ASR ANALYTICS

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Broadband Technology Opportunities Program Evaluation Study

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Case Study Report

Round 2

WorkForce West Virginia

Public Computer Center

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Executive Summary

> *"Success is when people are confident in what they're doing, and able to achieve their goals, whether … they found a job or they were able to fill out the application online or develop a résumé. Success all depends on what the person's goals are." – WorkForce West Virginia Placement Specialist*

WorkForce West Virginia (WFWV) was established as a result of the Workforce Investment Act (WIA) of 1998, a law requiring governors to develop a state plan to increase employment, to improve the quality of the workforce, and to enhance job retention and earnings. WFWV provides workforce development assistance through a network of One-Stop Centers operating in local offices throughout West Virginia.

On February 1, 2010, the National Telecommunications and Information Administration (NTIA) awarded WFWV a Broadband Technology Opportunities Program (BTOP) Public Computer Center (PCC) grant for $1,901,600 to implement the One-Stop Public Computer Center Modernization project. Through the BTOP grant, WFWV implemented a self-help service model focused on empowering job seekers to use broadband resources in their job search. WFWV provided self-service access to broadband as well as digital literacy and job search training.

The One-Stop Public Computer Center Modernization project used BTOP funds to update computer labs in nineteen One-Stop Centers across West Virginia, making use of the physical space already available in existing WFWV One-Stop Centers. The centers upgraded through this project provide high-speed Internet access and critical job training services to unemployed, disabled, veteran, low-income, and other residents throughout the state. The project proposed to:

- Replace all 165 existing computer workstations at One-Stop Centers across the state and add eighty new workstations. WFWV installed 438 new workstations across all Public Computer Centers (PCC) by the end of 2012.
- Increase broadband speeds at each center to 3−10 megabits per second (Mbps). WFWV increased broadband speeds to 10 Mbps at seventeen of nineteen centers by the fourth quarter of 2012, with another gaining this improved access in January of 2013. Broadband speed at the Charleston center increased to 100 Mbps.
- Attract almost 2,300 additional users per week, nearly double current traffic. After BTOP-funded improvements, PCCs averaged 3,490 users per week. WFWV PCCs averaged 4,932 users per week in the fourth quarter of 2012, up from 4,348 weekly users in the previous quarter.
- Undertake a marketing and direct mail campaign aimed at local residents, especially the unemployed, veterans, seniors, and low-income individuals. The project included two mailings that notified potential users of the opportunities available to them at the PCC.
- Collaborate with the West Virginia Departments of Education and Health and Human Resources (DHHR) to offer vocational education and job training using computers and broadband technology. West Virginia DHHR offered Strategic Planning in Occupational Knowledge for Employment and Success (SPOKES) training at PCCs.
- Offer American Association of Retired Persons (AARP)-sponsored training focused on workforce preparation skills. The AARP WorkSearch program is the largest provider of training for the WFWV project, providing 4,881 hours of training to users and volunteers.
- Equip each computer center with videoconferencing capability; each PCC has a dedicated Skype videoconferencing station.

- Provide Wi-Fi access at each PCC. WFWV has enabled public Wi-Fi networks at each PCC to provide access to broadband for users with their own devices, such as laptops, tablets, and smartphones. Installation of wireless broadband connectivity outpaced the improvement of wired broadband connections. Eighteen of nineteen PCCs received wireless connectivity by the second quarter of 2012.

WFWV administered a user survey at One-Stop locations and other public computer centers. Users were prompted to complete the survey when they logged in to a computer, and the first 250 users to complete the survey received a free flash drive. A total of 19,225 survey responses were collected, with 9,211 respondents identifying themselves as first-time users of the PCC, 9,317 respondents identifying themselves as returning users, and 697 respondents leaving this question unanswered. WFWV provided several key observations, including:[1]

- 66 percent of respondents do not have access to broadband at home
- 73 percent of respondents are unemployed
- 71 percent of respondents describe themselves as low income
- 69 percent of respondents are between the ages of twenty-six and forty-five
- 72 percent of respondents were referred to the center by a friend

The One-Stop Public Computer Center Modernization project activities encompass the entire State of West Virginia. The grant's priority is to serve the unemployed, disabled, veteran, and low-income members of the state's population. The service area has a higher composition of individuals over the age of fifty-nine and a smaller percentage of individuals under the age of twenty than the nation. The unemployment rate in the service area is lower than both the state and national rates. More than half of the service area households have an income below $50,000, compared to 40 percent of households nationwide.

The case study presented here is one of fifteen case studies performed by ASR Analytics on a sample of eight PCC and seven Sustainable Broadband Adoption (SBA) grants. It is part of a larger mixed-methods evaluation of the social and economic impacts of the BTOP program.

The purpose of this case study is to:[2]

- Identify how the grantee maximized the impact of the BTOP investment.
- Identify successful techniques, tools, materials, and strategies used to implement the project.
- Identify any best practices, and gather evidence from third parties, such as consumers and anchor institutions, as to the impact of the project in the community.

This case study is primarily qualitative. The information presented here was collected during two field visits to evaluate the social and economic impact of WFWV. The evaluation study team originally met with representatives of WFWV over a two-day period in October 2011, visiting administrative offices and One-Stop Center locations in Charleston, Huntington, and Elkins. ASR conducted a follow-up site visit with the grantee, project partners, and individual users from January 7, 2013 to January 10, 2013. The second site visit focused on the PCCs that were included in the first site visit: Charleston, Huntington, and Elkins. ASR also visited an additional PCC in Welch.

In total, the evaluation study team performed six case study site visit interviews and focus groups. ASR transcribed these discussions and used this information, and other information and reports provided by the grantee, to supplement Quarterly Performance Progress Reports (PPR), Annual Performance Progress Reports (APR), and other publicly available information. Where possible, ASR performed statistical analysis based on these materials and data provided by WFWV.

This report further investigates the initial impacts uncovered during the first round of visits and identifies additional impacts that occurred in the time between the site visits. The results presented

in this report reflect the evaluation study team's observations at the time of the second site visit. This report includes both qualitative and quantitative components. It will serve as a basis for *Interim Report 2*, which will analyze data from fifteen case studies.

Five components of the WFWV BTOP project provided the most significant benefits to users: access to online job applications; résumé and cover letter preparation; email accounts and email etiquette training; access to online job markets; and access to WFWV staff and resources. There is statistical evidence that the presence of the PCC caused a reduction in the use of WFWV job center services in favor of self-help measures. Statistical evidence also suggests an increase in the number of work skills classes that trainees passed after the broadband was made available at the PCC.

The evaluation study team noted the following major impacts of the WFWV BTOP grant:

- The PCC reduced the time and money cost of job searches. The PCC allows users to consolidate their job search activities in one location. For instance, users can obtain information about past employers, create a résumé, obtain past paystub information, and perform other job search tasks that would have required a trip to a public library or another location. This allows for uninterrupted job search time, reduced travel time, and lower costs for users. As a result, some users have gone from unemployment to accepting a job offer during a single visit to the One-Stop Center.

- WFWV personnel report multiple instances of individuals finding jobs using the PCC. It appears that the presence of the PCC is linked to increased independent job searching, and searching for employment at jobs not known to WFWV. This has resulted in ongoing placements, with reductions in referrals to jobs listed with WFWV.

- The PCCs have provided an online training environment for workforce skills. There is some evidence of increased workforce training as a result of improved broadband connectivity, especially with respect to WorkKeys certification training.

- Unemployed individuals are better able to manage their own unemployment claims and job search at the PCC, improving their access to government benefits and services while reducing the need for WFWV personnel to spend time on case management.

- The project has improved WFWV's ability to deliver services by improving broadband connections used by state employees at the WorkForce centers. The project has also provided a platform for improved technological development and other state technology initiatives. Broadband and connections have been provided or improved at nineteen PCCs and seventy libraries, as well as the library commission main office.

- Although it was not planned as part of the grant, WFWV office operations have experienced improved efficiency as a result of BTOP. WFWV offices are now on a single Wide Area Network (WAN), using the PCC 10 Mbps broadband connections. West Virginia is considering adoption of a voice over Internet Protocol (VOIP) phone system. The state also improved its ability to develop standardized configurations and manage them remotely, which saves on technician travel time to remote locations in sometimes difficult travel conditions.

The BTOP grant was essential to achieving these impacts. Many of the PCCs had been making do with limited resources before the BTOP grant. Without the BTOP grant, WFWV would have continued to provide the level of service at computer labs that had been possible historically. Cast-off computers would have been installed where possible. Standardization would have been impossible. Maintenance would have been difficult. Broken equipment, viruses, nonstandard software, and user frustration would have continued. As discussed in this report, the focus of WFWV on improving these conditions was a key part of achieving the benefits described.

Section 1.   Introduction

WorkForce West Virginia (WFWV) was established as a result of the Workforce Investment Act of 1998 (WIA) for employment growth, improvement in workforce quality, and job retention. On February 1, 2010, the National Telecommunications and Information Administration (NTIA) awarded WFWV a Broadband Technology Opportunities Program (BTOP) Public Computer Center (PCC) grant for $1,901,600 to implement the One-Stop Public Computer Center Modernization project. This project uses BTOP funds to update nineteen computer centers across the state, making use of the physical space already available in existing WFWV One-Stop Center locations. The centers upgraded through this project provide high-speed Internet access and employment training to unemployed, disabled, veteran, low income, and other residents throughout the state. WFWV partners with the American Association of Retired Persons (AARP), West Virginia Department of Education, West Virginia Department of Health and Human Resources (DHHR), West Virginia Division of Rehabilitation Services, West Virginia Bureau of Senior Services, West Virginia Office of Technology, West Virginia Library Commission, and West Virginia National Guard.

1.1 What the Interviewees Told Us

Figure 1 displays words interviewees frequently used during the site visit. These interviewees included program management and representatives from four WFWV One-Stop locations: Charleston, Huntington, Elkins, and Welch. The word cloud displays the 100 words used most frequently by the interviewees. The purpose of the word cloud is to provide a succinct visual summary of the conversations that occurred. Statements made by ASR personnel during the interviews and focus groups were excluded from the analysis, as were common words, such as prepositions, articles, and conjunctions, which were identified using a standard "stop list."

As shown in the word cloud, the respondents perceived the grant as being highly focused on computers and the people who use them. The primary focus of the grant, as expected, was workforce and economic development, with most of the major terms used by the grantee directed toward this goal. In addition to "people," "computer," and "job," other significant words in the word cloud refer to employment search and the resources required to look for work, including "time," "resume," "application," "apply," and "employment." Respondents also spoke about the PCC's role in facilitating job searches, using the words, "service," "helped," and "lab" frequently.

