)

Salary bins and wage dynamics

With such a wide range of salaries in the sample population, we divided the respondents into wage groups (or salary bins) for a more detailed understanding of wage outcomes. Table 12 gives the salary bins, with wage outcomes after the training.

We then examined results for each wage group, further broken down by ICT skill level. Participants with intermediate and advanced skills after training saw on average the largest wage increase. However, the increase also depended on the wage group. Participants with intermediate ICT skills and $12–14 median hourly wage experienced a 20% increase in wages; those with advanced ICT skills and a $20–22 hourly wage experienced a 50% increase—the highest percentage increase.

Using the salary groups to assess the effects of ICT skills on wages, our analysis found the following:

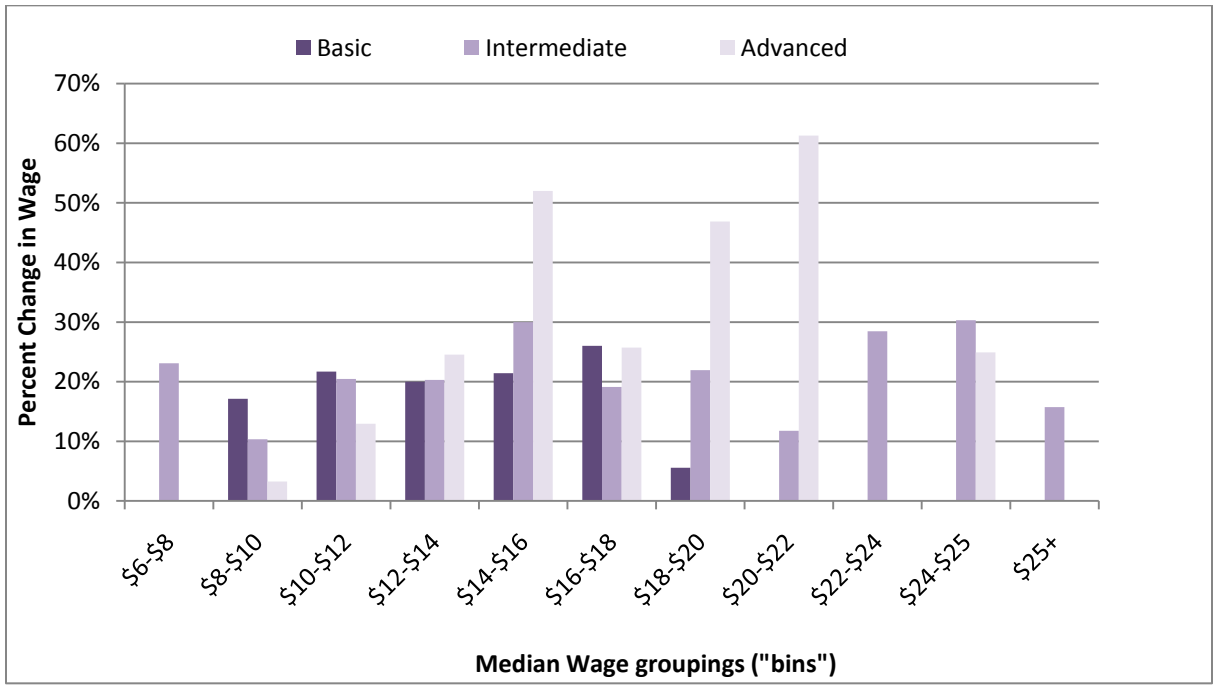
- The large majority of the sample earns at the lowest level—within the $8–16 range. The value of employment assistance services for these low-skilled, low-income, and unemployed groups cannot be sufficiently emphasized.
- All the salary groups experienced an increase in wage, with one exception: the $6–8 wage group experienced a wage decrease after training (-4%). The small size of this group, however, makes the result statistically insignificant.

Table 12: Median hourly wage before and after training, by salary bin

Salary Bin ($)	Median Hourly Wage Before	Median Hourly Wage After	% wage change	Total Number
$6-$8	7.63	7.3	-4%	7
$8-$10	8.21	8.72	6%	48
$10-$12	9.75	10.5	8%	46
$12-$14	11.12	12.45	12%	38
$14-$16	14.85	15	1%	22
$16-$18	13	17	31%	13
$18-$20	17	18.75	10%	17
$20-$22	20	20	0%	20
$22-$24	22	22.62	3%	5
$24-$25	17.93	24.18	35%	4
$25+	26	28	8%	14
Total	**10**	**12**	**20%**	**225**

We further examined our findings on wage dynamics in terms of wage groups. Figure 13 gives the results for the **wage-increase group**, broken down by skill level and wage group. For the group who increased their wages, the overall average wage increase was 28%.

Figure 13: ICT skill levels after training for people with wage increase, by wage bins



In the **wage-decrease group**, the average wage decrease was a full 22%. Appendix 5, Figure 1 gives the results for the wage-decrease group, broken down by skill level and wage group. Those with only basic ICT skills saw the most dramatic wage decrease, overall -15%. For those in the $14–16 wage group, with only basic skills after training, **the decrease was almost -50%.** These wage decreases must be viewed, again, in the context of a state-wide (indeed, global) economic downturn.

The higher the ICT skill level, the higher the change in wage

ICT skill level is only one predictor of wages. It is important that any discussion of technology and wages refer to the *contribution* of ICT to wages, rather than "attribution": there are so many intertwined factors that affect how an individual's labor is valued in the market that we cannot attribute wage outcomes to any single factor. Many of the people who experienced a decrease in wage after training had (self-reported) intermediate ICT skills (See Figure 1 in Appendix 5). However, when we break out the wage increases of the entire sample based on level of ICT skills after training, the percent wage increase is progressively higher for those with higher skill levels (Table 13).

We found a similar result when we examined the less-educated sector of the sample. Of the group with at most a high school diploma, those with intermediate ICT skills after training experienced a 20% wage increase, compared to only a 12% increase for those with basic ICT skills (Table 14).

Table 13: Median hourly wage before and after training, by ICT skill level

ICT Skill level after the training	Median Hourly Wage Before	Median Hourly Wage After	% Change	Average Age
Basic (n = 42)	10.63	11.95	12%	53
Intermediate (n = 139)	10	12	20%	46
Advanced (n = 23)	12	14.88	24%	33
Total (n = 206)	**10**	**12**	**20%**	**47**

* After training (self-reported). The "no skills" group was omitted, with only 2 individuals.

