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Evaluation of the STEM Initiative

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EXECUTIVE SUMMARY

As noted by a number of observers, science, technology, engineering, and mathematics (STEM) fields have become increasingly central to U.S. economic competitiveness and growth. Employment in science and engineering occupations was expected to grow about 70 percent faster than employment in all other occupations through 2014.[1] The U.S. educational system, however, struggles to meet the demand for training the needed workers. Low engagement with STEM-related learning is particularly acute among minority, female, and lower-income students, who comprise a growing proportion of the total college-going public.[2] The challenge of producing skilled workers in STEM fields can be addressed in part by increasing the supply and quality of baccalaureate and advanced degree earners. Yet, a substantial percentage of the STEM workforce is made up of technicians and others who enter into and advance in their fields through sub-baccalaureate degrees and certificates or through workplace training.[3] Consequently, attention should also be paid to often overlooked groups such as incumbent workers who need skills upgrading or dislocated workers who are trying to find new jobs in industries with a future. If the United States hopes to remain competitive and promote economic opportunity for its citizens over the long term, public, private, and not-for-profit entities must coordinate their efforts to prepare an adequate supply of qualified workers for employment in STEM fields at varying skill levels. To advance this objective, the Employment and Training Administration (ETA) announced the "Science, Technology, Engineering, and Mathematics Opportunities in the Workforce System Initiative," or STEM Initiative, in 2008 as part of a broader ETA "STEM action agenda."

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1 Hecker, Daniel, "Occupational Employment Projections to 2014," *Monthly Labor Review*, November, 2005.

2 Jobs for the Future, "The STEM Workforce Challenge: the Role of the Public Workforce System in a National Solution for a Competitive Science, Technology, Engineering, and Mathematics (STEM) Workforce," April 2007.

3 According to the forecast of occupational growth developed by Georgetown University Center on Education and the Workforce, 25% of the STEM job openings through 2018 will be available to workers with less than a bachelor's degree. (Carnevale, Anthony, Nicole Smith, and Michelle Melton, "STEM: Science, Engineering, Technology, and Mathematics," Georgetown University Center on Education and the Workforce, October 2011.)

The STEM Initiative

The STEM Initiative Solicitation for Grant Applications (SGA) invited local public workforce entities to apply for grant funding for projects designed to make the public workforce system a catalyst and leader in regional efforts to build a highly skilled and educated STEM workforce. Among the criteria for selecting grantees were the extent to which the applicants (1) targeted expanding employment opportunities in growing STEM occupations and industries, (2) developed outreach and recruitment strategies to reach dislocated workers and/or disadvantaged youth, and (3) developed or expanded strategic regional partnerships to coordinate regional STEM workforce preparation, education, and employment activities and resources. In November 2008, ETA awarded the following entities STEM grants of about two million dollars each:

- Eastern Connecticut Workforce Investment Board
- Central Massachusetts Regional Employment Board (now the Central Massachusetts Workforce Investment Board)
- Indianapolis Private Industry Council (now Employ Indy)
- Southwest Washington Workforce Development Council
- Workforce Solutions of the Lower Rio Grande Valley (in Texas)

The expected period of performance for each of the STEM grantees was the 36-month period from January 5, 2009, through January 4, 2012.

The major goals of the STEM Initiative were to attract disadvantaged youth and dislocated workers to STEM-related careers and prepare them for those careers, while simultaneously enhancing regional employer competitiveness. To further these goals, the grantees were required to develop partnerships with a variety of other agencies and organizations that would enable them to expand and coordinate STEM-related workforce education and training strategies, activities, and resources within American Job Centers. The grantees were also expected to test a variety of new and innovative service features, including hiring customer service staff members with knowledge of and experience with STEM occupations and career pathways, referred to as STEM coaches.

While most of the grantees were still experiencing only moderate rates of unemployment in their surrounding areas at the time the grants were announced, economic conditions in the project sites worsened during 2009 and 2010. High unemployment and recessionary conditions caused unanticipated changes and forced grantees to adapt their project implementation strategies to reflect new economic realities. These changes and their implications are discussed in more detail in the sections below.

The STEM Evaluation

ETA contracted with Social Policy Research Associates (SPR) to evaluate the implementation of the STEM Initiative. To describe the implementation experiences of the STEM grantees and assess their outcomes, the evaluation drew on existing data and conducted primary data collection. A qualitative study component was informed by three rounds of site visits to each project conducted at various stages of project planning and operation as well as periodic telephone conversations with project managers. The quantitative component focused on data collected by the individual grantees on the characteristics of project participants, the services provided, and the outcomes achieved by individual participants. The 42-month evaluation period—from July 1, 2009 through December 31, 2012—was intended to be long enough to enable the evaluators to collect and analyze final outcome data on the completed STEM grants. However, due to the approval of no-cost extensions of the grant period for several grantees, two of the five projects ran longer than anticipated, making it impossible for the evaluators to collect final outcome data for these projects.[4] This report presents findings as of the date each project submitted its final outcome data file for the evaluation in the late spring of 2012.

Project Organization and Partnerships

ETA required each STEM project to have a regional focus, with participation by multiple local workforce investment boards (WIBs), and to develop partnerships with other organizations, including the public workforce investment system, the public education system, and private industry. Chapter II reviews how the STEM grantees organized their projects in light of these mandates and the challenges they encountered along the way.

Regional Scope. The geographic service areas for the projects ranged from five local workforce investment areas and a total of 34 full-service American Job Centers at the project in Texas to two local workforce investment areas and four full-service American Job Centers at the project in Indiana. The requirement that grantees develop consortia of multiple local WIBs to ensure a regional approach created organizational and management challenges for the STEM grantees. The grantees with previous experience undertaking regional projects were able to overcome these challenges more easily than other grantees, because they had built shared regional understanding about goals and priorities. Other grantees found it difficult to develop a unified regional approach to the STEM initiative, because each participating WIB operated its portion of the project as an independent entity.

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4 The last two projects to complete operations—in Connecticut and Indiana—were scheduled to complete operations at the end of September 2012 and the end of December 2012, respectively.

Project Management. In most projects, a regional leadership team or advisory committee played an active role on project planning and design, and the body's continued oversight during project implementation helped to keep grantees focused on the overarching policy objectives of the STEM projects. In addition, each project designated a project director or manager—by using existing WIB staff, hiring new project managers, or contracting with outside consulting firms—to provide day-to-day management of the projects and coordinate efforts across the participating local WIBs. To be effective, project managers needed to have the capacity to ensure that administrative requirements, such as documentation and reporting, were addressed as well as the ability to guide and coordinate the services provided by STEM coaches. Some projects identified a single project director who provided both functions; others divided these functions between two individuals—an administrative manager and an individual who guided the activities of the STEM coaches.

Partnerships. The STEM projects developed strategic partnerships to strengthen both overall project designs and the design and delivery of services to participants. Projects that had active buy-in from the executive-level of local WIB staffs and other organizational partners appeared to be able to develop the strongest and most active project partnerships. All STEM projects developed coordination linkages within the *American Job Center network* to provide basic information about STEM careers to a wide range of American Job Center customers and to refer customers interested in STEM occupations to the STEM coach for personalized career counseling and support. However, STEM coaches found that it was difficult to find time for to schedule formal or informal training sessions to share their knowledge of STEM education and workforce issues with other American Job Center staff members.

The SGA for the STEM Initiative called on grantees to develop expanded partnerships with education and training entities so that partners could align activities, strategies, and resources relevant to the STEM projects. Based on the experience of the STEM grantees, local community colleges were some of the most active education partners and are likely to be essential partners in any future efforts to build and sustain STEM-related training for adults and youth. Educational institutions were important partners in providing STEM project participants with meaningful training opportunities using existing courses. The STEM grantees did not play an active role in developing new STEM courses or programs of study, because grant funds were not sufficient, in most cases, to develop new training offerings.

Developing partnerships with *employers or employer associations* was one of the most challenging aspects of the STEM initiative. Projects had very little success in recruiting representatives from individual STEM firms to participate in project activities, particularly during the first two years of project operations, because of the prolonged economic downturn. However, one project succeeded in developing strong relationships with employers by offering subsidies for training incumbent workers. Two other projects were able to use relationships with well-respected employer intermediaries to develop an ongoing three-way partnership among training institutions, employer groups, and the public workforce investment system.

Data Collection and Reporting. A lack of uniform data collection and entry practices, particularly across local WIBs, made it cumbersome to gather and report information on project outcomes and difficult for projects to ensure the quality of the outcome data reported to ETA. Because they included multiple local WIBs, the STEM projects would have benefited if they had been able to establish a standardized data collection system for each project that enabled them to capture data consistently and share data easily among the participating WIBs.

Key STEM Features

The STEM Initiative outlined four key features to be included in the design and delivery of STEM services. Chapter III reviews how the STEM projects developed these key project features and how they viewed them in relation to furthering the overall STEM Initiative goals.

STEM Coaches. Across all STEM projects, STEM coaches were envisioned as experts on STEM occupations, training options, and job opportunities for individuals wishing to pursue STEM careers. Projects were generally successful in hiring individuals with STEM expertise to assist in providing good information to participants about STEM occupations and STEM training. Conversations with customers confirmed the importance of the STEM coaches' roles. However, staff turnover was challenging in some sites, and the time required for STEM coaches to carry out their direct service responsibilities often left them with little time to carry out employer outreach and system-level partnership-building activities.

Mentoring. The mentoring component of the STEM Initiative was intended to provide STEM participants (both youth and dislocated workers) with the ongoing advice and support of current or retired STEM professionals. Although projects invested significant amounts of energy to try to get mentorship programs off the ground, they found it difficult to interest adult STEM customers in having mentors and difficult to convince business representatives to serve as mentors. Projects moved away from traditional one-on-one mentoring models to develop other approaches to bring together individuals interested in STEM careers and professionals working in STEM fields. For in-school youth, a variety of other adults not in formal mentor roles—science teachers, school counselors, STEM coaches, and internship work supervisors—proved to be important sources of participant support and encouragement.

STEM Centers of Excellence. ETA required STEM grantees to develop STEM Centers of Excellence as the physical or virtual locations at which interested customers could obtain information about STEM careers and STEM training. All five STEM grantees created one or more physical STEM Centers in each participating local workforce investment area. The physical STEM Centers were largely synonymous with the person of the STEM coach who interacted with customers via face-to-face meetings, telephone, or email. Three projects developed virtual STEM Centers of Excellence to complement their physical centers. Although the virtual STEM Centers had the potential to offer access to information about STEM education and training and job opportunities to a broad audience, virtual STEM Centers in two of the three sites were not as widely used by the general public or by STEM employers as grantees had hoped.

Career Blueprints. As conceived by ETA, career blueprints were intended to be enhanced versions of individual employment plans designed to provide additional information about long-term career goals and the training needed to pursue proposed career paths. The career blueprint process worked well with youth and newer entrants into the labor market, but was generally not helpful for people who already had clear career goals or who were focused on immediate re-employment. In most locations, career blueprints were not well integrated with WIA participant assessments, plans, or case management tools, and did not gain traction as a result. However, one grantee was very happy with the longer-term career pathway focus of career blueprints and plans to adopt this format in developing service plans for all participants in its WIA youth program.

STEM Services for Adults and Youth

The STEM Initiative called for grant applicants to provide STEM project services to both adults and youth. The adults to be targeted included "incumbent workers who need skills upgrading" and "dislocated workers trying to find new jobs in industries with a future;" the youth to be targeted were those who were disadvantaged or members of groups underrepresented in STEM occupations. Chapter IV describes how the STEM projects arranged services for these target populations.

Adult Services

All five STEM grantees initially planned to recruit workers new to STEM occupations and to focus on training participants for entry-level or mid-level positions in STEM industries. However, the onset of the recession caused the STEM grantees to switch gears to respond to the needs of the large number of dislocated workers who flooded the American Job Centers seeking assistance with reemployment in STEM-related jobs.

Career counseling and case management played an important role in the STEM projects. In three of the five STEM projects, career guidance from the STEM coach was a stand-alone service received by a significant portion of all project enrollees. Throughout the three rounds of site visits, participants indicated that coaches' moral support and individual attention was invaluable. Participants also valued the coaches' specialized knowledge about the local STEM job market, the skills and experience required for particular jobs, and options for training.

Generally, the STEM grantees were not involved in creating new training offerings in particular STEM fields. Instead, they helped refer participants to relevant training offerings that already existed within the region. Due to a shortage of training resources from public workforce investment programs at the time the STEM projects were launched, STEM coaches worked with participants to identify potential scholarship funds, Pell grants, and other low-cost training opportunities.

Projects had to identify short-term, cost-effective training options. Many dislocated worker customers already had substantial training and experience in STEM fields and wanted relatively brief training that would help them find new jobs as soon as possible. Further, as described above, funds available for training proved to be more limited than expected. To adapt to these circumstances, projects offered several types of short-term, cost-effective training options, in addition to more traditional, classroom-based training, including: (1) brief workshops in broad skill areas, like management and efficiency in production, generally providing industry-recognized certificates; (2) short-term occupational skills training, which generally lasted between a week and three months; and (3) self-paced online training courses.

Specialized training tailored to the needs of local employers was successful in preparing some participants for available jobs. As an alternative to on-the-job training with a commitment to hire, four projects referred some participants to unpaid work-based training opportunities. Additionally, two projects created training programs customized to the needs of specific employers that were designed to prepare participants for entry-level positions in advanced manufacturing. Training incumbent workers emerged as a successful project activity in yet another project.

The fields in which STEM participants received occupational skills training covered a wide range of occupations and industries, with training opportunities for workers with less formal education (e.g., mechanic skills, basic manufacturing production and construction skills) to occupations for more highly educated workers (engineering and business management training). Information technology was the most common training field overall, with engineering-related, advanced manufacturing, and business management and marketing also being commonly studied fields.

Youth Services

The STEM projects developed a wide variety of youth-related activities to provide age-appropriate and skills-appropriate content to youth of different ages and in different circumstances. The variety of activities enabled them to reach out to youth in middle school, high-school juniors and seniors, students transitioning from secondary to post-secondary education and training, and youth who had dropped out of school.

Across the STEM projects, strong partnerships were the cornerstone for the successful design and implementation of youth services. These partnerships—with community based organizations, school districts and educational institutions, and employers—proved to be invaluable for recruiting and serving youth participants and for leveraging expertise in youth services and funding.

Activities designed for in-school youth emphasized career exploration and encouraged continuation in STEM coursework as the desired outcomes. Three different types of activities were directed to in-school youth: (1) career exploration activities in the classroom, through field trips, or after school; (2) work-based STEM internships; and (3) and services designed to help students pursue STEM education or training as they bridged the transition from high school to post-secondary studies.

Activities designed for out-of-school youth emphasized delivery of occupational skills training with placement into an entry-level STEM job as the desired first step of a planned career pathway. In general, projects found it difficult to recruit out-of-school youth for STEM-related services. Most out-of-school youth received services alongside adults and dislocated workers, though several projects made special efforts to recruit and serve out-of-school youth in the local community and who were incarcerated.

Project Outcomes

To understand how the STEM projects performed on achieving the goals of the STEM Initiative, it is important to look at both organizational- and individual-level outcomes. Chapter V presents data on the characteristics of STEM participants, along with projects' success in enrolling the expected number of participants, the extent to which participants entered and completed training, and participants' success in securing employment.[5] Data on training and employment outcomes are not shown for STEM youth participants because the project timelines did not allow the collection of data for sufficient periods to explore relevant outcomes for in-school participants (e.g., entry into post-secondary education or employment in a STEM field).

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5 All the projects submitted individual-level data to SPR to be used in the evaluation of the STEM grants. While these data were fairly comprehensive, various factors should be taken into account when interpreting these data and using them to draw conclusions. First, the data may not always be of the highest quality because it was not always collected in a standardized format across the coaching staff positions or across local areas. Second, a few of the grantees submitted data that were limited in some particular way. Third, two of the projects—Connecticut and Massachusetts—were still operating at the time data were collected for the evaluation, so their data do not capture their final project outcomes.

Enrollment

Projects differed on where to draw the line between pre-enrollment use of informational resources and active participation in projects. Because the definition of an official project participant varied, the number of enrolled participants varied widely across projects, with a low of 300 enrolled adults in Massachusetts to a high of over 4,000 enrolled participants in Texas. Two projects exceeded their enrollment targets for adults while the other three projects fell short (at 34 percent, 58 percent, and 81 percent of their enrollment targets).

The typical adult participant across all projects was male and unemployed at enrollment. The average age of participants across four of the five projects was early-to-late-forties. One project served a younger customer group, with an average participant age of 26 years. Two projects served mostly White participants while nearly all of another project's participants were Hispanic/Latino; the remaining two projects served participants from a wide variety of racial/ethnic backgrounds.

Only two projects were able to report the characteristics of enrolled youth separately from adult participants. One project served mostly Black/African American males, while the other project served mostly Caucasian youth about evenly divided between males and females. The average age of youth enrolled in each of these two projects was 17 years of age.

Training

Although ETA anticipated that occupational skills training would be a core service provided to most participants,[6] only two of the five grantees enrolled the majority of enrolled participants in training programs. The cross-project variation in the percentage of enrollees who participated in training is largely because some grantees carefully screened all applicants for an interest in training before enrolling them in the project, while other projects enrolled all individuals who received career counseling from the STEM coach. Overall, the majority of participants who exited the projects after beginning training were successful in completing their training programs (95 percent overall). Of the two projects that reported whether participants had attained employer-recognized certificates or other certification or credentials upon completion of training, nearly all training completers had attained certifications (99 and 97 percent, respectively).[7]

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6 As evidence of this expectation, we offer the fact that the required quarterly reports called for grantees to report employment outcomes only for participants who had completed training.

7 Between these projects, there is considerable variation in what projects defined as "credentials;" thus, there is no standardized understanding of the meaningfulness of the various credentials received across projects, and the results on the types of credentials obtained should be viewed with caution.

Employment

Overall, 60 percent of exited participants obtained employment.[8] The individual projects reported varying levels of employment outcomes, ranging from one-third of all exited participants on the low end to two-thirds of all exited participants on the high end. The hourly wage of employed participants ranged from $14.90 to $21.09 across projects. All three grantees that reported on the hours worked indicated that the majority of participants were employed in full-time positions. Participants between 35 and 44 years of age were most likely to be employed at program exit, while participants between 18 and 24 years of age were least likely to have found employment at exit.

Two projects were able to provide information on whether employed participants obtained jobs in training-related fields. Both indicated that over half of the exiters who had participated in training obtained jobs in a training-related field. Of the three projects that were able to provide information on employment by industry, two projects placed the highest proportion of participants into jobs in the manufacturing sector, while one project placed equal numbers of participants into jobs in information technology and manufacturing.

Capacity Building and Sustainability

Because the STEM grants were time-limited three-year grants, the ability of the grantees to continue to provide STEM-related services largely depended on building the capacity of American Job Center staff members to learn how to provide services to future customers interested in STEM occupations and careers. Different approaches the projects explored included training American Job Center staff on STEM issues, trying to find funding from other sources to retain the STEM coaches, ensuring the continuation of the STEM tools available on the websites designated as virtual STEM Centers of Excellence, and incorporating some of the STEM activities within other ongoing programs.

Grantees were not very successful in having the STEM coaches train other American Job Center staff members to serve customers interested in STEM careers or jobs. Challenges included the specialized nature of information about STEM occupations and employer practices and the high volume of customers seeking reemployment services during the recession. There was little time available for staff training. Paradoxically, one of the barriers to capacity building for other American Job Center staff members was the fact that other staff members referred all customers interested in STEM training to the STEM coaches and did not gain any first-hand experience of STEM fields.

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8 The entered employment rate was calculated for all exited program participants regardless of whether they entered or completed a training program, excluding those identified as incumbent workers.

Two of the STEM grantees were able to identify funds to retain at least one STEM coach as a resource specialist within the local American Job Center network at least six months after the end of the grant. A third grantee sought to transition a STEM coach to a position as a mainstream staff member within the local American Job Center, so that she could provide expertise on STEM occupations to other staff working within the local workforce investment system.

With the ability to continue to offer staffed STEM services after the end of the grant uncertain, several projects developed plans to sustain their virtual STEM Centers of Excellence by incorporating them into the websites maintained by the WIB or by another entity.

Conclusion

The STEM Initiative was intended to strengthen the ability of local Workforce Investment Boards and American Job Centers to play a central coordinating role in regional efforts to prepare current workers and students (future workers) for jobs that will help regional STEM-related industries to expand and thrive. During the grant period, STEM coaches and virtual STEM centers were successful in promoting public awareness about STEM training and job opportunities and helping to link interested individuals to education and training opportunities that helped prepare them for jobs in STEM-related fields. They also developed valuable online tools available to customers who were interested in learning about STEM resources.

Furthermore, the STEM Initiative grantees offer examples of effective ways for WIBs to participate in the design and delivery of regional STEM services, including:

- Continuation of regional STEM advisory councils as a vehicle to facilitate ongoing collaboration among regional business owners, educational institutions and workforce investment partners.
- WIB involvement in partnerships with K-12 school districts, post-secondary educational institutions, and the business community to coordinate the design and delivery of STEM exploration activities and internships in STEM business for in-school youth.
- WIB involvement in partnerships to support the bridge between high school and post-secondary education and training for youth interested in continuing their STEM studies.

Continued collaboration among education, workforce investment and business partners in support of STEM training emerged as one of the essential features for future projects to promote STEM education and workforce preparation.

The grantees were less successful in preparing for the continuation of STEM activities by WIBs and American Job Center staff after the end of the grant period. Without continued funding to support staff with STEM expertise within Job Centers, grantees were not able to maintain distinct STEM coach positions within American Job Centers. In addition, the three projects that had developed virtual STEM centers were had to find entities that could take over maintaining these online tools so that they would continue to be available to the general public.

Given that building STEM skills can be expected to remain an important issue on the national education and workforce policy agenda, it will be important to look for ways to continue promoting knowledge about STEM occupations and STEM skill development for the staffs of American Job Center. Options might include:

- Investing in the development of online curriculum modules that could be used to train vocational counselors and workforce development professionals about particular STEM occupations, industries, and related education/training resources. Such courses could be offered as part of formal certificate programs to prepare career counseling and workforce development professionals, or as ongoing professional development opportunities for individuals already working in the field. National curriculum modules could be customized to address the issues relevant to particular regions.
- Promoting the development of STEM career resource centers within educational institutions, American Job Centers, or other organizational entities, tasked with the responsibility to provide information and referral services to a broad audience including K-12 students and teachers, college students, and adult workers interested in preparing for STEM occupations. Such centers might be established at the state level or for multi-state regions; these centers might be able to draw on and disseminate some of the virtual tools already developed by the STEM grantees.

I. INTRODUCTION

This report offers findings from an evaluation study of the "Science, Technology, Engineering, and Mathematics Opportunities in the Workforce System Initiative," or STEM Initiative, as it is often called. The initiative began in November 2008, when ETA announced the award of $10 million in grant funds to five grantees to pilot new strategies to prepare workers for jobs that require STEM skills. ETA awarded the following entities STEM grants of about two million dollars each:

- Eastern Connecticut Workforce Investment Board
- Central Massachusetts Regional Employment Board (now the Central Massachusetts Workforce Investment Board)
- Indianapolis Private Industry Council (now Employ Indy)
- Southwest Washington Workforce Development Council
- Workforce Solutions of the Lower Rio Grande Valley (in Texas)

The expected period of performance for each of the STEM grantees was the 36-month period from January 5, 2009, through January 4, 2012.

The major goals of the STEM Initiative were to attract disadvantaged youth and dislocated workers to STEM-related careers and prepare them for those careers, while simultaneously enhancing regional employer competitiveness. To further these goals, the grantees were required to developed partnerships with a variety of other agencies and organizations that would enable them to expand and coordinate STEM-related workforce education and training strategies, activities, and resources within American Job Centers. The grantees were also expected to test a variety of new and innovative service features, including hiring customer service staff members with knowledge of and experience with STEM occupations and career pathways.

To evaluate the implementation of the STEM Initiative, ETA awarded a competitive contract to SPR at the end of June 2009. The 42-month evaluation period—from July 1, 2009 through December 31, 2012—was intended to be long enough to enable the evaluators to collect and analyze final outcome data on the completed STEM grants. However, due to the approval of no-cost extensions of the grant period for several grantees, two of the five projects ran longer than anticipated, making it impossible for the evaluators to collect final outcome data for these projects.[9]

The remainder of this chapter describes the STEM Initiative and its rationale, introduces the five grantees and their regional contexts, summarizes the key features of the evaluation, and previews the organization of the remaining chapters of the Final Report.

Background of the STEM Initiative

As noted by a number of observers, science, technology, engineering, and mathematics (STEM) fields have become increasingly central to U.S. economic competitiveness and growth. Employment in science and engineering occupations was expected to grow about 70 percent faster than employment in all other occupations through 2014.[10, 11] The U.S. educational system, however, struggles to meet the demand for training the needed workers. Low engagement with STEM-related learning is particularly acute among minority, female, and lower-income students, who comprise a growing proportion of the total college-going public.[12] If the United States hopes to remain competitive and promote economic opportunity for its citizens over the long term, public, private, and not-for-profit entities must coordinate their efforts to prepare an adequate supply of qualified workers for employment in STEM fields.

ETA announced the STEM Initiative in 2008 as part of a broader ETA "STEM action agenda" directed at addressing this need for an expansion of the STEM workforce "pipeline." As stated in the Solicitation for Grant Applications (SGA), the key elements of the STEM action agenda are (1) building gateways to STEM careers, (2) enhancing the capacity of education and training institutions to produce more and better-skilled STEM workers, and (3) supporting innovation, entrepreneurship, and economic growth for the U.S. economy as a whole.[13]

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9 The last two projects to complete operations—in Connecticut and Indiana—were scheduled to complete operations at the end of September 2012 and the end of December 2012, respectively.

10 Hecker, Daniel, "Occupational Employment Projections to 2014," *Monthly Labor Review*, November, 2005.

11 Carnevale, Anthony, Nicole Smith, and Michelle Melton, "STEM: Science, Engineering, Technology, and Mathematics," Georgetown University Center on Education and the Workforce, October 2011.

12 Jobs for the Future, "The STEM Workforce Challenge: the Role of the Public Workforce System in a National Solution for a Competitive Science, Technology, Engineering, and Mathematics (STEM) Workforce," April 2007.

13 "Notice of Availability of Funds and Solicitation for Grant Applications (SGA) for the Science, Technology, Engineering, and Mathematics (STEM) Opportunities in the Workforce System Initiative." Published in *Federal Register,* Vol. 73, No. 10, January 15, 2008.

The SGA emphasized that the challenge of producing workers with the skills needed to satisfy the labor needs of STEM industries was not just about "the supply and quality of the baccalaureate and advanced degree earners." Because a large percentage of the STEM workforce is made up of technicians and others who enter into and advance in their fields through sub-baccalaureate degrees and certificates or through workplace training, the STEM Initiative SGA called on potential grantees to focus attention on workers who are often overlooked in STEM discussions. These overlooked groups include "incumbent workers who need skills upgrading, dislocated workers who are trying to find new jobs in industries with a future, and individuals from groups traditionally underrepresented in STEM fields."

The STEM Initiative SGA invited local public workforce entities to apply for grant funding for projects designed to make the public workforce system a catalyst and leader in regional efforts to build a highly skilled and educated STEM workforce. The SGA emphasized that in order to be effective, each STEM grantee would need to develop a coordinated regional approach by building strategic partnerships between the workforce system, a continuum of educational institutions (including community colleges, four-year colleges and universities, and a variety of other educational pathway programs), and other local organizations that could contribute expertise or resources. The SGA also required all grantees to (1) focus on high-growth occupations or industries that need workers with STEM skills, (2) develop regional approaches to building STEM capacity within the public workforce system by involving multiple local workforce investment boards (WIBs), and (3) develop multiple entry points into STEM occupations for workers with different education and skill levels.

The call for applications for the STEM projects identified four key features that all grantees should develop and incorporate into the design and delivery of services to American Job Center customers interested in STEM training and careers: STEM coaches, career blueprints, STEM mentors, and STEM Centers of Excellence. Since these required features are central to the evaluation, we briefly describe each one below.

- **STEM Coaches.** The SGA called for each STEM grantee to fund at least one STEM coach, who would work within at least one American Job Center (and/or online) to serve individuals interested in STEM occupations. STEM coaches were described as individuals with a "diverse and unique set of skills" including an understanding of STEM skills and competencies, experience as a recruiter of STEM professionals or as a STEM educator, and an understanding of the STEM job market and hiring practices. STEM coaches were expected to develop strong relationships with regional STEM enterprises, provide career counseling to individual customers, and help customers prepare for immediate employment goals as well as longer-term career paths.
- **Career blueprints.** ETA called for all STEM grantees to develop and test the concept of a ''career blueprint''—an intentional career development framework

that includes not only an immediate employment goal but also a map for the longer-term career development path of a STEM participant. Although ETA did not specify a particular format for a career blueprint, the SGA said that it should provide tools that would help a customer manage his/her own long-term career development by describing how work experience and future post-secondary education or training would help him/her progress along his/her desired career path.

- **STEM mentors.** All STEM grantees were required to develop a system that would match each STEM participant with a mentor. The mentor would be an individual who was enrolled in a STEM academic program, employed in a STEM occupation, or retired from a STEM-related job; he or she would provide the STEM participant with personalized support and information. ETA strongly encouraged grantees to develop relatively long-term and intense mentoring models that allowed for regular meetings between the protégé and mentor over at least a six-month period.
- **STEM Centers of Excellence.** STEM grantees were to create virtual or physical STEM Centers of Excellent within American Job Centers that gathered together sources of STEM information and offered individuals interested in STEM careers different points of entry into training. The STEM Center of Excellence was envisioned as a replicable demonstration model that would teach other Job Centers how to provide high quality STEM services.

Overview of the STEM Projects

Each of the STEM grantees developed project designs that took into account its regional geographic and economic context. Among the influential features of the regional context were the size of the project's service area, which STEM sectors of the regional economy were expected to expand to produce new job opportunities, and overall regional economic conditions.

Project Service Areas

The SGA for the STEM Initiative required individual WIBs to apply on behalf of a regional consortium representing a specific economic region.[14] Grantees responded to the requirement to develop regional consortia by involving from two to five local WIBs in each project. This resulted in projects with relatively large service areas (see Exhibit I-1).

[14] The SGA did not provide guidance on the recommended size of the designated economic region or the number of WIBs that should be involved in the consortium; however, it made an exception to the requirement for a multi-WIB consortium if the defined region was a rural area or a portion of a state whereby only one WIB existed.

Exhibit I-1:
STEM Grantees and Project Service Areas

Project Name	Grantee	Primary Service Area
Connecticut STEM Jobs	Eastern Connecticut Workforce Investment Board	5 LWIAs, including the entire state of Connecticut (8 counties and 18 American Job Centers)
STEM Works Indiana	Employ Indy (formerly the Indianapolis Private Industry Council)	2 LWIAs, including 9 counties around and including Indianapolis/Marion County; focus on two American Job Centers.
STEM Manufacturing Pathways (often referred to as "STEMPower")	Central Massachusetts Workforce Investment Board (formerly Central Massachusetts Regional Employment Board)	3 LWIAs encompassing four counties in western Massachusetts
Northern Willamette Valley STEM Initiative, Washington and Oregon	Southwest Washington Workforce Development Council	4 LWIAs encompassing 9 counties, including 3 counties in southwest Washington and 6 counties in northwest Oregon
Operation Workforce, Texas	Workforce Solutions of the Lower Rio Grande Valley	5 LWIAs, encompassing 23 counties along the 1,000-mile Texas-Mexico border

The most ambitious projects, in terms of their geographic coverage, were *Operation Workforce* in Texas, which covered 23 counties, and *Connecticut STEM Jobs*, which included the entire state of Connecticut. (In Chapter III of this report, we discuss how grantees addressed the organizational challenges they encountered in administering the STEM projects across multiple local workforce investment areas.)