Figure 1. Words Interviewees Used Frequently

Section 2. Impacts

The most prominent impacts of the WFWV project are in the areas of Workforce and Economic Development, as was envisioned in the grant. WFWV has integrated the PCC into its operations in a way that leverages its other services and the unique abilities of its staff. According to the interviewees, the main impact of BTOP was the employment of unemployed individuals by providing them with the resources required to obtain a job in a modern labor market, where broadband technology is presupposed of applicants for many positions, and all applicants benefit from broadband tools and skills. The grant has also expanded the applicant pool for jobs requiring online applications. Applicants developed digital literacy skills based on the training classes provided at the PCC. The applicants developed digital literacy skills specifically aimed at using online tools and resources to search for jobs, prepare and submit applications, and network with employers. This increases the number and quality of applicants for open positions.

It appears that the presence of the PCC is associated with increased independent job searching, and searching for employment at jobs not known to WFWV. This has resulted in ongoing placements, with reductions in referrals to jobs listed with WFWV. The accounts ASR heard include the following:

- "One person came in the first Saturday we were open. They got information about the job that they wanted to apply for through WorkForce. They printed off their resume and faxed it over on Saturday. They were called on Monday, and they were hired on Wednesday. If that doesn't define success, I don't know what does."
- "Without this computer lab, we would not be getting people the jobs that we're getting them. It's just a great thing."
- "I ask people who use the lab, 'If you go to work please let me know where you go.' In the past 90 days, I'd say probably seven out of ten people have gotten jobs."
- "Most of the time the people I help in the lab get the interview and they get the job. They'll come back and thank me or they'll say, 'I got the job,' and they'll hug me."
- "[Without the grant] it would have been exactly back where it was before we had any computers. People would be frustrated, they wouldn't be using them, and they wouldn't have access to them."

ASR believes the evidence most strongly supports the conclusion that the BTOP grant enabled self-help on the part of unemployed individuals, as discussed in detail below. This included improved job-seeking and employment prospects, as well as additional training opportunities. These results are in line with the intent of the American Recovery and Reinvestment Act of 2009 (Recovery Act) and the specific goals of the WFWV grant.

An additional unexpected benefit of the BTOP grant has been to WFWV itself. The 10 Mbps circuits installed as part of the grant are not only used by the PCC, but also by WFWV itself. Before the BTOP grant, service for an entire WFWV office was provided using a single T1 (1.5 Mbps). Offices have experienced improved speed after the upgrade to 10 Mbps, especially in larger offices such as Parkersburg and Charleston, the latter of which has since upgraded to 100 Mbps. The WFWV offices are now on a Wide Area Network (WAN) that enables file sharing, and WFWV has centralized email systems. Office operations have experienced improved efficiency as a result of the upgrade to 10 Mbps, especially in relation to file sharing. West Virginia is also considering adoption of a voice over Internet Protocol (VOIP) system to replace a phone system that is at the end of its life. This system will replace an existing system that the manufacturer will no longer support. The VOIP system is predicated on the presence of the 10 Mbps circuits.

The BTOP project also marked the first time the government of West Virginia provided public access Wi-Fi. Some of the technical goals were initially challenging, especially those related to remote management and automatic updates of the systems. The lessons learned in how to manage public access computers are expected to translate into other contexts, such as computer centers located in public libraries. The state also improved its ability to develop standardized configurations and manage them remotely, which saves on technician travel time to remote locations in sometimes difficult travel conditions.

2.1 Focus Areas

This section describes the impacts of the WFWV project in terms of five focus areas. ASR tabulated the training hours for WFWV reported in the 2012 Annual Progress Report (APR) using the focus area categories described in *Interim Report 1* to analyze where impacts should be found.[3]

Figure 2. Grantee Training Hours Categorized by Focus Area
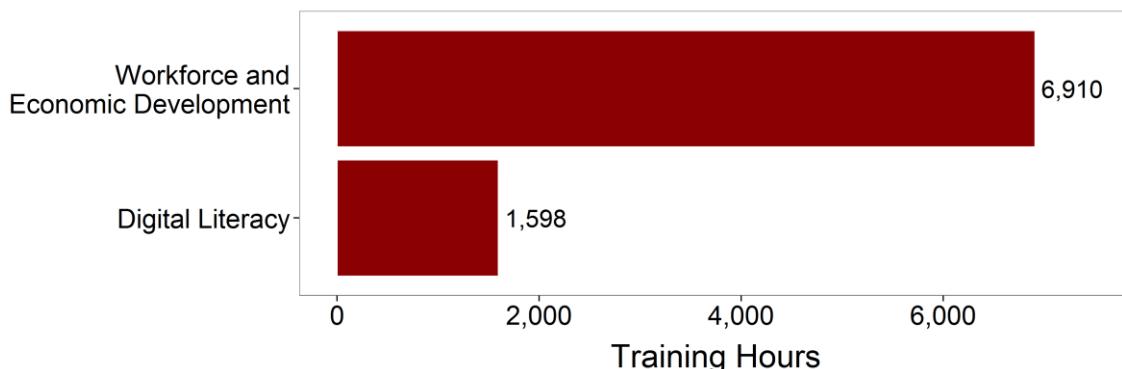
As shown in Figure 2, training hours reported in the 2012 APR for WFWV were mostly provided on subjects related to Workforce and Economic Development. Remaining training hours related to Digital Literacy. ASR also analyzed the statements grantees made during the interviews and focus groups and categorized them based on focus area, as shown in Figure 3.

Figure 3. Focus Area Statements Made by Interviewees
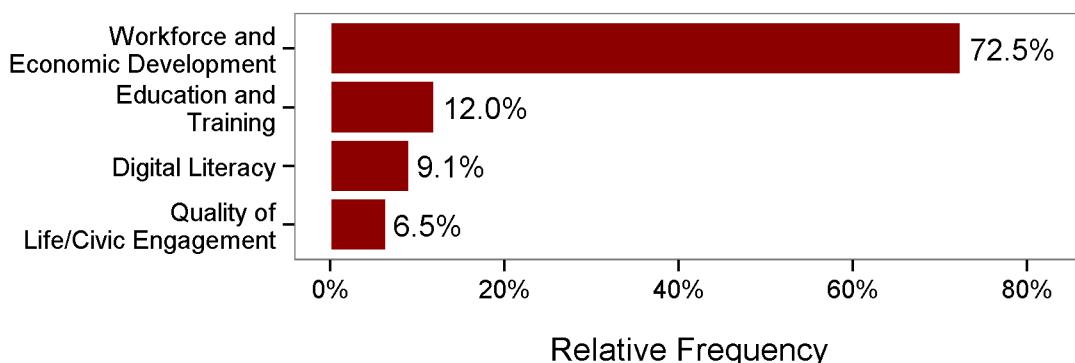
The results presented in the figure provide another measure of the grantee's focus. As shown above, most responses and discussion in the interviews and focus groups centered on Workforce and Economic Development. Furthermore, the proportion of the grantee's responses referencing

Workforce and Economic Development is nearly the same as the proportion of training time devoted to that subject.

2.2 Workforce and Economic Development

"A lot of these people would not have gotten jobs without the grant" – WorkForce West Virginia Volunteer, 35 years of placement experience

This focus area includes activities intended to increase overall employment of the target population, or to assist employed members of that population in finding jobs that offer increased salaries, better benefits, or a more attractive career path, including self-employment. Workforce and Economic Development activities can be performed for one's own benefit, or they may be done on behalf of another person to assist with his or her employment situation. In order for project activities to be included in this category, it must be the intention of the grantee to assist members of the workforce in improving their employment outcomes, and project resources must be devoted to this purpose. WFWV directed the majority of its activities toward Workforce and Economic Development.

PCC staff report that five components of the project provide the most significant benefits to those seeking employment:

- **Access to online job applications**. Online job applications are becoming the standard for many employers, especially larger employers who hire a significant number of unemployed individuals in the service area of the grant. Examples described during the site visit include jobs in the transportation industry, oil and gas industry, coal mining, healthcare, higher education, manufacturing, corrections, and state government. Potentially qualified applicants would be excluded from these positions solely because they lacked access to a computer and broadband connection for a sufficient length of time to complete an application. The Elkins PCC described mass hiring at job fairs where more than 550 applicants submitted online applications for 147 new manufacturing jobs. The PCC also allows users to complete online examinations for corrections positions in both state and federal prisons.

- **Résumé and cover letter preparation**. Résumés are frequently required for jobs that did not require them in the past. Although the form of these résumés is simplified versus what might be submitted for some positions, assembling this information in the proper format to ensure consideration is not a task that some unemployed workers have ever had to perform. WinWay résumé generation software was a significant aid to the job search techniques of many users. This software provides menu-driven assistance to workers (and PCC staff) in order to form more complete descriptions of the skills and experiences of workers. These essential job search documents are not familiar to some job seekers, and the preparation of complete and accurate documentation assists in a successful job search. The ability to create these documents, and thereby remove a barrier to job search, is a major output of the BTOP project.

- **Email accounts and email etiquette**. Email communication is essential for maintaining contact with potential employers during the job search. The scheduling of interviews and requests for information frequently occur through an email account. Many newly unemployed workers do not have an email account and do not know how to obtain or use one. Training in basic email use, including how to attach documents such as résumés, enables unemployed individuals to complete their job search more successfully.

- **Access to online job markets**. WFWV promotes online job searching using sites such as Monster or Indeed. It is not clear how many job seekers benefit from using these sites, as many of the jobs will not be tracked by WFWV's systems. However, the presence of these sites at the PCC allows users to search more effectively for jobs out of state. In contrast, many of the jobs WFWV lists would be for in-state positions.

- **Access to WorkForce West Virginia Staff and Resources**. The placement of the PCC within the WorkForce Center provides access to staff with placement experience that cannot be found

in other locations. These staff members provide customized assistance to job seekers. The WFWV computer centers have also allowed some users to perform more of the work related to their job search on their own, including managing their case information and performing more job search functions. This has reduced the workload of the WFWV staff during a time of budget cuts.

The presence of the PCCs also assists with job searching by lowering search costs. This would be expected to increase the amount of time and effort unemployed individuals are able to devote to job search, improving search outcomes. Patrons and staff report that the PCC saves time and money in several ways:

- The PCC provides services at no cost, which benefits the unemployed. These services include:
  - Free printing of resumes and cover letters on high-quality paper
  - Free use of copy machines
  - Free fax service for employers requesting a faxed resume or cover letter
- The PCC allows users to consolidate their job search activities in one location. For instance, users can obtain information about past employers, create a résumé, obtain past paystub information, and perform other job search tasks that would have required a trip to a public library or another location. This allows for uninterrupted job search time, reduced travel time, and lower costs for users. As a result, some users have gone from unemployment to accepting a job offer during a single visit to the WorkForce Center.
- Users applying for unemployment benefits may find information necessary for their application online, rather than using paper-based methods, such as old phone books, for locating necessary pieces of data.
- Users can deposit benefit checks online.