Table 14: Median wage before and after training, by ICT skill level for people with high school diploma

Skill level		Wage before	Wage after	% change in wages
None	Median	7.45	12.61	--
	N	2	2	
Basic	Median	9.00	10.15	13%
	N	15	16	
Intermediate	Median	10.00	12.00	20%
	N	66	68	
Advanced	Median	9.00	10.00	11%
	N	7	8	
Total	**Median**	**10.00**	**11.18**	12%
	N	**90**	**94**	

A main tenet behind the skills-biased technological and organization approach is that low-skilled workers face a disadvantage in the labor market—and the danger of being crowded-out—because of the obsolescence of their skills measured by the needs of the market. This suggests that low-skilled workers would greatly benefit from training that allows them to gain or improve the skills widely demanded in today's job environment. As we saw in the previous section, NGOs and public workforce agencies that provide basic ICT skills training do in fact contribute to improve low-skilled workers' human capital and thus open more opportunities for them in the labor market.

However, the level of ICT skills also matters; in order for these workforce organizations to smooth the path between training and employment, it is necessary to take the training to a higher level. Organizations are well aware of the need to offer more advanced ICT skills training, but they are constrained by resources and, more recently, by the increased demand for their services. All the organizations in our study reported that the number of people requesting training and employment training has increased dramatically in the last year; some reported a 30% increase in clients.

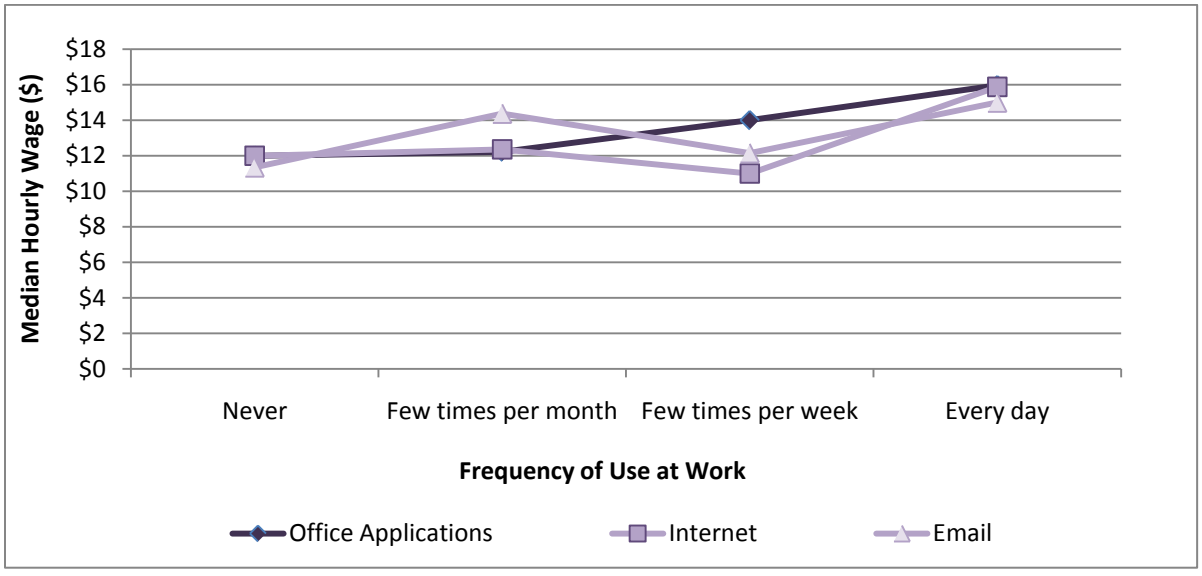
3.5 The effects on wages of ICT use at work

In addition to ICT skill level, we also analyzed the effect of ICT on wages by looking at the frequency of ICT use at work, for those employed after training. We analyzed the use of three ICT components: computer (office) applications, Internet, and e-mail.

The most recent CPS data (2003) found that: "72% of Americans who are employed and have more than a high school education use computers at work, and 58% use the Internet at work. This compares with 35% of workers with a high school education or less who use computers at the workplace, and 21% who use the Internet." [31]

Controlling for other factors, our analysis found that people who use ICT at work more frequently are more likely to earn higher hourly wages. People using office applications at work every day in our sample had a 31% increase in their median hourly wage *(*see Figure 14). Higher-skilled individuals are more likely to use ICT at work, however, so the differential in earnings or wage premium can also be attributed to other factors, such as position, educational level, and other skills needed in the workplace. [32]

Figure 14: Median hourly wage after training, by frequency of ICT use at work



[31] Johns (2008)

[32] Green et al. (2007)

The combination of ICT use at work and ICT training showed dramatic impact on wages. Respondents who use *office applications* at work on a daily basis had a 31% increase in median hourly wage after training (see Table 15). In Appendix 5, Figures 2–4 give a more detailed breakdown of wage levels and ICT use for specific sectors of employment for the whole employed group.

Table 15: Median wage before and after training, by frequency of office applications use at work

		Median Wage Before	Median Wage After	% change
Never	Median	10.00	10.50	5%
	N	73	74	
A few times per month or less	Median	9.25	10.83	17%
	N	22	25	
A few times per week	Median	9.75	12.00	23%
	N	25	27	
Every day	Median	11.43	15.00	31%
	N	79	81	
Total	**Median**	**10.00**	**12.22**	**21%**
	N	**199**	**207**	

The results are just as dramatic for use of *Internet* at work. Tables 16 and 17 show wage outcomes for the high-school-only group, in relation to frequency of use of Internet and office applications respectively.

Table 16: Median wage before and after training, by frequency of Internet use at work*

		Wage before	Wage after	% change
Never	Median	10.63	10.50	-1%
	N	34	34	
A few times per month or less	Median	12.50	12.50	0%
	N	5	5	
A few times per week	Median	8.50	10.83	27%
	N	11	12	
Every day	Median	9.50	12.00	26%
	N	38	41	
Total	Median	10.00	11.39	14%
	N	88	92	

*For people with a high school diploma or less

Table 17: Median wage before and after training by frequency of office application use at work*

		Wage before	Wage after	% change
Never	N	35	36	
	Median	10.50	10.50	0%
A few times per month or less	N	11	12	
	Median	9.15	10.54	15%
A few times per week	N	9	9	
	Median	8.50	11.35	34%
Every day	N	32	34	
	Median	9.88	12.18	23%
Total	N	87	91	
	Median	10.00	11.43	14%

*For people with a high school diploma or less

3.6 Do the skills required for the job affect wage levels?

Research shows that one of the factors that affect wage levels is the skills required in the particular job. The most innovative research shows that computer skills translate into a wage premium when they are associated with "influence skills"—the capacity of an individual to effect changes in the firm or organization.[33]

We accordingly developed a broader list of job skills beyond ICT skills, [34] and asked survey participants to select from the list the skills required in performing their jobs. The analysis shows that the four skills people reported needing the most were English skills (77%), teamwork and collaboration (74%), basic computer skills (67%), and customer service (66%). Fewer than 30% required management skills, with women representing the highest proportion in this group (70%).

Interestingly, 45% of the group needing management skills on the job have only a high-school diploma, with an average age of 46. This is noteworthy because the wage increase for those required to have management skills is significantly higher (followed by customer skills and computer skills). (Table 18 shows the skills that are the most often required for the job.) However, when we did a full statistical analysis, we found that the factor of skills required on the job was not by itself a significant predictor of wage levels or increase.