Targeted STEM Industries

Because the STEM Initiative was funded by mandatory employer fees paid under the H-1B visa program, grantees were required to use STEM Initiative funds to support training in the occupations and industries for which employers use H– 1B visas. The industry sectors identified on the "H-1B visa list" include information technology; finance, insurance and real estate and administrative support services; advanced manufacturing; health care; energy; and transportation. Although health care occupations are on the H-1B via list, the STEM Initiative SGA specifically excluded support for occupations associated with the delivery of health care services, because these occupations had been addressed by other ETA training grants awarded prior to the STEM Initiative grants.

Furthermore, grantees were expected to target industry sectors that were expected to expand and create new high-wage jobs in the applicant's regional economy. As shown in Exhibit I-2, the most commonly designated target sectors were advanced manufacturing, bioscience and biotechnology, alternative and renewable energy, and information technology. Aerospace was identified as a targeted industry by one project (in Indiana) and construction by one project (in Texas).

Exhibit I-2:
Targeted STEM Sectors, by Project

Project	Targeted STEM Industry Sectors
Connecticut *STEM JOBS*	• Advanced Manufacturing • Engineering • Information Technology • Energy
Indiana *STEM Works*	• Biotechnology • Information Technology • Engineering • Advanced Manufacturing
Massachusetts *STEMPower*	• Aerospace • Biotechnology • Renewable Energy • Advanced Manufacturing
Texas *Operation Workforce*	• Manufacturing • Construction
Washington/Oregon *Northern Willamette STEM Initiative*	• Bioscience • Solar and Alternative Energy • Manufacturing • Information Technology

Regional Economic Context

At the time the STEM Initiative grants were announced in November of 2008, most of the grantees were still experiencing only moderate rates of unemployment in their surrounding areas, although the declining numbers of traditional manufacturing jobs had been of longstanding concern in many of the project areas. Economic conditions in the project sites worsened during 2009 and 2010, however. By the time the first evaluation site visits were conducted in February of 2010, the unemployment rate in most project locations was above nine percent (see Exhibit I-3). High unemployment and recessionary conditions caused unanticipated changes in the characteristics of the individuals seeking to participate in the STEM projects, and projects were forced to respond by shifting their strategies and foci.

Exhibit I-3:
Regional Unemployment Rates, by Project

Project	Unemployment Rate, Inception of STEM Initiative (Nov. 2008)*	Unemployment Rate, 1st Site Visit (Feb. 2010)*	Unemployment Rate, 3rd Site Visit (Nov. 2011)*
Connecticut *STEM JOBS*	5.8%	9.8%	7.9%
Indiana *STEM Works*	5.9%	9%	8.2%
Massachusetts *STEMPower*	6.7%	10%	6.8%
Texas *Operation Workforce*	6.1–7.9%	8.8–14.8%	7.8–8.8%
Washington/Oregon *Northern Willamette STEM Initiative*	6.0–9.1%	8.6–11.2%	7.2–11.2%

* Source: Monthly U.S. Bureau of Labor Statistics Reports for States and Metropolitan Areas, not seasonally adjusted. Downloaded from http://www.bls.gov/schedule/archives/metro_nr.htm#2011 on 9/2/2012.

As described in many of our interviews with project staff during our first site visits to the STEM grantees, American Job Centers were inundated with a high volume of laid-off workers seeking training and reemployment assistance; some of these workers possessed significant STEM experience and training and others were interested in entering STEM fields for the first time. Since many of these workers were seeking to gain reemployment as soon as possible, there was less demand than expected for training and much greater demand for job placement assistance. The limited employment opportunities in any single field forced projects to seek to broaden the range of occupations originally targeted, in order to improve participants' chances for reemployment in the short term. At the same time, the recession negatively impacted the ability of the STEM projects to engage employers as active partners in designing new models for training and hiring STEM trainees.

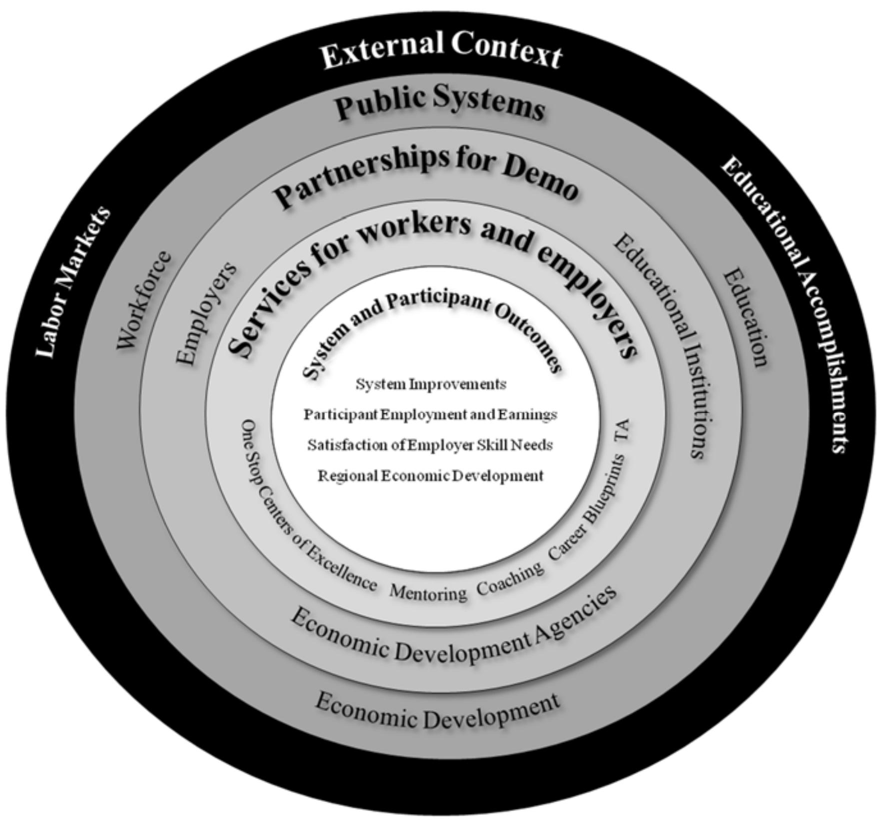
Although the recession initially caused an influx of training funds into WIA and other workforce training programs, by the time the projects launched operations, our site visit respondents reported that these supplementary funds were largely exhausted, causing a shortage of training funds available for the STEM projects to leverage on behalf of project participants.

While the five STEM grantee sites varied in demographic and economic context, each one served populations that faced significant financial hardship and reduction in employment opportunities in the wake of the economic recession. In later chapters of this report, we describe in more detail how the changed economic conditions caused the projects to adapt their service designs to meet the needs of a new stream of workers dislocated from jobs in STEM sectors.

Evaluation Approach

To guide the evaluation, SPR developed a conceptual model that organized the investigation around the interaction of the factors likely to affect the progress of the STEM Initiative. Exhibit I-4 displays this model as a series of concentric rings. The conceptual model roots the evaluation in an account of baseline contextual elements such as underlying economic and educational circumstances, workforce investment systems in place, and institutional partnerships. These baseline elements (the three outer rings in the model) inform the documentation and assessment of the services delivered and the outcomes achieved across the individual, employer, and systemic levels.

**Exhibit I-4:
Conceptual Model for the STEM Evaluation**



Key Research Questions

To investigate fully each element in the conceptual model presented above, the evaluation team organized its inquiry around research questions grouped into four main categories: external context and public systems, project planning and partnership formation, service design and implementation experiences, and system and participant outcomes. These questions are summarized by category in Exhibit I-5.

Exhibit I-5:
Key Research Questions

External Context and Public Systems

- What were the regional contexts within which grantees operated, including the characteristics of the regional STEM environments, the nature of the regions' workforce systems, and the characteristics of the regions' workforces?
- How did these contextual features influence the design and implementation of the STEM projects?

Project Planning and Partnership Formation

- What was the process through which grantees planned and administered the STEM projects?
- How did the lead grantees work with other members in their consortia?
- To what extent did the WIB consortia establish additional partnerships, and how did these partnerships function?
- What were the lessons learned about how to develop effective partnerships and how to manage regional STEM projects?

Service Design and Implementation Experiences

- What significant issues and/or challenges did grantees face during STEM Initiative implementation?
- How did grantees target particular groups of participants for STEM program services and how did they deliver these services?
- What service planning, training, job placement, and case management services did participants receive?
- To what extent did grantees leverage STEM education and training resources from a variety of funding sources and entities?
- What services appeared to be most important in supporting successful outcomes? What promising practices were developed?

System and Participant Outcomes

- To what extent did the STEM grants facilitate increased awareness of STEM career pathways?
- To what extent did STEM grants result in an increased supply of workers with STEM skills to meet the needs of regional employers?
- How did the STEM projects benefit regional STEM employers?
- To what extent were the grantees able to sustain the STEM project features after the end of the grant period?

Data Collection and Analysis Methods

To describe the implementation experiences of the STEM grantees and assess their outcomes, the evaluation drew on existing data and conducted primary data collection. The qualitative component was informed by detailed site visits conducted at various stages of project planning and operation as well as periodic telephone conversations with project managers. The quantitative component focused on data collected by the individual grantees on the characteristics of project participants, the services provided, and the outcomes achieved by individual participants.

Qualitative Component

To collect primary data the evaluation team used the following qualitative methods.

- Initial phone calls to each grantee during the fall of 2009 were used to collect basic information about the project's design, key staff members, and organizational arrangements, and to document progress in designing the grant activities and launching project services.
- Three rounds of site visits to each project were conducted over the course of the grant period:
  - A first round was conducted between December 2009 and February 2010, approximately 12 months after the initial grant award.
  - A second round was conducted between November 2010 and January 2011, approximately 23 months after the initial grant award.
  - A third round was conducted between November 2011 and January 2012, approximately 35 months after the initial grant award.

During each site visit, an SPR site visitor or team of visitors observed project operations and interviewed key STEM grant personnel, including project managers and staff members providing customer services. In addition, each case study site visit included interviews with representatives of education and training partners, youth service providers, business representatives, and community-based organization (CBO) partners. The second- and third-round site visits, conducted after the projects were fully operational, also included focus groups with small groups of participants as well as interviews with employer representatives. Following the completion of each site visit, the site visitor prepared a detailed case study narrative to support cross-site analysis. Appendix A includes the detailed data collection protocols used in the third round of site visits, as an example of the information collected during each site visit.

Quantitative Component

To analyze project outcomes, the evaluation team collected existing participant-level data from the projects on the individuals enrolled in the STEM project and reviewed project-level information submitted quarterly to ETA on quarter narrative reports and ETA form 9134. The evaluation encountered a number of data collection and analysis challenges, which are discussed in Chapter V.

Organization of Report

The remainder of this report summarizes the findings from the completed evaluation activities. In the report, we refer to each project primarily by the name of the state in which it was located. Chapter II focuses on issues related to project organization and management practices, as well as the development of grantee partnerships. In Chapter III, we review how the projects realized the four key design features promoted by ETA (STEM coaches, career blueprints, virtual STEM centers of excellence, and mentoring) and discuss how well these design features worked in practice to further project goals. Chapter IV describes the services developed by the STEM projects for adult and youth participants. Chapter V discusses data collection and analysis challenges and describes project outcomes as measured by the participant-level data provided by the projects. Finally, Chapter VI synthesizes findings and presents conclusions about key implementation challenges, lessons learned, and strategies for sustainability. Appendix A contains the protocols used in the third case study site visits. Detailed profiles describing the design, implementation, and outcomes of the individual STEM projects are located in Appendix B. Readers interested in the challenges faced by individual projects and how these challenges were addressed are encouraged to consult these project profiles.

II. PROJECT ORGANIZATION AND PARTNERSHIPS

ETA required each STEM project to have a regional focus, with participation by multiple local workforce investment boards (WIBs). The SGA also called on each grantee to develop partnerships with other organizations to ensure that STEM project activities would be coordinated with other STEM-related activities and the grantee would be able to leverage funds from other programs. This chapter reviews how the STEM grantees involved multiple WIBs and how they organized project oversight, day-to-day management, and delivery of customer services. It also describes the partnerships project managers developed with other STEM stakeholders in their regions, and how different partners were involved in planning and implementing the STEM projects. Finally, the chapter describes how staff members at each STEM project interacted with their workforce investment partners within the American Job Center network.

Organizing and Managing a Regional Project Consortium

To ensure that each grant encompassed an entire economic region, ETA required that each project cover multiple local workforce investment areas and be implemented by a consortium of local WIBs.[15] A single WIB had to be designated in the grant application as the grantee, responsible for grant management on behalf of the consortium. This arrangement created a series of complex organizational challenges for the STEM projects. In particular, projects had to

- develop a shared understanding of project goals and strategies across the participating workforce boards, and

[15] The SGA did not provide guidance on the recommended size of the designated economic region or the number of WIBs that should be involved in the consortium. However, the SGA noted that ETA would make an exception to the requirement for a multi-WIB consortium if the defined region was a rural area or a portion of a state whereby only one WIB existed

- collect consistent information from the multiple LWIBs and American Job Centers to document fiscal and service delivery operations.[16]

Grantees with particularly large geographic service areas and a large number of participating WIBs faced the most complex organizational challenges. As shown in Exhibit II-1, Operation *Workforce* in Texas had the largest and most complex project area, encompassing five local workforce investment areas with 23 counties that stretch 1,000 miles along the Rio Grande River and 34 full-service American Job Centers. This breadth made it very difficult to get the participating WIBS to agree on project goals and strategies. At the other end of the spectrum, the Indiana project—focusing its services on only two full-service American Job Centers in one of the participating WIBs—had the simplest and most straightforward organizational context and did not have difficulty in reaching consensus about project goals.

Exhibit II-1:
Geographic Scope and Administrative Complexity of the STEM Projects

	Number of LWIAs	Number of Counties	Number of Full-Service American Job Centers
Connecticut *STEM JOBS*	5	8	9
Indiana *STEM Works*	2	9	4
Massachusetts *STEMPower*	3	3	6
Texas *Operation Workforce*	5	23	34
Washington/Oregon *Northern Willamette STEM Initiative*	4	9	12

Geographic scope was only one factor influencing the organizational challenges faced by the STEM project managers. Another factor was whether the participating WIBs had a prior history of working together. Local WIBs that had a prior history of working together on regional projects found it easier to develop an effective STEM project consortium, for two reasons. First, pre-existing regional STEM policy boards were helpful to project managers as they developed their regional consortia. (Two such regional entities existed, one in Massachusetts and the other in Washington/Oregon, and both were able to be re-purposed as planning and advisory bodies for

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16 The reporting challenges associated with managing a multi-LWIB project are addressed in Chapter V on "Limitations of Project Data for Cross-Site Analysis."

the STEM initiative.) Second, local WIBs that had previously worked together on a regional initiative found it easier to develop a consensus about regional economic needs and priorities. The existence of a regional planning and policy group also made all the participating WIBs feel like they were equal partners, which increased their “buy in” to the project.

Another influential factor was the extent to which each of the participating WIBs was committed to the STEM project goals. The problem of coordination was greatest in Texas, which faced both of the above challenges—the participating WIBs had not previously worked together on collaborative projects and not all WIBs were fully committed to the project goals. In the Texas case, the project manager, who worked for the grantee WIB, had to devote considerable effort to build mutual trust among the other participating WIBs and had difficulty developing a consistent understanding of project goals across the project region.

Project Management and Staffing

To oversee their grants, four of the five STEM grantees used an advisory committee or leadership team made up of representatives from a variety of stakeholder organizations. These STEM project advisory committees usually met frequently during the planning and start-up phases of the projects. Once the projects were underway, the advisory committees tended to meet less frequently. In most projects, the executive director of the grantee WIB also provided policy guidance and general oversight of project activities and expenditures. The fifth grantee did not form a project advisory committee, and, partially as a result, lacked strong policy guidance during project implementation.

Each grantee designated a project manager to guide the project throughout the consortium’s service area. In three projects (Washington/Oregon, Massachusetts, and Texas), the grantee designated a WIB employee as the STEM project manager. In Washington/Oregon and Massachusetts, the project manager provided both technical and administrative leadership for the project. In Texas, the STEM project manager was a contracts administrator who did not play an active role in guiding the design of the project or guiding the delivery of services by the STEM coaches, so technical leadership for this project was delegated to the STEM coach hired by the grantee WIB (designated as the “lead” STEM coach for the project.) One consequence of naming a WIB employee as project manager was that this individual was not always seen as having the authority to direct STEM project staff members who worked for different local WIBs.

Two grantees (Connecticut and Indiana) used contracts with outside organizations to provide project management. The Connecticut grantee representative indicated that employing an outside consultant to administer the grant on behalf of the entire consortium helped the participating WIBs accept the authority of the project manager. This arrangement also helped pull the participating WIBs together into a team and reassured the WIBs that they were all being treated equitably. Indiana's experience contracting with a third party to manage the grant was less successful; the WIB staff took back some grant oversight responsibilities partway through the project period.

All grantees created at least one STEM coach position within each of the participating local workforce investment areas. As the only project staff members funded by the STEM grant in most local areas, the STEM coaches were generally responsible for recruiting individuals to the STEM projects and linking program participants to STEM employment, education, and training opportunities. In Chapter III on "Key STEM Project Features," we discuss more about how the projects designed and operationalized the position of STEM coach within American Job Centers.

Partnerships and Integration of STEM into the American Job Center Network

As described in Chapter I, the Solicitation for Grant Applications (SGA) for the STEM Initiative called for grantees to develop partnerships with organizations in three different realms: (1) the public workforce investment system; (2) the public education system (high schools, community colleges, colleges and universities, and adult education providers); and (3) private industry (STEM employers and their related associations). Project consortia were also encouraged to expand their partnerships as needed to strengthen their ability to reach out to a broad range of potential STEM students and workers, involve all entities participating in ongoing regional STEM initiatives, and invite potential sources of additional funding to support regional STEM objectives. The emphasis on partnership building was designed to advance two desired outcomes of the STEM Initiative: (1) build the capacity of the workforce development system to act as a broker and facilitator between regional education stakeholders and business interests, and (2) promote innovation and increase the responsiveness of the system to the needs of disadvantaged youth and dislocated workers. Below, we review how the STEM partnerships were developed by the grantees and how different partners contributed to grant activities.

Relationship with Other Programs within the American Job Center Network

One of the overarching goals of the STEM Initiative was to increase the capacity of the American Job Center network to recruit and assist individuals interested in entering the STEM jobs pipeline. The existence of STEM coaches within Job Centers was viewed as the essential element that would allow the American Job Center network to realize this goal. Operating from within American Job Centers, STEM coaches were envisioned as providing specialized knowledge about STEM occupations and training opportunities and having the ability to guide interested customers through the steps needed to enter STEM-related training (e.g., through the development of career blueprints) and prepare themselves for employment in a STEM field.

All STEM projects developed coordination linkages within the American Job Center network to provide basic information about STEM careers to a wide range of American Job Center customers and to refer customers interested in STEM occupations to the STEM coach for personalized career counseling and support. The projects developed several different approaches to making information about STEM training and STEM careers accessible to Job Center customers. Several projects (e.g., Texas and Massachusetts) arranged for information about STEM careers and STEM training to be included as part of the general orientation provided to all new Job Center customers. Tools available within interactive virtual Centers of Excellence (e.g., in Indiana, Massachusetts, and Connecticut) provided an alternative way for customers to obtain information about STEM training and STEM jobs. Information from automated tools was available via the Internet, from resources rooms within the American Job Centers, from kiosks or computer stations available in other public places, and from computers available to customers at home or at work. Connecticut's virtual STEM Center of Excellence combined these two approaches by allowing interested American Job Center customers to complete a STEM self-assessment online and then make an appointment to meet face-to-face with a STEM coach at the closest American Job Center.

Coordination between the STEM project and other workforce development programs also occurred by virtue of program co-enrollment. In some of the projects, all STEM participants were co-enrolled in WIA (Washington/Oregon, Indiana, and Texas). In other projects, the level of co-enrollment was high—in Connecticut, for example, about half of all STEM participants were co-enrolled in WIA. Although WIA was by far the most common program in which participants were co-enrolled, it was also relatively common to find co-enrollment in other programs such as Veterans Affairs or Upward Bound (a program to promote college readiness for youth who are low-income or whose parents did not attend college). STEM coaches often viewed WIA and other programs as additional sources of funding to support training or of supportive services for customers interested in STEM fields. As viewed by the coaches themselves, the STEM coach's role was to provide specialized mentoring and ongoing case management (primarily counseling during training and advice and support during post-training job search) to persons interested in STEM careers. Because four of the five projects decided to designate all American Job Centers within their service areas as physical STEM Centers of Excellence, the STEM coaches often traveled to all American Job Centers in their local areas on a regular basis to meet with STEM project participants.

The STEM coaches worked hard to be visible as STEM specialists within the American Job Centers during the grant period. The STEM coaches encouraged other Job Center staff members and organizational partners to refer interested customers to the STEM coaches for project services. For example, in Washington/Oregon and Texas, other Job Center staff members were trained to provide information about the STEM project to all American Job Center customers during orientation sessions, to inform any customers interested in STEM occupations or training about the project, and to refer these individuals to STEM coaches. In another project, the STEM coach in one local area reported on STEM activity within the region as part of her regular participation in all-staff meetings at the Job Center. In another local area in that state, the STEM coach accompanied the WIB's business services representative on visits to local employers to inform them about the STEM initiative and to inquire about job opportunities for STEM project participants.

Surprisingly, even though the goal of the grant was to increase the overall capacity of American Job Centers to promote STEM skills and STEM careers, the STEM coaches did not generally provide training to other American Job Center staff members to increase their knowledge about STEM occupations. As a result, although most American Job Center staff members received some training on how to do the paperwork related to STEM enrollment, most were not trained to take over STEM career counseling functions for customers interested in STEM occupations. An exception occurred in Indiana, where the STEM coaches did train other American Job Center staff members on STEM occupations, so that STEM services could be integrated into existing public workforce investment services upon completion of the grant. In interviews with members of the evaluation team, American Job Center staff members in other sites often indicated that they had had little contact with STEM coaches and had been provided with few opportunities to learn about STEM occupations.

Relationships with the Education and Training System

The STEM Initiative SGA encouraged the STEM grantees to develop partnerships with regional education and training institutions so that the projects could help align activities, strategies, and resources relevant to the STEM project goals. In all five projects, post-secondary educational institutions played important roles in STEM project planning and implementation. In addition to participating as members of project planning and advisory committees, regional colleges and universities were involved in various roles:

- In Indiana and Connecticut, educational institutions helped design the online interfaces through which interested customers could contact projects and use self-service tools.
- In Indiana and Texas, educational institutions designed and delivered project services to in-school youth.
- In Washington/Oregon, educational institutions employed and supervised STEM coaches (Washington/Oregon).

- In Washington/Oregon and Massachusetts, educational institutions developed new short-term certificate programs in STEM fields.[17]

Educational institutions were also important partners in providing STEM project participants with meaningful training opportunities using existing courses. However, in most cases, the STEM grantees did not play an active role in developing new STEM courses or programs of study to meet the emerging needs of local employers, because grant funds were not sufficient, in most cases, to develop new training offerings, and because STEM employers were facing large scale layoffs at the time the grants were launched, rather than planning to train newly hired workers.

The STEM projects were less active in developing relationships with local K–12 school districts, partly because the decentralized nature of school districts meant that many districts usually operated within a single local workforce area. Several notable exceptions occurred in Washington/Oregon and Massachusetts. In Massachusetts, local high schools worked with the STEM coach to develop STEM career exploration clubs, a regional robotics competition, and internship opportunities. In the STEM project in Washington and Oregon, one STEM coach successfully engaged local school districts and individual high schools to develop an innovative STEM internship program for low-income high school students. In addition, the Texas STEM grantee used a portion of its STEM grant funding to support professional development for K–12 science teachers as part of an existing system of regional education service centers.

Relationships with Employers and Industry Groups

In the SGA for the STEM initiative, ETA stated its expectation that regional STEM businesses, business intermediaries, and business associations would be involved in a variety of STEM project activities. Ideally, they would

- help to define the strategy and approach for each STEM Center of Excellence,
- identify the skills and competencies that workers need in order to fill STEM-related jobs,
- design new training approaches,
- mentor STEM students and offer work-based learning opportunities through internships or on-the-job training,

[17] In the STEM project in Washington and Oregon, Portland Community College worked with a group of small and medium-sized employers to develop an eight-week long "Manufacturing Foundations Course" to prepare individuals for entry-level jobs in high-tech manufacturing. In Massachusetts, Worcester Polytechnic Institute developed an eight-week long biotech pharmaceuticals manufacturing certificate program.

- contribute financial support to STEM activities (e.g., share in the cost of training that prepares workers needed by the firm and allow employees to use scheduled work time to serve as STEM mentors), and
- hire qualified STEM education and training graduates, where appropriate.

Project staff members reported that developing partnerships with employers or employer associations was one of the most challenging aspects of the STEM initiative. Projects used two different strategies to engage businesses and business associations: (1) recruiting individual employers for participation in the STEM project and (2) involving business associations or business intermediaries (organizations that act on behalf of, or in support of, business sectors to promote their interests). Projects had very little success in recruiting representatives from individual STEM firms to participate in project activities, particularly during the first two years of project operations, because of the prolonged economic downturn. Project managers indicated that local businesses were short-staffed because of layoffs and were so focused on keeping their businesses alive during the recession that they did not have time to participate in the STEM project. Furthermore, businesses were not interested in participating in plans to establish training programs, because they had no plans to hire new workers in the immediate future, trained or not. However, as economic conditions began to improve and companies began to hire new workers, at least one project (Massachusetts) reported that it had succeeded in recruiting several employers for participation on the project's advisory council. In addition, by the last year of the demonstration, representatives from other employers began to contact STEM staff members in this project for assistance identifying prospective workers with the requisite skills.

One STEM project succeeded in engaging an employer intermediary as its STEM project partner. In Massachusetts, a key project partner throughout the demonstration period was the Massachusetts Manufacturing Extension Partnership (MassMEP), which receives funding as a public-private partnership from the U.S. Department of Commerce. This organization, which has a strong record of accomplishment supporting employers in the advanced manufacturing sector, offered strong support to the STEM project by providing training directly to STEM adult and youth participants, as described in the project profile in Appendix B. MassMEP provided services to the STEM project that far exceeded in value the small amount of money the organization received from the STEM project budget.

One project (Connecticut) used STEM funding to offer training to incumbent workers at small STEM businesses in its service area. Businesses were more responsive to this offer than they had been to requests that they participate in plans for training prospective new hires. The format of these trainings varied: some were offered on-site, some were offered as part of larger sessions open to multiple organizations, and some focused on a very small number of specially chosen employees within the firm.

Data Collection and Reporting

Each STEM grantee was required to submit to ETA every quarter a report on funds expended, a narrative progress report, and a report with aggregate data on project outcomes to date, using the ETA Form 9134. Form 9134 includes information on customers served, customer services and activities, capacity-building activities, leveraged resources, data elements so ETA could calculate performance on the Common Measures, and optional supplemental data on the Common Measures (entered employment rate, employment retention rate, and average earnings). This section describes the data systems that the STEM grantees used to collect the required information; it also notes issues identified regarding data collection and reporting requirements. (Each of the grantees also submitted an individual-level data extract to SPR to support the evaluation's outcome analysis; this aspect of data collection and reporting is described in Chapter V.)

Systems Used to Collect Project Data

As shown in Exhibit II-2, each of the STEM projects used its state's unified management information system (MIS) for the WIA and Wagner-Peyser programs to record some data on STEM participants. Two grantees (Indiana and Texas) collected all data about STEM participants using the state MIS. The grantee for the *STEM Initiative* in Washington and Oregon, which included four local workforce investment areas from two different states, had to compile data from three MISs—the Washington state information system, the Oregon state information system and the Portland area WIB's local MIS.

Exhibit II-2: STEM Grantee Data Systems

	Data System(s)		
Grantee	**State/Local MIS**	**Coach-maintained Spreadsheets**	**Performance At Work (PAW) Database**
Connecticut *STEM Jobs*	X	X	
Indiana *STEM Works*	X	X	
Massachusetts *STEMPower*	X		X
Texas *Operation Workforce*	X		
Washington/Oregon *STEM Initiative*	X	X	

In order to make them work for the STEM projects, several grantees modified their existing data systems. In Indiana, the lead WIB was able to modify the system so that the MIS would automatically determine eligibility for youth interested in participating in the project's STEM youth component. A field was also added to denote co-enrollment in the STEM project and WIA. In both Texas and Massachusetts, the only modification needed was the creation of a new program code for the STEM project.

To supplement data recorded in the state MIS, two of the grantees used Microsoft Excel spreadsheets maintained by individual STEM coaches to record data on STEM participants. For the most part, these spreadsheets were developed for the STEM coaches to use as case management tools. However, in Connecticut, project staff members also used the coach spreadsheets to record detailed information on the services received by STEM project participants—data that could not be captured in the state MIS. Thus, in Connecticut, the state MIS was used only to document demographic data on STEM participants. Because the project managers in the different local areas in Washington/Oregon could not transfer data directly from one unified MIS to another, the project manager required the individual STEM coaches to complete and submit spreadsheets to the lead WIB to provide the information required for grant reports. The data on these individual spreadsheets were compiled by the project manager.

Those grantees using spreadsheets to collect participant data indicated that they had both advantages and disadvantages compared to the use of the state unified information systems. On the positive side, use of spreadsheets made it easier for coaches to record data about STEM participants' use of services. Coaches did not have to sign onto the state information system to enter data, and they could easily modify and improve the spreadsheets to meet the changing data collection needs of the grant (the state information systems usually could not be revised once the initial project modifications were made). On the other hand, it was a disadvantage that the spreadsheets were used in different ways by different coaches and were not always a standardized or user-friendly source of data for the evaluation. To promote standardization of data entry in Connecticut, the lead WIB created a uniform spreadsheet for all coaches and provided the coaches with technical assistance on how to use it. In Washington/Oregon, the coach spreadsheets developed more organically, so they were less uniform from coach to coach. Because they had been designed for case management purposes rather than to meet reporting needs, it was time-consuming for the project managers to "roll-up" the data from individual coach spreadsheets for required project reports. The data manager for one of these grantees expressed regret about the decision to use coach-maintained spreadsheets for reporting and instead wished they had used or devised a more uniform computerized system.

Only Massachusetts utilized the complimentary MIS "Performance at Work" (PAW) data collection system developed by ETA for the High Growth Job Training Initiative grantees. .

STEM coaches were required to enter data into both the PAW system and the state MIS.[18] Issues in the Collection and Reporting of Project Data

The STEM grantees encountered a number of challenges in collecting data and reporting on project outcomes. These challenges included difficulties coordinating data across multiple WIBs and difficulties generating the data for the Quarterly Progress Reports.

Coordinating Data Across WIBs

In all projects, staff members from each of the participating local WIBs were responsible for collecting and maintaining their own data on STEM participants. In most cases, the project manager had to ask administrative staff members in each of the participating WIBs to extract relevant data from the state MIS and send it to the lead WIB for compilation and inclusion in project reports. Only in Massachusetts was the lead WIB able to generate reports for all participating areas from one central location. For projects that used only the unified state MIS, the data submitted by each local area were somewhat uniform. However, among projects that had to compile data from both the unified MIS and the less-uniform coach spreadsheets, preparing the quarterly project reports was a very complex and time-consuming process.