2.3 Digital Literacy

> *"I told one person about the digital literacy classes. She attended a class with a friend and, as a direct result of attending that class, was able to apply for a job and got hired. She gave me a hug and said, "Thank you so much for being able to do this, and for telling us about it." – WorkForce West Virginia Placement Specialist*

This focus area is fundamental to all the others. Digital Literacy defines a set of skills and abilities that enable an individual to interact with the digital aspects of culture, and to maintain a digital identity. In the National Broadband Plan, the Federal Communications Commission (FCC) defines digital literacy as "the skills needed to use information and communications technology to find, evaluate, create, and communicate information."[4]

Digital Literacy remains one of the major issues confronting prospective users of the computer centers. In contrast to grantee expectations, the level of digital proficiency of new patrons has not been increasing over time. If anything, the level of preparation of new users has declined. The grantee attributes this decline to the initial wave of PCC users having some familiarity with computers. Later users were likely to be referred to the center by knowledgeable peers. Many of the later users required more assistance as a result.

Participants in interviews and focus groups report the following impacts from Digital Literacy activities:

- Staff members report that users who have taken the training are able to use the center independently for job search activities after completing training.
- Job applicants list their digital literacy skills on their résumés.

- The PCC has allowed for improved communication between unemployed people using the One-Stop center and WFWV. Center personnel and volunteers described how the computer center had streamlined job searching and unemployment benefit management, with users being able to take more responsibility for their casework. Users could also more successfully complete online job applications, which is a key component of finding work with major employers in West Virginia. This has shifted the burden of case management from the staff of WFWV to the users of the PCC, which allows the staff to focus less on routine case management tasks and more on employment preparation and job search.
- Improved digital literacy among seniors and veterans has allowed these groups to have better access to web-based resources particular to them. Seniors with digital literacy training can access Experience Works, a program to promote employment. Veterans can access WVMilitaryConnection.org, a website for returning veterans and their families and spouses. Services include employment opportunities, benefits, healthcare, and training.

WFWV addresses issues of Digital Literacy both by offering classes and by engaging students in one-on-one instruction. One-on-one instruction remains the preferred method of Digital Literacy training, both because it provides a more comfortable experience for the student, and because class instruction requires disrupting the use of the PCC for other users while class is taking place.

WFWV implements the following activities related to Digital Literacy:

- WFWV offers the course "Basic Computer Skills," first reported in the first quarter of 2012. Originally, three hours in duration, the program was lengthened to four hours in the fourth quarter of 2012. A total of 488 participants have completed 1,592 hours of course time.[5]
- Many new users have to begin with an orientation to the computer, including how to use a mouse and a web browser.
- One-on-one training is used to address the specific needs of individual users. Class materials are frequently tailored to the level and learning goals of the class members.

2.4 Education and Training

This focus area includes activities that lead to a certificate or diploma that would typically be awarded by an educational institution, or that indicates the recipient has received training that is recognized as valuable for career advancement. Examples of certificates or diplomas include the following: community college degrees, four-year college degrees, advanced degrees, general equivalency degrees (GED), certifications in advanced software technologies such as network engineering, and other licenses or certifications that reflect knowledge of a particular subject at a level that would typically be taught at an educational institution.

Figure 4 shows training as reported in WFWV's 2012 APR. The majority of training hours have been devoted to WorkSearch training provided by AARP, which is focused on Workforce and Economic Development and includes training hours for WorkSearch volunteers. WFWV provides additional training in Office Skills. The remaining training hours focus on basic Internet and computer use, which promotes digital literacy.

Figure 4. Types of Training Offered by WFWV
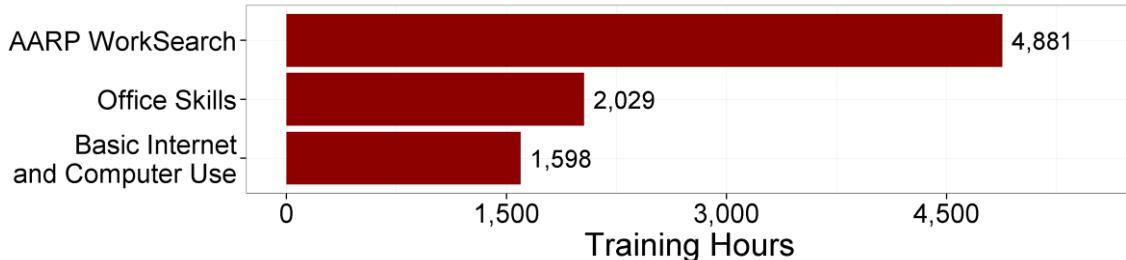
This training increased in intensity until the first quarter of 2012, when it sharply declined. At that time, WFWV offered other training, including basic computer skills, résumé writing, and SPOKES training, which includes WorkKeys training. Figure 5 presents a more detailed view of training hours by quarter and source of training.

Figure 5. WFWV Training Hours by Quarter
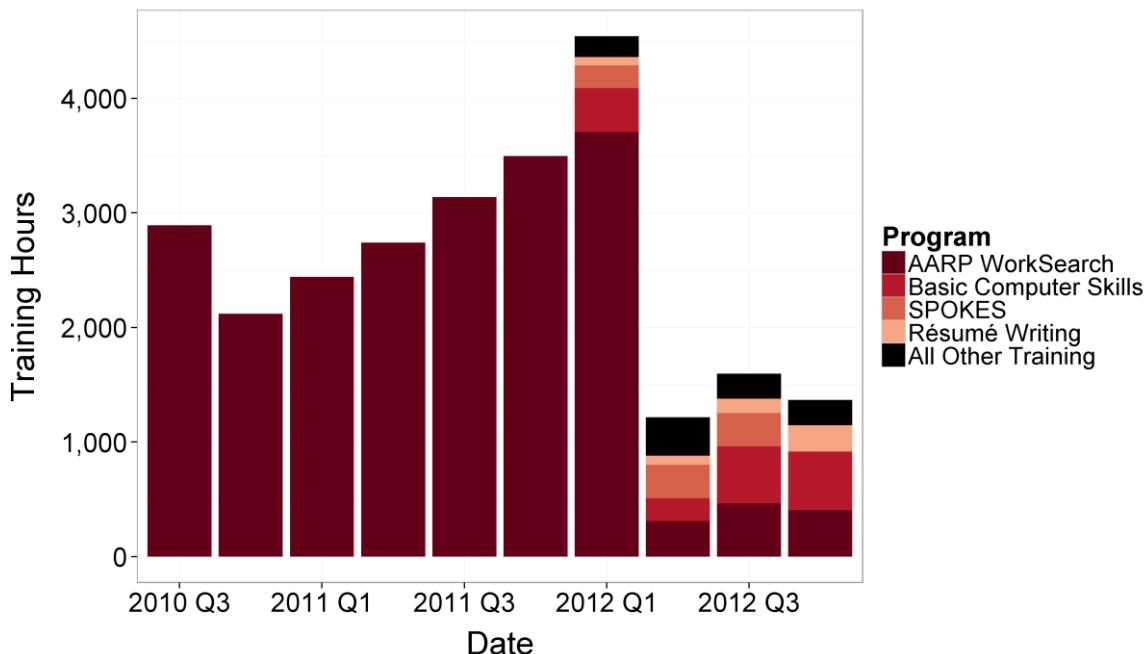
WorkKeys provides certification that a potential employee has a working knowledge of key concepts. This program provides training in workforce skills to new labor market entrants, and a refresher to those with workplace experience who are looking for a new job. WorkKeys, endorsed by the Governor, provides a career-readiness certificate at the Bronze, Silver, and Gold levels. Some employers use WorkKeys as an initial screening criterion for selecting among job applicants. WFWV would like job applicants to be at the highest level of proficiency for this certification. Training for WorkKeys is provided by KeyTrain, a training system that was in place before the BTOP grant, using hardcopy training materials. The PCC provides access to online KeyTrain materials, including access to streaming video.

There is some evidence that the presence of 10 Mbps broadband connections promoted the use of online WorkKeys resources, at least in Morgantown and Parkersburg. WFWV personnel reported to us that the T1 connections in those locations precluded the use of streaming video, as the entire WorkForce center would be affected by the heavy use of bandwidth. Streaming video training was discouraged until the 10 Mbps connection was established. As shown in Figure 6, there is an increase in the number of new students and the number of active students in both locations following the introduction of the 10 Mbps service.

Figure 6. Student and Training Statistics for Morgantown and Parkersburg PCCs
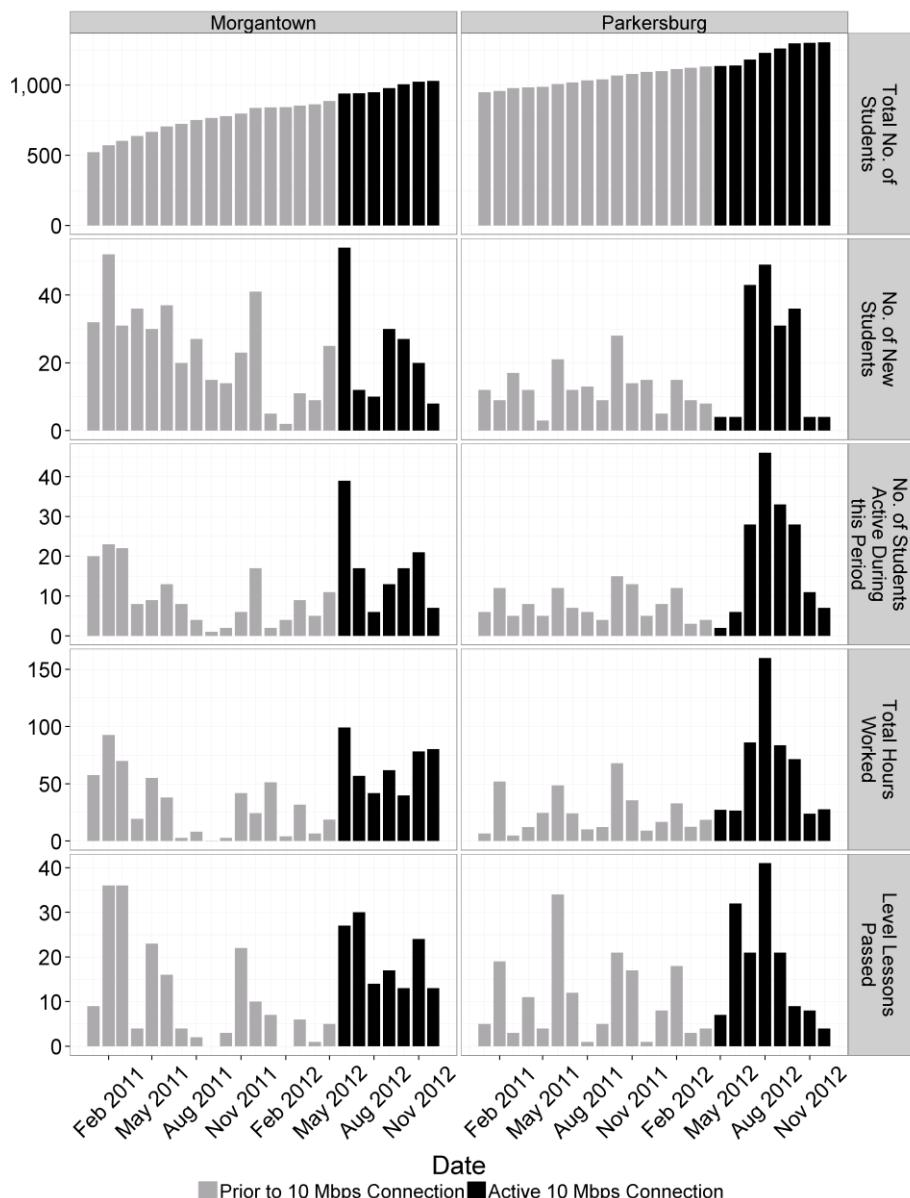
WFWV noted that students at both the high school and post-secondary levels have benefitted from the PCC:

- Some high school students use the WorkForce centers for homework.