[33] Green et al. define influence skills as: persuading or influencing others; instructing, training or teaching people; making speeches or presentations; writing long reports; analyzing complex problems in depth; and planning the activities of others (2007:5).

[34] The list of skills was informed by the work of Green et al. 2007. The list included: English skills, Basic computer skills, Technical skills (such as operating equipment), Trade or craft skills, Customer service skills, Team work and collaboration, Management Skills, and Other.

Table 18: Skills required for the job for people employed after the training

Skills Required for the job	% of people requiring skill for the job
English skills	77%
Basic computer skills	67%
Technical skills	31%
Trade or craft skills	21%
Customer service skills	69%
Teamwork/Collaboration	74%
Management skills	30%
Other	18%

Table 19: Skills required for the job by median hourly wage before and after the training

Skills Required for the Job	Median Hourly Wage Before	Median Hourly Wage After	% Wage change	% of people who require this skill at work (N=226)
English skills	10	12.22	22%	77%
Basic computer skills	10.5	13	24%	67%
Technical skills	10.75	13	21%	31%
Trade or craft skills	10.71	12.88	20%	21%
Customer service skills	10	12.45	25%	69%
Teamwork/Collaboration	10	12.4	24%	74%
Management skills	11.43	14.5	27%	30%
Other	10.75	12.35	15%	18%

Clearly, jobs require a combination of skills. The most successful combinations of skills, in terms of wage increase, can be seen in Table 20. Computer and management skills combined are the most successful, followed by computer and customer service skills. Again, however, skills alone—even in combination—were not a significant determinant of wage outcomes.

Table 20: Combination of skills required for the job by median hourly wage before and after the training

Skills required for job	Wage before	Wage after	% Wage change	Total Number
Basic computer skills + Customer service skills	10.38	13.6	31%	127
Basic computer skills + Teamwork/Collaboration	10.75	13.41	25%	136
Basic computer skills + Management Skills	11.71	15	28%	65
Customer service + Teamwork/Collaboration BUT NOT basic computer skills	9.15	10	9%	27
Technical skills BUT NOT Computer skills	10	11.45	15%	16
Technical skills + computer skills	12	13.55	13%	34

3.7 Working? Yes, but can they meet the financial needs of their families | Perceptions of living wage by the people employed after the training

We need to view the data on wages in the broader context of the individual's perception of a minimum living wage, as well as level of financial responsibility for the household. The data show that only 52% of the study participants who were employed before the training (N=140) reported making a living wage. The median hourly wage for this population was $15.49, a living wage for a family *smaller* than the average household in our sample (two adults with .74 children).

The participants who reported not making a living wage in their job before the training (N= 128) were usually single breadwinners for larger families. The median hourly wage for this group was $10, to provide for households consisting of (on average) 1.87 adults and 1.64 children. The men and women in our sample seemed to have similar financial responsibilities to provide for their families. 42% of the men are responsible for providing all the financial support to their families, compared to 39% of the women.

This situation changed moderately for people who were employed before and after the training. The change went both ways. Almost 30% of the group who were *not* earning a living wage before the training reported earning a living wage after the training: the median hourly wage for this group is $14 after the training, an increase of almost 25% from before the training. The majority of this group are women.

However, we found a trend in the opposite direction for people who were already making a living wage before the training: only 78% were able to keep their living wage after the training, earning a median hourly wage of $17.50 after the training (an increase of 9%). Thus, 22% of this group experienced a

significant wage decrease after the training, so they were no longer earning a living wage—in spite of the overall wage increase for the group. The median wage for this less fortunate subgroup decreased 25% (from $14.68 to $11.00). Almost half of this subgroup have only a high-school diploma, with men and women roughly equally represented.

3.8 ICT and Wages in Nutshell

The data show that ICT skills and frequency of ICT use at work are indeed significant predictors of wage premiums. However, this analysis needs to be dissected to build a more comprehensive picture of ICT and wage dynamics. Several other factors affect wage changes: education, previous work experience, location, etc.

An important limitation of the data is the lack of information about the specific job position, which has direct and indirect implications for wage level. For example, job position determines the centrality of ICT skills and ICT use at work, which both have an effect on wages.

Nevertheless, even this limited snapshot shows the benefits of the training programs in providing opportunities to find a job paying a living wage. It is noteworthy that 20% of the group who were not making a living wage before training experienced a substantial increase in wage, earning a living wage after the training. The difficulties experienced by so many other participants simply highlight the challenge to *all* job-seekers posed by the current deterioration of the regional economy.

Chapter 4: Aspirational Outcomes and Employability

Employability research tends to use statistics to identify factors that improve actual employment opportunities. In this section, we use statistics somewhat differently, to capture participants' *assessments* of their employability following training. Here, we are focusing on the subjective factor in employability, which we term the **aspirational dimension**—including increased self-esteem, aspiration to acquire additional skills, and aspiration to find employment or a better job. We borrow this term from Appadurai,[35] who talks about the individual's "capacity to aspire" to a better future.

Aspirational outcomes are thus the third building block of this research. The survey included questions to capture (1) participants' perception of the usefulness of the ICT training (combined with other employment service programs), and (2) the contribution of these programs to aspirational outcomes related to employability.

The aspirational dimension is evidently well understood by the workforce organizations that provide employability training and services. By providing a supportive learning environment and an opportunity for informal networking, these programs contribute to self-esteem even before the first lesson. Even the most basic ICT training can help to "de-mystify" the challenge of computer skills, expanding the horizons of participants.

4.1 The effects of ICT training on aspirational outcomes

Does the perceived usefulness of the training and employment services to the individual depend on a positive experience (i.e., successful employment outcome) following the training? As we were designing the survey, "informed opinion" led us to believe that the perception of value of the training and employment services would be determined to some extent by the employment situation of individual participants after the training. This assumption proved to be ill-informed.

The overwhelming majority of the participants in our study reported that the contribution of the training to advance their employment situation was "important" or "very important." This perception was shared by most of the participants, regardless of their employment outcomes after the program. The perception of value was indeed among the highest for those individuals who found a new job after the program, or who found employment after the training but were unemployed at the time of answering the survey. The positive perception was also shared, however, by people who remained *unemployed* after the training, although the percentage who regarded the training as important or very important is somewhat lower, at around 70%.

This positive perception of the contribution of the training and employment services also cuts across gender, educational levels, and wage levels, within the employed group. There are some slight differences based on educational level, but overall the perception of value is positive and very high (see Tables 21 and 22).