Quarterly Reporting

The Quarterly Progress Report format and instructions were problematic for the STEM grantees for two reasons. One problem was that the quarterly reports did not allow the grantees to break out enrollments and outcomes for youth versus dislocated workers or other adults. As part of ETA's High Growth Job Training Initiative, the STEM projects were required to report for each reporting period the total number of participants served and the number of participants who entered and exited the program. All participants (including in-school youth, out-of-school youth, dislocated workers, and other adults) were all added together in the numbers provided in the quarterly reports to ETA. For some projects—such as Texas, which used the same service design for youth and adults—this worked well. However, for projects that designed distinctive activities for youth and adults, aggregating measures of customer enrollments and outcomes made it difficult for project staff members to report to ETA on how effective the project had been in serving different target groups that received different services.

Another problem grantees encountered was the fact that the instructions ETA provided for completion of the quarterly reporting form (ETA-9134) indicated that only participants who entered enrollment in the same quarter in which they completed training could be counted as having entered employment. Some of the projects reported that they followed this definition,

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[18] Since the evaluation was provided with participant-level data from the State MIS, we do not have any evidence about how individual coaches used PAW, or whether they found it useful as a data collection tool.

while others indicated that they had used a more general definition of entered employment that did not include restrictions on the timing of employment attainment; this resulted in inconsistent reporting on employment outcomes across sites. In September 2011, ETA officially modified the definition of "Entered Employment" for the High Growth Job Training Initiative grantees so that they could include participants employed beyond the quarter in which they completed training. However, it is not clear when or if all grantees modified their reporting practices accordingly. Thus, not only were there inconsistencies in how entered employment outcomes were reported across projects, but also in how they were reported within individual projects over time. This throws into doubt the quality of the summary outcomes collected by ETA on Form 9134.[19]

Summary of Key Findings

As summarized below, the STEM grantees found it challenging to develop organizational structures and management strategies that could provide coherence to regional projects involving multiple WIBs. The regional project scope also made it difficult for grantees to collect data and report accurately on project accomplishments. Projects put substantial energy into developing partnerships that would enable them to act as brokers between associations representing employer interests and local educational institutions. However, most projects had difficulty engaging employers as active project partners.

Regional Scope

The requirement that grantees use a regional approach created a number of organizational and management challenges for all grantees:

- STEM funding was diffused to the extent that the amount of investment in any one LWIA was relatively limited, making it difficult for STEM coaches to adequately serve participants throughout the project area.
- It became difficult to provide a unified approach to the STEM initiative, because each participating WIB often operated its portion of the project as an independent entity.
- The requirement for consortia complicated the management and reporting of project activities and outcomes, often placing heavy burdens on the grantee, which was responsible for data collection and reporting for the entire region.

Grantees with previous experience undertaking regional projects (e.g., the grantees in Connecticut, Washington/Oregon and Massachusetts) were able to overcome these challenges

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19 For this reason, in reviewing project outcomes, we have more confidence in the summary numbers generated from the participant-level records provided by the grantees than in the aggregate numbers collected via the quarterly reporting forms, as described in more detail in Chapter V.

more easily than other grantees because they had built shared regional understanding about goals and priorities.

Project Management

Projects developed a number of different management structures. In most projects, a regional leadership team or advisory committee played an active role on project planning and design, and provided oversight, as needed, during the project implementation phase. Although advisory committees tended to be most active during the initial project planning stage, their continued oversight during project implementation helped to keep grantees focused on the overarching policy objectives of the STEM projects.

In addition, each project designated a project director or manager to provide day-to-day management of the projects and coordinate efforts across the participating local WIBs. Projects used several different arrangements to provide project management, including designating existing WIB staff, hiring new project managers, and contracting with outside consulting firms for project management. To be effective in managing the grant-funded projects, project directors needed to have the capacity to ensure that administrative requirements, such as documentation and reporting, were addressed, as well as the ability to guide and coordinate the services provided by STEM coaches. Some projects identified a single project director who provided both functions; others divided these functions between two individuals—an administrative manager and an individual who guided the activities of the STEM coaches.

Partnerships

Each of the projects worked hard to develop partnerships with the rest of the public workforce investment system, with public and private training providers, and with industry groups and individual employers. However, the partnerships that projects had hoped to create with employers and employer intermediaries did not occur in most sites, because employers were not hiring any new employees due to the recession.

Coordinating with other STEM-related Initiatives

ETA encouraged the STEM projects to play a key coordinating role for all STEM-related initiatives in the region. However, the expectation that the STEM project manager could provide coordination for all regional STEM-related initiatives was usually unrealistic. The level of funding available through the STEM grant was usually small in comparison to the funding level of other regional STEM initiatives. In addition to having larger budgets, partner programs often had tasks and goals that were more discrete and well defined than those of ETA's STEM Initiative. The STEM grant managers acknowledged these initiatives as aligned activities, and, on occasion, worked closely with other partners on specific issues.

Data Collection and Reporting

A lack of uniform data collection and entry practices, particularly across local WIBs, made it cumbersome to gather and report information on project outcomes and difficult for projects to ensure the quality of the outcome data reported to ETA. Because they included multiple local WIBS, the STEM projects would have benefited if they had been able to establish a standardized data collection system for each project that enabled them to capture data consistently and share data easily among the participating WIBs. In addition, by having such a uniform system in place at the outset of project operations, the grantees could have provided systematic training on data collection procedures to all staff.

III. KEY STEM FEATURES

The solicitation for grant applications (SGA) for the STEM Initiative outlined four key features to be included in the design and delivery of STEM services: STEM coaches, mentoring, STEM Centers of Excellence, and career blueprints. In this chapter, we review how the STEM projects developed these key project features and how they viewed them in relation to furthering the overall STEM Initiative goals. The individual project profiles in Appendix B provide more detail on how each project realized the key STEM features.

STEM Coaches

Across all STEM projects, STEM coaches were envisioned as experts on STEM occupations, training options, and job opportunities for individuals wishing to pursue STEM careers. STEM coaches in most sites were also expected to carry out a broad range of system-building responsibilities. STEM coaches were expected to build relationships with the business community, work with training programs and education providers to develop new training to meet the needs of regional employers, educate American Job Center staff members about STEM-related opportunities, and make recommendations for improving the ability of the American Job Center system to link STEM employers and workers with STEM skills.

Projects encountered a variety of staffing challenges relating to the skills of STEM coaches and the functions they carried out within American Job Centers:

- Individuals possessing the mix of STEM knowledge, workforce-investment-system experience, and counseling skills needed for the STEM coach positions were difficult to find.
- Furthermore, because the STEM coach responsibilities often included routine paperwork and reporting duties, many of the individuals who had been hired as STEM coaches did not stay in those positions for very long, forcing projects to recruit, hire, and train multiple times.
- STEM coaches were burdened with more job responsibilities than any one person could carry out. Furthermore, several of these job responsibilities—including developing partnerships with educational institutions and recruiting employers for participation in the STEM Initiative—would have been more effective if they had

been carried out by an individual placed higher up in the WIB administrative hierarchy than the STEM Coaches.

- Some grantees had secured agreements from participating local WIBs to contribute a percentage of the STEM coaches' salaries from other funds. Unfortunately, they often found that the American Job Center managers that had contributed funds wanted to assign additional responsibilities to the STEM coaches that drew them away from their STEM-related duties.

Projects tried to recruit and hire STEM coaches who offered expertise in three different areas: (1) familiarity with STEM occupations and STEM-related training, (2) knowledge of the American Job Center workforce development system and how it works, and (3) the ability to provide case management services to a wide variety of individuals needing assistance in finding employment. It was difficult to find coaches with expertise in all three areas.

Projects dealt with this difficulty in different ways. Two projects used the strategy of trying to hire a team of STEM coaches within the project region who offered complementary skills, so that through the exchange of information and support they could form a team possessing the requisite expertise. In these projects, some STEM coaches had industry backgrounds in diverse fields, such as bioscience and engineering, while other STEM coaches had experience working with youth or dislocated workers in a workforce setting. For example, in the project in Washington and Oregon, one STEM coach had a background in private industry working for a bioscience company, a second had worked as an engineer and project manager, and a third had a background as a career counselor and admissions officer for an institution of higher education. By drawing on complementary staff-member skills and placing a heavy emphasis on training STEM coaches at the beginning of the project, project managers were able to give STEM customers access to the expertise they needed. One project was lucky enough to find one or more STEM coaches who had industry experience as well as experience as a teacher, or in some other job that prepared them for work in a social service setting.

Although ETA envisioned that STEM coaches would lead a variety of activities, the multiple demands placed on them often turned out to be more than any one individual could realistically handle (see Exhibit III-1). These responsibilities included providing information about STEM occupations and available training to the general public, recruiting dislocated workers (both youth and adults) for enrollment in the project, and providing career counseling to and developing career blueprints for individuals interested in STEM fields. Coaches were also typically tasked with addressing system-level issues: identifying ways to improve the ability of the workforce system to meet regional STEM needs, building high-level ongoing partnerships with employers to identify their priority workforce skills training needs, and working with training institutions to tailor training to employer needs and making it accessible to the individuals interested in STEM occupations.

Exhibit III-1:
Typical STEM Coach Job Responsibilities

Conduct public relations, outreach, and recruitment for the STEM project

- Attend STEM conferences and job fairs to promote the STEM program and learn about emerging STEM jobs.
- Act as point person for education, training, and partner groups in the area.
- Develop relationships with American Job Center managers.
- Arrange for American Job Center staff members to refer appropriate customers to the STEM project.
- Recruit youth and adults interested in STEM fields.
- Develop relationships with employers.
- Recruit employers to participate as STEM mentors.

Provide services to STEM project enrollees

- Decide who should be enrolled in the STEM project.
- Provide career counseling and help participants interested in STEM careers develop meaningful Career Blueprints and make informed decisions.
- Stay in touch with customers throughout their career development process: "making sure the customers don't falter or give up."
- Support the job search efforts of STEM participants.
- Develop jobs for STEM participants.
- Travel to other American Job Centers as needed to serve STEM customers.

Provide services to STEM employers

- Assess employer needs and develop responsive STEM training and employer services.
- Talk to employers, identify their staffing needs, and help design needed training curricula.

Coordinate STEM and other workforce development programs

- Refer customers to WIA case managers or other workforce development programs for training when available/appropriate.
- Work closely with WIA case managers to co-enroll and provide case management to individuals interested in STEM occupations.
- "Help the customer navigate the system."

Train other American Job Center staff members on STEM careers and training opportunities

Different projects had different expectations about whether the STEM coaches would be the primary case managers for individuals enrolled in the project. In some projects, STEM coaches were used strategically, intervening only at those points in the service delivery process where their knowledge of STEM occupations and training was most critical. These points included the initial stages of a customer's involvement in the program, when he or she needed STEM career counseling and employment planning, and the point at which a customer was ready to develop plans for STEM-related training. The most common arrangement was for STEM participants enrolled in another program, such as WIA or TAA, to receive primary case management from that program. In many cases, participants were already enrolled in WIA and assigned to a WIA case manager by the time they were referred to STEM coaches. However, several sites—i.e., those in the Indiana project and in several of the local workforce investment areas participating in the Texas project—expected STEM coaches to serve as the primary case managers for STEM participants.

As the number of laid-off workers seeking services from American Job Centers increased during the recession, it became increasingly important for STEM coaches to be able to help customers navigate the local workforce development system and take advantage of all available services. STEM coaches who had been hired specifically for their STEM expertise found themselves spending much of their time assisting customers with WIA enrollment and the associated paperwork. As a result, by the end of the grant period, several of the local areas in Texas and Connecticut hired regular American Job Center staff members to fill job openings within the STEM project, rather than recruiting STEM experts.

Mentoring

As conceived by ETA, the mentoring component of the STEM Initiative was intended to provide STEM participants (both youth and dislocated workers) with the ongoing advice and support of current or retired STEM professionals. The STEM mentor was expected to fulfill a 6- to 12-month commitment with a protégé to ensure continuous support during a period long enough to encourage the development of qualities important in the STEM workplace. In addition to supporting STEM participants during the training and job search phases, mentors were also expected to support STEM participants once they were placed into jobs. At this point, mentors would help to identify further career development opportunities that would support both individual and employer objectives, and they would serve as bridges between employers and workforce development communities.

Implementing a viable ongoing mentoring component was a major challenge for STEM grantees. Only one grantee had an organizational partner with expertise in designing and operating a mentorship program. Even more fundamental was a lack of interest on both sides of the mentoring equation: most dislocated workers and other adults were unenthusiastic about being assigned mentors, and local employers were reluctant to act as mentors or to have their employees serve in this role. In addition, projects generally lacked the resources or knowledge necessary to market a mentoring program, to recruit or screen mentors, or to match, train, or supervise mentors and their protégés.

Two projects—Washington/Oregon and Indiana—developed workable models for recruiting mentors and matching them to project participants. Both adapted the traditional long-term mentoring model to make it more attractive to both STEM participants and employers.

- The Indiana project developed an online "Mentoring and Leadership" course at a local university. Each student enrolled in this course was assigned between one and three STEM project participants to mentor. A student received academic credit and a scholarship credit based on how many contact hours he or she had had with his or her assigned protégés (see the Indiana project profile in the Appendix for more detail).
- The nonprofit organization operating the mentoring component in Washington/Oregon had experience operating mentoring programs. This organization experimented with a number of different models for mentoring, including short-term online mentoring, face-to-face mentoring, and "speed mentoring" meetings at which small groups of youth or adults engaged business people in brief informal networking discussions.

Other projects also moved away from traditional one-on-one mentoring models to develop other approaches to bring together individuals interested in STEM careers and professionals working in STEM fields. Online webinars and discussion groups were used as alternatives to mentoring in the Connecticut and Massachusetts projects.

STEM Centers of Excellence

ETA required STEM grantees to develop STEM Centers of Excellence as the physical or virtual locations at which interested customers could obtain information about STEM careers and STEM training. Grant applicants could propose to develop either *physical* STEM Centers or *virtual* STEM Centers or both. Physical centers were to be housed within the American Job Centers and staffed by STEM coaches; virtual centers would use digital media available via the Internet to provide STEM information online. All five STEM grantees created one or more physical STEM Centers in each participating local workforce investment area. Three projects developed virtual STEM Centers of Excellence to complement their physical centers.

Physical Centers

The physical STEM Centers were largely synonymous with the person of the STEM coach. As described by one STEM coach in the project in Washington and Oregon, who traveled to different American Job Centers on a rotating schedule to meet with customers, "the STEM Center of Excellence is wherever I am." Four of the five projects designated all American Job Centers within their service areas as physical STEM Centers. In Texas, one or two American Job Centers within each local workforce development area were designated as physical STEM Centers. At any of the physical centers, individuals interested in STEM occupations could arrange to meet face-to-face with the STEM coach, use a computer to explore online tools, or consult a library of physical books, pamphlets, and other printed materials containing STEM career information, career-planning, or job search tools. In some local areas, STEM coaches could interact with customers via telephone or e-mail in addition to meeting with them face-to-face.

Virtual Centers

Virtual Centers of Excellence were established in Massachusetts, Connecticut, and Indiana. The virtual COEs generally provided links to education, training, and job opportunities based on occupational preferences. In all three sites, virtual COEs were designed to provide a range of STEM information and self-service tools via the Internet to the general public, to STEM job seekers and workers, and to the business community. Virtual Centers of Excellence were therefore designed to be central "warehouses" of STEM-related information. The virtual COEs developed by two projects (Massachusetts and Connecticut) also provided forums in which jobseekers, employers, educators, mentors, and/or training providers could communicate with one another.

STEM Power in Massachusetts and *CT STEM Jobs* were the two STEM grantees that placed the greatest emphasis on the development of virtual STEM Centers. The virtual STEM Center models developed by these two grantees are similar in many respects, although the Massachusetts project seemed to have been more successful in generating a large and broad group of users. [20]The *STEM Works* project in Indiana also developed a virtual STEM Center, in the form of a somewhat less ambitious website that explains what the *STEM Power* project is, offers access to STEM career exploration and career planning tools, and refers visitors to other physical and virtual workforce development sites for further services.

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[20] A comparison of the features of the STEMPower and CT CTEM Jobs sites suggests that the Massachusetts site might have attracted interest from a wider variety of users because it offered a wider range of information and activities, was more effective in gaining participation by members of the business community, and did not require users to completeo any elaborate activity to register as a site user. However, it might also have undertaken promotional activities that made the site more visible to the general public.

Examples of Well-Developed Virtual STEM Centers in Massachusetts and Connecticut

The www.STEMPower.org website in the Massachusetts STEM project was a central hub through which all STEM activity within the participating LWIBs was funneled. The website was dedicated to creating a virtual STEM community composed of STEM employers, incumbent workers, job seekers, STEM coaches, STEM mentors, and project advisory committee members, with information and activities relevant for each of these potential user groups. With over 1,000 registered members, the virtual STEM community was substantially larger than the total number of individuals who were enrolled as participants in the STEM grant. Activity on the website included discussion groups and forums on STEM as a whole, as well as discussion groups for individual STEM clusters (aerospace, biotechnology, engineering, architecture, manufacturing, computing, and green jobs). Employers, currently employed individuals, and job seekers were asked to register when they visited the site. Registrants could obtain information about STEM training opportunities, review job listings, use resume-writing tools, and access other STEM-related resources. Registered employers could post STEM-related job listings. Before enrolling in the STEM project, an individual was required to register on the STEMPower website and join at least three of the online groups in the virtual STEM Center, in addition to attending a STEM orientation and meeting with a STEM coach. After registering on the STEMPower website, an individual interested in STEM jobs could build his/her own personal profile, join STEM online groups, and use any of the other online resources. Individuals registered in the virtual STEM community could also initiate contact with a STEM coach or mentor through the STEMPower website. The STEM coaches, in turn, were able to contact project participants individually or by groups via e-mail through the website.

In Connecticut, the STEM website at www.ctstemjobs.org was designed to be a "participant portal to the world of STEM." Visitors to the virtual STEM Center could search an online database for a wide variety of general STEM resources throughout the state. A visitor could develop a Career Blueprint online, develop a resume, request a STEM mentor, consult a STEM Jobs event calendar, explore STEM career pathways through an interactive software program, watch STEM-related videos, and make an appointment for a one-to-one meeting with a STEM coach. Connecticut's virtual COE had two functions for employers—they could apply to be STEM mentors and they could request to talk with someone about specialized services available to employers.

Connecticut's virtual STEM COE was used rather differently than the one in Massachusetts. Whereas the latter received broad use by employers, STEM workers, STEM job seekers, and program participants, the primary users of Connecticut's virtual COE appeared to be enrolled program participants and STEM coaches. STEM Coaches in Connecticut used the *STEM Jobs* Center of Excellence to track the online activities and progress of their customers (who were required to complete an online profile before they are enrolled in the STEM project). Since the *STEM Jobs* project depended heavily on online occupational skills training, the project also used the virtual STEM Center of Excellence for the delivery (to enrolled participants) of online training courses licensed from a proprietary provider.

Exhibit III-2: Services Available Through Virtual STEM Centers of Excellence

	STEM Jobs CT	STEM Works IN	STEMPower MA
Online Assessment		X	
Online career blueprint	X	X	
Ability to create or post resume	X	X	X
Ability to make appointments with STEM staff	X	X	X
Job listings		X	X
Online STEM training	X		
Online mentoring	X		
Peer-to-peer sharing across national STEM projects			X
Information on STEM careers and training providers	X	X	X
Discussion groups			X

In the early phase of STEM project implementation, virtual STEM Centers of Excellence appeared to have significant potential to reach a greater number of individual jobseekers and employers than could normally be served via the traditional American Job Center model, which required access to a physical site and scheduled time with a STEM coach. However, Connecticut and Indiana had difficulty achieving widespread use of their virtual Centers of Excellence by the general public. The largest groups of users of the virtual services in these two projects were the enrolled program participants, for whom the online Center supplemented the face-to-face services received from a STEM coach. Because of the interactive nature of Massachusetts' virtual STEM Center, this project was more successful in generating a virtual community with a higher volume of users, including regional STEM employers as well as STEM job seekers.

Career Blueprints

As conceived by ETA, career blueprints were intended to be enhanced versions of individual employment plans (IEP). They were designed to cover a longer time horizon than an IEP and to provide additional information about long-term career goals and the training needed to pursue proposed career paths. In actual practice, the scope and format of the career blueprint varied considerably among the STEM grantees and, in several cases, among local areas within one project. Two grantees adapted existing career planning tools to create their blueprints, which was less time-consuming than developing them from scratch. The other three grantees designed career blueprints specifically for the STEM project.

Brief Career Blueprints

Two projects (Massachusetts and Washington/Oregon) developed abbreviated one- or two-page formats for career blueprints. In both of these cases, the career blueprint was treated as a procedural requirement and served more as a service checklist for case managers than as a tool to support individual long-term career planning. This implementation of career blueprints could be considered appropriate given the circumstances: STEM project staff in both Massachusetts and Washington/Oregon found that dislocated workers were so focused on finding new jobs as soon as possible that they were usually not interested in long-term career planning. In addition, customers in Washington/Oregon had usually completed individual assessments by the time they were referred to the STEM coach and already knew what type of training and career they wanted.

Comprehensive Career Blueprints

The remaining three projects developed more comprehensive career blueprints that were intended to support meaningful long-term career planning processes. In the STEM projects in Indiana and Connecticut, the career blueprint process was embedded within the online STEM system (see “Centers of Excellence” above). In these projects, completion of a career blueprint was an elaborate procedure that could take several hours for a participant to complete. The online systems allowed participants to inventory their skills and experience, review available resources, and, based on the results from these initial stages of career exploration, develop career blueprints. Connecticut’s STEM Jobs online system allowed career blueprints to feed into an e-portfolio and link to a resume database searchable by employers.

In Texas, the paper-and-pencil career blueprint process was developed by the lead STEM coach for use with both youth and adults, but found its greatest champion in a local WIB that focused on serving youth with its STEM grant funding. As in Indiana and Connecticut, individuals typically began by completing career and occupational interest and skills inventories. In follow-up exercises, customers were asked to research training providers or employers, write responses to a series of questions, develop brief essays detailing their chosen careers, and summarize *relevant training plans, including how training would be financed.

Summary of Key Findings

As summarized below, STEM coaches, mentoring, Centers of Excellence, and career blueprints were implemented in the STEM projects with mixed success. Of the four elements, the STEM coaches feature was viewed as the most essential; it was also the one given universal support and emphasis. Virtual STEM Centers of Excellence had great potential but did not generate as many users as the projects that invested in creating them had hoped. Career blueprints and mentoring were seen as useful primarily for youth and for new labor market entrants.

STEM Coaches

Customers appreciated both the information about STEM careers and the encouragement and support they received from their STEM coaches. Coaches understood STEM career pathways and were able to provide participants with career counseling about STEM jobs and STEM training. Overwhelmingly, participants indicated that coaches helped them to clarify their goals and to develop plans for finding STEM-related educational opportunities and jobs.

Although they were expected to help increase the capacity of the public workforce investment system to prepare customers for STEM careers, STEM coaches in practice often did not have the requisite authority or experience to effect systemic change throughout the STEM consortium. Because they were often relatively junior-level staff members, STEM coaches were not always able to wield significant influence among the directors in partner WIBs or with employers or employer associations. One project manager reflected that it might have been helpful to designate at least one STEM coach who was a more senior staff member.

Sharing the costs of the STEM coach staff position between STEM and other workforce initiatives was sometimes counter-productive. Although this arrangement was intended to leverage additional funding for staffing costs, it often prevented STEM coaches from devoting their full-time attention to STEM project responsibilities. Because American Job Center managers were contributing to the salaries of STEM coaches, they felt they could ask the STEM coaches to perform duties related to WIA eligibility, assessment, intake, data entry, and, in some cases, quality assurance or WIA reporting, in addition to their STEM project duties.

Mentoring

With one notable exception, mentoring programs did not emerge as an important part of the STEM services provided to customers in the demonstration projects. Although projects invested significant amounts of energy to try to get mentorship programs off the ground, they found it difficult to interest adult STEM customers in having mentors and difficult to convince business representatives to serve as mentors. Further, a variety of other adults not in formal mentor roles—science teachers, school counselors, STEM coaches, and internship work supervisors—

proved to be important sources of support and encouragement for in-school youth, thus fulfilling the mentor function for this target population.

Virtual Centers of Excellence

Virtual Centers of Excellence were not widely used by the general public or by STEM employers, although they did serve the important role of offering links to information about STEM education and training and job opportunities to individuals interested in STEM occupations.

Career Blueprints

The career blueprint process worked well with youth and newer entrants into the labor market, but was generally not helpful for people who already had clear career goals or who were focused on immediate re-employment. In most locations, career blueprints were never well integrated with participant assessments, plans, or case management tools and did not gain traction as a result. However, coaches in several projects described blueprints as useful tools for assisting dislocated workers at the initial stages of their client interactions. In addition, some Texas areas are considering using the longer-term perspective of career blueprints to refine and improve their IEP process for WIA youth.

IV. STEM SERVICES FOR ADULTS AND YOUTH

ETA's Solicitation for Grant Applications (SGA) for the STEM Initiative called for grant applicants to provide STEM project services to both adults and youth. The adults to be targeted included "incumbent workers who need skills upgrading" and "dislocated workers trying to find new jobs in industries with a future;" the youth to be targeted were those who were disadvantaged. Within both adults and youth, grantees were encouraged to recruit members of groups traditionally underrepresented in STEM fields. During the first grant year, most of the STEM grantees planned to respond to the mandate to serve youth without developing special youth services. They focused on designing services for dislocated workers and other adults, and indicated that they would enroll older disadvantaged youth[21] in the same services. However, as the projects evolved over time, four of the five STEM grantees did develop distinct strategies to reach out to disadvantaged youth and encourage them to pursue STEM careers (the project in Connecticut continued with its plan to serve older youth alongside adults). The services these four projects developed for and provided to youth were very different from those provided to adults.

Because four of the five projects ended up having youth-service components that were quite distinct from their suites of adult services, this chapter treats adult services separately from youth services. The services provided to adults are discussed first, and those provided to youth second. A summary of key findings is provided at the end of the chapter.

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[21] Under Section 127 (b)(2)(C), the Workforce Investment Act states that "the term 'disadvantaged youth' means an individual who is age 16 through 21 who received an income, or is a member of a family that received a total family income, that, in relation to family size, does not exceed the higher of-

(i) the poverty line; or

(ii) 70 percent of the lower living standard income level."

Services for Adults

All five STEM grantees initially planned to recruit workers new to STEM occupations and to focus on training participants for entry-level or mid-level positions in STEM industries. The onset of the recession caused the STEM projects to reassess dramatically both the needs of the workers they expected to serve and the services they planned to offer. By the time the STEM projects began enrolling participants in 2009, STEM employers were laying off workers rather than hiring new workers. Consequently, the projects had to switch gears to respond to the needs of the large number of dislocated workers who flooded the American Job Centers seeking assistance with reemployment in STEM-related jobs. In several regions, a number of these customers already had substantial training and experience in STEM fields. Many of these customers wanted relatively brief training that would help them find new jobs as soon as possible. Thus, the STEM projects found that they had to modify their service plans in order to meet the needs of a much broader range of customers. In particular, projects had to expand their training offerings to include shorter-term training designed to upgrade the skills of experienced STEM workers, as well as preparing new STEM workers for entry into STEM occupations.

As noted below, in three of the five projects, participants often received career counseling and job market information/job search support provided by the STEM coach as stand-alone services, without training. In these projects, a significant subset of all STEM participants had not enrolled in training by the time we collected project outcome data.

Projects varied in their targeting of different adult sub-groups. Two projects (Indiana and Washington/Oregon) served only dislocated workers; the remaining three projects (Connecticut, Massachusetts, and Texas) served both dislocated workers and other adults. A detailed description of the enrollment numbers and characteristics of adults served by the STEM projects is provided in Chapter V under "Enrollment and Characteristics of Project Participants."

Outreach and Orientation

Participants usually accessed STEM projects through referrals from American Job Center counselors, including WIA case managers. Although STEM coaches initially conducted outreach efforts to community colleges and other organizations to advertise the existence of the project, they soon found that the influx of American Job Center customers brought on by the recession generated a sufficient pool of prospective STEM project participants. Grantees that built online STEM Centers of Excellence had hoped that these websites would also serve as avenues for more potential participants to encounter and enroll in the STEM project. However, when grantees analyzed their online traffic, they discovered that it was uncommon for individuals to access their STEM websites without prior knowledge of or participation in the STEM initiative.

Most grantees arranged for STEM coaches or other American Job Center staff members to provide STEM project orientation sessions to prospective participants at the American Job Centers. These sessions either occurred as part of a general Job Center orientation or separately, for small groups of individuals who had already expressed interest in STEM fields.

Career Coaching and Guidance

STEM coaches provided career coaching and guidance to participants as a standard service component of the STEM project. As one of the four key features of the STEM projects, STEM coaches are discussed in detail in Chapter III. Among other topics, that chapter describes the many service-related roles that STEM coaches were called upon to play (see Exhibit III-1).

Prior to the STEM projects, case management staff members within the American Job Centers generally possessed little knowledge of STEM-related occupations. Hence, they lacked sufficient information to counsel customers about what types and levels of training employers looked for when hiring new workers. The primary benefit offered by the STEM coaches was that they could provide targeted information and guidance about employer demands and training requirements for STEM occupations in their respective regions. They were also able to conduct targeted employer outreach and establish relationships with firms that might be willing to hire STEM participants in the future.

STEM coaches met with participants to discuss their interests, experiences, and employment goals, and this information became the foundation for helping participants identify appropriate training opportunities. Some form of career blueprint was used during this process. As described in Chapter III, the STEM projects developed different formats for the career blueprints that they used to guide the career planning process. In some sites, the customer was required to initiate the career blueprint before he/she could set up a face-to-face meeting with the STEM coach; in other sites, the coach and the customer developed the career blueprint jointly during their first meeting.

Career guidance from the STEM coach was frequently praised by participants as the most valuable service received during their participation in the project. Participants reported that their STEM coaches not only understood how to guide them along STEM-related career pathways, but also provided critical moral support. For many dislocated workers this support was particularly important, because losing their jobs during the recession dealt a blow to their self-esteem and dampened their outlook for the future. One participant in the Connecticut project told us: "When you get laid off, it's devastating at first. [The coach] was great in that she gave me that boost that I needed to move forward." The encouragement and assistance available from the STEM coach was particularly appreciated by individuals who reported that their WIA case managers had only a limited understanding of STEM training and STEM-related jobs.

Training

Although training in STEM skills was intended to be the “effective ingredient” that would prepare project participants for new jobs in STEM occupations, not all individuals who were enrolled in the STEM projects participated in training. As shown in Exhibit IV-1, in Massachusetts, Connecticut, and Indiana over half of all enrolled participants had not entered training at the time data were submitted for the evaluation. In contrast, the Washington/Oregon and Texas projects enrolled nearly all of their participants in some type of training.

Exhibit IV-1:
Adult Participation in Training by Project

	CT STEM Jobs	STEM Works IN[a]	STEM Power MA[b]	Operation Workforce TX[c]	STEM Initiative WA/OR[d]	Total Across Projects
Percent of all enrollees who entered training	47%	37%	43%	99%	91%	53%
N	1,295	233	536	152	278	2,494

Source: Individual-level data submitted by grantees for the evaluation

[a] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[b] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[c] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[d] Data for STEM Initiative WA/OR are reported for two of the three participating WIBs except for "number of trainings entered," and "training duration," which contain data from only one WIB.