- Some students have pursued online education using the WorkForce centers. This has included training through the WIA and online universities.
- In Welch, some students from the community technical college use the WorkForce center to assist in their studies.

2.5 Quality of Life/Civic Engagement

The Quality of Life/Civic Engagement category includes activities that create stronger and more integrated communities, and those that promote interaction between citizens and their governments. Quality of Life/Civic Engagement was not a focus of the WFWV grant. However, the presence of the PCC in the WorkForce Center has facilitated application for and management of unemployment benefits. Unemployed individuals can more easily file an unemployment claim. In Charleston, they are also able to direct-deposit their unemployment checks by using a computer at the PCC set up for that purpose. These Civic Engagement benefits are complementary to the Workforce and Economic Development benefits that are the focus of the WFWV project.

Section 3.   Recovery Act Goals

This section describes the activities and outcomes associated with Recovery Act goals. Of the five Recovery Act goals for the BTOP program as a whole, two relate most directly to PCC programs:

1. Provide broadband education, awareness, training, access, equipment, and support to
   a. schools, libraries, medical and healthcare providers, community colleges and other institutions of higher learning, and other community support organizations
   b. organizations and agencies that provide outreach, access, equipment, and support services to facilitate greater use of broadband services by vulnerable populations (e.g., low-income, unemployed, seniors)
   c. job-creating strategic facilities located in state- or federally designated economic development zones
2. Stimulate the demand for broadband, economic growth, and job creation

3.1 Provision of Equipment and Services

The focus of the grant was on the provision of broadband equipment and connections at nineteen PCCs and seventy libraries, as well as the library commission main office. Many of these locations had been making do with limited resources before the BTOP grant. Without the BTOP grant, WFWV would have continued to provide the level of service at computer labs that had been possible historically. Cast-off computers would have been installed where possible. Standardization would have been impossible. Maintenance would have been difficult. Broken equipment, viruses, nonstandard software, and user frustration would have continued. WorkForce centers would have maintained T1 connections to the Internet, which would have precluded streaming video training of job seekers and improvements in technology for the centers as a whole.

As shown in Figure 7, installation of workstations increased steadily throughout the grant period. Seventeen of nineteen PCCs received 10 Mbps broadband connections by the fourth quarter of 2012, with another gaining this access in January of 2013.[6]

Figure 7. Cumulative Hardware and Connectivity Progress for Project
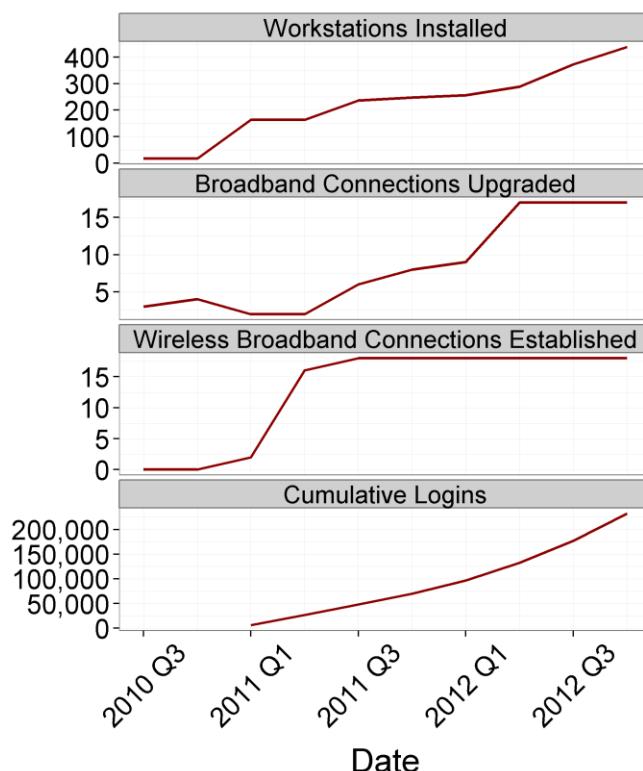
Installation of wireless broadband connectivity outpaced the improvement of wired broadband connections. Eighteen of nineteen PCCs received wireless connectivity by the second quarter of 2012. Total sessions provided at libraries and PCCs has grown steadily over time.

WFWV has provided evidence that access has increased at the targeted locations. Figure 8 presents data compiled from session logs created by WFWV. These logs tally the number of sessions that have taken place daily at each location since installation of the equipment at the WorkForce center or public library. The figure presents results from February 2011 through December 2012. Patrons, often on mobile devices such as smartphones and tablets, used Wi-Fi to access the network. However, the extent of Wi-Fi usage cannot be measured. Also, a single user might have multiple sessions in a single day. There is no way to ascribe sessions to a particular individual.

Figure 8. Sessions per Month at WFWV PCCs
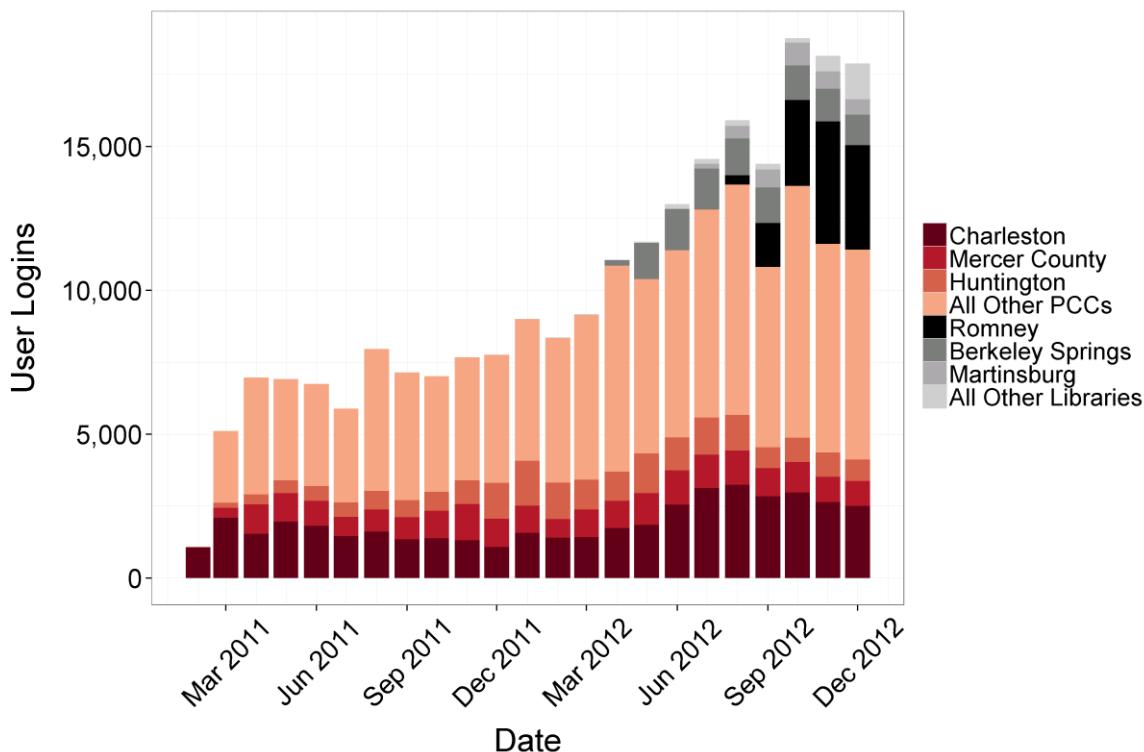
The number of sessions provided by the grant has in general increased over time. Until the latter half of 2012, growth in the number of sessions per month was entirely the result of more usage at WorkForce centers. In recent months, the opening of PCCs at public libraries has driven additional growth in the number of sessions. In the final three months of 2012, the Romney library PCC surpassed the PCC in the Charleston WorkForce center as the most active PCC in terms of sessions provided.

WFWV has not, in general, developed strategies customized for specific socioeconomic groups. However, some groups have received priority of service or special attention during grant implementation:

- Veterans receive priority of service from the West Virginia Department of Labor, so there is a focus on providing services to veterans. The Local Veterans' Representative offers veterans assistance with all services provided by the WorkForce center.

- Mailings targeted specific demographic groups, such as youth, seniors, the unemployed, and veterans.

- Each PCC includes a workstation for use by disabled individuals. Deployment of these workstations was for the most part still underway during the second site visit. The installed workstations for the disabled had been used, but lightly in most places.

- Both mailing campaigns targeted those in the Mid-Atlantic Career Consortium (MACC) system who had visited a center in the last six months. The mailings targeted vulnerable populations, including the unemployed, veterans, seniors, and low‑income individuals. Mailing survey results indicate that the surveys reached the target populations. Specifically, 74 percent of respondents completing the employment status question indicated they were unemployed; more than 70 percent indicated they were low-income, just less than 15 percent were self-identified veterans, and 5 percent were disabled.

The most prominent impacts of the WFWV project are in the areas of Workforce and Economic Development, as was envisioned in the grant. WFWV has integrated the PCC into its operations in a way that leverages its other services and the unique abilities of its staff. According to the interviewees, the main impact of BTOP was the employment of unemployed individuals by providing them with the resources required to obtain a job in a modern labor market, where broadband technology is presupposed of applicants for many positions, and all applicants benefit from broadband tools and skills. The grant has also expanded the applicant pool for jobs requiring online applications. Applicants developed digital literacy skills based on the training classes provided at the PCC. The applicants developed digital literacy skills specifically aimed at using online tools and resources to search for jobs, prepare and submit applications, and network with employers. This increases the number and quality of qualified applicants for open positions.