[35] Appadurai (2004)

Table 21: Perceived importance of training and employment services received, by gender

		Male	Female	Total
Very Important	Count	40	131	171
	% within Gender	35.1%	43.0%	40.8%
Important	Count	42	99	141
	% within Gender	36.8%	32.5%	33.7%
Not so important	Count	12	31	43
	% within Gender	10.5%	10.2%	10.3%
Not at all important	Count	12	11	23
	% within Gender	10.5%	3.6%	5.5%
Don't know	Count	8	33	41
	% within Gender	7.0%	10.8%	9.8%
Total	Count	114	305	419

Table 22: Importance of training and employment services received, by educational level

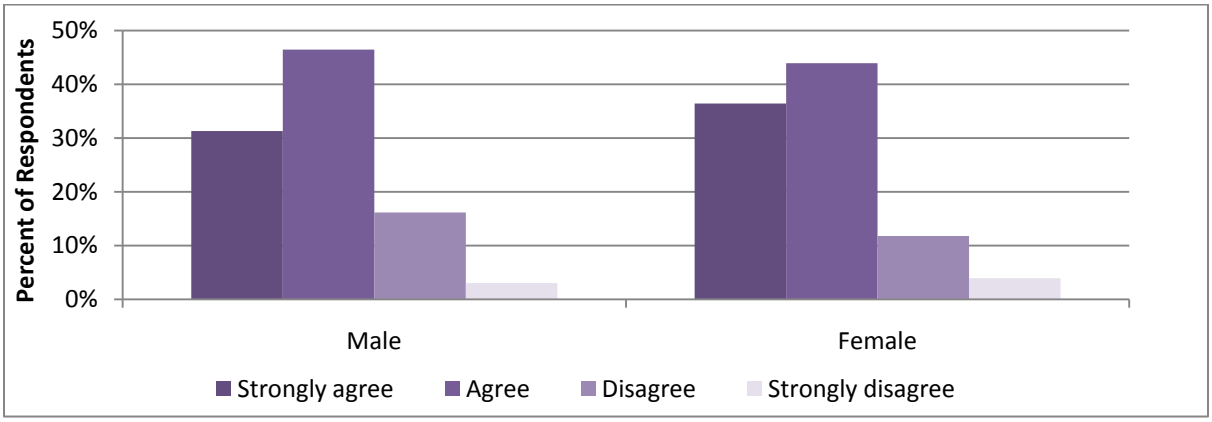
		10th Grade or Less	High School Degree	2-year Degree	4-year Degree	Post-graduate Degree	Total
Very Important	N=	7	81	38	33	11	170
	% Level of Education	41.2%	43.5%	40.0%	37.9%	37.9%	41.1%
Important	N=	7	63	31	30	10	141
	% Level of Education	41.2%	33.9%	32.6%	34.5%	34.5%	34.1%
Not so important	N=	1	14	14	9	3	41
	% Level of Education	5.9%	7.5%	14.7%	10.3%	10.3%	9.9%
Not at all important	N=	0	10	6	3	2	21
	% Level of Education	.0%	5.4%	6.3%	3.4%	6.9%	5.1%
Don't know	N=	2	18	6	12	3	41
	% Level of Education	11.8%	9.7%	6.3%	13.8%	10.3%	9.9%

Across the 454 people in our sample, there was an overwhelming boost to self-confidence after the training. 81 percent of the people surveyed reported higher self-confidence after the training, regardless of gender, age, and educational background (see Figure 15). We also analyzed this self-esteem effect according to employment status after the training: for respondents who were unemployed, only 6% did *not* agree that their self-confidence had improved after the training.

The perceived value of training (and learning in general), and the resulting increase in self-esteem and self-confidence, may be as important a result as actual employment and wage outcome. For individuals

who face high barriers to employment—the long-term unemployed, and low-skilled, or older workers—learning new skills makes them feel "modern" and "relevant" and motivates them to keep learning more. This may in fact be one of the most important benefits of learning basic ICT skills for unemployed individuals.

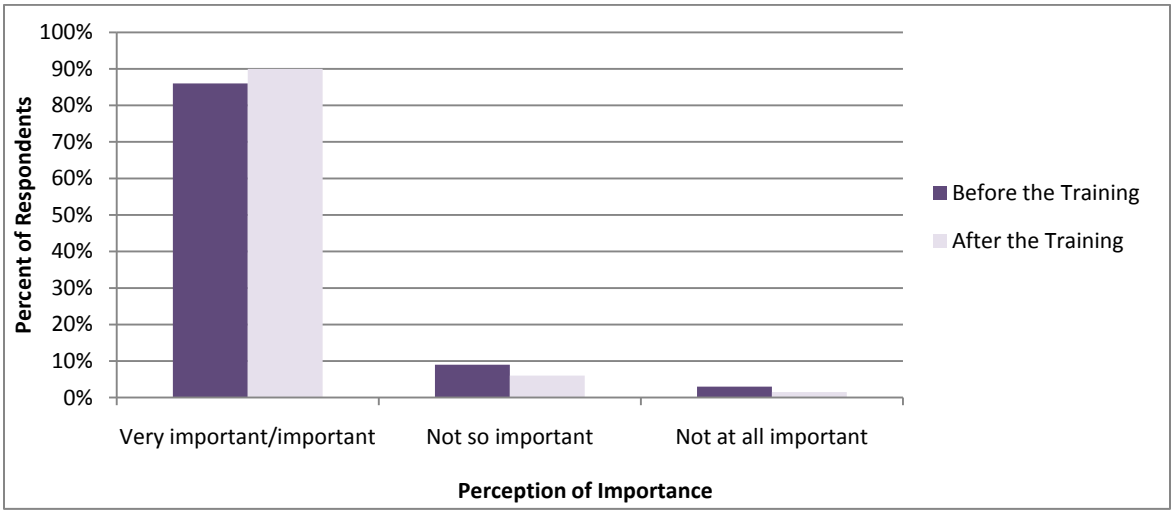
Figure 15: "Have higher self-confidence after the training than before"



4.2 What is the perception of the value of ICT skills to improve employability?

We found a very similar trend in the perception of the importance of ICT skills in employability. Overall —across gender, educational levels, ICT skills level, and wage groups — **the overwhelming majority believe that ICT skills are important or very important to improve their employment situation** (see Figure 16).