Furthermore, most of the STEM project managers found that they were short on funds to support training as the projects unfolded. Project planners had anticipated that they would be able to leverage training funds from other programs, such as the WIA Adult and Dislocated Worker Program. As a result, they had budgeted most of the STEM project resources to support staffing costs and had reserved smaller amounts of project funding to support training. Unfortunately, by the time the STEM projects were launched, the ARRA-funded training supplements for the WIA program had been nearly exhausted. This meant that many of the STEM projects found themselves in the undesirable position of trying to promote STEM training without having access to significant amounts of training funds.

Rather than developing new STEM courses to meet employer needs, the projects matched most participants to existing training opportunities, either by using individual training accounts (ITAs) with approved training providers under the WIA program, or by paying for STEM-related courses or workshops from public or private education/training institutions. As noted above, the costs of training were often shared between the STEM grant and the WIA program for individuals enrolled in both programs. The duration of the STEM training ranged in length from one day to two years. During the first year of operations, when ARRA funds were available to pay for WIA training, several projects were able to approve up to two years of training in a

STEM field. After the first year of project operations, after ARRA funds were exhausted and WIA training budgets became smaller, shorter-term training became more common.

The skills training provided by the STEM grantees varied from project to project and within projects in terms of the duration and intensity of the training and the breadth of the covered skill sets. Some training was designed to help participants develop STEM skills that could be applied in a wide variety of occupations or STEM sectors (e.g. computer programming or process management), while other types of training focused more narrowly on specific occupational settings (e.g. safety procedures for shale oil extraction workers). In this section, we describe the different types of training provided by the STEM Initiative grantees.

Exhibit IV-2 describes the different types of training offered across the five STEM projects. There were four major types of training: (1) classroom training, (2) special short-term workshops, (3) work-based training, and (4) customized training developed to meet the needs of specific employers.

Exhibit IV-2:
Types of STEM Training by Project

	CT STEM Jobs	STEM Works IN	STEM Power MA	Operation Workforce TX	STEM Initiative WA/OR
Referrals to Existing STEM Courses					
Training in Basic STEM Skills	X		X		X
Courses Leading to Certificates, Credentials, or Degrees	X	X	X	X	X
"Scholarships" for Existing College Students		X		X	
Special Training					
Brief Workshops	X	X	X	X	
Online Courses	X				
Work-based Training					
On-the-Job Training				X	X
Unpaid Work Experience		X	X	X	X
Customized Training					
Training for New Hires			X		X
Training for Incumbent Workers	X				

Source: Case study data collection

Classroom Training

As shown in Exhibit IV-1, the STEM projects provided access to classroom training in three different ways: offering training in basic STEM skills; referring participants to existing STEM courses leading to certificates, credentials or academic degrees; and providing scholarships for students already enrolled in college-level STEM degree programs.

Basic STEM Skills Training. Several projects supported skills training for individuals interested in STEM occupations who needed basic instruction in computer, math, and/or writing skills. For example, in some projects, STEM coaches referred dislocated workers who did not have previous experience working with computers to basic computer literacy classes offered through American Job Centers that provided instruction on fundamental skills such as using e-mail, conducting Internet searches, and using basic office computer programs like those in the Microsoft Office Suite. Completing these courses was an essential first step that many participants had to take before they could consider specific occupational skills training. The STEM project in Connecticut worked with three adult basic education providers to make community college STEM courses accessible to more students by developing "math academies" that prepared young adults as well as older individuals for the placement exam required in advance of enrollment in the state's community college system. Students needed to achieve a certain score on the exam in order to enroll in college-level STEM-related courses (as opposed to receiving a mandate to do remedial coursework).

Existing Classroom Training Courses and Programs. Many existing STEM courses were offered on a semester or quarter schedule. All five grantees referred adult participants to existing classroom training courses lasting at least three months (one academic quarter). The most common venues for these programs were community colleges, which offered a broad range of cost-effective programs. Most projects supported a wide range of training options, including courses leading to employer-recognized certificates or credentials and courses that were part of two-year degree programs. Most often, a combination of STEM project funds and WIA training funds were used to support this kind of STEM occupational skills training. Pell Grants were another important source of leveraged funding for training; in fact, individuals interested in training were usually required to apply for Pell Grants to supplement the training funds available from public workforce investment programs. Thus, most STEM coaches also worked to help participants interested in pursuing coursework or degree programs apply for community college courses and complete financial aid applications, even if WIA or STEM funding was not available to support training.

All but one project (in Washington/Oregon) also offered short-term occupational skills training lasting less than three months. Successful completion of a short-term course generally resulted in the award of a training certificate recognized by the employer community. The delivery of certificate-based training was intended to help participants market their skills to employers. Short-term course topics included computer numerical control (CNC), computer-aided design and drafting (AutoCAD), specialized machinery operation, welding, software programming, mobile application design, and shale oil production. This brief training was designed to assist two types of STEM participants—individuals preparing for entry-level occupations in STEM fields and individuals with prior experience in a STEM-related occupation needing to upgrade their skills.

Scholarships for STEM College Students. Three projects supported STEM training for students in 4-year degree programs, but only on rare occasions. One of the local workforce investment areas participating in the STEM project in Texas used its entire STEM training funds to award 22 $1,000 STEM "scholarships" each year to economically disadvantaged students who were already enrolled in local college or university degree programs in STEM fields.

Special Training: Brief Workshops and Self-paced Online Courses

To balance participants' training needs with their demands for immediate employment, four of the STEM grantees offered participants brief training workshops designed to develop specific skill sets and help participants enhance their resumes. These short-term training opportunities included workshops lasting between one day and one month in duration and self-paced online training courses.

Brief workshops—offered by the projects in Connecticut, Indiana, Massachusetts and Texas—generally provided industry-recognized certificates in relatively broad skill areas such as communication, leadership, management, and efficiency in production. These courses were often taken by individuals who were in the process of applying for employment. Completion of one of these courses was viewed as helping a participant document a very specific skill set that could be noted on his/her resume. Some STEM participants completed single workshops offered by the STEM project; others completed several.

Self-paced online training courses were used extensively by the STEM project in Connecticut. Because the project had not budgeted any funds for training (expecting to be able to leverage WIA funding), it had limited ability to pay for training. The project licensed a wide range of online courses from a proprietary training provider and offered STEM participants free 90-day licenses that they could use to complete as many courses as they desired during that period. Available training modules covered a wide range of topics, including computer skills, manufacturing skills, blueprint reading, measurement skills, and basic arithmetic. Project leaders believed this format was the most economical way to allow participants to study a number of different subjects at a fixed cost. Although most participants did not receive industry-recognized certificates for completing the online courses, they could receive such certificates by passing exams (or series of exams) offered at local testing centers.

Work-based Training

Two projects (Washington/Oregon and Texas) anticipated that on-the-job training (OJT) contracts would be useful for training and placing STEM project participants. However, managers from these projects reported that, as a result of the recession, most employers could not commit to contracts that required them to hire participants at the end of the OJT period. Although a small number of OJT contracts were used in these projects, OJTs did not account for a substantial proportion of the training provided. As an alternative to on-the-job training with a commitment to hire, four projects referred some participants to unpaid work-based training opportunities. These opportunities were particularly appealing to participants interested in entering STEM occupations that required on-the-job experience for all new hires.

Customized Training

Training for Potential New Hires. Despite the difficult economy, two projects (Washington/Oregon and Massachusetts) helped broker relationships between selected local employers and local educational institutions that were dedicated to the development of short-term courses tailored to the hiring needs of the participating employers. For example, in the STEM initiative in Washington and Oregon, a local community college worked with small and medium-sized local employers to design and implement a "Manufacturing Foundations Training Course" that covered foundational skills for entry-level jobs in machine manufacturing. These programs demonstrated the potential for the workforce system, training partners, the higher education system, and employers to work together to prepare workers for entry-level occupations in STEM fields.

Training for Incumbent Workers. As discussed in Chapter II, most projects found it difficult to establish partnerships with employers, because employers were typically not in the position to hire new employees. The STEM project in Connecticut decided to involve employers by reaching out to small and medium-sized STEM businesses with an offer to pay for training to upgrade the skills of their current workforces. Project staff members identified local businesses they believed might be willing to work with the project, and helped these businesses create customized trainings that would improve their employees' productivity. Training topics included welding, AutoCAD, mobile application design, and efficiency in manufacturing operations. Participant business owners were especially appreciative of the opportunity to enhance the skills of their workforce at little or no cost to the firm.

Data on Training Provided to STEM Participants

Exhibit IV-3 provides information on the average number of separate courses entered and the duration of the training period for participants enrolled in each project. In four of the five projects, the bulk of participants enrolled in only one training program. However, in Connecticut, over one-third of participants were enrolled in more than one training program.

Many of these offerings were technology-based training options provided by the grantee under a license with a proprietary provider. Participants of the Connecticut program also tended to be enrolled in shorter training programs than participants in the other projects; half of them enrolled in trainings that lasted four weeks or less, while the majority of participants in the other projects enrolled in training that lasted at least three months.

Exhibit IV-3:
STEM Training Characteristics by Project[a]

	CT STEM Jobs	STEM Works IN	STEM Power MA[b]	Operation Workforce TX[c]	STEM Initiative WA/OR[d]	Total Across Projects
Number of trainings entered						
One	62%	100%	94%	100%	98%	81%
Two or More	38%	n/a	6%	n/a	2%	19%
N	603	86	228	150	241	1,308
Training duration for all completed trainings[e]						
1 week or less	47%	n/a	4%	1%	2%	16%
2 to 4 weeks	9%	n/a	15%	11%	0%	9%
1 to 2 months	3%	n/a	31%	25%	39%	24%
3 to 6 months	23%	n/a	40%	33%	32%	32%
Over 6 months	28%	n/a	16%	30%	38%	26%
Mean (in days)	99	n/a	110	134	171	128
Median (in days)	30	n/a	66	85	84	72
N	257	n/a	218	150	236	861

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages may not total 100% due to rounding.

[b] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[c] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[d] Data for STEM Initiative WA/OR are reported for two of the three participating WIBs except for "number of trainings entered," and "training duration," which contain data from only one WIB.

[e] Includes completed trainings only. The percentages presented are for participants in each category. Please note that because some participants engaged in more than one training program, particularly in Connecticut, there may be multiple responses and the percentages may not total 100%. For CT STEM Jobs, "training duration" does not include the technology-based learning program because there is no information available on the duration of these self-paced courses.

Exhibit IV-4 shows the different content of the training programs in which participants were enrolled, classified into fields of study by using the Classification of Instructional Programs (CIP) codes. Across all projects, computer and information sciences proved to be a popular training field, with nearly all of the Indiana participants engaged in this type of training. In Connecticut, over half of the project's participants were enrolled in an engineering-related field of study. In both Washington/Oregon and Texas, precision production (defined as manufacturing that requires skilled human labor) was the most commonly studied field (34 percent for each grantee). In Massachusetts, a sizeable percentage (41 percent) of participants studied courses that fell into the category of "business management and marketing."

Exhibit IV-4
STEM Training CIP Classifications by Project[a]

	CT STEM Jobs[b]	STEM Works IN[c]	STEM Power MA[d]	Operation Workforce TX[e]	STEM Initiative WA/OR[f]	Total Across Projects
Computer and Information Sciences	12%	94%	24%	5%	16%	28%
Engineering-Related Fields	56%	--	16%	5%	--	25%
Business Management and Marketing	5%	--	41%	9%	3%	20%
Precision Production	--	--	5%	34%	34%	18%
Construction Trades	5%	--	3%	5%	23%	10%
Biological and Biomedical Sciences	9%	--	--	7%	2%	5%
Engineering	2%		2%	14%		4%
Mechanic and Repair Technicians	8%	--	--	--	5%	4%
Communications Technologies/ Technicians and Support Services	--	6%	3%	--	2%	3%
Health Professions	--	--	--	13%[g]	--	3%
Basic Skills and Developmental/Remedial Education	--	--	4%	--	--	2%
Natural Resources and Conservation	--	--	2%	--	4%	2%
Social Sciences	--	--	--	--	8%	2%

Transportation and Materials Moving	--	--	2%	5%	--	2%
Architecture and Related Services	2%	--	--	--	--	1%
Communications, Journalism, and Related Services	--	--	2%	--	--	1%
N	319	85	211	149	252	794

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages may not total 100% due to rounding and small cell sizes (fewer than 3) being excluded. The percentages presented are for participants in each category. Please note that some participants engaged in more than one training program, thus, there may be multiple response and the percentages may not total 100%.

[b] CIP data for CT STEM Jobs does not include the technology-based learning programs provided by the grantee.

[c] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[d] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[e] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[f] Data for STEM Initiative WA/OR are reported for two of the three participating WIBs.

[g] Although ETA clarified to this grantee that health care training was not allowable under the STEM Initiative grant, some of the early participants who attended training in a health care field may not have been purged from the STEM project database.

Job Search Support and Ongoing Case Management

Beyond career guidance and referrals to training, STEM coaches also provided support with job search and placement as part of the ongoing case management provided to each participant. As STEM participants completed training, coaches worked with them to help navigate the job search and application process. Project staff reported that many participants had not recently engaged in a job search and were not comfortable with various tasks such as developing resumes, searching for jobs online, interviewing, and applying for jobs online. In addition to preparing participants for the job search process, coaches also worked with them to develop job readiness skills. For example, coaches in the Massachusetts project explained that their younger customers often needed to be instructed about the behaviors that were necessary for retaining employment, such as wearing proper workplace attire, being consistently prompt, and addressing coworkers and supervisors appropriately.

Services for Youth

As noted above, four of the five STEM grantees developed service strategies for disadvantaged youth that were entirely distinct from those for their adult customers. These four grantees were those in Indiana, Texas, Massachusetts, and Washington/Oregon. The STEM project in Connecticut served older youth along with adults and did not develop any STEM project activities specifically for youth.

Many of the STEM grantees developed multiple service approaches to serve disadvantaged youth. In addition, the youth-focused activities often varied from one local workforce investment area to another, even within the same grantee. The diverse menu of STEM activities targeting youth was a response to the wide spectrum of youth participants and their varying needs. Some projects attracted college-bound youth whereas other programs appealed to youth interested in shorter or less academically oriented pathways to employment. Distinct services were usually developed for in-school youth and out-of-school youth. Several projects reached out to particular sub-groups of youth, such as incarcerated youth. When mapping the spectrum of youth participants to the diverse menu of youth activities, certain patterns emerge. Activities designed for in-school youth emphasized career exploration and encouraged continuation in STEM coursework and enrollment in STEM-related post-secondary education or training as the desired outcomes. Activities designed for out-of-school youth emphasized delivery of occupational skills training with placement into an entry-level STEM job as the desired first step of a planned career pathway.

In some local workforce investment areas, the youth service component of the STEM project was operated by an organizational entity that was distinct from the adult service provider. In other local sites, the same project staff members operated youth and adult services.

A detailed description of the enrollment numbers and characteristics of youth served by the STEM projects is provided in Chapter V under "Enrollment and Characteristics of Project Participants."[22]

Services for In-School Youth

As they strategized about how to expand the pipeline of STEM workers, most STEM project partnerships recognized the importance of getting more students interested in STEM subjects as early as possible in their school careers. The services for in-school youth were most often targeted to youth who were high school juniors or seniors. A few projects also reached out to younger students. In some sites, projects developed services to reach out to youth who had not

22 Data specific to youth served were not available from the STEMPower project in Massachusetts or Operation Workforce in Texas. Therefore, while the discussions of youth services in this chapter are based on findings from all four projects with distinct youth services, the reporting of quantitative information in Chapter V is limited to data from the projects in Indiana and Washington/Oregon.

previously indicated an interest in STEM coursework. In other sites, activities targeted youth enrolled in high schools with a STEM-related vocational focus or students who had already indicated that they wanted to pursue STEM-related careers. The STEM project in Indiana enrolled some high school students who were already taking STEM-related community college courses on a dual-enrollment basis. Three different types of activities were directed to in-school youth: career exploration activities, work-based STEM internships, and services designed to help students pursue STEM education or training as they bridged the transition from high school to post-secondary studies. Below we describe each of these activities.

Career Awareness Activities

Three of the five projects (Massachusetts, Washington/Oregon, and Texas) worked with STEM project partners to develop short-term, engaging, stand-alone activities—for the classroom or for field trips or after school—to increase student interest in and awareness of STEM careers. These activities were targeted to students in schools that had a high proportion of students from low-income households. STEM projects relied heavily on participation by key partners—including local school districts, high schools, and interested teachers, as well as WIA youth providers—to develop and implement these activities. In most projects, the STEM coaches served primarily as coordinators of these activities, rather than as the actual service providers.

Below are a few examples of the career-awareness activities promoted by the STEM projects. The project profiles in Appendix B provide additional detail about specific activities.

- In one of the local workforce investment areas that participated in the Texas project, the STEM project initiated a "STEM challenge" for all local high school students, in which teams of students were invited to develop business proposals for products that solved critical social problems.
- In Massachusetts, one of the local WIBs worked with its local partners to establish an after-school STEM Club.
- By working with MassMEP, a manufacturing extension program funded by the U.S. Department of Commerce, the STEM project in Massachusetts was able to provide interactive workshops that introduced more than 2,000 high school students to advanced manufacturing skills.
- The STEM project in Washington/Oregon developed an intensive "STEM Institute" for a group of high school students from high schools throughout the local workforce investment area. This two-day program took youth to a nearby national park and included a number of hands-on lessons and activities that connected youth with local businesses and postsecondary institutions and provided opportunities to explore STEM-related careers.

All of these activities were intended to increase student interest around STEM studies and STEM career paths. Although they were viewed as important STEM project activities, the youth who participated in them were not formally enrolled as STEM project participants, in part because the projects were relatively brief. To provide information to ETA about these activities, projects counted them as "capacity building contacts." Although the projects were not able to track outcomes for youth who participated in these activities, anecdotal evidence from teachers and students suggests that the activities were sometimes effective in increasing student interest in STEM courses. The STEM coach at one project shared the following statement from a student who had been on a fieldtrip to a local manufacturing plant: "You know, I've been taking AP Physics and I was thinking that a lot of it I wasn't going to use it later on. But now that I've seen how you use modeling and simulation and everything is based on physics, I really want to do well in physics." The STEM coach explained: "That's really at the root of what I want to do—[help students make] that connection between what they're studying and what they're challenging themselves to do, [while they are] in high school."

Work-based Internships

STEM coaches at two of the five projects (Massachusetts, Washington/Oregon) worked closely with local employers to develop internship opportunities that targeted high school students. The *STEM Initiative* in Washington and Oregon had the most extensive internship component. The STEM coach in one of the local workforce investment areas devoted much of his time to developing and guiding the STEM internships. By developing strong partnerships with school districts and individual school guidance counselors, the coach arranged for 135 low-income high school students from 14 different high schools to complete 90-hour STEM internships during the 2009–2010 and 2010–2011 school years. The Washington and Oregon project enrolled youth who participated in the internship component as STEM project participants. The STEM project in Massachusetts developed work-based internships on a smaller scale by placing a group of high school juniors and seniors from one of the participating local workforce investment areas into internship positions at the local public electric utility. Massachusetts did not officially enroll these in-school youth in its STEM project.

In addition to providing youth with first-hand experience of STEM occupations, the internships often resulted in the development of supportive relationships between youth and their work supervisors in which the supervisors were able to provide to the youth valuable information and advice about STEM education and careers. In a few cases, internships helped youth obtain part-time or full-time jobs with the same companies after the end of the internships.

Services to Help In-School Youth Transition to STEM-related Post-secondary Education

Four STEM projects developed services to help high school students transition to STEM-related post-secondary education. Below are some examples of this particular strategy. The project profiles in Appendix B provide additional detail about specific activities.

- In two projects (Washington/Oregon and Massachusetts), the STEM coaches counseled high school students about STEM post-secondary education and training options and college applications. At one of these projects, the coaches also counseled community college students about transferring to programs in the sciences at four-year colleges. Unless they also received other more intensive services, these youth were not generally enrolled in the STEM project.
- One project (Indiana) recruited and enrolled high school students from low-income neighborhoods and provided them with an integrated package of intensive services. The objective of this grant component was to help youth who were interested in STEM fields graduate from high school and progress to post-secondary STEM education or training. Over the course of the grant period, these youth received mentoring, education and career counseling, and academic tutoring. The grant also paid for STEM-related courses in which participants enrolled while they attended high school and immediately after high-school graduation.
- One project (Texas) collaborated with a local college to develop a new STEM component of a summer program held at the college campus. The purpose of this program was to help encourage first-generation college goers and other low-income youth to attend college by providing them with college-level classes and exposure to a college environment.

As the STEM projects matured, the STEM grantees that had enrolled in-school youth became aware of some of the difficulties associated with tracking in-school youth and documenting the desired outcomes. For instance, measureable outcomes were less likely to occur before the end of the three-year grant period. Moreover, in-school youth were less likely than adults to enter employment upon exiting the project.

Services for Out-of-School and Incarcerated Youth

Four of the five STEM grantees served out-of-school youth alongside adults and dislocated workers when those youth sought services from American Job Centers. In addition, two projects (in Indiana and Texas) made a special effort to recruit disadvantaged out-of-school youth for enrollment in the STEM project by developing referral linkages with other youth programs, such as Youth Opportunity, Youth Build, and Upward Bound. In addition to recruiting out-of-school youth in the local community, two of the STEM projects (in Massachusetts and Washington/Oregon) worked with the juvenile justice system to provide STEM activities to incarcerated youth.

The services provided to out-of-school youth and incarcerated youth tended to be short-term vocational training programs leading to employer-recognized certificates in a STEM field, as described below.

- One of the local workforce investment boards participating in the STEM project in Washington/Oregon provided training in metalworking and woodworking to youth incarcerated in two juvenile justice facilities using a combination of online instruction and hands-on practice with tool kits.

- A STEM partner in another local workforce investment area in Washington/Oregon developed a curriculum to teach foundational skills for machine manufacturing to high-school students. This curriculum was ultimately offered to both youth and adults to prepare students for entry-level manufacturing jobs.
- As part of the STEM project in Massachusetts, American Job Center staff members provided STEM career orientations to incarcerated youth.

In general, STEM project staff members reported that they found it difficult to recruit and serve out-of-school youth, because they were harder to identify and less likely to have the basic math skills necessary to enter in STEM related training. The STEM project in Indiana, for example, was not able to reach its goal of enrolling 30 out-of-school youth for its youth services component. In addition to recruitment challenges, two STEM projects found it hard to contact incarcerated youth after their release to a community setting in order to document outcomes and provide follow-up assistance, even though follow-up contact about next steps (additional training or job search support) might be most crucial for such youth.

Summary of Key Findings

The menu of services provided by the STEM projects evolved to respond to the needs of dislocated customers affected by the recession, many of whom already had some training and experience in STEM fields. In particular, projects had to make more short-term training options available in order to meet the needs of dislocated workers who wanted to return to work as soon as possible. Below we summarize the key findings, first for adult services, and then for youth services. No single model for effective STEM training emerged from the experiences of the STEM grantees, because they served a wide variety of types of participants and provided many different types of training.

Adult Services

Career counseling and case management played an important role in the STEM projects. In several projects, career guidance from the STEM coach was a stand-alone service received by a significant portion of all project enrollees. Participants appreciated STEM coaches as valuable sources of information and one-on-one support. Throughout the three rounds of site visits, participants indicated that coaches' moral support and individual attention was invaluable. Participants also valued the coaches' specialized knowledge about the local STEM job market, the skills and experience required for particular jobs, and options for training.

Projects had to identify cost-effective training options. For various reasons, funds available for training proved to be more limited than expected. ARRA supplements to WIA funding were exhausted early; expected leveraging opportunities did not pan out; grant funds had to be directed toward staffing costs and implementation of the four required key STEM features; recession-stressed employers had no interest in helping to pay for training. The cost-effective training options included short-term training options and technology-based training.

Productive training partnerships with employer groups and local educational institutions were important to ensure that participants were prepared for the available jobs. Although several of the STEM projects had difficulty developing relationships with employers for the design and delivery of training, three projects developed relationships with employer groups and local educational institutions that allowed them to establish productive training partnerships. The projects in Massachusetts and Washington/Oregon created training programs customized to the needs of specific employers that were designed to prepare participants for entry-level positions in advanced manufacturing. Training incumbent workers emerged as a successful project activity in the project in Connecticut.

The fields in which STEM participants received occupational skills training covered a wide range of occupations and industries, with training opportunities for workers with less formal education (e.g., mechanic skills, basic manufacturing production and construction skills) to occupations for more highly educated workers (engineering and business management training). Information technology was the most common training field overall, perhaps as an indication that computer skills are relevant to workers in a wide variety of industries and occupations. Further, training in information technology was widely available, and individuals could often enroll in a number of short-term courses leading to certification in specialized areas linked to clear employment opportunities.

Youth Services

The STEM projects developed a wide variety of youth-related activities to provide age-appropriate and skills-appropriate content to youth of different ages and in different circumstances. The variety of activities enabled them to reach out to youth in middle school, to work with high-school juniors and seniors to promote STEM careers, and to support students in making the transition from secondary to post-secondary education and training.

Across the STEM projects, strong partnerships were the cornerstone for the successful design and implementation of youth services. These partnerships—with community based organizations, school districts and educational institutions, and employers—proved to be invaluable for recruiting and serving youth participants and for leveraging expertise in youth services and funding. The STEM grantees did not have the capacity to develop project activities for youth in every local workforce investment area. By coordinating with existing youth providers and adapting their activities, they were able to infuse STEM content into existing youth activities.

Most out-of-school youth received services alongside adults and dislocated workers. However, two projects identified incarcerated youth as an important underserved group that might benefit from learning skills that would help them find entry-level jobs in STEM-related industries.

V. OUTCOMES

The goal of the STEM Initiative was to see that participants were able to obtain and retain employment in well-paying jobs in STEM-related occupations. To support this goal, the STEM projects provided training and related services to build STEM skills. To understand how well projects used training and other services to achieve their employment goals, it is important to look at the projects' success in enrolling the expected number of participants, the extent to which participants entered and completed training, and participants' success in securing STEM-related employment. This chapter presents data on these and other related outcomes. It also presents data on the characteristics of STEM participants, which are helpful for understanding and interpreting the other outcome data.

Limitations of Project Data for Cross-Site Analysis

This chapter analyzes STEM outcomes using individual-level data provided to SPR by each of the projects. These data are used instead of the data reported to ETA on the Quarterly Progress Reports (QPRs), because the QPR data were submitted only in the aggregate. In addition, as described in Chapter II, the projects faced some challenges in reporting data on the QPRs. Namely, they were not able to differentiate between youth and adult participants and confusion about the definitions of QPR reporting categories caused some difficulties in reporting employment outcomes. While the evaluation data have some limitations themselves, their relative richness allows for a more in-depth analysis of project outcomes.

Generally, the individual-level data provided by the projects were fairly comprehensive and included information on participant characteristics, training programs entered and completed, and employment outcomes. However, SPR is aware of various factors that should be taken into account when interpreting these data and using them to draw conclusions.[23] First, the quality of the data may vary depending on how well individual staff members were trained on data collection and reporting tasks. Although individual STEM coaches were responsible for

[23] Please see the earlier section on "Data Collection and Reporting Responsibilities" on page II-8 for an in-depth discussion of the challenges involved in collecting data for the evaluation.

recording project data, they did not all receive detailed training on data collection and reporting practices. Different coaches used different data collection practices and grantees found it difficult to standardize and monitor coaches' data collection. This issue was exacerbated by the fact that a variety of different spreadsheets and data systems were used in different local areas within some projects. In addition, some grantees experienced significant turnover in STEM coaches. New staff members did not necessarily enter data in the same ways as previous staff members and may not have received adequate training on data entry. As emphasized by the project manager of the WA/OR project, "the quality of the data is dependent on how the coaches enter the data."

Second, a few of the grantees submitted individual-level data to SPR that were limited in some way:

- The Massachusetts project was unable to extract and submit information about participants' characteristics, such as demographic information, veteran and disability status, and employment status at enrollment. In addition, the project did not clearly differentiate between enrollees over the age of 18 and participants less than 18 years of age, so all the participants are lumped together regardless of age and presented as adults.
- The Washington/Oregon project could only supply participant-level data for two of the project's three participating WIBs. Additionally, the two WIBs did not capture exactly the same data elements, so there is some variation in what data elements are available for each WIB.
- Because it initially enrolled some project participants in health care related training, which was not an allowable use of the funds, the Texas STEM project received approval from ETA to "backfill" the project with individuals who were already enrolled in training in STEM-related fields under WIA. In this report, we have summarized data only for the subset of individuals who were coded in the MIS as official STEM project participants.[24]
- Even though several projects may have served incumbent workers, only one project identified participants who were employed at program entry in the outcome data they supplied to us. Thus, some individuals who were employed at the time of enrollment may be included in employment measures that are designed to measure outcomes for participants who were unemployed or anticipating unemployment at the time of enrollment.

Finally, two of the projects—Connecticut and Massachusetts—were still operating at the time data were collected for the evaluation, so the data for these projects do not capture final project outcomes.

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[24] Please note that, as a result, there is a significant difference between the number of participants reported in the Operation Workforce Texas 12/31/11 quarterly progress report and the evaluation data reported in this chapter (1,461 versus 152 participants).

Enrollment and Participation

Enrollment outcomes—such as the number of participants enrolled relative to the number targeted for enrollment—are important measures in themselves. Participation outcomes like the duration of enrollment and the length of time between completion of training and program exit also serve the purpose of helping to frame the employment outcomes of STEM participants. Even more helpful in this regard are data on the characteristics of enrolled participants, included at the end of this section.

Enrollment Data

Each project made its own decision about when to enroll individuals in the STEM project. Essentially, projects differed on where to draw the line between the use of pre-enrollment informational resources and official participation in projects. Because the protocol for enrollment was not consistent across projects, it is difficult to compare enrollment outcomes across projects.

Exhibit V-1 summarizes the decisions that different projects made about when to enroll participants. For adults, three projects identified the first individual meeting with a STEM coach as the point of service that defined project enrollment. However, one of these projects later went through its log of enrolled customers and eliminated customers who had completed a project enrollment form at their first meeting with the STEM coach but who had not subsequently received any additional services. As noted in Exhibit V-1, some projects enrolled only individuals interested in training, while others enrolled a broader group of individuals who wanted career counseling on STEM occupations.

ETA provided further guidance to projects on when to enroll project participants, by saying that adults or youth who received only a career exploration experience should be counted as capacity-building contacts, rather than being officially enrolled in the project.