As required by the Recovery Act, WFWV reported the number of jobs created as a direct result of the project on a quarterly basis. As shown in Figure 9, this has resulted in approximately two additional full-time equivalent positions throughout most of the grant's period of performance.[7] In the latter half of 2012, the number of full-time-equivalent positions increased to 2.54 in September and 4.87 in December. [8]

Figure 9. Direct Jobs Created by WFWV
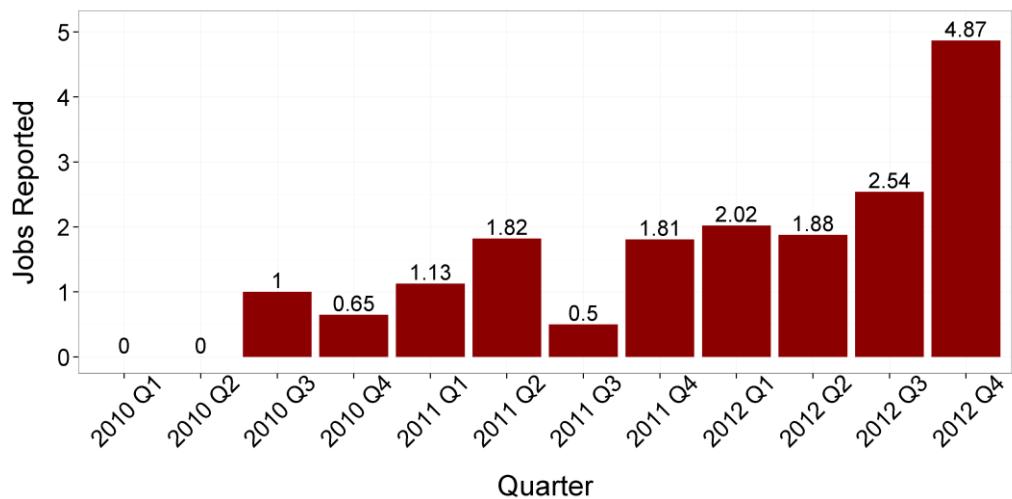
It is important to note that the figure above displays only direct jobs created, and does not include indirect or induced job creation.

Section 4.   Grant Implementation

This section describes particular aspects of implementation of the WFWV grant in order to understand the composition of activities and outcomes observed. The purpose of this section is twofold. First, defining a consistent set of categories for each of the grants in the study sample facilitates cross-case comparison and analysis. Second, presentation of the activities and outcomes for this grant by category simplifies understanding of the focus of the grantees' work. This analysis is based on qualitative observations made during the site visit.

ASR is using a theory-based evaluation approach to examine the social and economic impacts of the BTOP program. This permits deeper understanding of grant features in terms of theory, which helps to explain how the grant activities produce impacts. For the PCC and SBA grants, ASR uses theories of technology adoption to examine factors that shape the demand-side of broadband services. The key theory ASR employs is the unified theory of the acceptance and use of technology (UTAUT), a technology adoption model proposed by Venkatesh et al. (2003).[9] The model is among the top three most frequently cited articles published in the information systems field and the preeminent article explaining the adoption of information systems. The UTAUT model traces its history from theoretical constructs found in literature that have a bearing on a user's intention of technology adoption and use. The UTAUT model is derived from the leading theories of technology adoption, including the theory of reasoned action, technology acceptance model, motivational model, theory of planned behavior, a combined theory of planned behavior/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory.

UTAUT explains technology acceptance by looking at a user's intention to use an information system and the user's long-term use of that technology. The UTAUT model combines concepts found in earlier models of technology use to posit a unified theory of information technology adoption and use. UTAUT includes four dimensions determining user intention and technology use: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. Each of these dimensions is further classified into constructs constituting the dimension. The subsections below define and discuss each of these dimensions. Venkatesh empirically tested the model and reported that it was successful in explaining more variation in user adoption of technology than other adoption models tested.

Figure 10 presents the relative frequency of topics related to grant implementation as discussed during interviews and focus groups. These topics were placed in four categories, corresponding to the four UTAUT categories listed above. Most of the implementation topics discussed relate to facilitating conditions.

Figure 10. Distribution of Grant Implementation Topics by UTAUT Dimension
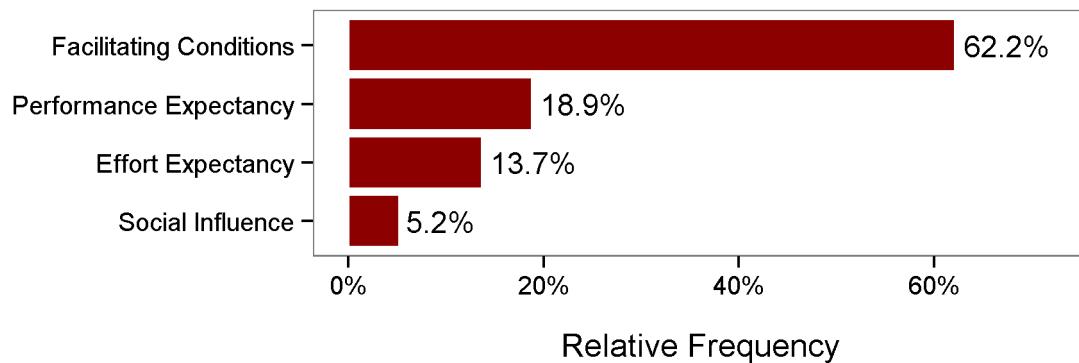
4.1 Facilitating Conditions

This category captures the degree to which the technical infrastructure available to the user supports potential broadband adoption, and the degree to which there are organizational supports to adoption. This includes access to broadband technology, the extent to which users can choose to use broadband, the compatibility of broadband with their lifestyle and activities, and the cost of using broadband. This also includes the resources needed to support the PCC's services to provide access to the Internet and computers. It includes such things as the broadband connection, computers, workspaces, and clean and safe computer labs. WFWV focused on Facilitating Conditions. The subsections below address each of these topics.

4.1.1 Access

Computer hardware was a primary focus of the participants in our interviews and focus groups. WFWV upgraded PCCs with PCs configured in one of several different standardized hardware configurations:

- The first batch of general-use computers is a set of Hewlett-Packard business PCs with integrated monitors that include features such as an optical drive with DVD-burning capabilities, Ethernet and Wi-Fi Internet connectivity, and the Microsoft Windows 7 operating system. Software includes the Microsoft Office suite, WinWay Resume Deluxe, and Mavis Beacon Teaches Typing.
- The second batch of general-use computers included a different Hewlett-Packard business model that uses a separate monitor but features the same capabilities and software.
- WFWV used a third configuration for some general-use PCs.
- A Hewlett-Packard business PC with an integrated touchscreen monitor and webcam served as a dedicated Skype PC. Aside from the Skype software, the Skype PC's other features and software are the same as general use PCs.
- Some PCs include additional accessibility hardware and software to reach the disabled. Hardware includes a larger keyboard, a joystick, and a braille display, and software includes a text magnifier, dictation software, an on-screen keyboard, and a screen reader.

In addition, WFWV installed hardware at PCCs for networking and printing, including the following:

- A Cisco Aironet 1142N Wireless Access Point with Power Injectors provides wireless connectivity at each PCC

- A Lexmark X466dwe Print, Copy, Scan, Fax Multifunction Unit provides networked (wireless) printing and scanning, with additional fax capabilities

The BTOP grant also improved broadband access. Two One-Stop locations had received enhanced broadband service at the time of the first site visit (Charleston and Huntington). Eighteen of the nineteen PCC locations now have 10 Mbps service, and the Charleston PCC has 100 Mbps service. An additional site in Martinsburg has yet to be opened. Most sites became active in mid-2012. Table 1, below, lists the locations and approximate dates when enhanced broadband service became available.[10]

Table 1. WFWV One-Stop PCC Locations, 10 Mbps Connectivity

PCC Location	Approximate Date 10 Mbps Service Began
Charleston (Plaza East)	September 2010
Huntington	March 2011
Beckley	May 2012
Bridgeport (Clarksburg)	May 2012
Logan	May 2012
Moorefield (South Branch)	May 2012
Parkersburg	May 2012
Princeton (Mercer County)	May 2012
Teays (Putnam County)	May 2012
Weirton	May 2012
Welch	May 2012
Fairmont	June 2012
Ronceverte (Greenbrier Valley)	June 2012
Morgantown	June 2012
Wheeling	June 2012
Summersville	July 2012
Elkins	August 2012
Ripley	January 2013
Martinsburg	N/A

In total, the WFWV PCC grant served nineteen WorkForce locations, seventy libraries, and the library commission main office.

4.1.2 Supporting Job Search

WFWV addressed facilitating conditions most often within the framework of job search support. This includes the location of the PCCs, the types of software and training provided, and other support services complementary to job search activities. In addition to the activities discussed in the previous section, job search support activities included:

- Clean, secure, and conveniently located WorkForce centers for potential job seekers. The centers are typically on public transportation lines (if these are available), and there is free parking, which alleviates a significant expense job seekers may incur in other locations.
- Trained WorkForce staff to provide assistance in the PCC as needed throughout the day.
- Simplified maintenance of the computers and broadband connection by co-locating the PCC in the WorkForce center.
- Free faxing, scanning, and printing on high-quality paper. Users identify the need for professional-quality paper cover letters and résumés as one component of a successful job search that is not easily obtained in other locations.
- Bookmarks for websites related to job search are preloaded on each of the computers in the PCC. This facilitates user access to employment information. This includes skill-building websites that allow users to perform a self-assessment to expand the categories of jobs they might apply for.

4.1.3 Other Activities

WFWV engaged in several other activities to address facilitating conditions for different users of the PCC

- WFWV users expressed concern about the security and maintainability of their personal information and job search documents. In order to address this, WFWV distributed flash drives to users of the PCC, including those who had completed surveys, those who were using the PCC for job search, and those who received mailings advertising the PCC. PCCs distributed more than 10,000 flash drives to users to allow them to control access to their files. Cloud storage online was not widely accepted by the user community because of privacy concerns. In part, the flash drives acted as a tangible reward and reminder for users of the PCC. Also, having files on a physical data storage device gave users a sense of empowerment regarding their personal information. Finally, the flash drives enabled users to transport their documents to other locations that might not have adequate broadband access to use online storage, such as home computers.
- The PCCs included videoconferencing capabilities, using equipment designated for that purpose and adaptive technologies for disabled individuals. The use of these technologies has been infrequent. In part because of the complexity of assembling and testing workstations with adaptive technologies, the workstations for the disabled were only beginning to come online during the second case study site visit. It appears that Skype has not yet become part of the lifestyle of most of the users of the PCC, except in special circumstances. In the future, videoconferencing using Skype, or other tools, may become more commonplace. Two potential areas where this could be of immediate benefit are communication with deployed service members planning a return to civilian life (and thus requiring employment) and communication with employers, including those at the federal prison, who use Skype for job interviews.
- WFWV planned to use Wi-Fi as a means to reduce the networking requirements of the new PCC. By choosing all-in-one PCs with Wi-Fi connections, the configuration of the PCC could be modified as needed to reflect changing demands for the equipment and space devoted to the PCC. As an offshoot of the use of this technology, Wi-Fi access was envisioned for the entirety of the WFWV center, which required significant thought and planning on the part of the project team and technical support staff. The result was a Wi-Fi network that users could access by bringing their own hardware, including laptops, tablets, and smartphones.
- Some locations have begun to hold Saturday hours, with mixed results. Saturday hours were perceived as less formal than weekday hours, offering beginning users with a more comfortable setting. At the same time, centers faced challenges in overcoming the perception that the WorkForce centers would not be open.