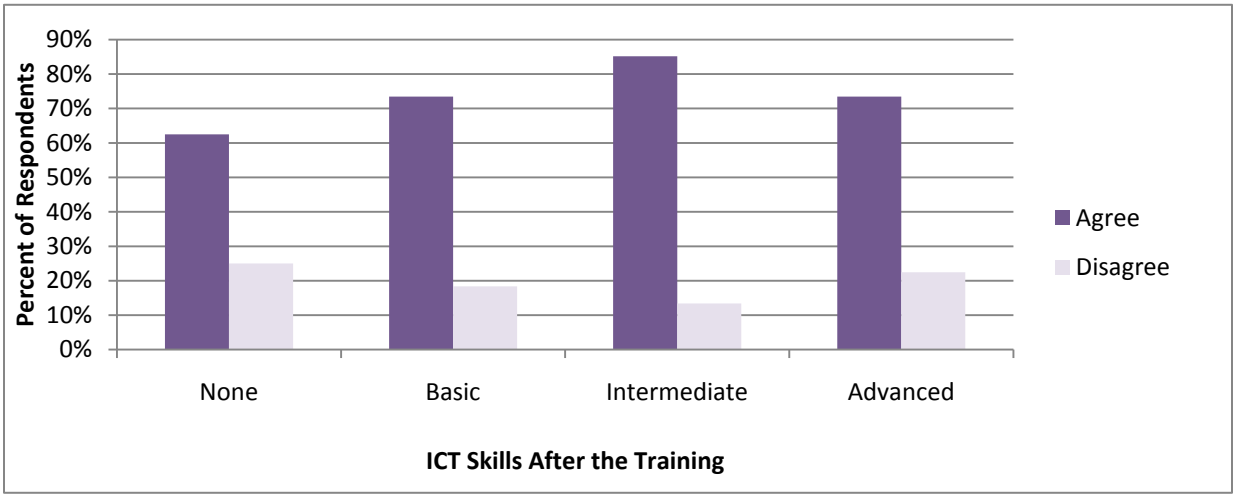
Figure 16: Perception of the importance of ICT skills to improve employment situation before and after the training



The ICT skills training provided by non-profit and publicly funded workforce organizations not only build skills for the unemployed but also help shape their perception of ICT skills, as something that is not only important but also *attainable*. Their new appreciation of training can enhance their "capacity to aspire," in Appadurai's elegant phrase: to aspire to attain more advanced skills, and to get a job that makes use of the newly acquired or improved ICT skills. It can potentially expand the professional horizons of people with high barriers to employment and raise their expectations and goals for themselves. An energized outlook may help people cope with and overcome the hurdles of unemployment.

This boost to self-confidence, while it affects all skill-level groups, is most dramatic for those who began at a lower ICT skill level (with no skill or basic skills), and who improved their skills to the *intermediate level* through training. People in two other categories were somewhat less likely to agree that their self-confidence had improved: those with no ICT skill or only basic skills after training (62.5% and 63.5% agreed, respectively); and those with advanced ICT skills after the training (73.5%). Those with intermediate ICT skills were more likely to agree or strongly agree (85.2%). (See Figure 17.)

Figure 17: Perception of changes in self-confidence before and after training, by ICT skill level

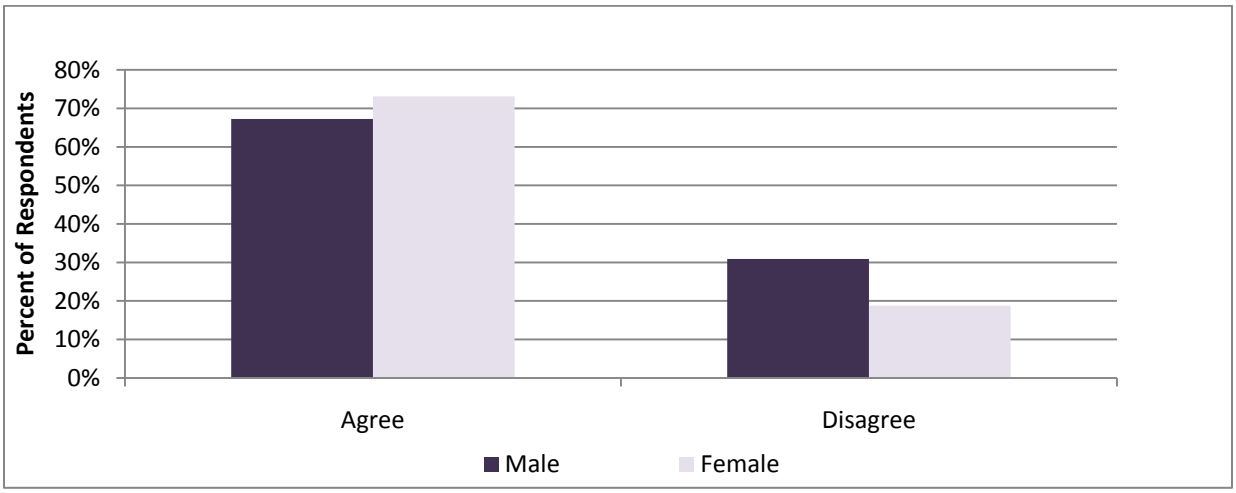


4.3 What is the perception of job satisfaction and opportunities for upward mobility?

Assessing the *quality* of jobs, for the people employed after the training, is difficult: the survey did not capture any indicator other than wages. One way to explore job quality is to look at reported job satisfaction and reported opportunities to move up to a higher-paying job in the same organization.

In terms of job satisfaction, 74% of the employed group reported being satisfied with their current job (strongly agreed or agreed). Women appeared to be more satisfied with their current job than men, although the difference is only a few percentage points (73% compared to 67% for men; see Figure 18). Overall, people with more education reported the highest level of dissatisfaction with their jobs.

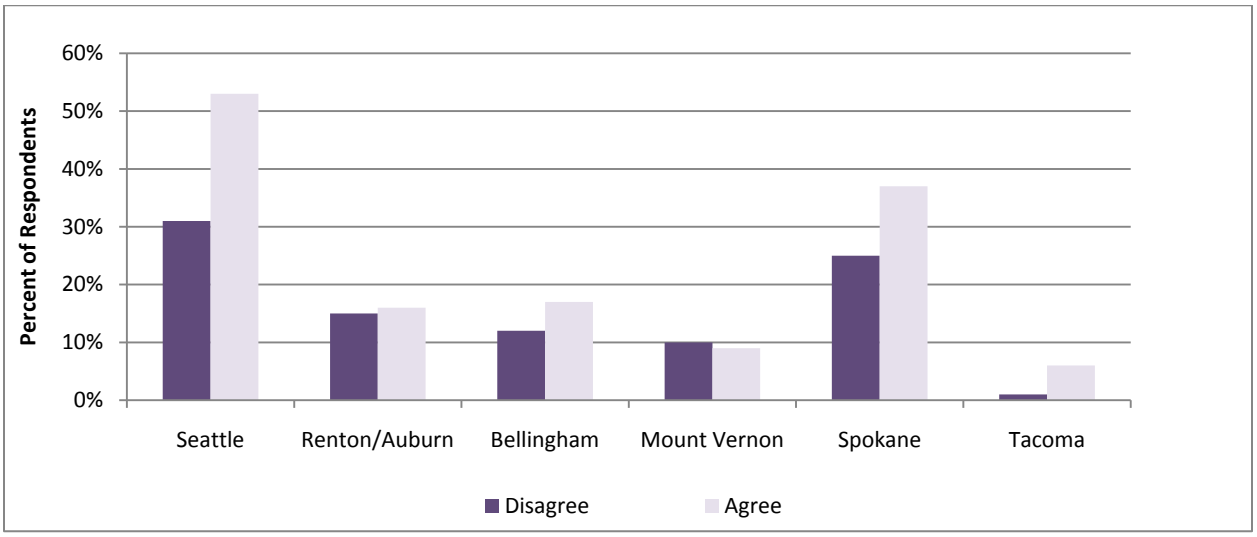
Figure 18: Job satisfaction for those employed after the training



The question of individuals' perception of opportunities to move up to a higher-paying job within the organization shows smaller but still significant positive responses. 60% of those employed feel that there are roads for upward mobility in their current employment, with some variations based on city, gender, and age.