Exhibit V-1:
Record-Keeping Practices: Point of Enrollment by Project

STEM Project	Point of Enrollment
Connecticut *STEM JOBS*	Unemployed adults were generally enrolled after they had gone through the STEM orientation, met with a STEM coach in-person, and filled out a CT STEM Jobs enrollment form. There were some exceptions to this procedure for dislocated workers, who could be enrolled in the project after meeting with a WIA case manager. Incumbent workers were enrolled after their employer made arrangements for workers to receive project-funded training. *Individuals did not have to be in training to be enrolled in this project.*
Indiana *STEM Works*	Youth were enrolled after completing a career and interest assessment and meeting with a STEM Advisor. "Existing dislocated worker customers" were enrolled after beginning WIA training. "New dislocated worker customers" were enrolled after expressing an interest in STEM training. *STEM Works enrollees had to be WIA-eligible and were all co-enrolled in WIA.*
Massachusetts *STEMPower*	Adults were enrolled after meeting with a STEM coach. Youth receiving STEM career orientations were not enrolled, but were counted in capacity-building outcomes. *Individuals did not have to be in training to be enrolled in this project.*
Texas *Operation Workforce*	Adults and youth were enrolled after being assisted by a STEM coach.
Washington/Oregon *Northern Willamette STEM Initiative*	Individuals were enrolled after meeting with the STEM coach and completing assessments (the enrollment decision was made by the STEM coach and customer together; enrollment was limited to those planning to enroll in training.) *Only participants in training were enrolled in the project.*

Note: The definition of "active CT STEM Jobs client" was adjusted during 2nd Quarter 2010 to remove clients that had registered but upon closer review had not connected with a STEM coach or received any significant level of services.

Enrollment Outcomes

One measure of a projects' success in implementation and execution is its ability to serve the number of participants that it had originally predicted it would serve in its grant proposal. Exhibit V-2 summarizes the enrollment targets and outcomes for adult STEM participants across all five projects. According to the data collected for the evaluation, the Massachusetts and Connecticut projects exceeded their enrollment expectations for adults. Although the evaluation data indicate that the Indiana project had enrolled just over half of the targeted adults at the time the project submitted its data, there is a chance the project will have met these targets by time it concludes operations. Evaluation data for the Washington/Oregon project indicate that the project met about 80 percent of its enrollment goal; however, the evaluation data are missing information from one of the participating WIBs, thus under-representing actual enrollments. The

Texas project reported meeting only about one-third of its enrollment goal for adult participants, although it enrolled the greatest total number of participants.

Exhibit V-2:
Adult Enrollment by Project

	Target	Number Enrolled[a]	Enrollment as % of Target
Connecticut *STEM JOBS*[b]	1000[b]	1,263	126%
Indiana *STEM Works*[c]	400	233	58%
Massachusetts *STEMPower*[d]	300	536	179%
Texas *Operation Workforce*	4,333	1,461	34%
Washington/Oregon *Northern Willamette STEM Initiative*[e]	350	285	81%

[a] Data for the evaluation were submitted from CT STEM Jobs in April 2012; and from STEM Power MA, STEM Works IN, and STEM Initiative WA/OR in June 2012. For Operation Workforce TX, we have reported the number of enrollees from the 12/31/11 QPR, because only 152 individuals in the individual-level data provided for the evaluation were coded as having received activities funded by the STEM project.

[b] Note: CT STEM JOBS did not establish separate enrollment targets for adults and youth.

[c] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[d] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[e] For STEM Initiative WA/OR, enrollment information is only available for two WIBs of the three that participated in the project.

Exhibit V-3 displays more information about projects' enrollment outcomes: the percentage of participants who had exited each program by the time we collected the evaluation data in May and June of 2012, the mean duration of enrollment in the program, and the mean time elapsed between completion of training and exit. By the time projects submitted data for the evaluation, three had exited the majority of their participants. The other two projects (Connecticut and Indiana) received extensions to continue operating their programs until the end of September 2012 and December 2012, respectively. Participants in the Massachusetts project had the longest training programs (411 days on average) and were retained in the program the longest following

Exhibit V-3:
Measures of Adult Participation by Project[a]

	CT STEM Jobs	STEM Works IN[b]	STEM Power MA[c]	Operation Workforce TX[d]	STEM Initiative WA/OR[e]	Total
Exiters						
Percent of all enrolled adults who had exited project at the time outcome data were collected	45%	64%	96%	82%	99%	71%
Mean duration of enrollment in days for program exiters	95	283	411	220	394	272
N	570	150	512	124	281	1,637
Exiters who completed training						
Mean time elapsed in days between training completion and exit	37	n/a	304	45	187	171
N	123	n/a	212	122	240	697

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages *may not total 100% due to rounding.*

[b] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[c] For STEMPower MA, training information for adults may include some participants who were under 18 years of age

[d] In this and all subsequent exhibits in this chapter, we present data only for the 152 individuals whose activities were coded as STEM-funded in the database provided by the grantee. Due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[e] For STEM Initiative WA/OR, enrollment information is only available for two WIBs of the three, except for "Time Elapsed between Training Completion and Exit," for which data are only available for one WIB.

"n/a" denotes data not available.

the completion of their training programs (304 days on average). Connecticut participants were enrolled for the shortest duration (95 days on average) and were retained after training for the shortest period (37 days on average).[25] The programs that kept participants enrolled for longer periods after training may have retained these participants in an effort to provide them services until they secured employment.

As described in Chapter IV, several projects also had distinctive youth services strategies and served a number of youth participants. Two of the projects reported on youth STEM participants separately from adult participants; Exhibit V-4 summarizes their enrollment of youth. According to the evaluation data, the Indiana project exceeded its enrollment targets for youth (148 percent of the target). The Washington/Oregon project did not meet its enrollment for youth. However, because the project was not able to provide individual-level data for one of the participating WIBs, the outcome findings presented here undercount actual enrollments.

Exhibit V-4:
Youth Enrollment by Project

	Target	Number Enrolled[a]	Enrollment as % of Target
Indiana *STEM Works*	100	148	148%
Washington/Oregon *Northern Willamette STEM Initiative*[1]	500	223	45%

Source: Individual-level data submitted by grantees for the evaluation

[a] For STEM Initiative WA/OR, evaluation outcomes enrollment information is only available for two WIBs of the three. Thus, the actual number of youth enrolled is undercounted.

As shown in Exhibit V-5, most youth participants in the Indiana and Washington/Oregon projects had exited their programs at the time data were submitted for the evaluation. The two projects both kept their youth participants enrolled for long periods—296 days on average in Indiana and 323 days in Washington/Oregon. For both projects, the average youth enrollee remained in the project for a slightly shorter period than did the average adult enrollee.

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[25] In the project in Connecticut, the short duration of participation after training completion may have been influenced by the fact that some of the participants were incumbent workers who could exit the program as soon as training was completed, because they were already employed.

Exhibit V-5:
Measures of Youth Participation by Project[a]

	STEM Works IN	STEM Initiative WA/OR[b]
Exiters		
Percent of all enrolled youth who had exited project at the time outcome data were collected	93%	83%
N	148	223
Mean duration of enrollment in days for youth exiters	296	323
N	137	185

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages may not total 100% due to rounding.

[b] For STEM Initiative WA/OR, enrollment information is only available for two WIBs of the three.

Demographic Characteristics of Participants

Demographic characteristics of adult and youth STEM participants across projects are presented in Exhibits V-6 and V-7. These data give some context to the enrollment data reported above and the employment data reported in the following section.

As shown in Exhibit V-6, the typical adult participant in all of the projects was male and unemployed at enrollment. Relatively few participants were veterans or persons with disabilities. The projects in Massachusetts served mostly White participants. Nearly all of Texas's participants (99 percent) were identified as Hispanic/Latino. Indiana served similar numbers of White and Black/African American participants (51 and 44 percent, respectively). The Connecticut and Washington/Oregon programs served participants from a variety of different racial/ethnic backgrounds. The average age of participants across four of the five projects was early to late-forties. The Texas project tended to serve younger participants; the average age of its participants was 26.

Exhibit V-6:
Demographic Characteristics of Adult STEM Participants by Project[a]

	CT STEM Jobs	STEM Works IN[b]	STEM Power MA[c]	Operation Workforce TX[d]	STEM Initiative WA/OR[e]	Total
Gender						
Male	60%	74%	81%	50%	67%	60%
Female	40%	26%	19%	50%	33%	40%
N	1,264	233	464	1,461	285	3,707
Race/Ethnicity[f]						
Hispanic/Latino	11%	2%	7%	99%	16%	53%
Amer. Indian/ Alaska Native	<1%	n/a	n/a	1%	n/a	1%
Asian	6%	2%	2%	1%	11%	3%
Black/African American	20%	44%	6%	1%	4%	9%
Hawaiian/ Pacific Islander	<1%	<1%	<1%	<1%	<1%	<1%
White	64%	51%	83%	4%	62%	36%
More than One Race	<1%	n/a	2%	10%	4%	6%
N	554	233	463	1,461	279	2,990
Veteran						
Veterans as percent of all enrollees	4%	18%	15%	1%	9%	6%
N	641	233	465	1,461	285	3,085
Individuals with Disabilities						
Individuals with disabilities as percent of all enrollees	3%	5%	<1%	1%	2%	2%
N	641	233	465	1,461	285	3,085
Age at Enrollment						
Average age in years	48	42	n/a	26	44	42
N	282	233	n/a	152	247	914
Employment Status at Enrollment						

Unemployed	83%	95%	n/a	82%	90%	86%
Employed	17%	5%	n/a	18%	10%	14%
N	828	233	n/a	152	256	1,469

Source: Individual-level data submitted by grantees for the evaluation, unless otherwise noted

"n/a" denotes data not available

[a] Percentages may not total 100% due to rounding.

[b] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[c] Demographic data for STEM Power MA are from the 12/31/11 Form 9134 because the project could not provide SPR with participant-level data on participant characteristics.

[d] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group. Data on "gender," "race/ethnicity," "veterans," and "individuals with disabilities" were were obtained from the 12/31/11Form 9134 (which was based on a much larger number of participant records).

[e] Data for STEM Initiative in Washington/Oregon are reported for two of the three participating WIBs except for "employment status," which includes data from only one WIB.

[f] Race/Ethnicity" categories were not mutually exclusive for CT STEM Jobs and STEM Works IN (that is, an individual could be identified as belonging to multiple categories). Thus, in these sites, the percentages may add to more than 100%. In STEM Power MA, Operation Workforce TX, and STEM Initiative WA/OR, "Race/Ethnicity" categories were mutually exclusive (individuals could be identified with only one category), except for "Hispanic/Latino," which could be selected in conjunction with another category.

"n/a" denotes data not available.

Exhibit V-7 provides demographic information on the youth served by two of the projects that had unique services for youth—Indiana and Washington/Oregon.[26] In the Indiana project, most of the participants served were Black/African American males. The Washington/Oregon project served about equal numbers of males and females, with most of the participants of Caucasian background. The average age of youth participants in each of the projects was similar (approximately 17 years old). The high-school age youth participants in the Washington/Oregon project were typically either in the 9th or 12th grade, with many fewer second- and third-year students enrolled.[27] About 13 percent of Indiana's youth participants reported that they were employed at program enrollment.

[26] Youth-specific data were not available from the STEMPower MA and Operation Workforce TX projects.

[27] As described in the individual project profile for the project in Washington and Oregon in Chapter III, this project operated several activities for youth in their early high-school years that focused on classroom-based career exploration. For high school juniors and seniors, the project offered employer-based internships.

Exhibit V-7:
Demographic Characteristics of Youth Participants by Project[a]

	STEM Works IN	STEM Initiative WA/OR[b]
Gender		
Male	65%	52%
Female	35%	48%
N	144	223
Race/Ethnicity[c]		
Hispanic/Latino	13%	19%
Asian	2%	9%
Black/African American	57%	5%
Hawaiian/Pacific Islander	0	<1%
Native American/Alaska Native	1%	3%
White	33%	65%
N	148	222
Individual with a Disability		
Yes	9%	3%
No	91%	97%
N	148	223
Age at Enrollment		
Average Age	17.11	16.91
N	148	223
Grade at Enrollment (high-school age participants)		
9th	n/a	43%
10th	n/a	13%
11th	n/a	10%
12th	n/a	34%
N	n/a	174
Employment Status at Enrollment		
Employed	13%	n/a
Unemployed	87%	n/a
N	148	n/a

Source: Individual-level data submitted by grantees for the evaluation

"n/a" denotes data not available.

[a] Percentages may not total 100% due to rounding.

[b] Data for STEM Initiative WA/OR are reported for two of the three participating WIBs except for "grade at enrollment," which contains data from only one WIB.

[c] Race/ethnicity categories are not mutually exclusive in STEM Works IN, but are for STEM Initiative WA/OR, with the exception of "Hispanic/Latino," which may have been selected in addition to one other racial/ethnic category.

Training and Employment Outcomes

The STEM projects aimed to help participants secure employment in high-growth, high-demand fields by providing them with training in STEM-related fields and other related services. The training and employment outcomes obtained by participants are key indicators of the projects' success in achieving this goal.

ExhibitsV-8 through V-13 display information on the training and employment outcomes of adult STEM participants. Data on training and employment outcomes are not shown for STEM youth participants because projects did not document relevant outcomes for these participants, namely, whether youth graduated from high school or entered STEM-related training or education programs or entered into STEM-related jobs or career paths.

Training Outcomes

Because the QPRs required by ETA recorded employment outcomes only for enrollees who completed training, the extent to which project participants enrolled *and* completed training is one good indicator of the success projects had in implementing their program designs, connecting participants to the appropriate training, and supporting them throughout these programs.

Exhibit V-8 describes adult participants' training participation, their success in completing their training programs, and their success in attaining certifications.[28] At the time data were submitted for the evaluation, only two projects had enrolled most of their participants in training programs (Washington/Oregon and Texas). Massachusetts, Connecticut, and Indiana had all enrolled fewer than half of their participants in training, although the Connecticut and Indiana projects will continue until later in 2012 and may be able to increase these training rates.

Overall, the majority of participants who entered training from each grantee were successful in completing their programs (95 percent overall). Four of the five grantees saw a training completion rate of 94 percent or higher. Nearly three-fourths of trainees of the remaining grantee (Indiana) completed their training programs. These findings suggest that programs were able to match participants to appropriate training programs and provide the necessary support to help them be successful in these programs.

[28] Because each STEM project defined training differently, it is challenging to generalize across projects about the types or intensity of training programs.

Exhibit V-8:
Training Participation and Outcomes by Project[a]

	CT STEM Jobs	STEM Works IN[b]	STEM Power MA[c]	Operation Workforce TX[d]	STEM Initiative WA/OR[e]	Total
Enrollees who entered training (Percent of all enrollees)	603 (47%)	86 (37%)	228 (43%)	150 (99%)	254 (91%)	1,328 (53%)
Total Enrollees	1,295	233	536	152	278	2,484
Enrollees who completed training successfully (Percent of all trainees no longer active in training)	425 (97%)	16 (73%)	218 (97%)	144 (96%)	234 (94%)	1,037 (95%)
Total trainees who are no longer active in training[f]	437	22[g]	225	150	254	1,088

Source: Individual-level data submitted by grantees for the evaluation.

[a] Percentages may not total 100% due to rounding.

[b] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[c] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[d] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[e] For STEM Initiative WA-OR, training completion and certification information is only available for one WIB of the three, except "Training Completion," which includes data from two WIBs. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was not able to provide the evaluation with participant-level records for project participants who had been served in one of the local WIBs that had participated in the grant.

[f] Trainees no longer active in training includes those who had finished their training program, either successfully or not. This measure excludes participants who were still enrolled in training at the time data were collected.

[g] The project in Indiana was able to provide information on training completion for only 22 of the 223 individuals who entered training.

Only two of the five projects reported on whether participants attained employer-recognized certificates or other certification or credentials upon completion of training, as shown in Exhibit V-9. The Washington/Oregon and Texas projects had nearly all of their training completers attain certifications (99 and 97 percent, respectively).[29]

Exhibit V-9:
Training Certification for Training Completers for Two Projects

	Operation Workforce TX[a]	STEM Initiative WA/OR[b]
Percent of training completers who earned training certificates	97%	99%
N	144	236

Source: Individual-level data submitted by grantees for the evaluation

[a] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[b] For STEM Initiative WA/OR, training completion and certification information is only available for one WIB of the three, except "Training Completion," which includes data from two WIBs. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was not able to obtain participant-level records for project participants who had been served in one of the local WIBs that had participated in the grant.*

Employment Outcomes

The major goal of the STEM projects was to see that participants were able to secure employment following their exit from their respective programs, preferably in training-related fields.

Outcomes from Data Submitted by Grantees

Data obtained from the grantees captured information on program participants' employment outcomes, as shown in Exhibit V-10. Individual project profiles included in Appendix B compare each project's outcomes to its goals. The entered employment rate was calculated for all exited program participants regardless of whether they entered or completed a training program, but excluded those identified as incumbent workers. Overall, about 60 percent of exited participants obtained employment. Two of the projects—Washington/Oregon and

[29] Between these projects, there is considerable variation in what projects defined as "credentials," thus, there is no standardized understanding of the meaningfulness of the various credentials received across projects, and the results on the types of credentials obtained should be viewed with caution.

Massachusetts—reported that about two-thirds of all exiting participants obtained employment.[30] Texas indicated that nearly half of its exiters entered employment. One-third of the exiting participants in the remaining two projects entered employment.[31]

Exhibit V-10:
Entered Employment Outcomes for Program Exiters[a]
From Data Submitted by Grantees

	CT STEM Jobs[b]	STEM Works IN[c]	STEM Power MA[d]	Operation Workforce TX[e]	STEM Initiative WA/OR[f]	Total
Percent of exiting participants who entered employment	33%	33%	65%	49%	68%	59%
N	515	150	512	124	281	1,582

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages may not total 100% due to rounding. Data in this table includes only participants who exited the programs. These data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted. In CT, "Entered Employment" includes any participants who were employed before or after exit, including during a number of quarters after exit.

[c] The participant-level database provided to the evaluator by the STEMWorks IN project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date. In Indiana, the employment outcomes presented include as employed only individuals who were employed at the time they exited the program and omits participants who found employment after exit.

[D] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[G] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[H] For STEM Initiative WA/OR, training completion and certification information is only available for one WIB of the three, except "Training Completion," which includes data from two WIBs. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was not able to provide the evaluation with participant-level records for project participants who had been served in one of the local WIBs that had participated in the grant.

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30 Although we were not able to conduct a multivariate analysis to identify the key factors associated with high employment outcomes, because of the small number of sites included in the STEM Initiative, we note that the projects in Washington/Oregon and Massachusetts both had strong relationships with employer associations and employer intermediaries as an important feature of their projects, which may have helped participants from these projects to find training-related jobs.

31 As noted previously, these outcome data do not include the full period of performance for the projects in Indiana and Connecticut, which were granted no-cost extensions of their STEM grants by ETA.

As shown in Exhibit V-11, Massachusetts reported that its employed participants achieved the highest hourly wage ($21.09), followed by Washington/Oregon ($16.11) and Texas ($14.90). Connecticut reported that the two-quarter average earnings of its employed participants was $19,742, which equates to approximately $19 per hour if one assumes that participants worked 40-hour work weeks over the 26-week period.[32]

Three grantees—Massachusetts, Washington-Oregon, and Texas—reported the hours worked weekly by employed participants. All indicated that the majority of their employed participants obtained full-time positions (90, 83, and 82 percent, respectively).

Only two projects—Connecticut and Texas—reported on whether employed participants obtained jobs in training-related fields. Each of these projects indicated that over half of its participants entered training-related employment (54 and 62 percent, respectively).

Three of the five projects reported on the industries in which their participants obtained employment, as shown in Exhibit V-12. Most of the participants from the Washington/Oregon and Texas projects obtained employment in manufacturing industries (41 and 45 percent, respectively). In the Connecticut project, manufacturing and information were the most popular industries for employment (23 percent each).

Outcomes on Common Measures from the Common Reporting Information System

In order to have common performance measures for programs with similar goals, ETA uses three Common Measures to evaluate program performance for most workforce programs serving adults. These three measures are Entered Employment, Employment Retention, and Average Earnings.[33] One advantage of using the Common Measures to assess project outcomes is that these measures are usually based on information from comprehensive data maintained by states in the unemployment insurance system's wage records as well as several additional sources, rather than depending on outcome data collected by the projects themselves.

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32 The STEM grantee in Indiana was not able to provide participant-level data on the hourly wage for participants who found employment.

33 The Entered Employment rate is defined as the percentage of participants who were unemployed (or anticipating unemployment at program entry) who were employed in the first quarter following the quarter in which they exited the program. The Employment Retention rate is defined as the percentage of participants who Entered Employment in the first quarter after program exit that were employed in both the second and third quarters following exit. Average Earnings is the average of total second and third quarter earnings of participants counted in the Employment Retention measure.

Exhibit V-11:
Characteristics of Employment for Program Exiters[a]

	CT STEM Jobs[b]	STEM Works IN	STEM Power MA[c]	Operation Workforce TX[d]	STEM Initiative WA/OR[e]
Type of employment found[f]					
Percent of exiters who found full-time employment	n/a	n/a	90%	82%	83%
Percent of exiters who found part-time employment	n/a	n/a	10%	18%	17%
N	n/a	--	326	61	185
Wages					
Average hourly earnings for exiters who found employment	n/a	n/a	$21.09	$14.90	$16.11
Average earnings for exiters who found and retained employment[g]	$19,742	n/a	n/a	n/a	n/a
N	126	--	334	61	185
Training-related employment					
Percent of exiters that had participated in training who obtained employment that was training-related	54%	n/a	n/a	62%	n/a
N	67	--	n/a	52	n/a

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages may not total 100% due to rounding. Data in this table includes only participants who exited the programs. These data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted. In CT, "Entered Employment" includes any participants that got a job before or after exit, including during a number of quarters after exit.

[c] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[d] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[e] For STEM Initiative WA/OR, training completion and certification information is only available for one WIB of the three, except "Training Completion," which includes data from two WIBs. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was not able to provide participant-level records for project participants who had been served in one of the local WIBs that had participated in the grant.

[f] Full-time employment is defined as working more than 35 hours per week.

[g] Average Earnings are calculated according to the Common Measures standard—second and third quarter earnings for participants who entered employment in the first quarter after program exit and who were also retained in employment for the second and third quarters after exit.

"n/a" denotes data not available.

Exhibit V-12:
Industries in which Participants Most Frequently Gained Employment, Using the North American Industry Classification System (NAICS) Codes of Employment[a]

	CT STEM Jobs[b]	Operation Workforce TX[c]	STEM Initiative WA/OR[d]
Construction	5%	7%	13%
Manufacturing	23%	45%	41%
Information Technology	23%	2%	2%
Professional, Scientific, and Technical Services	16%	22%	22%
Health Care and Social Assistance	2%	6%	6%
Other[34]	31%	18%	16%
N = number of exiters who found employment	57	58	180

Source: Individual-level data submitted by grantees for the evaluation

[a] Percentages may not total 100% due to rounding. Data in this table includes only participants who exited the programs. These data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically. These figures may also include participants that did not enter into training-related employment.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted.

[c] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[d] For STEM Initiative WA/OR, training completion and certification information is only available for one WIB of the three. In WA/OR, participants may have had more than one job, thus "NAICS Code" is a multiple response variable and percentages may not total 100%.

Data on the Common Measures outcomes were obtained from ETA's Common Reporting Information System (CRIS) for only one of the five grantees (Washington/Oregon).[35] Although not specifically requested in the evaluation data, the Connecticut project provided Common Measures information on all its participants, so that project's data are also presented above in

[34] Under "Other," we have lumped together 15 other diverse industry clusters that were less frequent sources of jobs for STEM participants. Examples include wholesale trade; retail trade; finance and insurance; transportation and warehousing; mining, quarrying, and oil and gas extraction; and administrative and support services.

[35] CRIS reports for this period were also available for the Massachusetts project; however, too few participants were included (3 or less) so the results were not disclosed. In addition, CRIS reports were obtained for the Texas project. However, because many of the early enrollees of this project were trained for health care occupations (and were later removed from the project) we decided to omit the Texas CRIS outcomes.

Exhibit V-11.[36] Because there is a significant time lag associated with the collection of the CRIS data, Common Measures information was only available for early-exiting cohorts of participants. These cohorts represent only a small percentage of program exiters to date. Furthermore, because the Entered Employment Common Measure is based on a definition that is different from the definition used for the rest of the outcome evaluation, it is difficult to compare outcomes from the CRIS data to outcomes presented elsewhere in this report.[37]

In Exhibit V-13, the Entered Employment rate is displayed for all adult participants who exited the two projects during 2010. About half of the Washington/Oregon project's participants and a little over one-third of the Connecticut project's participants were working during the first quarter following the quarter in which they exited the project. In Connecticut, the Common Measures Entered Employment rate (37 percent) is similar to the rate of employment presented for *all* program exiters in Exhibit V-10, above. For the Washington/Oregon project, all exiters presented in Exhibit V-10 had a slightly higher rate of employment (68 percent) than participants included in the Common Measure Entered Employment rate, suggesting that later exiting cohorts in Washington/Oregon may have had more success in finding employment than early-exiting cohorts.

The Employment Retention rate and Average Earnings measures included in the CRIS report are extremely valuable. The Employment Retention rate indicates whether exiters who found employment during the initial quarter after exiting the project succeeded in retaining employment during the following two quarters; the Average Earnings measure captures information on total earnings over those two quarters for individuals who retained employment. Exhibit V-13 presents data on employment retention and earnings for the cohort that exited the STEM projects between July 2009 and the end of June 2010. These CRIS data suggest that a high proportion of the early exiters from the Washington/Oregon project retained employment (91 percent) and had high average earnings ($18,438) over the second and third quarters after

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36 Because the Connecticut and Indiana projects did not participate in CRIS reporting, they are responsible for reporting their outcomes on the Common Measures to ETA at the conclusion of their grants (at the end of September and December 2012, respectively).

37 As noted in elsewhere in this report, the STEM projects were initially required to report entered employment outcomes for the STEM Quarterly Progress Reports as employment obtained by training completers during the same quarter that training was completed. The QPR definition was later changed to permit projects to report employment obtained by training completers after the quarter in which they had completed training. Using the participant-level data provided to the evaluators by the individual projects, the evaluators analyzed entered employment outcomes achieved by all project exiters who were unemployed at project entry, rather than just for training completers. The Common Measures definition of entered employment used in the CRIS reports system utilizes yet another definition. None of these definitions are directly comparable.

exit. Although it is difficult to speculate about why this might be the case, exiters from the Connecticut project during this same period had a somewhat lower rate of employment retention (62 percent) and somewhat lower average earnings ($17,639) over the same two-quarter period.

Exhibit V-13:
Common Measures Outcomes from CRIS by Project

	Entered Employment			Retention			Average Earnings		
	# Entered Employment	# in Cohort	%	# Retained	# Who Entered Employment	%	Total $	# Retained	Average $
	Exit Cohort: 1/01/10-12/31/10			Exit Cohort: 7/01/09-6/30/10					
CT STEM Jobs	41	111	37%	16	26	62%	$282,216	16	$17,639
STEM Initiative WA/OR	24	47	51%	31	34	91%	$571,588	31	$18,438

Source: Common Measures outcomes for WA/OR were obtained from the Common Reporting Information System (CRIS) reports provided by ETA. CT reported the Common Measures variable for its participants. The two cohorts presented are the ones with the latest data available at the time of reporting.

Employment Outcomes by Characteristics of Participants and Their Training

To better understand how participant characteristics and training participation may be related to employment prospects, Exhibits V-14 through V-17 display information on participants' employment outcomes as functions of age, participation in training, the duration of training, and the industries for which participants were trained. These findings are based on the individual-level data collected by the grantees and provided to the evaluators.

The age group with the highest rate of employment were program exiters in the 35-to-44 age range (63 percent employment overall). Participants in the age groups both older and younger than this age group had somewhat lower rates of employment. Participants age 18 to 24 had the lowest employment rates within their respective projects.

Exhibit V-14:
Adult Employment by Age by Project[a]

	CT STEM Jobs[b]		STEM Works IN[c]		Operation Workforce TX[d]		STEM Initiative WA/OR[e]		Total	
	Percent Employed	*N*	*Percent Employed*	*N*	*Percent Employed*	*N*	*Percent Employed*	*N*	*Percent Employed*	*N*
18 to 24	--	--	8%	5	36%	70	50%	44	43%	119
25 to 34	31%	13	20%	38	59%	34	66%	38	48%	123
35 to 44	50%	16	34%	45	73%	15	78%	74	63%	150
45 to 55	26%	51	22%	41	100%	5	71%	87	49%	184
Over 55	49%	35	16%	21	n/a	n/a	63%	38	52%	94

Source: Individual-level data submitted by grantees for the evaluation

[a] Data in this table includes only participants who exited the programs. This data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically. STEMPower MA is omitted because no demographic information was reported for this grantee.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted. In CT, "Employed" includes any participants that got a job before or after exit, including during a number of quarters after exit.

[c] In IN, the "percent employed" refers only to individuals who were employed at the time they exited the program and omits participants who may have found employment after exit.

[d] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[e] These data were available for only two of the three WIBs participating in the grant in Washington/Oregon. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was no longer able to provide participant-level records for project participants who had been served in one of the local WIBs.

To what extent does training help participants secure employment? Exhibit V-15 provides data bearing on this question. It compares exiting participants' employment outcomes by whether or not they successfully completed training. Overall, the employment rate was higher for training completers than non-trainees or participants who did not complete training (67 percent compared to 42 percent). The "training advantage" appeared to be strongest for the Massachusetts project. Since most exiters from the projects in Indiana, Texas, and Washington/Oregon received training, there are not enough observations of non-completers to provide a valid comparison group. For the remaining projects—Connecticut—there is no association between training completion and employment.

In the case of Massachusetts, these findings suggest that the grantee was successful in working with employers to identify promising fields in which to train participants. In addition, as described in previous chapters, the Massachusetts project was able to leverage its relationships with individual employers, employer intermediaries, and training providers to place trainees at the conclusion of training. As shown above in Exhibit V-9, participants in Massachusetts also had the highest average hourly wages, which may indicate that the project not only targeted industry sectors in which participants were likely to obtain employment, but also was successful in forging relationships with employers that would be able to offer participants with well-paying jobs.

Exhibit V-15:
Employment by Training Completion[a]

	CT STEM Jobs[b]		STEM Works IN		STEM Power MA[c]		Operation Workforce TX[d]		STEM Initiative WA/OR[e]		Total	
	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N
Completed training	36%	94	54%	13	78%	211	52%	116	76%	238	67%	672
Did not enter or complete training	32%	421	67%	6	57%	298	17%	6	20%	5	42%	736

Source: Individual-level data submitted by grantees for the evaluation

[a] Data in this table includes only participants who exited the programs. This data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted.

[c] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[d] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[e] These data were available for only two of the three WIBs participating in the grant in Washington/Oregon. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was no longer able to provide participant-level records for project participants who had been served in one of the local WIBs.

For four of the projects, the evaluation examined the relationship between training program duration and the employment rates of exited participants. These data are shown in Exhibit V-16. Across projects, the employment rate was slightly higher for participants who completed shorter-term training (2 months or less). The Massachusetts project reported high rates of employment for participants, regardless of the duration of their training programs. However, participants in longer-term training (3 months or more) secured employment at slightly higher rates. In the other three projects, participants in shorter training programs—two months or less—had better rates of employment than the project participants who obtained longer-term training.

Exhibit V-16:
Employment by Duration of Training[a]

	CT STEM Jobs[b]		STEMPower MA[c]		Operation Workforce TX[d]		STEM Initiative WA/OR[e]		Total	
	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N
2 months or less	65%	17	74%	105	70%	43	89%	97	78%	262
3 months or more	36%	39	84%	120	39%	79	69%	142	64%	380

Source: Individual-level data submitted by grantees for the evaluation

[a] Data in this table includes only participants who exited the programs. This data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically. STEM Works IN is omitted because no information on the duration of training was reported for that grantee.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted. In CT, "Employed" includes any participants that got a job before or after exit, including during a number of quarters after exit.

[c] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[d] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[e] These data were available for only two of the three WIBs participating in the grant in Washington/Oregon. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was no longer able to provide participant-level records for project participants who had been served in one of the local WIBs.