4.1.4 Cost and Available Contract Terms

The WFWV grant did not include activities that reduced the cost or increased the availability of broadband connections for new or existing subscribers.

4.2 Performance Expectancy

Performance expectancy measures the degree to which a potential adopter believes that using the public computing center to gain access to broadband is beneficial for job searching or for an activity in another focus area. Aspects of performance expectancy include the perceived usefulness of the new technology, outcomes expectations, and the perceived relative advantage of the technology versus previously used technologies. Examples include:

- The primary focus of the WFWV grant is to provide Internet and computer access for the public, especially to support people using the workforce development services and employment-related uses of the Internet. WFWV labs are co-located within the One-Stop Centers and provide services that are complementary to job search. WFWV did little to address performance expectancy in any area but Workforce and Economic Development. In contrast to grants that promoted the general-purpose nature of broadband technology, WFWV concentrated on employment-related uses of broadband, as described in the Focus Area sections above.

- Performance expectations of PCC users appeared to include better expected job search outcomes versus alternatives available in the community. Online job applications often require more time than is available at the library or other publicly available locations. Other locations were had limited parking, more costly résumé materials, and few staff dedicated to employment matters. This made WFWV PCCs more attractive job search locations than other alternatives.

- Performance expectancy also negatively affected the PCC. Before the BTOP grant, the public access computers available at the PCC were of extremely low quality and poorly maintained. As a result, potential users expected poor performance from the PCC, when, in fact, the BTOP grant greatly improved broadband access at the One-Stop Center. WFWV has attempted to overcome these negative perceptions through advertising and other social influences, as described below.

4.3 Effort Expectancy

> *"We found that a lot of the times, when people don't know anything about computers, they won't ask for help. They're too bashful, especially Monday through Friday, when computer lab is usually full of people." – WorkForce West Virginia Placement Specialist*

This category measures the expectations of the potential adopter regarding the difficulty of using broadband to achieve benefits in one or more of the focus areas described above. It includes preconceived ideas about the difficulty of using broadband technology and computers in general, and anxiety or concerns about the risks of broadband use. For PCCs, it indicates how the service model made using broadband to access information and services on the Internet easier. Examples include:

- The effort expectations of the users varied by location. In Charleston, most of the early users of the PCC already had experience using computers. The effort expectations of this group were apparently quite low, as many of them use the center without training or assistance. On the other hand, later users of the Charleston PCC had little or no previous experience with computers or broadband. Interviewees described this group as sometimes fearful, anxious, or

embarrassed by a lack of knowledge. Some PCC personnel pointed out that Saturday hours offered a better opportunity for inexperienced patrons to ask for assistance, in an environment where the abilities of other patrons were not as intimidating.

- In all locations, grantee personnel described anxiety, discomfort, and fear on the part of new users. Many of the users of the PCCs in locations outside of the Charleston and Huntington areas had little or no experience with computers and broadband, and uncertainty about the difficulty of using the PCC is evident from the conversations with grantee personnel in those locations.

- In general, WFWV addressed effort expectations through one-on-one interactions with users. One-on-one training often began as part of the job placement process itself, if potential users had limited digital literacy skills. These interactions often began with a very basic introduction to the functioning of the computer, including how to use a mouse and how to navigate to a website. One PCC monitor described these beginning steps as the most significant contribution of the PCC. Although digital literacy classes were provided for those beginning with no digital literacy skills whatsoever, these classes were described as still too intimidating for some new users, especially older users.

- Effort expectations were most frequently addressed within the job search framework. Users of the PCC needed not only to develop basic digital literacy skills, but also to develop an understanding of how these skills were used in a modern job search. This included developing email and web search skills as well as creating documents such as résumés and cover letters or emails. These activities were not part of earlier job searches by experienced workers, and, as a result, additional barriers to broadband use had to be overcome.

- As described in the social influence subsection below, the social nature of the PCC and word-of-mouth advertising for the PCC provided opportunities to address effort expectations. Peers were reported to participate in setting effort expectations for prospective users.

Cost is not considered in this dimension, but rather in the Facilitating Conditions category, above.

4.4 Social Influence

This category measures the degree to which potential adopters perceive that others will view them favorably or interact with them in a positive way if they adopt broadband technology. This includes friends and family members who might already be using broadband technology. It also includes measures of whether the use of broadband is considered to be a social norm for the social group to which the potential adopter belongs. Components of social influence include subjective norms, social factors, and the image associated with broadband use. Examples include:

- Social Influences were an area of focus for WFWV. During the first site visit, the evaluation study team noted that advertising for the centers was difficult because of state approval requirements. In the intervening time period, WFWV developed standardized, pre-approved advertising templates that could be used by the centers with minimal customization. Other techniques WFWV used to advertise the centers include flyers, posters, banners, and open houses. Statewide press releases were developed regarding the opening of new centers, and WFWV believes these events have been well covered in the local media.

- The project included two mailings that notified potential users of the opportunities that were available to them at the PCC. Mailings targeted a mixture of people including youth, older populations, the unemployed, and veterans. The mailing list was pulled from the Mid‑Atlantic Career Consortium (MACC) system. Mailings were also used on targeted populations to announce Saturday hours.

- Grantee personnel in multiple locations identified word of mouth as the most significant factor in attracting new users of the PCC. This is consistent with survey results, which indicate that 70 percent of new users who responded to the survey came to the PCC after hearing about it from a friend.

- Some locations supported activities to bring school-age children and young adults to the center. In part, these activities have an educational component. They also provide a means by which the children of potential PCC users can see the available facilities. The hope is that they will then tell their parents or relatives about the benefits of using the center for employment assistance.

- Trainers identified one-on-one interaction with users as one of the keys to successful training of new users. Personal interaction with center personnel was preferable to most users than classroom training.

- Interaction with WFWV case managers as part of the initial unemployment filing process was cited as one way in which users became aware of the PCC and the services offered there.

- Users would assist each other and network with other users to support each other's employment searches. This could include emailing job leads to each other.

Section 5.   Techniques, Tools, and Strategies

This section describes successful techniques, tools, and strategies identified by the grantee. WFWV noted many successful techniques, tools, and strategies that it developed over the course of the grant. Many of these will serve as examples and best practices for future information technology development within the state. The grantee had few examples of techniques, tools, and strategies that did not work, although some were mentioned.

5.1 Techniques, Tools, and Strategies

- Those experiencing employment barriers because of a lack of digital literacy skills are referred to a computer class for assistance. This includes informing individuals attending mandatory sessions related to unemployment insurance extensions that digital literacy classes are available to them.
- WFWV raises awareness of the availability of the PCC in other classes and sessions. As one WFWV employment specialist stated, "All of our classes include all services that are offered, but we focus a lot of attention on those computers, so know they're available for free during normal business hours and on weekends."
- Low levels of digital literacy are addressed to overcome barriers to adoption. Some people would like to use the computer lab but they do not know what a mouse is or how to use a keyboard. Classes begin with a basic orientation to the computer and web browser.
- All of the hardware for the project was purchased with extended warranties upfront. As a result, maintenance is prefunded for three years.
- All-in-one machines have been very successful in place of regular desktops. The smaller form allows more machines fit in the same desk space, and power consumption is lower. The all-in-one computers also have Wi-Fi capability built in, which, when combined with local Wi-Fi, makes the lab much more configurable and maintainable. Reliability of the machines has been higher than expected.
- Users prefer standard versions of Microsoft software to student versions of the same software. Microsoft PowerPoint has received significant use.
- Pilot-testing equipment in Charleston was generally successful. This allowed for the fielding of equipment at distant locations with a higher probability of success.
- Frontier waived the cost of buildout of the circuits to the WFWV offices as part of the larger West Virginia BTOP infrastructure project, although there is no direct connection between the projects. These costs in were estimated at $10,000 or $20,000 per office.
- The location of the PCCs includes free parking, which can be difficult to find and a potential expense for users of other computer centers, such as those at a university or library.

5.2 Challenges

- Saturday hours have not worked out well everywhere, and they have been discontinued in one location. Potential reasons include users not expecting centers to be open on Saturday. Also, physical space became an issue. Some spaces were not configured for security when the building was not completely open for business. As a result, Saturday hours were not feasible in all locations.

- There has been some competition for users with the Future Generations grant, which might be getting more Saturday users.
- Equipment for the disabled has been slow to be distributed. It is only now getting rolled out to the centers. Staff members have little familiarity with the specialized hardware.
- During the timeframe of the project there has been no significant increase in the availability of broadband in the state, which WFWV staff think limits increases in broadband adoption.
- It took longer than expected to install 10 Mbps connections. This had an impact on the rollout of services at the PCC.
- Changing the configuration of the PCs at the PCC to a "locked-down" and managed configuration did not please some employees, who were accustomed to installing software on their own.
- Credential management was an early issue. Machines had to be cleaned after each use, which required some careful planning on the part of the Office of Information Technology (OIT).
- Allowing public access at the PCC surprised some users who thought others should not have access to non-employment-related content at a WorkForce site.
- The grant did not fund staff training. Although staff assisted with the use of the lab as they could, some staff members indicated that additional training, especially in more advanced topics, would have enabled them to be more helpful to users.
- The National Guard portion of the project has gone slowly because a Memorandum of Understanding was slow in being developed.
- Managing the PCCs, including ongoing updates such as virus protection, was initially challenging because of the domain structure required for public access. This required some learning and creativity on the part of support personnel, which will be leveraged for future public access projects.
- Additional publicity was cited as one factor that could help to improve the success of the PCCs.

Section 6. Conclusions

The WFWV BTOP grant approached issues of broadband access and adoption from the standpoint of workforce development. This included a focus on the provision of broadband services to job seekers and others who used one of nineteen WFWV One-Stop Centers to find employment. In addition, the grant provided equipment necessary for improved broadband access at seventy libraries and the main office of the library program. The service model used by the grant focused on empowering job seekers to use broadband resources in their job search by providing self-service access to PCCs as well as digital literacy and job search training. WFWV also provided complementary supporting services, such as fax and printing capabilities.

The PCC provided a supportive environment in which job seekers could obtain assistance learning the skills necessary to find a job. One-on-one training was found to be the best modality for teaching many users. Although some users arrived with high levels of digital literacy, and therefore required little assistance, many had no experience with broadband or computer technology. These users responded best to one-on-one assistance. A majority of the assistance provided at the center was provided by project partner AARP, through its WorkSearch program. Most training hours were directed at Workforce and Economic Development, with the remainder applied to Digital Literacy training.