In terms of regional differences, Mount Vernon is the only city where a slight majority of people reported a lack of opportunity for upward mobility in their job (see Figure 19). In the other cities studied, most people feel they do have access to climb the wage ladder within the organization—with a significant difference by gender: women are less likely to report upward mobility opportunities than men.

Figure 19: Opportunities to move up to a higher paying job at current work, by city



4.4 Overall outlook of study participants

For the entire sample, 83.3% agree (or strongly agree) that they have opportunities to use their knowledge and skills. 81% agree that they need more skills in order to obtain a better-paying job. This last finding is significant, as it indicates an aspiration to continue to improve skills through further training—a key element in enhancing employability. It may also indicate a greater awareness that employment skills require continuing reinforcement and upgrading through lifelong learning, as the employment context evolves.

We found striking similarities in aspiration indicators along two important dimensions: gender and education. Men and women participants, of all educational levels, showed similar aspiration effects from participation in training. We also found that participants at all *skill levels* reported positive aspiration effects— especially for those who began at the lower levels of ICT skills.

4.5 ICT and Aspiration in a nutshell

The aspirational benefits of any program are the difficult-to-quantify positive effects on individual self-confidence, motivation, and capacity to persevere. In the case of ICT training, there is the added dimension of entering into a previously closed world of job-related skills. In this case, enhanced aspiration includes the aspiration to obtain and achieve further ICT training, reflecting the newly expanded horizons of participants.

We found quantitative measures that indicate aspirational benefits even for those who remained unemployed after the training. The overwhelming majority of respondents judged the contribution of the training to advance their employment situation “important” or “very important,” with only a slightly lower percentage of positive responses by those without jobs. Similarly, even among the unemployed, most respondents agreed that their self-confidence had improved after the training.

The overwhelming majority of respondents believe that ICT skills are important or very important to improve their employment situation—and, importantly, they express an interest in strengthening those skills. For many of them, entering into employment training means opening the door to increased opportunities, to enter a career path and obtain a specialized degree (for example, in accounting or nursing). Thus, the longer-term impact of participation in training may go well beyond the short-term impact on immediate employment and wage outcomes.

Conclusion

A variety of factors contribute to the employability of low-skilled, older workers and the long-term unemployed. While some of these factors are beyond the scope of social services to address, we find clear evidence that comprehensive training and support programs—like those participating in this research—can have substantial positive effects in three key dimensions: finding employment, increasing earnings, and encouraging further skill development.

Balanced training programs, combining technical ICT skills training with "soft skills" training and social services, were successful in assisting participants to find employment. Whereas fewer than one-fifth of respondents were employed prior to training, well over half were employed after the training, in spite of the worsening economic picture just at that period.

Similarly, our data on wages confirm the benefits of the training programs. Of the group who had jobs prior to training but earned less than a living wage, one-fifth substantially increased their wages after the training, at least to the level of a living wage.

The study shows clearly that the ICT skills portion of the employment training is a key element in its success. ICT skill level was positively correlated with employment outcomes (controlling for other factors). Similarly, the data show that ICT skills and frequency of ICT use at work—among other factors—are significant predictors of wage premiums. Access to such training, for people who face high barriers to employment, is critical to enhance their position in the labor market. We found that mere access to computers and Internet had no effect on employment or wages, in the absence of training. The research supports the conclusion that people with high barriers to employment require a combination of training programs and employment services to improve their employability and their ability to earn a living wage.

Clearly, however, the workforce development programs are not able to move all participants into employment, or into higher paying jobs than their current employment. A large portion of the respondents remained unemployed, or found work after training but were once again unemployed; and some of those who had jobs both before and after the training saw a decrease in wages. The difficulties experienced by these participants reflect, in part, the contraction of employment opportunities in the context of a recession.

It must be emphasized that a training program cannot be viewed as a one-time opportunity. Some participants begin with virtually no ICT skills, and they may require several training experiences to become competitive in the job market. Others will benefit from up-skilling through additional training, in order to advance on the employment ladder. From this point of view, even those participants who remain unemployed after a training program may have benefited importantly from the experience, simply by venturing beyond their familiar boundaries into an environment where growth and learning are encouraged and expected.

Aspirational outcomes are thus the third building block of this research. The overwhelming majority of respondents—including those who remained unemployed—judged the contribution of the training to

advance their employment situation “important” or “very important.” Similarly, most respondents reported an increase in self-confidence. The overwhelming majority of respondents said that ICT skills are important to improve their employment situation—and, importantly, they expressed an interest in strengthening those skills. Thus, the longer-term impact of participation in training may go well beyond the short-term impact on immediate employment and wage outcomes.

As this research was going to print, Washington State had lost 1 in 20 jobs since the beginning of the recession in 2008, and unemployment was over 9%. Programs that enhance individuals’ job-related skills—including training in computer technology—have demonstrated positive results in improving their employment prospects. From a policy perspective, too, increasing the overall skill level of the labor pool is an important objective. An aging and increasingly diverse workforce presents special challenges, but it also presents the opportunity to implement innovative, comprehensive strategies to improve individual employability and regional competitiveness.

Bibliography

Bernston, E., Magnus, S., & Marklund, S. (2006). Predicting Perceived Employability: Human Capital or Labour Market Opportunities? *Economic and Industrial Democracy, 27*(2), 223-244.

Brown, P., Hesketh, A., & Williams, S. (2003). Employability in a Knowledge-driven Economy. *Journal of Education and Work, 16*(2).

Casner-Lotto, J., & Barrington, L. (2006). *Are They Really Ready to Work? Employer's Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce*. Tucson, AZ: The Conference Board, Corporate Voices for Working Families, Partnership for the 21st Century Skills and Society for Human Resources. Retrieved from: http://www.seattlejobsinitiative.com/policy/documents/MiddleWageJobsWorkingPaperJan31-v2.pdf

Chapple, K. (2005). *Promising Futures: Workforce Development and Upward Mobility in Information Technology*. Berkeley, CA: University of California Berkeley.