Exhibit V-17 displays the frequency of participants' employment by the field in which they were trained, for the most popular fields of study. Overall, trainees in precision production had the highest employment rate (81 percent). In contrast, the employment outcomes for participants engaged in computer and information sciences and engineering-related fields varied considerably by grantee. For participants who received training in computer and information sciences, the projects in Massachusetts and Washington/Oregon were more successful in placing trainees (79 and 100 percent, respectively, obtained employment)[38] than the projects in Connecticut, Indiana, and Texas projects, where only 39, 22, and 29 percent of participants, respectively, had secured jobs.

[38] It should be noted, however, that the Washington/Oregon project trained only four participants in this field.

Exhibit V-17:
Employment by Training Area (CIP Code)[a]

	CT STEM Jobs[b]		STEM Works IN[c]		STEM Power MA[d]		Operation Workforce TX[e]		STEM Initiative WA/OR[f]		Total	
	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N	Percent Employed	N
Computer and Information Sciences	39%	33	22%	49	79%	34	29%	7	66%	29	47%	152
Engineering-related Fields	--	--	--	--	100%	1	14%	21	76%	140	69%	162
Construction Trades	100%	5	--	--	62%	47	100%	7	68%	19	63%	78
Precision Production	60%	10	--	--	80%	66	90%	30	100%	2	81%	108

Source: Individual-level data submitted by grantees for the evaluation

[a] Data in this table includes only participants who exited the programs. This data may also include participants that were employed at entry, as most programs did not identify participants as incumbent workers specifically.

[b] In CT, these figures do not include participants designated as incumbent workers, unless otherwise noted. In CT, "Entered Employment" includes any participants that got a job before or after exit, including during a number of quarters after exit.

[c] In IN, the "percent employed" refers only to individuals who were employed at the time they exited the program and omits participants who found employment after exit.

[d] For STEMPower MA, training information for adults may include some participants who were under 18 years of age.

[e] Data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group.

[f] These data were available for only two of the three WIBs participating in the grant in Washington/Oregon. Because the project in Washington/Oregon completed its grant operations at the end of December 2011, by the spring of 2012, the grantee was no longer able to provide participant-level records for project participants who had been served in one of the local WIBs.

Summary

Overall, based on the data available to the evaluators, the projects had mixed results regarding training and employment outcomes.[39] The projects reported training completion rates ranging from 73 percent (in Indiana) to highs of 97 percent in Massachusetts and Connecticut. However, project participants were less successful in obtaining employment: at the high end, just over two-

[39] As noted previously, these outcome data do not include the full period of performance for the projects in Indiana and Connecticut, which were granted no-cost extensions of their STEM grants by ETA.

thirds of the participants in the Washington/Oregon project obtained employment and, at the low end, only one-third of Connecticut participants obtained employment. The challenge of finding employment may have been compounded by the ongoing recession, and the economy may be a significant contributing factor in the relatively low employment rates of programs. However, when they did find employment, participants were able to secure relatively well-paying positions, with hourly rates ranging from over $21 per hour in Massachusetts to almost $15 per hour in Texas.

VI. ACCOMPLISHMENTS, CHALLENGES, AND LESSONS LEARNED

In their applications to ETA, the STEM grantees proposed a broad range of strategies to encourage youth and adults new to STEM occupations to prepare for high-quality jobs in expanding STEM sectors. However, as the economic downturn deepened, most grantees had to adapt their implementation strategies to reflect the new economic realities. Over the course of the grant, many projects developed alternative models to recruit and prepare both dislocated STEM workers and workers new to STEM fields to fill the STEM workforce pipeline.

As they worked to implement their projects and reach the initiative's goals, grantees struggled to overcome challenges, achieved notable successes, and developed strategies and practices that hold promise for building the STEM capacity of the workforce development system. This chapter is dedicated to reviewing and summarizing these varied results and experiences. It does so by dividing the task into the four key areas of grant design features, organization and partnerships, service design and delivery, and capacity building and sustainability. In each of these sections, we put forward some possible answers to two important questions: What lessons about expanding the STEM worker pipeline have emerged from the initiative? How might ETA and/or local workforce investment areas improve on the experiences of the STEM Initiative projects in future efforts to promote skills development for workers interested in STEM-related occupations and career paths?

Grant Design Features

The STEM grantees developed their project designs in response to general guidelines laid out by ETA in the SGA. Among these guidelines were the requirements that local projects implement four key design features, develop a regional approach, and target dislocated workers and/or disadvantaged youth for project participation.

Realization of the Required Features

ETA specified that all local STEM project designs should incorporate four general design elements. It required all grantees to designate STEM coaches as the key staff members for delivering STEM services within American Job Centers, design and implement career blueprints as a new tool to support individual service and career planning, and develop mentoring services for adults and youth interested in STEM careers. In addition, local projects were required to develop at least one virtual or physical STEM Center of Excellence. Grantees refined their designs for the four STEM project features requested by ETA in response to their regional economic conditions, organizational contexts, and the characteristics and expressed needs of project enrollees. The degree of fidelity to the four grant design features described by ETA varied across regions. Some grantees found it difficult to incorporate all four prescribed components of the STEM initiative; across all sites, some of the requested design features were more fully realized than others.

Key Findings:

- Grantees were generally successful in hiring STEM coaches with STEM expertise who could provide information about STEM occupations and STEM training to project participants. Customers indicated that they appreciated the knowledge about STEM skills that STEM coaches brought to their roles as customer-service staff members.
- Grantees experienced challenges in delineating the responsibilities of STEM coaches. All grantees created ambitious job descriptions and three made the STEM coaches the primary case manager for enrolled project participants. This caused some STEM coaches to spend much of their time on reporting and other administrative case management functions, which diminished their ability to reach out to employers and educational institutions to improve STEM service capacity at the system-level.
- Although the STEM grantees were diligent about implementing the required STEM features, all five projects experienced difficulty implementing their initial mentoring designs, and four projects questioned the usefulness of career blueprints, particularly in serving dislocated workers. As described below, three grantees adapted STEM features to meet their local context.
    - Two projects provided opportunities for brief mentoring interactions, rather than the traditional model of a single long-term mentoring relationship.
    - One project developed a modest one-page career blueprint form as a set of questions to guide the initial interview between a participant and his/her STEM coach.
- In response to ETA’s emphasis on the importance of the four key STEM project features, all grantees ended up devoting substantial amounts of their project budgets to hiring STEM coaches and developing virtual STEM tools. One grantee, in particular, had very little project funding to use to support the costs of STEM training.
- Virtual STEM Centers of Excellence hosted on websites that provided public access to online sources of STEM information—as well as the opportunity for

interaction among different users—worked well to provide a standardized set of information and services across large geographic service areas.

In summary, although STEM coaches and virtual STEM Centers of Excellence showed promise, most of the STEM grantees found that mentoring and career blueprints were not well matched to the service needs of dislocated workers, although these features appeared to have more potential in serving youth.

Regional Approaches

ETA required projects to develop regional consortia, because it wanted to ensure that projects would address STEM issues within the context of a regional labor market.

Key Findings:

- Grantees found it difficult to manage consortia with participation by multiple LWIAs, unless consortia members had worked together on collaborative projects in the past. Even all if the participating local areas agreed on general strategies, projects generally found it useful to allow different LWIAs within the consortium to develop specialized service models that drew on the particular challenges and opportunities within their local areas.
- Hiring a neutral party to manage the grant proved to be a workable solution to preventing tensions among participating LWIAs for projects that served multiple local areas.
- Data collection and reporting was particularly problematic for projects where the participating LWIAs did not share a common information system to record project activities and outcomes.

It may be useful for local project operators to think carefully about how to coordinate and manage the efforts of independent local workforce areas that are members of a regional consortium. Although it is important to achieve agreement about overarching goals and strategies, it may also be appropriate to encourage variation in the design and delivery of services among participating LWIAs because of variations in local contexts or STEM industries and/or variations in the particular expertise of project staff members in a particular local area. Planning for a unified data collection and reporting system would seem to be an important feature of a regional project, and one that was not uniformly achieved by the STEM grantees.

Targeted Populations

Although ETA did not require all projects to develop distinct services for dislocated workers and disadvantaged youth, it did encourage grantees to serve both groups.

Key Findings:

- Four of the five projects attempted to serve both dislocated workers and disadvantaged youth. Because each group required very different kinds of services, managers at two projects reported that their project was stretched thin trying to serve both populations well.

- Especially after the economic downturn, providing services to in-school youth—to encourage them to seek career pathways in STEM fields over the long-term—seemed, in many cases, to be a better investment than trying to work with adults who wanted rapid employment in STEM occupations in a very difficult job market.
- Respondents from two projects indicated that they wished they had decided to focus on only a single group. One project did decide to focus exclusively on serving dislocated workers and other adults.

In planning future local STEM projects, it may be helpful for local project planners to decide whether to focus on serving youth or adults, but not both, if staff time and resources are limited.

Organization and Partnerships

The STEM grantees developed strategic partnerships to strengthen both overall project designs and the design and delivery of services to participants. As a result of their experiences, grantees learned that it was important to involve top-level staff, build partnerships with educational institutions, and develop effective strategies to involve representatives from the business community in the targeted sectors.

Involving Top-level Staff

Project managers typically sought to develop partnerships with high-level policy staff members and organizations within their regions in order to strengthen their strategic planning and implementation processes.

Key Findings:

- Having active buy-in from the executive-level of local WIB staffs led to the strongest project partnerships. In these cases, the high-level policy staff members were able to use their positive relationships with their counterparts in other organizations within the region to bring these other organizations into the STEM partnerships in an active role.
- High-level participation from the policy makers within partner organizations also proved important. For example, high-level policy staff from the Massachusetts Manufacturing Extension Partnership (MassMEP) proved to be critical in opening up this partner organization's vast network of employers and educational institutions throughout the region.

Building Partnerships with Educational Institutions

Grantees engaged educational institutions (both K-12 and post-secondary) as partners that were important in offering information about and access to STEM-related occupations and the necessary courses to pursue STEM-related degrees and/or jobs.

Key Findings:

- Because they had limited training funds and generally targeted a large number of STEM fields, the STEM grantees generally did not act as brokers in the development of new training offerings in any particular STEM field. Instead, they helped refer participants to relevant training offerings that already existed within the region.
- At various points throughout the STEM grant period, educational institutions in two sites were particularly valuable partners in collaborating with local employers and developing training opportunities that prepared participants for employment in specific occupations upon completion of training.
- In the projects that focused on serving in-school youth, partnerships with educational institutions were particularly useful in developing and implementing services for youth.
- Each of the three projects that planned to sustain project activities and services beyond the grant period identified continued participation by local community college partners as critical to the achievement of that goal. Community colleges—and higher education institutions in general—were generally flexible in designing training offerings to reach groups previously underrepresented in STEM fields, including individuals with less formal educational preparation, as long as they had transferrable skills from previous work experience.

Based on the experience of the STEM grantees, local community colleges are likely to be essential partners in future efforts to build and sustain STEM-related training. As discussed below, community colleges were usually interested in taking over responsibility for maintaining the online information developed by the STEM grantees as part of the virtual STEM Centers of Excellence.

Building Partnerships with Employers

Grantees worked to develop relationships with employer associations and individual employers, to create opportunities to hire and mentor project participants.

Key Findings:

- The recession made it difficult to engage employers. Many local businesses in the five project regions found themselves struggling to stay afloat and reluctant to hire new workers, which meant they generally had little interest in supporting the development of new training services.
- In many cases, employers had laid off workers, leaving each remaining worker to do the work of multiple employees. Thus, not only were many employers unable to establish hiring relationships with the STEM projects, but many of their employees were too busy and stretched too thin to offer support in any other capacity (such as mentoring).

- One project developed relationships with employers by offering subsidies for training incumbent workers.
- Two projects used relationships with well-respected employer intermediaries to develop three-way project partnerships between training institutions, employer groups, and the public workforce investment system.

Developing strategies for stronger employer involvement needs to be a priority in designing future STEM-related projects. Based on the experiences of the STEM grantees, strategies for employer involvement may be more effective if they are coordinated with ongoing employer outreach and services to employers provided by the "business services" team within the local WIB, rather than developed separately and oriented exclusively to the needs of a specific project. In addition, the STEM grantees that had more successful involvement by employer representatives appeared to design their outreach efforts around specific employer-defined needs and interests, rather than asking employers to get involved in a broad initiative without a specific payoff for employers.

Service Design and Delivery

The STEM projects were generally designed around the delivery of two core services—career guidance provided by the STEM coach and the development and funding of a training plan to help participants prepare for an immediate STEM-related job and longer-term career pathway.

Recruiting Individuals Interested in STEM Training

As the STEM initiative was conceived, it was assumed that many workers would be interested in STEM training because it would allow opportunities for new workers to enter STEM occupations with opportunities for career advancement. However, the recession changed this dynamic.

Key findings:

- Grantees found that many dislocated workers who sought services from the STEM projects were in financial distress. They were behind on paying their bills, were in danger of losing their homes, and were unable to support their families. Consequently, they were hesitant to enroll in long-term training programs, even when such training might have improved their long-term employment prospects.
- Projects responded to dislocated workers' apprehension by broadening the occupations in which they offered training, and by developing a range of short-term training offerings that would help laid-off STEM workers find new jobs.

Developing Training Opportunities

At the outset, all five grantees planned for participants to receive training through traditional classroom-based courses, typically courses available at community colleges and vocational training centers lasting at least three months.

Key Findings:

- The dramatic increase in the customer demand for workforce training during the recession caused the economic stimulus funding, which was intended to increase available training funds, to be depleted more rapidly than initially expected. As a result, the level of training funds available under ARRA was less than grantees had expected by the time the STEM projects were launched.
- Four projects developed new short-term training opportunities (lasting one month or less) that would be more attractive to participants because it would give them a new certificate to update their resumes and enable them to continue a search for immediate employment.

The experience of the STEM grantees suggests the importance of considering multiple sources of funding to support training, in addition to WIA-funded training. In the face of limited WIA training funds, the STEM projects were forced to search for alternative ways to help participants fund training. In addition to seeking out low-cost short-term training, project staff members devoted more energy and resources to helping participants qualify and apply for Pell grants and scholarships. Technology-based training and short-term training modules were also utilized.

Developing Internships for Youth

Two projects offered high school-age youth internships designed to expose youth to STEM careers and provide training opportunities that could help them in their pursuit of college degrees and/or employment after they exited the STEM project.

Key Findings:

- Internships emerged as a very successful strategy for serving in-school youth in several projects, because they gave students a hands-on experience of a STEM workplace and provided them with a sense of how their classroom studies might prepare them for STEM occupations.
- Youth internships were also a successful strategy for connecting employers with the STEM projects. Employers could offer youth participants hands-on time-limited experience in a STEM work setting without needing to commit to offering full-time employment at the conclusion of the internship.
- Projects that helped high-school students find STEM-related internships also assisted youth in planning for STEM-related post-secondary education as they completed high school.

- Internships also appear to be an effective strategy to recruit youth from groups underrepresented in STEM occupations.

Capacity Building and Sustainability

Because the STEM grants were time-limited three-year grants, the ability of the grantees to continue to provide STEM-related services largely depended on building the capacity of American Job Center staff members to provide services to future customers interested in STEM occupations and careers. Different approaches the projects explored included training American Job Center staff on STEM issues, trying to find funding from other sources to retain the STEM coaches, ensuring the continuation of the STEM tools available on the websites designated as virtual STEM Centers of Excellence, and incorporating some of the STEM activities within other ongoing programs.

Training other American Job Center staff members on STEM occupations and training. One of the fundamental goals of the STEM grant was to expand the regional capacity to support STEM training and employment. Training American Job Center staff members to provide STEM-related services and support was intended to be a means toward that end.

Key Findings:

- It proved difficult for projects to build the capacity of other American Job Center staff members to serve customers interested in STEM careers or jobs for the reasons described below.
  - Paradoxically, one of the barriers to American Job Center staff members gaining STEM competence was the designation of a single individual as the STEM coach: this meant that other case managers referred all customers interested in STEM training to that individual and did not gain any first-hand experience of STEM fields themselves.
  - The high volume of jobseekers requesting services during the recession stretched American Job Center staff members to capacity and beyond. Hence, there was little time for staff training.
  - Most STEM coaches were not skilled trainers or teachers, and had little time themselves to share their expertise with other staff members.

As described below, the STEM information available on project websites might be valuable resources to use in training American Job Center staff about STEM careers and training opportunities.

Retaining STEM Coaches. As discussed in Chapter IV, participants greatly appreciated STEM coaches' specialized STEM knowledge and one-on-one support, and frequently identified the coach as the most valuable asset to the project. As a result, projects explored ways to retain their STEM coaches as American Job Center employees (even if they were not working in the same capacity).

Key Findings:

- The STEM projects in Washington/Oregon and Massachusetts were able to identify funds to retain at least one STEM coach as a resource specialist within the American Job Center network for a brief period after the end of the grant. The Massachusetts project manager sought to go a step further and transition another STEM coach to a position as a mainstream staff member within the local American Job Center, to serve as another source of STEM expertise for Center staff working within the local workforce investment system.

Transferring responsibility for online STEM tools to other staff members or organizations within the region. With the ability to continue to offer staffed STEM services after the end of the grant uncertain, all three projects that had developed virtual STEM Centers of Excellence were planning to sustain their virtual STEM Centers of Excellence by incorporating them into the websites maintained by the WIB or by another entity.

Key Findings:

- The grantees that had developed virtual STEM Centers of Excellence believed that their STEM websites could serve as valuable hubs of STEM information for the future.
- Grantees had different strategies for sustaining maintaining the STEM websites.
  - At the time of the final site visit, the grantee in Connecticut was developing a strategy to transfer ownership of the STEM website to the state community college system, on the premise that it would be a useful career exploration tool for students.
  - Indiana planned to maintain its physical Center of Excellence in the form of STEM kiosks where customers could also access the online career blueprint.

Continuing successful practices. Regardless of participant outcomes or available resources, each grantee made plans to continue some STEM activities or service component that they believed to be successful over the course of the grant. These included youth internships, college access programs, and continuing partnerships with business owners, educational institutions, and other workforce partners.

Key Findings:

- Two grantees—in Texas and Washington/Oregon—succeeded in developing ongoing partnerships between educational institutions and WIBs to continue the delivery of STEM exploration activities for in-school youth.
- Some local WIBs within the Texas project plan to continue to utilize the career blueprint format they developed as part of the STEM project to serve youth enrolled in the WIA program.
- One grantee (Massachusetts) elected to continue convening its regional STEM advisory council as a vehicle to facilitate ongoing collaboration among business owners, educational institutions and workforce partners within the region.
- The STEM grantees in Washington/Oregon, Connecticut, and Massachusetts plan to seek additional grants for possible STEM-related activities. The managers within these projects believed it would be important to sustain STEM-related services in their WIBs in whatever form possible.

Conclusion

The STEM Initiative was intended to strengthen the ability of local Workforce Investment Boards and American Job Centers to play a central coordinating role in regional efforts to prepare current workers and students (future workers) for jobs that will help regional STEM-related industries to expand and thrive. During the grant period, STEM coaches and virtual STEM centers were successful in promoting public awareness about STEM training and job opportunities and helping to link interested individuals to education and training opportunities that helped them prepare them for jobs in STEM-related fields. They also developed valuable online tools available to customers who were interested in learning about STEM resources.

The grantees were less successful in preparing for the continuation of STEM activities by WIBs and American Job Center staff after the end of the grant period. Without continued funding to support staff with STEM expertise within Job Centers, most grantees were not able to continue to maintain distinct STEM coach positions within American Job Centers. The three projects that had developed virtual STEM centers were also trying to find entities that could take over maintenance of these online tools so that they would continue to be available to the general public.

Given that building STEM skills can be expected to remain an important issue on the national education and workforce policy agenda, it will be important to look for ways to continue promoting knowledge about STEM occupations and STEM skill development for the staffs of American Job Center. Options might include:

- Investing in the development of basic online curriculum modules that could be used to train vocational counselors and workforce development professionals about particular STEM occupations, industries, and related education/training resources. Such courses could be offered as part of formal certificate programs to prepare career counseling and workforce development professionals, or as ongoing professional development opportunities for individuals already working in the field. National curriculum modules could be customized to address the issues relevant to particular regions.

- Promoting the development of STEM career resource centers within educational institutions, American Job Centers, or other organizational entities, tasked with the responsibility to provide information and referral services to a broad audience including K-12 students and teachers, college students, and adult workers interested in preparing for STEM occupations. Such centers might be established at the state level, or for multi-state regions.

It will also be important to follow the examples of the STEM Initiative grantees that developed successful ways for WIBs to participate in the design and delivery of regional STEM services, including:

- Continuation of regional STEM advisory councils as a vehicle to facilitate ongoing collaboration among regional business owners, educational institutions and workforce investment partners.
- WIB involvement in partnerships with K-12 school districts, post-secondary educational institutions, and the business community to coordinate the design and delivery of STEM exploration activities and internships in STEM business for in-school youth.
- WIB involvement in partnerships to support the bridge between high school and post-secondary education and training for youth interested in continuing their STEM studies.

From the various practices that grantees hoped to sustain beyond the grant, continued collaboration among education, workforce investment and business partners in support of STEM training emerged as one of the essential features of successful strategies for future projects to promote STEM education and workforce preparation.

APPENDIX A. DATA COLLECTION DESIGN FOR ROUND 3 VISITS TO STEM PROJECTS

During the Round 1 site visits, we investigated the design of the STEM projects and their implementation progress. We described how each site was realizing the key STEM project design features (Centers of STEM Excellence, STEM Coaches, STEM mentors, and Career Blueprints.) We reviewed the roles played by the leadership of different WIBs within each WIB partnership and examined the roles played by varied project partners (economic development agencies, education and training providers, and regional workforce development systems). We found out how the ETA-funded STEM projects were coordinated with other STEM initiatives in the region. We asked how the project wanted to improve the development of the STEM workforce in the region and how it was involving STEM firms and industry representatives in that improvement process.

In the second round of visits, our primary goal was to investigate project outreach and service delivery to customers. We paid particular attention to the specific characteristics of project customers (ranging from dislocated workers, to disadvantaged youth, to employers), and the specific STEM Initiative activities and practices taking place in each region. Finally, we examined more closely how STEM Initiative projects were embedded within the larger One-Stop Career Center system, as well as their visibility and accessibility to other One-Stop customers.

The goal of the final round of visits is to examine project outcomes and identify promising practices that that might inform whether and how the workforce system might implement STEM services in the future. While our data collection should capture any new developments in project service delivery or structure, we will largely prompt respondents to reflect on the results and/or effects of the components that were in place over the course of the grant. Our investigation will also pay a great deal of attention to how various regions plan to sustain STEM activities in the future.

Overview of the Round 3 Topic Guide

Part I. Information About Program Organization, Structure, and Operations

1. Goals and Key Components of STEM Initiative
2. Description of Project Organizational Structure
3. Description of STEM Coaches
4. Description of Project Partnerships
5. Linkages with the Rest of the One-Stop Career Development System
6. Progress in Creating STEM Centers of Excellence
7. Career Blueprints
8. Mentoring Services
9. Technical Assistance from ETA or Support From Other Grantees
10. Program Funding
11. Data Collection and Reporting
12. Program Outcomes, Reflections, and Lessons Learned
13. Plans for End of Project
14. Sustainability of STEM Efforts Beyond the Conclusion of the Grant

Part II. Focus on Program Customers and Services for Dislocated Workers and other Adults

15. Overview of STEM Services for Dislocated Workers and Other Adults
16. Career Exploration/ Counseling for Adults
17. STEM Training and Curriculum Development for Adults
18. Job Search Support and Job Placement Services for Adults
19. Outcomes for Dislocated Worker Participants and Other Adults
20. Stories about Selected "Typical" Project Participants
21. Lessons Learned in Providing STEM Training for Dislocated Worker Participants and Other Adults

Part III. Focus on Customers and Services for Disadvantaged Youth

22. Overview of STEM Services for Disadvantaged Youth
23. Career Exploration/ Counseling for Youth
24. STEM-Related Training for Youth
25. Job Search Support and Job Placement Services for Youth
26. Outcomes for Youth
27. Stories about Selected "Typical" Project Participants

28. Lessons Learned in Providing STEM Training for Youth

Part IV. Goals, Services and Outcomes for Employers and Industry Sectors

29. Project Goals for Industry Sectors or Specific Employers

30. Services Provided to Employers

31. Outcomes for Employers

Summary of Discussion Topics by Planned Respondents
Part I. Program Organization, Structure, and Operations

Discussion Topics	Project Director Administrators, Planners, or Advisors	STEM Coaches/Stem Coach Supervisors	Data Collection and Reporting Staff	One-Stop Managers and Staff	Employers, Economic Development and Industry Representatives	Adult Services Planners and Providers/ Adult Focus Group/ Mentor Focus Group	Youth Service Planners and Providers/ Youth Focus Group
1. Goals and Key Components of STEM Initiative	X	X					
2. Description of Project Organizational Structure	X	X			X		
3. Description of STEM Coaches	X	X					
4. Description of Project Partnerships	X	X			X		
5. Linkages with the Rest of the One-Stop Career Development System							
6. Progress in Creating STEM Centers of Excellence	X	X		X	X		
7. Career Blueprints	X	X		X	X		
8. Mentoring Services	X	X			X	X	
9. Technical Assistance from ETA or Support from Other Grantees	X	X			X		
10. Program Funding	X		X				
11. Data Collection and Reporting	X	X	X	X			
12. Program Outcomes, Reflections, and Lessons Learned	X		X		X	X	X
13. Plans for End of Project							
14. Sustainability of STEM Efforts Beyond Conclusion of the Grant	X	X		X			

Part II. Customers and Services for Dislocated Workers and Other Adults

Discussion Topics	**Project Director Administrators, Planners, or Advisors**	**STEM Coaches/Stem Coach Supervisors**	**Data Collection and Reporting Staff**	**One-Stop Managers and Staff**	**Employers, Economic Development and Industry Representatives**	**Adult Services Planners and Providers/ Adult Focus Group/ Mentor Focus Group**	**Youth Service Planners and Providers/ Youth Focus Group**
15. Overview of STEM Services for Dislocated Workers and Other Adults	X	X				X	
16. Career Exploration/Counseling for Adults	X	X		X		X	
17. STEM Training and Curriculum Development for Adults	X	X			X		
18. Job Search Support and Job Placement Services	X	X		X	X	X	
19. Outcomes for Dislocated Worker Participants and Other Adults	X	X	X	X	X	X	
20. Stories about Selected "Typical" Project Participants	X	X			X	X	
21. Lessons Learned in Providing STEM Training for Dislocated Worker Participants and Other Adults	X	X		X	X	X	

Part III. Customers and Services for Disadvantaged Youth

Discussion Topics	Project Director Administrators, Planners, or Advisors	STEM Coaches/Stem Coach Supervisors	Data Collection and Reporting Staff	One-Stop Managers and Staff	Employers, Economic Development and Industry Representatives	Adult Services Planners and Providers/ Adult Focus Group/ Mentor Focus Group	Youth Service Planners and Providers/ Youth Focus Group
22. Overview of STEM Services for Disadvantaged Youth	X	X		X			X
23. Career Exploration/Counseling for Youth		X		X	X (Mentors)		X
24. STEM-Related Training for Youth	X	X					
25. Job Search Support and Job Placement Services for Youth	X	X		X			X
26. Outcomes for Youth	X	X					X
27. Stories about Selected “Typical” Project Participants	X	X					X
28. Lessons Learned in Providing STEM Training for Youth	X	X		X			X

Part IV. Assessment of Employer Needs and Services Provided to Employers

Discussion Topics	Project Director Administrators, Planners, or Advisors	STEM Coaches/Stem Coach Supervisors	Data Collection and Reporting Staff	One-Stop Managers and Staff	Employers, Economic Development and Industry Representatives	Adult Services Planners and Providers/ Adult Focus Group/ Mentor Focus Group	Youth Service Planners and Providers/ Youth Focus Group
29. Project Goals for Industry Sectors or Specific Employers	X	X					
30. Services Provided to Employers	X	X			X		
31. Outcomes for Employers	X	X	X		X		

General Topic Guide

Part I. Information About Program Organization, Structure, and Operations

1. Goals and Key Components of STEM Initiative

Use your understanding of the project based on the previous site visits/write-ups to ask about evolution and changes in the following. Take notes on the project status as of the first two site visits to use when asking these questions.

- Goals of the project
  - How would you describe the long-term goals of your project? Short-term goals?
  - Over the course of your project, did your understanding of the goals of the project change or evolve? If so, how and why?
- Participants in project planning and oversight
  - Is there an advisory committee that provides planning input and oversees the STEM project? How has its role changed over the course of the grant?
  - Have any new individuals or organizations become active in project planning, management, and oversight? If so, describe.
  - Within the grantee WIB, who is ultimately responsible for overseeing STEM Initiative activities and outcomes?
- Target groups
  - Summarize targeted groups at site (dislocated workers, other adults, youth (in-school vs. out-of-school, etc.).
  - In setting project goals, did the project specify how many individuals it wanted to serve within each subgroup? Have the targeted groups or the emphasis on different groups changed over time? If so, how and why?
  - Did you make any changes to recruitment strategies or eligibility requirements since the last site visit during the spring of 2011?
- Target industry sectors/ occupations
  - Summarize targeted industries or occupations at site. Have the targeted industries or occupations evolved or changed over time? If so, how and why?

2. Description of Project Organizational Structure

- Relationship between Participating WIBs
  - Summarize project management/leadership structure (whether it is overarching or distinct within each participating WIB). Has this structure changed over time (since the previous visit)?
  - Were there unique roles for each WIB?
  - How well did the coordination of multiple WIBs work? (How frequently did the WIBs communicate with each other? At what level? About what topics?)
  - How does the grantee WIB oversee the implementation of STEM Initiative activities in other LWIBs (do other sites have to turn in progress reports to grantee WIB?)
  - Would you have any recommendations as to how the WIBs could coordinate on STEM efforts in the future?
- Overall Project Organization and Staffing
  - Has the project organizational structure changed or evolved over the course of the grant? How and why?
  - Have there been any changes in project administrative and service delivery staffing within the project? Has staff turnover been a problem? How? How have you addressed turnover challenges?
  - Any challenges with organizational structure and management?
  - What would be the ideal composition of staff dedicated to STEM services moving forward?

3. Description of STEM Coaches

- Have there been any changes in the job description and responsibilities of STEM coaches? Have you had to help the STEM coaches set priorities among their multiple job functions? What priorities have you set?
- How well prepared have STEM coaches been to provide customers with expert advice on training in science, math, engineering, and technology skills? How have you helped STEM coaches improve their expertise in this area?
- How well prepared have STEM coaches been to relate to the needs of various targeted beneficiaries (disadvantaged youth, dislocated workers, other groups targeted by the project)? How have you helped STEM coaches improve their understanding and skills working with the STEM Initiative customers?
- Has STEM coaching gone according to plan? How would you improve the functioning of STEM Coaches?

- What is the future of the STEM coach position and functions once the grant concludes?

4. Description of Project Partnerships (e.g. agencies involved in K-12 education, higher education, employers/employer associations/employer intermediaries, others)

- Review roles of different partners (e.g. assisted in project planning, attend oversight meetings, have a specific role in project implementation).
  - How have roles of different partners evolved over time?
  - Any changes in formal relationships among project partners?
- Who have been the most important partners to the project?
- Have any partnerships been particularly challenging to establish?
- How have partnerships increased the ability of the project to leverage funding in support of the STEM Initiative or align other partners' expenditures with the Initiative?
- How would you like to continue partnerships and coordinate activities with other agencies and organizations as the STEM grant ends?