Five components of the WFWV BTOP project provided the most significant benefits to users: access to online job applications; résumé and cover letter preparation; email accounts and email etiquette training; access to online job markets; and access to WFWV staff and resources. There is statistical evidence that the presence of the PCC caused a reduction in the use of WFWV job center services in favor of self-help measures. Statistical evidence also suggests an increase in the number of work skills classes that trainees passed after the broadband was made available at the PCC.

An additional unexpected benefit of the BTOP grant has been to WFWV itself. The 10 Mbps circuits installed as part of the grant are not only used by the PCC, but also by WFWV itself. Before the BTOP grant, a single T1 connection provided service for an entire WFWV office. Offices have experienced much better speed after the upgrade to 10 Mbps, especially in larger offices such as Parkersburg and Charleston, the latter of which has since upgraded to 100 Mbps. The WFWV offices are now on a WAN, which enables file sharing, and WFWV has centralized email systems. Office operations have improved efficiency as a result of the upgrade to 10 Mbps, especially in relation to file sharing. West Virginia is also considering adoption of a VOIP system to replace a phone system that is at the end of its life and that will no longer be supported by the manufacturer. The VOIP system is predicated on the presence of the 10 Mbps circuits.

The BTOP project was the state's first foray into public access computing and wireless access. Some of the technical goals were initially challenging, especially those related to remote management and automatic updates of the systems. The lessons learned in how to manage public access computers are expected to translate into other contexts, such as plans for computer centers located in public libraries. The state also improved its ability to develop standardized configurations and manage them remotely, which saves on technician travel time to remote locations in sometimes difficult travel conditions.

Section 7.   Quantitative Analysis

The qualitative evidence presented in this report is supported by quantitative analysis of data provided to the evaluation study team by the grantee. In order to assess the extent to which there was statistical support for the conclusion that the WFWV BTOP grant supported self-help on the part of job seekers, ASR examined two key aspects of job search: job referrals and workforce training. WFWV provided ASR with data, as described below, that measured these key variables over the grant period.

7.1 The Effect of the BTOP Project on Referrals

As a practical matter, the best available measure of workforce placements by the WFWV job center is referrals, which the MACC system tracked daily on a center-by-center basis.[11] Referrals are generated by one of two processes depending on whether a job seeker uses the PCC or not. The pre-PCC process, which is still available to job seekers, entails the review of job listings by the job seeker based on the title of the job, which provides a very short description of the position. Each job seeker is provided with information on up to three positions a day, which are selected based on the information provided in the title listing. If one or more of the three complete listings is a "fit" for the job seeker's qualifications, a referral is provided to the job seeker for the jobs that match. If no matches are found, the job seeker must return another day to search again.

The PCC has enabled job seekers to obtain more information earlier in this process, in effect allowing them to request referrals based on the more complete, second-stage listing of the job. This means that job seekers are more likely to find good matches for their three potential referrals and, as a result, are likely to obtain a satisfactory job match sooner.

Figure 11 presents the total referrals from all WFWV locations for calendar years 2011 and 2012, including all centers except Ripley, for which data are not available. There is an approximately 5 percent increase in total yearly referrals year-over-year. It is important to note that the 10 Mbps broadband was available in most locations for only the second half of 2012, so this increase could be the result of factors other than broadband, including overall improvement in the economy.

Figure 11. Total Annual Job Referrals by WorkForce PCCs
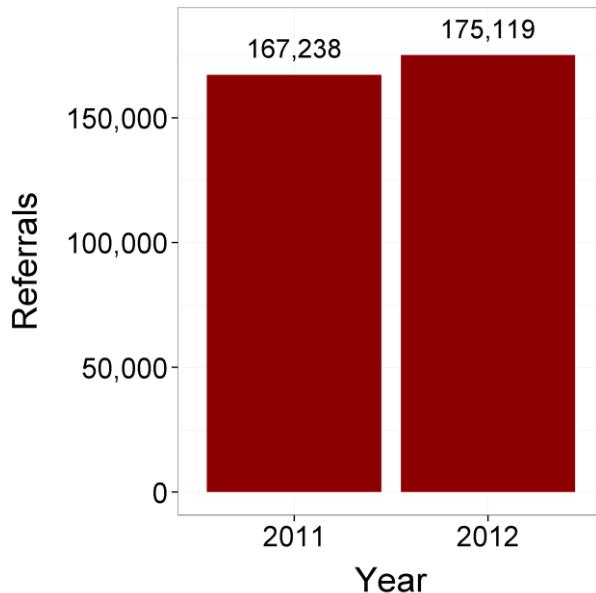
In order to investigate this increase in referrals, ASR performed a regression analysis based on twenty-four months of data provided by WFWV, covering the years 2011 and 2012, which is the time period where most of the PCCs became operational. The data included information on the number of referrals provided by month and center, the number of openings that were listed by month and center, and the month when the center received 10 Mbps service (as shown in Table 1, above).

A preliminary visual analysis of the data reveals strong seasonal tendencies, with more referral activity in the spring months, and a marked decline in referral activity leading up to winter. In addition, center size is significantly different across the state. In order to address both seasonality and diverse center size, we model the percentage increase or decrease in monthly referrals year-over-year at each center for the two-year period from 2011 to 2012. Referrals are hypothesized to be a function of the year-over-year percentage difference in job openings listed at that center in that month, and an indicator variable that is set to "1" if the center was connected to broadband in the year intervening between the months used to compute the other variables.[12] This resulted in 12 observations for each of 18 centers listed in Table 1, except Ripley, or a total of 216 observations.

The mathematical statement of the model is as follows:

$$\%\Delta REFERRALS_{i,t} = \alpha + \beta_1 \cdot \%\Delta OPENINGS_{i,t} + \beta_2 \cdot \Delta CONNECTION_{i,t} + \varepsilon_{i,t}$$

Where $\%\Delta REFERRALS_{i,t}$ is the percentage change in referrals year-over-year for month t at center i. The constant term, α, represents an overall change in referrals due to secular factors, such as overall improvements in the economy. The second term on the right-hand side, $\%\Delta OPENINGS_{i,t}$ captures the effect of changes in the number of positions available for referral, and the third term, $\Delta CONNECTION_{i,t}$, reflects the effects of improved broadband access.

Table 2 presents summary statistics for the variables used in the regression model.

Table 2. Summary Statistics of Job Referrals Regression Model Variables

Statistic	$\Delta\%$ $REFERRALS$	$\Delta\%$ $OPENINGS$	$\Delta\ CONNECTION_{i,t}$ $= 0$	$\Delta\ CONNECTION_{i,t}$ $= 1$
N	216	216	103	113
Minimum	-2.298	-2.723		
Median	0.033	0.019		
Maximum	2.175	1.877		
Mean	-0.038	-0.003		
Standard Deviation	0.580	0.642		

All variables have values for all 216 month-center combinations. Referrals appear to be fairly constant on average over the two-year time period, with the mean year-over-year reduction by center at approximately 3.8 percent. The number of job openings available for referral changed even less, with a mean reduction of 0.3 percent. There was, however, a wide variation in these variables, with a standard deviation of 58 percent in the year-over-year change in referrals, and a similar 64 percent standard deviation for job openings listed. Those months during which a 10 Mbps connection was available, but for which a 10 Mbps connection had not been available a year earlier numbered 113, which nearly balanced the 103 months in the sample where connection status did not change year-over-year.

Ordinary least squares (OLS) in R was used to estimate the coefficients of this model. Table 3 shows the regression results.

Table 3. Effect of Broadband on Referrals, OLS Results

Explanatory Variable	Estimate	Std. Error	t value	p value
α	0.055	0.043	1.27	0.20
$\Delta\ CONNECTION_{i,t}$	-0.180	0.061	-2.91	< 0.01
$\Delta\%\ OPENINGS_{i,t}$	0.560	0.047	11.84	< 0.01
R^2	0.424		N	216
F-statistic	78.44		p	< 0.01

As shown in the table, the regression model has a statistically significant *F-statistic*. The fitted equation explains 42 percent of the variation in referrals, as shown by the R^2 *statistic* of 0.4241.

The coefficient on $\Delta\%OPENINGS_{i,t}$, which measures the effect of listed jobs on referrals, is 0.56. This means that a 10 percent increase in the number of openings would be expected to produce a 5.6 percent increase in the number of referrals. This coefficient is extremely statistically significant. The coefficient on $\Delta\ CONNECTION_{i,t}$ is also statistically significant at beyond the 1 percent level. This coefficient measures the percentage change in referrals that would be expected after the installation of the improved 10 Mbps broadband connection. The value of this coefficient indicates that referrals dropped by approximately 18 percent in the months after the broadband connection was installed, versus what they would have been expected to be without the connection in place.

These results are open to several interpretations. One is that installation of the broadband connections allowed unemployed individuals to undertake more, or more successful, job search activities for a wider variety of jobs, bypassing some of the services of the WorkForce center. A second interpretation could be that the PCC distracted job seekers from their task at the center, resulting in a decrease in referrals and, presumably, placements. Other interpretations are also

possible, but the anecdotal evidence found on the site visit tends to support the first.[13] It appears that the presence of the PCC is associated with increased independent job searching, and searching for employment at jobs not known to WFWV. This has resulted in ongoing placements with reductions in referrals to jobs listed with WFWV.

We believe the evidence most strongly supports the conclusion that the BTOP grant enabled self-help on the part of unemployed individuals. This included improved job-seeking and employment prospects, as well as additional training opportunities. These results are in line with the intent of the Recovery Act as well as the specific goals of the WFWV grant.

7.2 The Effect of the BTOP Project on Training

A second area in which the qualitative data we obtained appeared to support the conclusion that the WFWV BTOP project supported self-help on the part of job seekers was in the area of WorkKeys training using the KeyTrain system. WorkKeys provides a certification that a potential employee has a working knowledge of key concepts. This program provides training in workforce skills to new labor market entrants, and a refresher to those with workplace experience who are looking for a new job. WorkKeys, endorsed by the Governor, provides a career-readiness certificate at the Bronze, Silver, and Gold levels. Some employers use WorkKeys as an initial screening criterion for selecting among job applicants. WFWV would like job applicants to be at the highest level of proficiency for this certification. KeyTrain provides training for WorkKeys. The PCC provides online KeyTrain training materials, including access to streaming video. As shown earlier, there is some evidence the presence of 10 Mbps broadband connections promoted the use of online WorkKeys resources, at least in Morgantown and Parkersburg.

In order to assess the effect of the BTOP grant on job training, ASR performed a statistical analysis on changes in the number of KeyTrain lessons passed per month for each PCC location. WFWV provided these data as PCC-level monthly counts for the years 2011 and 2012 for seventeen of nineteen PCCs.[14] The data included counts of students, student hours worked, and training lessons completed and in progress. Levels passed was selected as the variable that most closely measured the final impact on training outcomes.