Chapple, K. (2006). Networks to Nerdistan: The Role of Labor Market Intermediaries in the Entry-level IT Labor Market. *Journal of Urban and Regional Research, 30*(3), 548-563. Retrieved from: http://escholarship.org/uc/item/0498v959

deGrip, A., & Zwick, T. (2005). *The employability of low-skilled workers in the knowledge economy*. Unpublished manuscript, Maastricht, Neth Retrieved from: http://rlab.lse.ac.uk/lower/final_papers/grip.pdf

Desilver, D. (2009). One of every 20 jobs has vanished in state. *The Seattle Times* Oct. 14th Retrieved from: http://seattletimes.nwsource.com/html/businesstechnology/2010058502_jobs14.html

Dickerson, A., & Green, F. (2004). The growth and valuation of computing and other generic skills. *Oxford Economic Papers, 56*, 471-406.

DiNardo, J. E., & Pischke, J.-S. (1997). The Returns to Computer Use Revisited: Have Pencisl Changed the Wage Structure Too? *The Quarterly Journal of Economics*.

Fan, M., Dey, D., & Pen, G. (2006). *How do Computers and Internet Affect Employee Compensation?* Seattle, WA: University of Washington. Retrieved from: http://depts.washington.edu/pcls/documents/wa-state-research/How_Do_Computers_and_Internet_Affect_Employee_Compensation.pdf

Forrier, A. (2003). The concept of employability: a complex mosaic. *International Journal Human Resources Development and Management, 3*(2), 102-124.

Fugate, M., Kinicki, A. J., & Ashforth, B. E. (2003). Employability: A psycho-social construct, its dimensions, and applications. *Journal of Vocational Behavior, 65*, 14-38.

Garrido, M., Sullivan, J., Gordon, A., & Coward, C. (2009). *Researching the links between ICT skills and employability: An analytical framework*. Seattle, WA: Center for Information & Society, University of

Washington. Retrieved from: http://cis.washington.edu/depository/publications/CIS-WorkingPaperNo4.pdf

Giannamore, J. (2009). *Bellingham MSA (Whatcom County) Labor Area Summary*. Bellingham, WA: Washington State Employment Security Department. Retrieved from: http://www.workforceexplorer.com/admin/uploadedPublications/10007_Bell909.pdf

Giannamore, J. (2009). *Mt. Vernon - Anacortes MSA (Skagit County) Labor Area Summary*. Bellingham, WA: Washington State Employment Security Department. Retrieved from: http://www.workforceexplorer.com/admin/uploadedPublications/10021_MtV909.pdf

Green, F., Ashton, D., & Felstead, A. (2001). Estimating the determinants of supply of computing, problem solving, communication, social, and teamworking skills. *Oxford Economic Papers, 3*, 406-433.

Green, F., Felstead, A., Gallie, D., & Zhou, Y. (2007). Computers and Pay. *National Institute Economic Review*(201).

Holzer, H. J., & Lerman, R. I. (2007). *America's Forgotten Middle-Skill Jobs: Education and Training Requirements in the Next Decade and Beyond*. Washington DC: Skills2Compete. Retrieved from: http://www.skills2compete.org/atf/cf/%7B8E9806BF-4669-4217-AF74-26F62108EA68%7D/ForgottenJobsReport%20Final.pdf

Hu, J., & Wolfhagen, C. (2007). *Assessing Workforce Education and Evaluation Results*. Olympia, WA: Workforce Training and Education Coordinating Board. Retrieved from: http://www.wtb.wa.gov/Documents/2007employersurvey.pdf

Hudson, D. (2005). Employability, Skills Mismatch and Spatial Mismatch in Metropolitan Labour Markets. *Urban Studies, 42*(2), 221-243.

Johns, K. (2008). The Benefits of Society Online: Economic Opportunity. In Karen Mossberger, C. J. Tobert & R. S. McNeal (Eds.), *Digital Citizenship: The Internet, Society, and Participation.* Cambridge: MIT Press.

Karen Mossberger, Tobert, C. J., & McNeal, R. S. (Eds.). (2009). *Digital Citizenship: The Internet, Society, and Participation*. Cambridge, MA: MIT Press.

Krueger, A. B. (1993). How computers have changed the wage structure — evidence from microdata, 1984-1989. *Quarterly Journal of Economics CVIII*(1), 33-60.

Kuckulenz, A., & Zwich, T. (2003). *The Impact of Training on Earnings— Differences between Participant Groups and Training Forms*. Mannheim, Germany: Center for European Economic Research. Retrieved from: http://www.wiwi.uni-konstanz.de/forschergruppewiwi/english/Framesets/publikationen.htm

Lindsay, C. (2005). Employability, Services for Unemployed Job Seekers and the Digital Divide. *Urban Studies, 42*(2), 325-339.

Machin, S. (2001). The Changing Nature of Labour Market Demand in the New Economy and Skill-Biased Technology Change. *Oxford Bulletin of Economics and Statistics, 63 (s1), 753-776; 63*(1), 753-776.

Retrieved from:
http://www3.interscience.wiley.com/journal/120827842/abstract?CRETRY=1&SRETRY=0

McArdle, S., Waters, L., Briscoe, J. P., & Hall, D. T. (2007). Employability during unemployment: Adaptability, career identity, and human and social capital. *Journal of Vocational Behavior, 71*, 247-264.

McIntosh, S., & Vignoles, A. (2000). *Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes*. London, UK: Centre for the Economics of Education, London School of Economics and Political Science.

Moss, P. I., & Tilly, C. (2001). *Stories employers tell: race, skill, and hiring in America*. New York, USA: Russell Sage Foundation.

OECD. (2006). *OECD Information Technology Outlook 2006*: Organization for Economic Cooperation and Development. Retrieved from:
http://www.oecd.org/document/10/0,3343,en_2649_33757_37486858_1_1_1_1,00.html

Peck, J., & Theodore, N. (2000). Beyond 'employability'. *Cambridge Journal of Economics, 24*, 729-749.

Phair, D. (2009). *Seattle-Bellevue-Everett MD (King and Snohomish Counties) Labor Area Summary*. Seattle, WA: Washington State Employment Security Department. Retrieved from:
http://www.workforceexplorer.com/admin/uploadedPublications/10024_Sea909.pdf

Poverty in America Project at Penn State (2009). Living Wage Calculator. Retrieved from:
http://www.livingwage.geog.psu.edu/counties/53033

Seattle Jobs Initiative. (2004). *Beyond the Bottom Line: Expanding Economic Opportunities for Washington's Working Families*. Seattle: Seattle Jobs Initiative. Retrieved from:
http://www.seattlejobsinitiative.com/policy/publications/documents/BeyondtheBottomLine2004Report.pdf

Seattle Jobs Initiative. (2007). *The Status of Working Poor Families in Washington: An Update*. Seattle: Seattle Jobs Initiative. Retrieved from:
http://www.seattlejobsinitiative.com/policy/documents/WorkingPoorFamiliesUpdateMar8.pdf

Sommers, P., & Gardner, M. (2007). *Accessible Middle Wage Jobs in Seattle and the Puget Sound Region*. Seattle: Seattle Jobs Initiative. Retrieved from:
http://www.seattlejobsinitiative.com/policy/documents/MiddleWageJobsWorkingPaperJan31-v2.pdf

Seattle Jobs Initiative (2008). *Job Trends Report*. Retrieved from:
http://www.seattlejobsinitiative.com/policy/publications/index.html

Seattle Jobs Initiative (2007). *The Status of Working Poor Families in Washington: an update*.
http://www.seattlejobsinitiative.com/policy/publications/index.html

Sommers, P., Gardner, M., & Scarpa, J. (2008). *Skills Required: Preparing Puget Sound for Tomorrow's Middle-Wage Jobs*. Seattle: Seattle Jobs Initiative & Seattle University. Retrieved from: http://www.seattlejobsinitiative.com/policy/publications/documents/SJIMWJReport07242008.pdf

Stasz, C. (2001). Assessing skills for work: two perspectives. *Oxford Economic Papers, 3*, 385-405.