5. Linkages between STEM Project and the Rest of the One-Stop Career Development System

- How are WIA staff and other One-Stop Career Center staff involved in the recruitment, assessment, referral or delivery of other services to STEM project participants?
- How has the STEM project increased the awareness of and information about STEM training and STEM careers among One-Stop Career Center staff?
- To what extent have STEM participants been co-enrolled in other workforce development programs to increase their access to services?
- What lasting differences (improvements) has the STEM project made in the ability of American Job Centers to promote STEM occupations and careers and serve individuals interested in STEM fields?

6. Progress in Creating STEM Centers of Excellence

- How have you developed STEM Centers of Excellence (e.g. virtual, physical, particular tools, services, or locations created by grant)?
- How would you rate your project's experience with implementing Centers of Excellence (COEs)? What aspects of your COEs have been most effective? Most popular with customers?
- What do you believe have been the benefits and challenges of this format?
  - Has the medium (physical or virtual) worked well given the local context?
- What function does the virtual COE serve within the context of the STEM Initiative and the WIA service delivery system?

- How can you assess the visibility and volume of use of STEM COE tools by different groups (e.g. general public, enrolled participants, employers, incumbent workers)?
- What suggestions would you make for improving STEM COEs?
- What strategies do you have for sustaining STEM COEs after the end of the grant?

7. ***Career Blueprints***
- What do you see as the primary purpose of the STEM Career Blueprints? How well have they served that purpose? Any key challenges/successes?
    - Have there been any changes to the Career Blueprints format?
    - To what degree was your project able to utilize the Career Blueprint as an approach to career planning?
    - What use have participants been able to make of Career Blueprints?
- How would you rate the project's experience with the design and implementation of Career Blueprints?
- Do you plan to use Career Blueprints in future STEM activities?
- How would you recommend to others that they adapt or refine the Career Blueprint model?

8. ***Mentoring Services***
- What do you see as the primary role of mentors within the STEM Initiative?
- Have there been any changes in the design or implementation of the mentoring program?
    - Did you come across any successful strategies in attracting new mentors?
    - Were certain types of mentors better suited to relate to the needs of participants from specific sub-groups:
        - ~ disadvantaged youth?
        - ~ dislocated workers?
        - ~ other target groups or demographic backgrounds?
- What about the mentor format has been useful?
- If you were to continue on with STEM services and there were no requirements to do so, would you still incorporate mentoring in your design?

9. ***Technical Assistance from ETA or Support From Other Grantees***
- What types of technical assistance have you received throughout the project period?
- Did you develop any new TA needs or receive any new assistance since the last visit?

- If so, how would you assess it?
- Did you continue to participate in any workgroups or collaboration calls?
- Is there any technical assistance you would have liked to receive that you did not?

10. Program Funding

- Can you review your overall grant budget with me (including expenditures planned for staffing, training/customer services, and other costs)?
  - Have there been any significant budgetary changes?
  - Have there been any funding issues or problems?
  - Have there been any significant changes in expenditure patterns over time?
- How successful have you been in leveraging additional funding sources from project partners?
  - How did funds leveraged compare with what you had originally anticipated?
  - What lessons have you learned about how to leverage funds?
  - What are the implications for leveraging in the future?

11. Data Collection and Reporting

- What do you consider the most important measurable outcomes of the project?
- What problems have you encountered in collecting and reporting data on project outputs and outcomes?
- Have there been any changes in how you collect and report data? Have you been able to improve the process over the course of the grant?
- Has the data reporting and collection system allowed the project to demonstrate adequately the various outcomes that the project has furthered?
- In what other ways do you or could you document project accomplishments (in ways the ETA reporting tools and data system do not)?
- If you had to take on data collection and reporting for this project again, what would you do differently, if anything?

12. Program Outcomes, Reflections, and Lessons Learned

- What goals did you set for your project in your grant proposal?
  - If given another opportunity, would the project change or revise its goals?
  - Do you think the reporting requirements established by ETA are relevant to your individual project goals?
  - Do you perceive any tension between your understanding of your project goals and ETA-prescribed measures for reporting?

- How does the project describe customers who receive STEM project services?
  - Number and characteristics of participants
  - Number and types of employers or employer associations served
- How does the project describe the services it provides?
  - Participant education and training
  - "Capacity-building activities:" how defined; how measured
  - Services provided to employers
- How does the project describe its outcomes?
  - What types of credentials, certificates, or degrees do STEM participants attain?
  - Participant employment outcomes to date?
  - Any additional measures
  - Do you have any contacts with employers with whom participants are placed to see how pleased they are with skills of project graduates?
- Assessment of project success
  - How does the project measure success?
  - Where does the project feel it has been most successful (by any measure)?
  - Have project outcomes to date met your expectations?
  - Where has the project experienced the greatest challenges to success (by any measure)?
  - Have there been any unforeseen barriers to project success?

13. Plans for End of Project

- When did you/will you stop enrolling new participants into the STEM project? What was your reason for stopping new enrollments (e.g. out of money; no time to complete services)
- When will the project officially end?
- What is your estimate of how many participants will still be "active" in the project at the time the grant ends?
  - How many participants will not yet have completed planned STEM training when the grant ends? What will happen to them?
  - How many participants will still be looking for work when the grant ends?

- Do you have plans for transferring these participants to other programs?
- Will active participants at the end of the grant be able to complete training? Receive ongoing services from some other source?

- What will happen to STEM project staff (project coordinators and STEM coaches) at the end of the grant period? (e.g. termination or transfer to another position at WIB or One-Stop Career Center)
- To what extent will the WIB continue to track participant outcomes and enter data into the project MIS after the end of the grant?

14. Sustainability of STEM Efforts Beyond the Conclusion of the Grant

- Documentation of best practices for dissemination to grantee or to other interested sites
- Training of One-Stop Career Center Staff on STEM occupations.
  - Did the project train and increase the STEM knowledge of the One-Stop Career Center staff as a whole (and thereby increase their capacity to promote STEM to customers)?
  - Are One-Stop Career Center staff members familiar enough with STEM project resources to utilize them and show customers how to use them?
- Continuation of resources or procedures initiated under STEM grant (e.g. virtual STEM CoE; use career blueprints; involving employers in planning STEM training in region)
- What are the project's future goals for promoting STEM careers
  - through the One-Stop Career Center System?
  - through coordination with other agency partners?
- What sources of additional funding have been identified to continue activities started under STEM Initiative
- If STEM services continue in the future, how will the roles of One-Stop Career Center staff be defined? Will they take on the roles of STEM Coaches?

Part II. Focus on Program Customers and STEM Services for Dislocated Workers and other Adults

15. Overview of STEM Services for Dislocated Workers and Other Adults

- Have there been any changes in the services available to adults and dislocated workers since the Round 2 visits last spring?
  - Has the project introduced any new STEM services for adults or dislocated workers since the Round 2 visits last spring?

- Has the project discontinued any service components since the Round 2 visits last spring (or, if all services have concluded, did they discontinue any specific services before others)?
- Has the project made improvements or notable modifications to services already in place?

- Have there been any significant changes in the participant traffic and/or enrollment flow? Have there been any shifts in demand for services?
- Have STEM services become available at any additional locations within the region? E.g., services being offered/expanded at American Job Centers/within local WIAs?

16. Career Exploration/ Counseling for Adults

- What have been the strengths and weaknesses of the career counseling provided to One-Stop Customers under the STEM initiative?
  - How useful has the Career Blueprint been as a tool to support career exploration and career counseling?
  - How is the career counseling provided by the STEM project integrated with the development of IEP or training plans provided by WIA staff?
  - What is the most effective way that the project has provided STEM career awareness/ career counseling to individuals under the grant?
  - How many individuals have been reached with STEM career exploration/career counseling services? How are these individuals documented by the project (e.g. as capacity building contacts?)
- What arrangements has the project/ One-Stop Career Center made for continuing to provide STEM career exploration/ career counseling services after the end of the grant?

17. STEM Training and Curriculum Development for Adults

- Planning for STEM training as part of the STEM project
  - What types of training did you anticipate providing at the beginning of the grant? How did the patterns of how many participants participated in training and what types of training they selected match your expectations?
  - How many STEM participants planned to participate in STEM training in their Career Blueprint or IEP? What proportion actually entered training? Completed training?
  - Was the level of interest in STEM training as high as you had anticipated? What did you do if an individual decided he/she was not interested in training but wanted to look for training in a STEM-

related occupation? (Did you enroll them in the STEM project anyway?)

  - How well did participants' interests match the specific industries or occupations targeted by the STEM grant? What did you do if an individual was interested in a field that was not specifically targeted by the grant?

- How did the project's training funds hold up over the course of the grant?
  - What portion of training expenses is provided by the STEM grant versus some other source?
  - What other funding sources are used to pay for STEM training for enrolled participants?
  - Have other funding sources been available to the degree anticipated? If not, how has the project coped with the lack of training funds?
- To what extent has the STEM project been involved in developing new training curricula to meet employers' needs for skilled STEM workers?
  - In what particular areas has the project tried to develop new or improve existing STEM courses or training options?
  - With what partners has the project worked to develop new STEM courses?
  - How is the development of these courses financed? How do STEM participants pay for these courses?
  - How successful have these new STEM curricula been? Are they appropriate for the targeted students/workers? Is there a demand for these training courses?
  - To what extent do new STEM curricula enhance the overall STEM training offerings in the community?
- To what extent have STEM participants utilized existing STEM training available in the community?
  - Which types of training are most commonly utilized?
  - For what occupations have participants most commonly prepared?
  - How long does the typical training last?
  - How well does the training format reflect the needs and capabilities of target groups of STEM participants?
- What are the factors that limit customer choice of STEM training?
  - Was/is there a cap on tuition and other training costs?

- What are the limits on selecting a training occupation, besides being on the High Growth H-1B list?
- Can trainees select a training vendor? If so, are they restricted to the eligible provider list? Is the eligible training provider list adequate in terms of capacity and quality of programs?
- Did any of this change as time went on?

- What have been the strengths and weaknesses of the STEM training provided to participants?
  - Which training courses have had the best record to date of leading to employment? Which have had the worst record to date?
  - What have been some of the main challenges in training STEM project participants?
  - What has worked well in training STEM project participants?

18. Job Search Support and Job Placement Services for Adults

- To what extent have job search support and job placement services been made available and utilized by STEM participants?
- As the project winds to a close, has the project provided any post-placement services to STEM participants?

19. Outcomes for Dislocated Worker Participants and Other Adults

- What types of credentials, certificates, or degrees do STEM participants attain? Outcomes to date?
- Do you have any contacts with employers with whom participants are placed to see how pleased they are with skills of project graduates?
- What other measures of participant outcomes, besides those required by the STEM solicitation do you use?
- Have these participant outcomes met your expectations?
- Have there been any challenges with performance? How have you gone about addressing them?

20. Stories about Selected "Typical" Project Participants

- Background before enrolling in project (age, education, work experience)
- How project helped participant explore career options, develop an employment goal, and pursue that goal
- Participation in Training
- Support finding employment after training
- Outcome

21. Lessons Learned in Providing STEM Training for Dislocated Worker Participants and Other Adults

- What have you learned about promising practices to help dislocated workers and other adults prepare for STEM careers?
  - Have you documented your practices in a form that can be shared with other sites?
  - Have you made recommendations to the participating WIBs about how to learn from your experiences with the STEM Initiative?
- What advice would you give other regions in how to promote STEM occupations and prepare participants for jobs in STEM-related fields?

Part III. Focus on Customers and STEM Services for Disadvantaged Youth

22. Overview of STEM Services for Disadvantaged Youth

- Have there been any changes in the STEM services offered to disadvantaged youth since the Round 2 visits last spring?
  - Has the project introduced any new STEM services for youth since the Round 2 visits last spring?
  - Has the project discontinued any service components since the Round 2 visits last spring (or, if all services have concluded, did they discontinue any specific services before others)?
  - Has the project made improvements or notable modifications to services already in place?
- Have there been any significant changes in the participant traffic and/or enrollment flow for STEM services for youth? Have there been any shifts in the demand for services?
- Have STEM services for youth become available at any additional locations within the region? E.g., services being offered/expanded by additional organizational partners

23. Career Exploration/ Counseling for Youth

- What have been the strengths and weaknesses of the career exploration/ career counseling provided to youth under the STEM initiative?
  - How useful has the Career Blueprint been as a tool to support career exploration and career counseling for youth?
  - What is the most effective way that the project has provided STEM career awareness/ career counseling to youth under the grant?
  - How many youth have been reached with STEM career exploration/career counseling services? How are these individuals documented by the project (e.g. as capacity building contacts?)

- What arrangements has the project/ One-Stop Career Center made for continuing to provide STEM career exploration/ career counseling services to youth after the end of the grant?

24. STEM-Related Training for Youth

- Planning for STEM training for youth as part of the STEM project
  - What types of training did you anticipate providing to youth at the beginning of the grant? How did the actual patterns of services provided to youth match your initial expectations?
  - How well did participants' interests match the specific industries or occupations targeted by the STEM grant? What did you do if an individual was interested in a field that was not specifically targeted by the grant?
- To what extent has the STEM project been involved in developing new STEM training curricula for youth or young adults?
  - In what particular areas has the project tried to develop new or improve existing STEM courses or training options for youth?
  - With what partners has the project worked to develop new STEM courses for youth?
  - How is the development of these courses financed? How do STEM participants pay for these courses?
  - How successful have these new STEM curricula for youth been? Are they appropriate for the targeted students/workers? Is there a demand for these training courses? Are participants able to find employment in the field in which they trained?
- To what extent are youth referred to existing STEM training available in the community?
  - Which types of training are most commonly utilized?
  - For what occupations have participants most commonly prepared?
  - How long does the typical training last?
  - How well does the training format reflect the needs and capabilities of STEM participants who are youth?
- What have been the strengths and weaknesses of the STEM training provided to participants?
  - Which training courses have had the best record to date of leading to employment? Which have had the worst record to date?
  - What have been some of the main challenges in training STEM project participants?

- What has worked well in training STEM project participants?

25. Job Search Support and Job Placement Services for Youth

- Have youth received support in finding internships or summer jobs in STEM-related fields as part of the STEM project?
- Have out-of-school youth participating in STEM-related training received support in finding employment in STEM fields?
- As the project winds to a close, is the project providing expanded post-training services to STEM participants to support their transition to employment or continued education/training?

26. Outcomes for Youth

- What types of credentials, certificates, or degrees do youth participants attain? Outcomes to date?
- Do you have any contacts with employers with whom participants are placed to see how pleased they are with skills of project graduates?
- What other measures of participant outcomes do you use for youth?
  - Have these participant outcomes met your expectations? At the current rate of outcomes, will you meet/have you met your project goals for youth?
  - If you have experienced challenges with youth outcomes, how have you gone about addressing them?

27. Stories about Selected "Typical" Project Participants

- Background before enrolling in project (age, education, work experience)
- How project helped participant explore career options, develop an employment goal, and pursue that goal
- Participation in Training
- Support finding employment after training
- Outcome

28. Lessons Learned in Providing STEM Training for Youth

- What have you learned about promising practices to help youth prepare for STEM careers?
  - Have you documented your practices in a form that can be shared with other sites?
  - Have you made recommendations to the participating WIBs about how to learn from your experiences with the STEM Initiative?
- What advice would you give other regions in how to promote STEM occupations and prepare youth for jobs in STEM-related fields?

Part IV. Goals, Services and Outcomes for Employers and Industry Sectors

29. Project Goals for Industry Sectors or Specific Employers

- What were the project's specific goals for meeting employers' needs for skilled labor or improving the competitiveness of regional industries?
- How well have STEM services addressed skills needed by regional STEM employers?
- How well did the project do in meeting these goals?
- What are the remaining STEM skills that employers would like to address among job seekers or incumbent workers with help from the public workforce development system?

30. Services Provided to Employers

- What services, if any, have been provided directly to employers under the STEM grant? (e.g. customized training, recruitment and screening of job applicants)
- How have these services been received by the business community?

31. Outcomes for Employers

- How might you measure the effectiveness of the Initiative with regional STEM employers?
- Any evidence on whether the STEM project has helped participating employers to become more competitive?
- How might employer involvement look in STEM efforts moving forward?

Focus Group (or Individual Interviews) with Adult Participants

- When and how did you first find out about the STEM project?
- Were you looking for training in a STEM field or did you find out about STEM job opportunities after coming to the One-Stop Center?
  - How did your previous training/work experience prepare you for work in a STEM field or make you interested in this field?
  - What is it about a job in a STEM field that appeals to you?
  - What specific occupation would you like to work in? Do you know what types of training will be needed to prepare you for work in that field?
- What is/was your experience receiving services from this project? What services did you receive/ do you hope to receive? Who were your primary contacts at the STEM project? (Who did you have the most contact with?)
  - In what sort of career counseling and career planning activities did you engage? How helpful was this in helping you choose a career path?
  - What opportunities for STEM training have been available to you?
  - Are you participating in training/ planning to participate in training for a STEM occupation?
- What has been your experience interacting with STEM mentors (if any)?
- Have you thought about how you might advance in this field over time?
  - How could you move up in your field over time? What would you need to advance in your field? (job experience? additional training?)
  - What would be your ideal career pathway?
- What have you enjoyed about the STEM program?
- How do you believe STEM services could be improved?
- Would you continue to visit the One-Stop Career Center for training or employment services in the future?
- Are you aware of STEM resources available online? [*Describe what is available in that local project*]
  - Do you think you will use the online STEM resources in the future?
  - Even if the STEM coach were not around for assistance?

Mentor Focus Group/ Interview

- How did you hear about this opportunity to be a STEM mentor and what prompted you to take it on?
- How many participants have you been matched to thus far?
- How were you trained for the mentoring role?
- What do you do in your capacity as a mentor?
  - How much contact do you have with participants?
  - How do you support them in their interest in science, technology, math, or engineering?
  - How do you advise them in their education, training, and career plans?
- Without mentioning specific names, can you tell us about your experiences working with one of the participants in this project?
- How do you think the "mentees" have benefited from the mentoring experience?
- How have you (or your institution) benefited from this experience?
- How do you think the mentoring might be improved?
- How long would you like to continue participating as a mentor?
  - Would you consider taking on new mentees in the future?

Youth Focus Group

- When and how did you first find out about this STEM project?
- Where are you in your educational pathway (e.g. high school student, high school graduate, community college student, out-of-school)?
- Were you considering education/work in a STEM field before or were you directed to this area?
  - What was extent of your STEM education, training, or experience prior to program?
  - What made you decide to participate in the project?
  - What is it about studying and working in a STEM field that appeals to you?
  - What specific occupation would you like to work in? Do you know what types of training will be needed to prepare you for work in that field?
  - What would be your ideal career pathway? (initial job, training plans for higher level job)
- What is/was your experience participating in this project? What activities have you participated in/ do you plan to participate?
  - In what sort of career exploration activities did you engage? What have you learned about STEM career opportunities?
  - What information about STEM training and STEM careers and STEM jobs have you used as a participant in the STEM project? (Online/ virtual resources versus "hard copy" information?)
  - Are you participating in training/planning to participate in training for a STEM occupation?
- What has been your experience interacting with STEM mentors (if any)?
- What have you enjoyed about the STEM program?
- How do you believe STEM services could be improved?
- How has participation affected your thinking about your future plans (pursue STEM field)?

Focus Group/Interview with Employer in Industry Targeted by Project

- When and how did you first find out about this STEM project?
  - How does your industry or firm depend on a workforce with STEM skills (what skills; difficulty in finding qualified employees?)
  - What was your understanding of the ways in which you could participate in the project, and how participation might benefit your business or industry?
- Are you presently participating in any other regional workforce initiatives concerning science, technology, engineering and mathematics?
- To what degree have local economic conditions had an impact on your business; on your ability to participate in this initiative?
- What activities have you participated in or services have you received as part of the STEM Initiative?
- How would you describe the backgrounds of the participants with whom you have had contact?
  - Demographics, other characteristics, mastery of English language
  - Level of formal education?
  - Stage in career (entry level, mid-career, etc.)?
  - Range of STEM skills that participants have?
- What has been your experience interacting with STEM coaches (if any)?
- How would you measure the effectiveness of the local STEM Initiative?
  - "Hard"/quantitative outcomes and "soft"/qualitative outcomes?
  - Improvement in the relevant skills of new job applicants.
- In your opinion:
  - How has the STEM project added value for participants and/or employers?
  - How could the STEM initiative be improved?
- Do you have any thoughts about how the One-Stop Career system and the local region should prioritize future goals in promoting development in STEM?

APPENDIX B. INDIVIDUAL STEM PROJECT PROFILES

Introduction B-3

Connecticut STEM Careers Partnership B-5

STEMWorks Indiana B-17

STEMPower (STEM Manufacturing Pathways) Massachusetts B-29

Operation Workforce (Texas) B-41

Northern Willamette Valley STEM Initiative (Washington and Oregon) B-53

Introduction

This appendix provides a description of the key features of each of the five projects funded under the STEM Initiative, as background information to support the cross-site analysis presented in Chapters II through V. Some readers might decide to read the cross-site analysis chapters first, and then refer back to the individual case study profiles in this chapter for more detail. Other readers may want to read about the individual experiences of the demonstration projects before reading the chapters that analyze how the projects are similar and how they differ.

Each local project profile follows a standardized outline, including information on

- project context and goals
- project organization and administration
- STEM partnerships
- STEM Centers of Excellence
- use of career blueprints
- services for youth
- services for adults
- services targeted to employers and incumbent workers
- outcomes for enrolled participants
- notable practices
- plans for sustaining STEM features within the region, and
- lessons learned.

The individual project profiles are sequenced in alphabetical order by the name of the state in which the project is located. Below we list the order in which the profiles are sequenced, along with the page on which each profile begins.

Connecticut STEM Careers Partnership

Grantee: Eastern Connecticut Workforce Investment Board

Project Service Area: All five local workforce investment areas in the state of Connecticut, covering eight counties and including 18 American Job Centers

STEM Initiative Funding: $2,000,000

Targeted STEM Sectors: Information Technology, Advanced Manufacturing, Alternative and Renewable Energy, and Engineering

Project Goals (from Grant Application):

- 1000 individuals will receive counseling and career planning from STEM coaches
- 651 participants—primarily dislocated workers and disadvantaged youth—will achieve credentials ranging from associates degrees to certificates for shorter-term training through completion of STEM programs at community colleges, at WIA ITA vendors, or through technology-based learning (TBL) programs.
- 495 participants will enter employment in training-related occupations

Grant End Date: 9/30/2012

Project Context and Goals

Regional Context. Aerospace, manufacturing, and other high-tech sectors of Connecticut's economy provide high-wage jobs to a significant proportion of state residents. STEM industry jobs offer a sharp contrast to the lower-wage jobs available in the service sector, where most job growth is occurring. Before the onset of the recession in 2008, employers in STEM fields were experiencing labor shortages due to large-scale retirement of skilled workers and a growing skills mismatch between younger workers and the available jobs. It was worrisome to employers and state officials that the number of students expected to graduate from college with skills in information technology and engineering was projected to fall far short of being enough to replace the workers retiring over the next decade.

Thus, developing the education and skills of younger workers became a high priority for the state. It received several federal grants to develop its STEM industries and recruit new workers into STEM career pipelines (including separate grants to support advanced manufacturing and alternative and sustainable energy). Growing the skills of young workers and "re-tooling the skills of mid-career workers" were seen as necessary for supporting economic growth and diversification.

Because of its devastating effect on the Connecticut economy, the recent recession altered the situation considerably. While meeting the demand for skilled labor remained a long-term concern, the stalling of the economy reduced employers' needs for workers in the short term. According to the *Connecticut Economic Digest* (March 2010), the state lost over seven percent of total jobs between March 2008 and January 2010. Unemployment peaked at slightly over 9 percent in 2010 and declined slowly during 2011. Although it did not change the long-term goals of the project, the high unemployment rate during and after the recession made it more difficult to find jobs for the STEM project participants.

Project Objectives and Priorities. The overall goal of the Connecticut STEM Careers Partnership was to support the development of STEM careers and industries within the state in both the long term and the short term. Rather than targeting any specific STEM occupations or industries, project managers focused on creating a statewide education and training infrastructure capable of training workers in core STEM competencies, thereby preparing them for a wide variety of STEM occupations. According to the grant application, project managers wanted to concentrate on bringing three particular populations into STEM career pipelines: disadvantaged youth, dislocated workers, and low-wage workers. In furtherance of these goals, the project focused on three main objectives:

- Increase STEM awareness and competency in the state by providing each interested individual with a STEM coach, a STEM mentor, and individual educational and career blueprints.
- Build a statewide capacity to retain and grow STEM industries, by establishing articulated education and training offerings that support STEM career pathways and by improving coordination between workforce agencies, STEM employers, educational institutions, and training providers.
- Develop a user-friendly web site to disseminate regional, state, and national STEM information, offer an interface for virtual career exploration and planning, and provide a training portal will allow dislocated workers and disadvantaged youth access to online training in STEM fields.

In responding to the recession, the project deviated in several respects from its planned design. First, rather than preparing unskilled or mid-level jobseekers for available job openings, the project ended up serving primarily individuals with previous training and experience in STEM occupations who had been laid off as firms downsized. Second, because regional employers were not in a position to hire new workers, the project was unsuccessful in involving employers in designing services for dislocated workers. Finally, because of the large number of unemployed workers seeking training funds from the WIA program, the WIA training funds that the project had expected to be able to utilize for STEM participants were depleted soon after the project began operations. This caused the project to focus on offering a variety of short-term online training courses in STEM-related fields.

Project Organization and Administration

Project Management and Oversight. The Connecticut Workforce Development Council developed the STEM project in Connecticut as a collaborative effort involving the state's five local WIBs, state agencies, educational institutions, and employers. All five local WIBs had collaborated on two previous STEM-related job-training grants. To oversee the STEM project grant, the partners create a small collaborative group, the Connecticut STEM Jobs Work Group. Subcommittees were formed to help plan specific project activities. Although the history of prior collaboration made it easier to achieve a consensus about the importance of supporting the STEM sector, the existence of multiple coordinating and oversight groups and committees sometimes made the decision-making process cumbersome, according to leaders at the grantee WIB.

As the grantee, Eastern Connecticut Workforce Investment Board provided day-to-day project management. To administer the project, the grantee contracted with two different consulting firms. One consultant was responsible for administrative tasks, such as monitoring and reporting on project activities. The other consultant was responsible for training and supervising the STEM coaches and operating the project's mentoring component. According to the director of the lead LWIB, using third-party administrators was effective because it shifted the power dynamic, removing any appearance that the grantee WIB was trying to tell the other participating WIBs what to do with their project funds.

Because Connecticut STEM Careers Partnership was a statewide collaborative, all five of the state's WIBs were involved in making decisions about project implementation. This resulted in a decentralized model in which each local WIB developed its own particular approach to the STEM project. Each WIB was responsible for hiring its own STEM coach, allocating resources to its enrolled participants, assisting in the development of the Center of Excellence and career blueprint, auditing local STEM skill needs, and engaging employers.

Project Staffing and Service Delivery Arrangements. Each local WIB hired one STEM coach, whose salary was funded half from the grant and half from the WIB's budget. The director of strategic development at each WIB supervised its STEM coach and helped the coach coordinate service delivery with the American Job Centers in the local area. Technical support and training for the STEM coaches was provided by the project consultant, who facilitated weekly conference calls and monthly in-person meetings in which all the STEM coaches participated.

STEM coaches had office space in each of the American Job Centers within their local areas, and arranged to meet with customers interested in STEM services in the Center that was most convenient for customers. They also conducted outreach for the STEM project by developing and distributing flyers, attending job fairs, and visiting businesses and educational institutions.

One STEM coach estimated that he spent 75–80 percent of his time conducting outreach to the public about the project. Coaches were also responsible for helping other American Job Center staff learn about STEM training and STEM careers. To this end, STEM coaches attended American Job Center staff meetings, held regular workshops for Center staff members, and worked with WIA case managers.

A significant portion of the services provided to customers under the STEM project was available on a self-service basis through the virtual STEM Center, described below under "Virtual Centers."

STEM Partnerships

Planning Partners. The state community college system and adult education system were the project's strongest planning partners. Other local and state agencies referenced in the grant application did not materialize as partners after the grant was awarded. The project's partnerships with local business associations were similarly disappointing, as these groups failed to follow through with their original commitments to provide mentors and participate as training partners.

Service Delivery Partners. The project's most valuable partner in developing customer services was the Connecticut Distance Learning Consortium, which helped the project develop its virtual Center of Excellence and interactive career blueprint tool.

In addition, the project selected Metrix Learning, a proprietary vendor of online courses, as its primary source of occupational skills training. The project purchased 90-day licenses that enabled project enrollees to access over 6,000 online trainings and courses.

The state community college system and the adult education system were also important training partners for the project. The former hired a part-time STEM liaison so that it could better support the project. This individual helped the project create its interactive career blueprint tool; she also designed the curriculum for a STEM career exploration course that the project hoped to implement in local community colleges. The adult education system helped implement a basic math academy to help prospective students pass the math exam that would enable them to take STEM-related courses at the community college.

Leveraging of Funds from STEM Partners. Funds leveraged from participating agency partners supported the development of the virtual STEM Center and supported the community college STEM liaison. In addition, the project relied on leveraged funds and resources to support training for participants, since its own training funds were extremely limited. Many participants, for example, received funding for training by co-enrolling in the WIA or Trade Adjustment Assistance (TAA) programs. Others were able to obtain Pell grants to pay for

STEM courses at local community colleges. To a smaller extent, the project was also able to convince employers to provide funding for specific training programs.

Moreover, to maximize resources, the project coordinated STEM grant funds with funds from other federal grants that had aligned goals—such as a grant for developing training related to green energy, and another to promote training in advanced manufacturing skills.

STEM Centers of Excellence

Physical Centers. As noted above, STEM coaches were given office space in the American Job Centers throughout the state and from these locations they served customers interested in STEM occupations. However, the services available to customers through the STEM Virtual Center website were as essential to the STEM project as the face-to-face career counseling services provided by the STEM coaches within the American Job Centers.

Virtual Centers. Creating a virtual STEM Center of Excellence was one of the Connecticut STEM project's main goals. Particularly because it was a statewide initiative, the project needed an efficient way to inventory and coordinate STEM activities, resources, and information across the entire state. The virtual STEM Center of Excellence fulfilled this need by providing a single online portal to STEM information and self-service tools; it also dovetailed with the project's emphasis on online STEM training.

The Connecticut Distance Learning Consortium helped the project develop its virtual Center of Excellence (available at http://www.ctstemjobs.org/). In addition to providing a clearinghouse for all STEM-related information in the state, the website provided customized resources for participants, STEM coaches, and employers. Participants and employers visiting the site were required to create online profiles and sign in each time they visited the site to access certain site features (e.g., career blueprints, and the virtual mentoring tool). In addition to completing career blueprints online, participants could complete an interactive career exploration exercise and update their resumes. Participants could also use the site to access the array of online STEM-focused trainings and courses available to STEM participants.

STEM coaches could use the virtual STEM Center of Excellence to schedule meetings with participants and track the online activities and progress of enrolled participants.

Employers could use the site to apply to be mentors and to request more information about specialized project services available to employers.