To measure BTOP's impact on training outcomes, ASR performed OLS regression on the year-over-year percentage change in KeyTrain level lessons passed as a function of the change in 10 Mbps connection status. The year-over-year percentage change in the number of active students was also used as an explanatory variable to control for differences in activity across PCCs. The analysis data set contains 12 observations for 17 PCCs, or a total number of 204 observations. This model is similar in construction to the model for referrals, as described above.

The model can be expressed with the following functional form:

$$\Delta\% \ LEVEL \ LESSIONS \ PASSED_{i,t} = \ \alpha + \beta_1 \cdot \Delta \ CONNECTION_{i,t} + \beta_2 \cdot \Delta\% \ ACTIVE \ STUDENTS_{i,t}$$

In this form, $\Delta\% \ LEVEL \ LESSIONS \ PASSED_{i,t}$ is the percentage change in KeyTrain level lessons passed at PCC i from 2011 month t to 2012 month t, $\Delta \ CONNECTION_{i,t}$ is the year-over-year change in 10 Mbps connection status, and $\Delta\% \ ACTIVE \ STUDENTS_{i,t}$ is the year-over-year percentage change in the number of active students. Table 4 presents summary statistics for these variables.

Table 4. Summary Statistics of KeyTrain Level Lessons Passed Regression Model Variables

Statistic	$\Delta\% \ LEVEL \ LESSIONS \ PASSED_{i,t}$	$\Delta\% \ ACTIVE \ STUDENTS_{i,t}$	$\Delta \ CONNECTION_{i,t} = 0$	$\Delta \ CONNECTION_{i,t} = 1$
N	204	204	99	105
Minimum	-3.784	-3.114		
Median	0.000	0.000		
Maximum	3.584	2.708		
Mean	-0.023	-0.064		
Standard Deviation	1.121	0.840		

Table 4 shows that all three variables have values for all 204 observations. The percentage change in lessons passed has a mean value of -2.3 percent, with a standard deviation of approximately 112 percent. The percentage change in active students has a mean of -6.4 percent, with a standard deviation of 84 percent. Ninety-nine observations had no change in broadband connection status, while 105 observations were for centers that had improved their broadband connection within the past year.

OLS in R was again used to estimate model coefficients. Table 5 shows a summary of the model results.

Table 5. Effect of Broadband on KeyTrain Level Lessons Passed, OLS Results

Explanatory Variable	Estimate	Std. Error	*t* value	*p* value
α	-0.047	0.074	-0.64	0.52
$\Delta \ CONNECTION_{i,t}$	0.170	0.100	1.69	0.09
$\Delta\% \ ACTIVE \ STUDENTS_{i,t}$	1.010	0.060	16.43	< 0.01
R^2	0.582		*N*	204
F-statistic	139.97		*p*	< 0.01

Model fit statistics show that the variables $\Delta \ CONNECTION_{i,t}$ and $\Delta\% \ ACTIVE \ STUDENTS_{i,t}$ taken together have a statistically significant effect on $\Delta\% \ LEVEL \ LESSIONS \ PASSED_{i,t}$ The *F*-statistic is 139.969, with a *p*-value lower than 0.001. According to the R^2 statistic, the variation in $\Delta \ CONNECTION_{i,t}$ and $\Delta\% \ ACTIVE \ STUDENTS_{i,t}$ together explain 58 percent of the variation in $\Delta\% \ LEVEL \ LESSIONS \ PASSED_{i,t}$.

While the estimate of the constant term α is not statistically different from zero, it is very close to the overall mean of $\Delta\% \ LEVEL \ LESSIONS \ PASSED_{i,t}$. A coefficient of 1.005 on $\Delta\% \ ACTIVE \ STUDENTS_{i,t}$ shows that, holding the difference in 10 Mbps connection status constant, any percentage change in the number of active students leads to a nearly identical percentage change in level lessons passed. For example, a 10 percent year-over-year increase in the number of active students will lead to a 10.1 percent increase in the number of level lessons passed, holding connection speed constant. While this coefficient is statistically significant at a level lower than 0.001, it is not statistically different from one.

The effect of broadband is estimated using the variable $\Delta\,CONNECTION_{i,t}$, the year-over-year change in a site's 10 Mbps connection status. This effect is quantified by the coefficient on $\Delta\,CONNECTION_{i,t}$. As shown in Table 5, upgrading to a 10 Mbps connection at a site leads to a 17 percent increase in the number of level lessons passed, holding the percentage change in active students constant. This effect is statistically significant at the 10 percent level.

The regression results shown above support the conclusion that improving broadband connections to 10 Mbps at WFWV PCCs improved job training, although the 10 percent level of statistical significance is suggestive rather than conclusive. There are several explanations for how this might have occurred. First, improved broadband connections might have allowed students to increase the volume of level lessons attempted. The increase in volume of training would lead to an increase in lessons passed. Second, the number of levels passed may have increased through providing training that increased student performance. There is anecdotal evidence that streaming video training was provided in larger quantities after the 10 Mbps connections were in place, and SPOKES training was provided in greater quantities when the broadband improvements were complete.[15] One or both of these modalities might improve student performance and therefore levels passed.

Section 8.   Next Steps for the BTOP Evaluation Study

In early 2014, ASR will deliver *Interim Report* to NTIA. This report will include a summary of the second round of case study visits to the fifteen PCC and SBA grants, allowing for an analysis of the impacts of the grants over time. *Interim Report 2* will also summarize the findings from case study visits to twelve Comprehensive Community Infrastructure (CCI) grants. These visits will take place in the fall of 2013 and result in a set of twelve case study reports delivered to NTIA over several months.

For the PCC and SBA projects, *Interim Report 2* will provide an update to and refinement of the analysis presented in *Interim Report 1*. For the CCI projects, *Interim Report 2* will summarize the activities underway by twelve CCI grantees and the impacts these projects intend to have on broadband availability and adoption for community anchor institutions, communities, and individuals.

WFWV has taken steps to ensure sustainability over the next two to three years. These steps include prefunding maintenance of the equipment used in the PCCs and funding of 10 Mbps broadband connections as part of the One-Stop Center budgets. ASR will check in with WFWV in the second quarter of 2014 to learn more about the sustainability of the project.

In September 2014, ASR will deliver a *Final Report* that will quantitatively and qualitatively measure the economic and social impact of BTOP grants (including CCI, PCC, and SBA). The centerpiece of the *Final Report* will be an assessment of how and to what extent BTOP grant awards have achieved economic and social benefits in areas served by the grantees. To the extent that such information is available, results from studies performed by the grantees will round out the conclusions presented.

Glossary

Acronym	Definition
AARP	American Association of Retired Persons
APR	Annual Performance Progress Reports
ASR	ASR Analytics, LLC
BTOP	Broadband Technology Opportunities Program
CCI	Comprehensive Community Infrastructure
DHHR	West Virginia Department of Health and Human Resources
FCC	Federal Communications Commission
GED	General equivalency degree
MACC	Mid‑Atlantic Career Consortium
Mbps	Megabits per second
NTIA	National Telecommunications and Information Administration
OIT	Office of Information Technology
OLS	Ordinary least squares
PCC	Public Computer Center
PPR	Quarterly Performance Progress Reports
Recovery Act	American Recovery and Reinvestment Act of 2009
SBA	Sustainable Broadband Adoption
SPOKES	Strategic Planning in Occupational Knowledge for Employment and Success
VOIP	Voice over Internet Protocol
WAN	Wide Area Network
WFWV	WorkForce West Virginia
WIA	Workforce Investment Act of 1998

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WorkForce West Virginia, and Robert Fernatt. "More WV data and approximate 'live' dates for each PCC." *email*, January 30, 2013.

Notes

[1] West Virginia Department of Commerce, WorkForce West Virginia, and Robert Fernatt, "Calendar Year 2012 PCC Web Survey," *email attachment*, January 13, 2013.

[2] National Telecommunications and Information Administration, "Statement of Work for Broadband Technology Opportunities Program (BTOP) Evaluation Study", July 26, 2010, 6.

[3] ASR Analytics, *Progress towards BTOP Goals: Interim Report on PCC and SBA Case Studies, Broadband Technology Opportunities Program Evaluation Study (Order Number D10PD18645)* (Potomac, MD, December 5, 2012), http://www.ntia.doc.gov/report/2012/progress-towards-btop-goals-interim-report-pcc-and-sba-case-studies.

National Telecommunications and Information Administration, "Post-Award Monitoring (PAM) Database 2013-03-11" (Washington, DC: Distributed by National Telecommunications and Information Administration, 2013).

[4] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/.

[5] National Telecommunications and Information Administration, "Post-Award Monitoring (PAM) Database 2013-03-11." N.B. 2012 APR reports 1,598 hours of course time.

[6] National Telecommunications and Information Administration, "Post-Award Monitoring (PAM) Database 2013-03-11."

[7] The Recovery Accountability and Transparency Board, "How Jobs are Calculated," *Recovery.gov* (Washington, DC, January 15, 2010), http://www.recovery.gov/News/featured/Pages/Calculator.aspx.

[8] The Recovery Accountability and Transparency Board, "Recovery API," *Recovery.gov* (Washington, DC, March 20, 2013), http://www.recovery.gov/FAQ/Developer/Pages/RecoveryAPI.aspx.

[9] Viswanath Venkatesh et al., "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* 27, no. 3 (September 2003): 425–478.

[10] WorkForce West Virginia and Robert Fernatt, "More WV Data and Approximate 'Live' Dates for Each PCC," *email*, January 30, 2013.

[11] WFWV is not able to determine whether a job seeker who found employment used the PCC in seeking a job. WFWV is also not able to keep track of the number of individuals who find employment as a result of any of its other services, as users of WFWV services may simply stop appearing at the employment center when they have found a new job. Referrals by WFWV of an individual to a listed job are the closest metric available to track specific outcomes. While WFWV could theoretically combine data from disparate computer systems and hardcopy records to develop estimates of job placements resulting from use of the computer labs, the state does not have the resources to do so, and the human subjects requirements associated with this effort as part of the BTOP grant make the cost of doing so prohibitive.

[12] The Charleston center had a 10 Mbps connection for every month in both years. As a result, the CONNECTION variable is set to zero for all months. This reflects that no change in referrals due to broadband should be expected at that location. Similarly, Martinsburg did not receive a 10 Mbps broadband connection in this time period. As a result, the CONNECTION variable is also set to

zero, indicating that broadband did not have an effect on referrals at that center. Both Charleston and Martinsburg serve as valuable control cases in the regression model.

[13] See Section 2.2 Workforce and Economic Development.

[14] Putnam County and Ripley PCCs were not included in the data.

[15] See Section 2.4 Education and Training.