Sullivan, J. (2009). *Constructing Employability: Framing outcomes to analyze basic computer skills training*. Seattle, WA: Center for Information & Society, University of Washington. Retrieved from: http://cis.washington.edu/employability/files/2009/05/constructing_employability_20090416.pdf

Turek, P. (2009). *Tacoma MSA (Pierce County) Labor Area Summary*. Tacoma, WA: Washington State Employment Security Department. Retrieved from: http://www.workforceexplorer.com/admin/uploadedPublications/10027_Tac909.pdf

Tweedy, D. (2009). *Spokane MSA (Spokane County) Labor Area Summary*. Spokane, WA: Washington State Employment Security Department. Retrieved from: http://www.workforceexplorer.com/admin/uploadedPublications/10026_Spo909.pdf

U.S. Department of Labor Bureau of Labor Statistics (2007). Local Area Unemployment Statistics. [Data file] Unemployment Rates for States, Annual Average Rankings. Retrieved from: Http://www.bls.gov/lau/lastrk07.htm

U.S. Department of Labor Bureau of Labor Statistics (2008). *The Employment Situation*: December 2008. Retrieved from: http://www.bls.gov/schedule/archives/empsit_nr.htm

U.S. Census Bureau. (2005). *Computer and Internet use at Work in 2003*. Retrieved. From: http://www.bls.gov/news.release/ciuaw.nr0.htm

U.S. Department of Labor Employment and Training Administration (2008). Characteristics of the Insured Unemployed [Data file]. Retrieved from: http://workforcesecurity.doleta.gov/unemploy/finance.asp

Weeks, G., Wallace, D., Webster, M., & Moores, M. (2009). *Washington State Employment and Wages. First Quarter 2009 Preliminary*. Olympia, WA: Washington State Employment Security Department. Retrieved from: http://www.workforceexplorer.com/admin/uploadedPublications/9992_QCEW1Q2009.pdf

Washington State Employment Security Department (December 2008). Labor Market and Economic Analysis: *Washington Labor Market Quarterly Review*, 32(4). http://www.worksourcepierce.com/wdc/LAS_Quarterly_Oct_Dec_2008.pdf

Washington State Employment Security Department (December 2008). Labor Market and Economic Analysis: *Washington State Labor Market and Economic Report*. www.workforceexplorer.com.

Washington State Employment Security Department (December 2009). Labor Market and Economic Analysis: *Washington State Labor Market and Economic Report*. Retrieved from: www.workforceexplorer.com.

Washington State Employment Security Department (June 2008). Labor Market and Economic Analysis: *Washington State Spring 2008 Job Vacancy Survey Report*.

Washington State Employment Security Department (June 2009). Labor Market and Economic Analysis: *Washington State Spring 2009 Job Vacancy Survey Report*.

Washington State Employment Security Department (2009). Labor Market and Economic Analysis County Profiles: King County (September 2008), Pierce County (April 2008); Skagit County (October 2008), Spokane County (August 2009), Whatcom County, (August 2008), Yakima County (January 2009). Retrieved from: http://workforceexplorer.com/

Washington State Employment Security Department (January 15, 2008). "Record-low unemployment rate for 2007, even with slight rise." [News release]. Retrieved from: http://www.esd.wa.gov/newsandinformation/releases/archives/2008/record-low-unemployment-08-007.php

Washington State Employment Security Department. (January 8, 2009). "State unemployment claims set new record." [News release]. Retrieved from: http://www.esd.wa.gov/newsandinformation/releases/archives/2009/unemployment-claims-set-records-09-002.php

Washington State Employment Security Department (2008). Local Area Unemployment Statistics [Data file]. Resident Civilian Labor Force and Employment in Washington State. Retrieved from: http://www.workforceexplorer.com/cgi/dataanalysis/

Washington State Employment Security Department (2009). Labor Force Statistics [Data file]. Retrieved from: http://www.workforceexplorer.com/admin/uploadedPublications/4482_industry_historical.xls

Washington State Employment Security Department (2008). Industry Employment data [Data file]. Retrieved from: http://www.workforceexplorer.com/cgi/dataanalysis/AreaSelection.asp?tableName=Ces

Workforce Development Council of Seattle-King County. (2006). *The Aging Workforce*. Seattle, WA: Workforce Development Council of Seattle-King County. Retrieved from: http://www.seakingwdc.org/pdf/sow/sow0406.pdf

Workforce Development Council of Seattle-King County. (2007). *Information Technology and the Workforce*. Seattle: Workforce Development Council of Seattle-King County. Retrieved from: http://www.seakingwdc.org/pdf/sow/sow-it.pdf

Workforce Development Council of Seattle-King County. (2007). *The Myth of Full Employment: Working and Still Poor in King County*. Seattle: Workforce Development Council of Seattle-King County. Retrieved from: http://www.seakingwdc.org/pdf/sow/sow-myth.pdf

Workforce Development Council of Seattle-King County, & Seattle Jobs Initiative. (2009). *Top Job Vacancies: A tool for job seekers and workforce professionals*. Seattle: Workforce Development Council of Seattle-King County & Seattle Jobs Initiative. Retrieved from: http://www.seakingwdc.org/pdf/Reports/General/TopJobVacancies09.pdf

Workforce Training and Education Coordinating Board. (2008). *Workforce Training Results*. Olympia, WA: Workforce Training and Education Coordinating Board.

Workforce Training and Education Coordinating Board. (2008a). *High Skills, High Wages: Washington's Strategic Plan for Workforce Development*. Olympia, WA: Workforce Training and Education Coordinating Board. Retrieved from: http://www.wtb.wa.gov/Documents/HSHW2008.pdf

Workforce Training and Education Coordinating Board. (2008b). *Washington State Annual Report on The Workforce Investment Act Title 1-B*. Olympia, WA: Workforce Training and Education Coordinating Board, Washington State Employment Security Department, and The Workforce Development Councils.

Workforce Training and Educational Coordinating Board. (2008). *Skills for the Next Washington: A Statewide Strategy for Industry Cluster Development*. Olympia, WA: Workforce Training and Educational Coordinating Board.

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