STEM project leaders recognized that the STEM website, as realized, did not attract enough attention as a tool for informing the general public about STEM opportunities. The major drawback to the STEM website as a career planning tool for STEM customers was that it was often challenging for participants to navigate the career blueprint and virtual resume without the assistance of a STEM coach. As a result, the total number of users who completed resumes or career blueprints on the site was modest. The project also had difficulty encouraging employers and mentors to use the website. Project leaders also reflected that they had missed an opportunity to tailor this tool for use by youth, who may have been more receptive to using online services than many adults.

Use of Career Blueprints

After experimenting with several differing career blueprint formats, the STEM project ultimately created an online career blueprint. This career blueprint, which inventoried participants' short-, mid-, and long-term goals, was completed by participants after their initial face-to-face meetings with their STEM coaches. Because the tool takes several hours to complete, STEM coaches were unable to guide participants through the entire process; rather, STEM coaches encouraged, but did not require, participants to complete the tool on their own. Upon completing the blueprint, participants received customized lists of resources, supports, and activities that were aligned with their particular career interests and goals. The tool also used the information entered into the career blueprint to pre-populate a resume template, which allowed participants to easily update their resumes.

Like the virtual STEM Center of Excellence, the online career blueprint tool was underutilized. In fact, one STEM coach estimated that only two percent of project participants actually completed the tool. The substantial amount of time needed to complete the blueprint seems to have deterred many participants. In addition, the online career blueprints did not play any clear function in the service delivery process for STEM coaches or participants. A number of STEM coaches never referred back to see whether a career blueprint was completed, and did not use it to guide service delivery, even if it was completed. Moreover, the project leadership noted that the online career blueprint was not well suited to customers who already had a clear reemployment goal, because it was designed to guide customers through an exploration of a variety of different STEM careers.

Services for Youth

Although the project identified disadvantaged youth as a target group in its STEM grant application, it never developed a separate youth component. The project did serve young adults who were enrolled in adult education or received career counseling from STEM coaches, but this group of participants received the same resources and supports as older adult participants.

Services for Adults

Connecticut STEM Careers Partnership focused on serving dislocated workers. Specifically, the project primarily supported recently laid-off workers with high levels of education and work experience. This emphasis occurred because these types of workers were abundant at American Job Centers during the recession and because the project, as implemented, lacked the training resources to provide more intensive training to serve workers seeking entry-level STEM jobs. The project provided three main services:

- *One-on-one career and job search counseling from STEM coaches.* STEM coaches provided participants with useful information related to career exploration and job search activities. Coaches were generally unable to provide participants with access to training funds, ongoing case management, or significant job placement support, due to limited staff availability and a lack of training funds. STEM coaches often referred participants to online training opportunities, career exploration services, and resources available through the project's virtual Center of Excellence. Coaches also referred participants to other programs at American Job Centers and external providers (such as TANF, WIA, and local community colleges) for training funds and supportive services. On average, a project participant usually met with a STEM coach three or four times while enrolled in the program.
- *Online STEM training.* While the project could not supply funds for classroom training, it did provide participants with access to a wide array of online STEM-related courses and trainings. Through the project's licensing agreement with its proprietary provider of online training, participants were able to take as many online courses as they desired within a 90-day period, free of charge. The trainings, which were accessed through the project's virtual Center of Excellence, provided participants with basic STEM skills on topics such as blueprint reading, basic arithmetic, and process management. The trainings were self-directed; STEM coaches did not track participants' progress. The trainings did not provide certifications, but the project would pay for certification exams if the participant wanted to take them after he/she had completed an online course. Participants and project staff members believed that completing one or more online courses helped the typical participant strengthen his or her resume and demonstrate tangible skills to prospective employers.
- *Virtual mentoring.* The project intended to offer project participants one-on-one mentoring services through its virtual Center of Excellence. Despite recruiting and training some interested mentors and participants and developing an online platform to facilitate interaction between mentors and their mentees, the project never fully launched its mentoring component because it had difficultly matching mentees with mentors in their occupational fields of interest. To sidestep this challenge, the project used the virtual STEM Center to support an innovative practice of STEM webinars. The webinars enabled groups of STEM jobseekers interested in a particular STEM occupation to converse with a panel of local employers or individuals presently employed in that field.

In providing services to dislocated workers, the project was persistently hampered by its lack of training resources. STEM coaches relied on a limited supply of Individual Training Accounts provided as a leveraged resource by their WIBs to provide access to training programs at community colleges or other providers. The project was also made less effective by a mismatch between the career exploration services it had developed and the interests of the dislocated workers it served, since most participants were not interested in career exploration.

Services Targeted to Employers and Incumbent Workers

The Connecticut STEM project was not able to make much progress in engaging employers as envisioned in its initial project design, which called for employers to volunteer as mentors and help develop training curricula for prospective new hires. The project had also envisioned that employers would use the virtual STEM Center of Excellence to request appointments to meet with project staff members to discuss their specific workforce training needs and interests.

Although the above services did not succeed in attracting employers during the recession, the project did succeed in launching another activity targeted to STEM employers—providing financial support for training incumbent workers as a strategy to support local businesses and increase the skills of the incumbent STEM workforce. The STEM coaches recruited employers interested in this activity by reaching out to small and medium-sized employers with information about the available training support. Incumbent worker training sessions were co-funded and co-designed by employers. Within six months of its launch, the incumbent worker training component had attracted a group of 20 primarily small employers. Training topics included welding, computer assisted design, and manufacturing operations management. Although these trainings were provided to relatively small numbers of trainees, local employers viewed the service favorably.

Outcomes for Enrolled Participants

The Connecticut STEM project received a nine-month extension of its 36-month grant period through September 30, 2012. Thus, the outcome data that we present in the evaluation report do not reflect final project outcomes. Exhibits B-1 and B-2 display the Connecticut project's targeted outcomes as well as outcomes reported on the 12/31/11 Form 9134 Quarterly Progress Report (QPR) and in the individual-level program data submitted for the evaluation. Because both types of outcomes data may contain some inconsistencies (see Chapter VII for a more in depth discussion of data collection and reporting challenges), we report outcome information from both sources, even though they do not always agree. Enrollment and training outcomes for incumbent workers served by the Connecticut project are included in Exhibit B-1. However, incumbent workers are excluded from the employment outcomes shown in Exhibit B-2.

As shown in Exhibit B-1, both data sources agree that the Connecticut project had exceeded its enrollment targets, enrolling well over 100 percent of the expected 1,000 participants. Connecticut had not yet met its target of enrolling 92 percent of its 1,000 participants in training (Exhibit B-2). Instead, the project had enrolled about half of all program participants in training programs. The available data indicate that the project had exceeded its target for the percentage of trainees that completed their programs, according to both data sources. However, according to the QPR data, the proportion of training completers that had received credentials was substantially lower than the targeted percentage.

Exhibit B-1:
CT STEM Jobs Enrollment and Training Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted April 2012)
Enrollment			
Number enrolled (Percent of target)	1,000[a]	1,262 (126%)	1,263 (126%)
Training			
Number entered training (Percent of enrollees)	918 (92%)[b]	749 (59%)	603 (47%)[c]
Number completed training (Percent of trainees)[d]	651 (71%)	654 (87%)	425 (97%)
Number completed credential (Percent of training completers)	651 (100%)	65 (10%)	n/a

"n/a" denotes data not available.

[a] Note: CT STEM JOBS did not establish separate enrollment targets for adults and youth.

[b] Includes participants enrolled in Community Colleges, funded through ITAs, and taking technology-based learning courses.

[c] " Entered Training" and "Completed Training" information do not include the courses participants participated in using the proprietary provider's technology-based learning program, because data were not available on the participant use of this training. For this reason, the evaluation data on the number of trainees and training completers is lower than the number reported in the QPR.

[d] For the Evaluation Outcome Data, the percentage of "completed training" is calculated out of the participants that were longer active in training. Trainees no longer active in training includes those who had finished their training program, either successfully or not. This measure excludes participants who were still enrolled in training at the time data were collected.

As shown in Exhibit B-2, between 25 and 33 percent of participants who had completed training had obtained employment. Of those, only about one-fifth had entered into training-related jobs; a result that is much lower than was anticipated. Participants that had obtained employment had exceeded the earnings target range of $14,000-$19,000, with a two-quarter average earning of $19,742.

Exhibit B-2:
CT STEM Jobs Employment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted April 2012)
Entered employment			
Number entered employment (Percent of training completers *for QPR;* percent of exiters *for Outcome Data*)	n/a	166 (25%)[a]	172 (33%)[b]
Number entered training-related employment (Percent of training completers who entered employment)	495 (76%)	32 (19%)[a]	36 (21%)
Earnings			
Average earnings over a two-quarter period	$14,000-$18,000	n/a	$19,742

"n/a" denotes data not available.

[a] According to the QPR instructions provided by ETA, this is defined as the percent of training completers regardless of enrollment status in the program. However, because of changes in the QPR definitions, some projects may have only included only training completers who obtained employment in the same quarter in which they completed training.

[b] In computing employment outcomes from the participant-level data provided by the projects, we have included all exiters, with the exception of individuals who were employed at the time of enrollment.

Notable Practices

The following are notable practices implemented by the Connecticut STEM Careers Partnership:

- The project employed online training as a cost-effective and flexible way to provide participants with STEM training. The project's use of technology-based training allowed it to serve a larger group of participants than it could have using more costly classroom- or employer-based training. Using technology-based training also enabled the project to serve a diverse group of customers with varying needs and skills, since these courses were largely self-directed.
- The lead WIB hired external consultants to manage the project's administrative needs and personnel, which provided the project with skilled resources upon

which it could draw. These consultants also helped the five participating WIBs to reach consensus efficiently and avoid political conflicts, since the consultants were viewed as neutral parties.

- The project worked with the Connecticut Department of Education to integrate a 10-week remedial math course into local adult education schools, so that students could enroll in community college STEM courses without having to take remedial courses.
- The project developed an important ally in the community college's STEM liaison, who, as a professor and administrator at a local community college, possessed the credibility and contracts to rally support for the project's work within local community colleges.

Plans for Sustaining STEM Features Within the Region

Because the project started late due to delays in hiring project staff, it received a no-cost extension that enabled the program to continue to operate until the fall of 2012. The local WIBs were committed to continuing to promote STEM competencies and careers in the region, which they planned to do with the help of specialized STEM grants already in place. The WIBs were also eager to continue the operation of the virtual Center of Excellence, either by linking it to the state college and university system website, or to the state workforce system website. As of the time of the final site visit, the WIBs had not yet identified funds to cover the costs of maintaining the STEM website.

The project did not have plans to continue funding STEM coach positions beyond the grant period. The WIBs indicated that, where possible, they would transfer their STEM coaches into different roles at their respective American Job Centers. For example, one STEM coach was already beginning to shift into his new role on a health care grant at the time of the last evaluation site visit. The participating local WIBs had no plans to continue the project's mentoring component.

At the time of the final evaluation site visit, the WIBs were uncertain about whether they would continue working together as a consortium on future STEM activities.

Lessons Learned

- Before designing online services, a project must make sure the users (project participants and employers) will be interested in using the service.
- Although involving a great many partners may provide a project with substantial resources, it can make it more challenging and time-intensive to align goals, implement activities, and reach consensus on key decisions.
- Grantee organizations that have received multiple grants to support STEM occupations must work hard to coordinate these initiatives, in order to prevent duplication of effort and make sure the resources are used effectively.

STEMWorks Indiana

Grantee: EmployIndy (formerly the Indianapolis Private Industry Council)

Project Service Area: Two local workforce investment areas that make up the Indianapolis metropolitan area. The grantee WIB serves Marion County, which contains the city of Indianapolis. The Central Indiana Workforce Investment Board serves the remaining eight counties, which circle Marion County.

STEM Initiative Funding: $1,999,946

Targeted STEM Sectors: Biotechnology, Information Technology, Engineering, and Advanced Manufacturing

Project Goals (from Grant Application):

- Enroll 400 dislocated workers (200 of whom are already enrolled in WIA training)
- Enroll 100 disadvantaged youth
- A total of 234 individuals (dislocated workers or disadvantaged youth) will enter training-related employment

Grant End Date: 12/31/2012

Project Context and Goals

Regional Context. Until 1980, the regional economy of central Indiana was heavily dependent on the manufacture of transportation equipment and other durable goods. Over the last three decades, the region has suffered a steady decline in manufacturing employment and an increase in service industry jobs. Nevertheless, manufacturing is still an important sector of the regional economy; many of the current manufacturing firms depend on access to a workforce with STEM skills. Important STEM-related industries include pharmaceutical research, development, and manufacture; the advanced manufacture of aerospace components, fabricated metals, and auto parts; and financial services and information technology.

The region was hard hit by the recession in 2008. Unemployment in the Indianapolis metropolitan area rose rapidly, from 5 percent in mid-2007 to a high of over 10 percent in early 2010. By the end of the STEM grant in December 2011, economic conditions were starting to improve although unemployment rates were still over 8 percent.

Project Objectives and Priorities. The goals and strategies for the STEM project in Indiana included the following:

- *Preserve high-wage jobs*, by training workers dislocated from the manufacturing sector to meet the skills requirements in growing occupations in the targeted sectors.

- *Respond to employer needs*, by having business services unit staff members within the American Job Centers announce job openings, and screen and refer appropriate clients.
- *Recruit new workers to STEM fields*, by (1) having STEM coaches conduct outreach and provide information about STEM careers and STEM training, (2) developing online tools to reach the general public, and (3) increasing STEM career knowledge and awareness among all American Job Center staff members.
- *Coordinate STEM project activities with related STEM activities* within the region and leverage funding to support the STEM project activities when feasible.

Project Organization and Administration

Project Management and Oversight. Although the grantee WIB in Indianapolis/Marion County consulted with its partner WIB when it was preparing the STEM project application, as well as throughout the grant period, most project activities took place at the two American Job Centers operated by the grantee WIB. (Residents of the suburban areas were encouraged to seek STEM services at one of the two Indianapolis Centers; STEM Coaches also occasionally visited one of the American Job Centers in the suburban WIB.) Because the project was focused on providing services within a single county, the grantee did not have to oversee distinct project activities in two different local workforce investment areas.[40]

Responsibility for overseeing and monitoring the STEM project in Indiana was retained by administrative and policy staff members within the grantee WIB. Operational responsibility for grant activities was divided between two contractors:

- The School of Engineering and Technology at Indiana University-Purdue University Indianapolis (IUPUI) was responsible for designing and operating project services targeted to disadvantaged youth. This was a separate component of the grant, referred to as "The STEM Scholars Program." This contractor was also responsible for developing a STEM website and kiosks that would provide information about STEM careers to the general public and designing the career blueprint that would be available for customer use via the website and kiosks.
- The organization that acts as service provider for the American Job Centers was responsible for hiring the STEM coaches. The American Job Center general managers were responsible for functional supervision of the STEM coaches and coordinating the use of WIA funds to help pay for training for the STEM project participants.

In a grant modification approved by ETA after the award of the grant, day-to-day grant management was assigned to a project director employed by IUPUI, since that contractor had the

[40] One of five STEM kiosks developed to provide access to information about STEM careers was located in one of the American Job Centers in the partner WIB.

largest share of operational responsibilities under the grant. However, by the end of the first year of the grant, this contractor encountered difficulties (e.g., changes in the roles of different contractor staff and staff turnover among the STEM advisors) that caused the grantee WIB to play a stronger role in monitoring and overall project management.

Throughout the grant period, the grant's youth services and adult services were operated as two completely separate and distinct components.

Project Staffing and Service Delivery Arrangements. For providing services to adults, the grant supported two full-time STEM coaches who were employees of the American Job Centers. The American Job Center service provider filled these positions with staff members who were currently WIA case managers, because they were familiar with Indiana's WIA program, had experience serving dislocated workers, and had some knowledge of STEM careers. Each coach was assigned to work with STEM participants within one of the two Job Centers in Marion County. The STEM coaches were given responsibility for providing all case management services to the individuals co-enrolled in the STEM project and WIA during the demonstration period.

For providing services to disadvantaged youth, the grant supported two full-time STEM advisors who were recruited and employed by Indiana University-Purdue University Indianapolis. While STEM advisors were not required by DOL as part of the demonstration design, the grantee assigned these staff members responsibility for coordinating tutoring, mentoring, and career activities; providing counseling, assessments and follow-up; developing career blueprints, and supporting the students in transitioning into post-secondary training and education. STEM advisors were also responsible for recruiting, training, and overseeing mentors to work with enrolled youth. A high rate of turnover among the STEM advisors throughout the grant period made it difficult to maintain continuity in the services provided to STEM Scholars.

STEM Partnerships

Organizations Involved in Project Planning and Service Delivery. The grantee WIB assembled an advisory committee for the STEM project with representation from the contracted service providers described above, the participating WIBs, and various K-12 and post-secondary educational institutions. Employer representatives were not included on this advisory body. The advisory committee does not appear to have played an important role in guiding this project.

Although a large number of organizations other than the contracted service providers were mentioned in the grant application—including organizations involved in other regional STEM initiatives—the project did not develop any memoranda of understanding with other organizations. Aside from referring participants to a variety of regional educational entities for training, the project does not seem to have developed clear roles for other partners to play in the project. The lack of active involvement in the project by employers or employer associations was a notable gap in this grantee's STEM project accomplishments.

Leveraging of Funds from STEM Partners. As of the time of the second evaluation site visit in the late fall of 2011, the project reported that more than $200,000 in WIA training funds had been used to help pay for STEM-related training for project participants, all of whom were co-enrolled in WIA and the STEM project. In addition, the American Job Center service provider in the primary workforce investment area donated a portion of its contract budget to cover the personnel costs associated with the STEM coaches and STEM coach supervisory staff.

STEM Centers of Excellence

Physical Centers. Each of the two American Job Centers in the grantee's service area had a STEM coach stationed full-time at the Center. Other Job Center staff referred all customers interested in STEM occupations to the STEM coaches. All STEM participants had access to the full resources of the Job Center; there were no specialized services developed for STEM participants, other than the virtual tools described below.

Virtual Centers. The Indiana STEM project invested substantial portions of its grant in the development of online tools designed to make information about STEM occupations more accessible to the general public. The project developed two different delivery modes to make its virtual STEM tools accessible to the general public—physical STEM kiosks located in various service sites, and a "STEMWorks Indiana" website at http://www.stemworksindiana.org/. Both the kiosks and the website allowed customers to access various career resources:

- *online career exploration tools*, including instruments that assess STEM interests and skills and then link the user to a list of high-demand, high-growth, or high-wage STEM jobs available within the region that match the user's interests and skills;
- *information about different STEM jobs and careers* from a variety of sources that explain the amount of education or training needed to begin work in a field, describe that field's career pathway, and list the number of jobs available for that occupation within the region;
- *information about training providers* available in each area; and
- *information about the STEM project* and other sources of career support available from public agencies in the region.

Both the physical kiosks and the STEMWorks Indiana website encouraged each visitor to develop a "career blueprint," using a format described below. Although the grantee invested a substantial amount of grant funding in the development of the virtual STEM tools, the virtual STEM Center was not used by as many customers during the demonstration period as had been hoped. In assessing the effectiveness of the two modes of delivering information on STEM careers, the project manager for the STEM grant questioned whether the physical kiosks had been a good investment, since the website could be accessed via personal computer tablets, computers, and laptops as well as via computers in Job Centers accessible to the public.

Use of Career Blueprints

The Indiana project managers devoted considerable time and effort to developing the project's online career blueprint and considered this tool to be the keystone of the set of online assessment and career exploration tools available for customer use on the kiosks and the STEMWorks website. All visitors to the website were invited to register as users of the site and begin developing digital career blueprints. The career blueprint file for a registered user served as a repository for information about the customer's work history, assessment results, career options, and planned training. When printed out, the career blueprint also included detailed information about the chosen career, drawn from occupational databases linked to the system. For high-school students, an additional section of the career blueprint included room for college entrance test scores, an extracurricular activity log, a high school course plan, guidance checklists for grades 8–12, and a personal checklist.

Completing a career blueprint was a required part of the STEM project's service delivery process for disadvantaged youth, and was strongly encouraged for dislocated workers who were interested in training in STEM occupations. Project staff members pointed out that the tool was not very useful for customers who already knew what occupations they were interested in. The total number of completed career blueprints remained modest. At the time of the third site visit, only 125 dislocated workers had completed career blueprints. Overall, the relatively low volume of customers who completed career blueprints was disappointing, given the extensive amount of time and resources that were invested in developing the career blueprint tool. [41]

Services for Youth

The STEMWorks component targeted to disadvantaged youth, called "STEM Scholars," was operated as a separate program by The School of Engineering and Technology at Indiana University-Purdue University Indianapolis (IUPUI). The STEM Scholars program targeted WIA-eligible youth who were interested in pursuing certificate, credential, or degree programs in STEM fields.

The STEM Scholars program provided several key services to enrolled youth:

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[41] The project's quarterly progress report for 12/31/2012 reported that 19,321 users had created career blueprints during project period. However, upon querying the project director about this number, the evaluators learned that this number represent the total number of individuals that had begun completing career blueprints online, rather than the number that had completed career blueprints..

- group workshops covering topics such as STEM careers, career blueprints, math concepts, and study skills;
- access to mentoring and tutoring services, as needed, to help participants address personal issues, improve school performance, or have supportive role models;[42]
- exposure to STEM workplaces through field trips and opportunities for job shadowing;
- periodic meetings with a STEM Advisor;
- WIA funding (up to $3,000 per student) to pay for STEM-related training in demand occupations using a WIA-approved training provider; and
- funding (up to $1,000 per student) to cover the costs of transportation, books, and supportive services.

The project designers anticipated that the youth component would be able to support youth interested in beginning two-year associates' degree programs. However, most of the youth who participated in the STEM project ended up enrolling in certificate programs in the information technology field. Part of the difficulty experienced by the youth component was that it had a delayed startup. By the time it began to enroll participants, there was no longer enough time remaining in the demonstration period for youth to complete longer-term training. In addition, the absence of strong internal leadership and frequent turnover of the individuals in the STEM advisors positions prevented this component from being as successful as it might have been.

Services for Adults

STEM project services for adults were delivered as an integrated part of American Job Center operations. Dislocated workers enrolled in activities funded by the STEM grant were usually unaware that they were involved in a program different from the regular WIA program. The STEM project services provided to adults included the following:

- workshops and other core services available to American Job Center customers, including job search classes and basic computer skills workshops;
- access to the STEM-specific assessment and career exploration tools available on the STEMWorks website;
- career counseling from the STEM coach (who was each participant's assigned WIA case manager) and assistance in preparing career blueprints;

42 The project struggled to recruit mentors until it had the idea to develop an online "mentoring and leadership" course at IUPUI. Upon completion of the course, graduate students receive academic credit and a scholarship credit based on how many contact hours students have with their assigned mentees. The development of this college course was instrumental in recruiting graduate students in IT fields who were sincerely interested in and committed to mentoring high school students.

- coverage of tuition costs for training in high-growth occupations on the H-1B list from WIA-eligible training providers; and
- ongoing case management from the STEM coach, including limited job search support.

About one-half of STEM participants enrolled in technical certificate programs, one-fourth enrolled in associate degree programs, and one-fourth did not pursue training. The majority of participants who pursued training did so in the information technology field.

Services Targeted to Employers and Incumbent Workers

The STEMWorks Indiana initiative did not offer a separate menu of services to employers. The STEM coaches depended on the business service representatives who work within the American Job Centers to establish relationships with employers and let them know of any STEM-related job openings.

Outcomes for Enrolled Participants

Exhibits B-3 through B-5 display the Indiana project's targeted outcomes as well as outcomes reported on the 12/31/11 Form 9134 Quarterly Progress Report (QPR) and in the individual-level program data submitted for the evaluation. Because both types of outcomes data may contain some inconsistencies (see Chapter VII for a more in depth discussion of data collection and reporting challenges), we report outcome information from both sources, even though they do not always agree.

As shown in Exhibit B-3, the Indiana project reached about three-fourths of its adult target for overall enrollment targets by June 2012, according to the QPR data (58 percent according to the participant-level data submitted to SPR). The project enrolled greater numbers of youth than expected. However, the project was still ongoing at the time data were collected for the evaluation, so Indiana may meet its enrollment by the time the project is scheduled to end in December 2012.

Exhibit B-3:
STEM Works IN Enrollment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)[a]
Number enrolled (Percent of target)			
Adults	400	290 (73%)	233 (58%)
Youth	100	118 (118%)	148 (148%)
Total	500	408 (82%)	381 (76%)

[a] The participant-level database provided to the evaluator by the Indiana project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

According to the data reported on the 12/31/11 QPR, 81 percent of all 480 Indiana project participants were enrolled in a training program (Exhibit B-4). However, data from the evaluation extract indicates that less than half of all participants enrolled in a training program. This may be due to discrepancies in the definition of "training" for reporting purposes. "Training" in the evaluation data consists of only occupational skills training program, whereas other types of programs (e.g., participation in workshops provided by the project) may have been counted as training on the QPR. The evaluation data indicate that over four-fifths of all youth were either in a work-based learning program or in a traditional training program.

Limited data were available on training completion and credential attainment. The evaluation data contained credential attainment information for only a very small number of participants. However, of those participants with training completion outcomes recorded, 73 percent were reported to have successfully completed their training program. Although missing data on training completion, the 12/31/11 QPR indicated that 68 youth and adult participants had obtained credentials.

Exhibit B-4:
STEM Works IN Training Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)[a]
Number entered training (Percent of enrollees)			
Adults	400 (100%)	242 (83%)	86 (37%)
Youth	100 (100%)	87 (74%)	121 (82%)[b]
Total	500 (100%)	329 (81%)	207 (41%)
Number completed training (Percent of trainees)[c]			
Adults	n/a	n/a	n/a
Youth	n/a	n/a	n/a
Total	n/a	n/a	16 of 22 with data on training completion[d] (73%)
Number achieving credential (Percent of training completers)			
Adults	n/a	27 (n/a)	n/a
Youth	n/a	41 (n/a)	n/a
Total	255 (85%)[e]	68 (n/a)	n/a

"n/a" denotes data not available.

[a] The participant-level database provided to the evaluator by the Indiana project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

[b] For youth training includes work-based learning programs in addition to traditional education programs.

[c] For the Evaluation Outcome Data, the percentage of "completed training" is calculated out of the participants that were longer active in training. Trainees no longer active in training includes those who had finished their training program, either successfully or not. This measure excludes participants who were still enrolled in training at the time data were collected.

[d] This percentage is only of the 22 participants for which we have information on training completion.

[e] The training credential and employment targets are calculated for STEM participants only and do not include the 200 enrollees for Conexus Indiana, private foundation(s), or those receiving supported through other local workforce investment funds.

As shown in Exhibit B-5, about 33 percent of Indiana participants obtained employment as of the date the participant-level data were submitted to SPR. Of those, less than half entered into training-related jobs; a result that is much lower than was anticipated. Those participants that did obtain employment exceeded the earnings target of $15 per hour, with average hourly earnings of nearly $20 per hour.

Exhibit B-5:
STEM Works IN Adult Employment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)[a]
Entered employment			
Number entered employment (Percent of training completers *for QPR*/; Percent of exiters *for Outcome Data*)	160 (80%)	54 (n/a)	50 (33%)[b]
Number entered training-related employment (Percent of training completers)	240 (80%)	22 (n/a)	n/a
Earnings			
Average earnings over a two-quarter period	$15 per hour	$19.87 per hour	n/a

"n/a" denotes data not available.

a The participant-level database provided to the evaluator by the Indiana project has severe limitations. It does not include any activities (enrollments, services, or outcomes) that were entered into the project's MIS before January 2011. As a result, the evaluation data on outcomes does not include any information on participants who had exited from the project before January 2011, and is also missing information about services or outcomes that occurred prior to January 2011 for participants who were still active in the MIS system after that date.

b In computing employment outcomes from the participant-level data provided by the projects, we have included all exiters, with the exception of individuals who were employed at the time of enrollment.

Notable Practices

The Indiana STEM project was notable for its substantial investment in developing virtual STEM tools. Although the STEMWorks website did not immediately develop an active user community within the general public, the website has the potential to continue informing individuals about STEM careers and training opportunities long after the end of the grant period. The website also serves as an information and professional development resource for American Job Center staff members to draw on in serving future Job Center customers who are interested in pursuing STEM occupations.

The digital career blueprint template developed by the project appeared to be a useful product for youth who need to be guided through a comprehensive sequence of assessing their skills and interests, exploring possible careers, and planning a career pathway. Although it tended to be less useful to dislocated workers—because they often had occupational goals in mind already when they requested services from the American Job Center—other sites might be able to adapt this career blueprint design to meet their needs.

Finally, although the mentoring component of the STEM Scholar project did not serve large numbers of participants, the idea of recruiting mentors by offering a college or graduate-school class in mentoring and leadership that includes supervised practice in being a mentor is innovative and may be useful in other sites.

Plans for Sustaining STEM Features Within the Region

In planning for the end of the STEM project, the grantee ensured continuity of services to project participants who were still active by transitioning them to regular WIA case managers for approximately twelve months of follow-up services. To prepare for this transition, the project manager planned to provide additional training to American Job Center staff members on STEM-related occupations, education and training options, and the STEMWorks Indiana website. The project also planned to ensure continuity of services to youth still active in the STEM Scholars program by transitioning them to services available from other WIA youth providers.

The STEM grant manager reported that the grantee WIB will most likely maintain the STEMWorks Indiana website as a part of the larger WIB website. It was not yet clear whether or how the STEM kiosks would be maintained in the future.

Lessons Learned

- Certificate-bearing training in information technology is attractive to dislocated workers because successful completion of a relatively short-term course can make an individual more attractive to employers who are hiring.
- A STEM website can add value by helping to link customers to existing resources such as O*Net and providing new ways to link to existing career exploration tools and information about STEM occupations.

STEMPower (STEM Manufacturing Pathways) Massachusetts

Grantee: Central Massachusetts Workforce Investment Board (CMWIB)—formerly Central Massachusetts Regional Employment Board

Project Service Area: Three workforce investment areas encompassing four counties in central Massachusetts: Franklin, Hampshire, and Worcester, and part of Middlesex. The region includes the Worcester and Springfield metropolitan areas.

STEM Initiative Funding: $2,000,000

Targeted STEM Sectors: Aerospace, Biotechnology, Renewable Energy, and Advanced Manufacturing

Project Goals (from Grant Application):

- 1,200 individuals will learn about STEM careers
- 66 high school students will enroll in STEM programs at technical high schools
- 100 individuals will enroll in work-based training programs
- 80 individuals will enroll in certificate-granting training programs
- 44 individuals will work towards AS or BS degrees
- 122 individuals will enter employment after training (119 in STEM occupations)

Grant End Date: 3/31/2012

Project Context and Goals

Regional Context. Manufacturing is an important part of the regional economy in central Massachusetts, employing a higher percentage of the workforce than it does elsewhere in the state and accounting for a larger proportion of the high-wage jobs. Recent shifts towards technology-based manufacturing have increased the demand for workers with post-high-school education and experience with computer-based technologies, and resulted in layoffs of large numbers of traditional manufacturing workers who lack these qualifications. In part due to this mismatch between what employers need and what many workers can offer, the region's unemployment rate has remained high since the onset of the recession, increasing from 5.8 percent in 2008 to 9 percent in 2010. Another sizable population in the area disproportionately affected by unemployment is veterans, many of whom are having difficulty finding work because they possess less than a high school education.

Project Objectives and Priorities The STEMPower project in Massachusetts targeted mid-level occupations in the region's fastest growing industries: aerospace, biotechnology, renewable energy, and advanced manufacturing. The project was interested in serving dislocated workers from traditional manufacturing sectors, youth, and veterans (particularly those with limited educational attainment) and helping them prepare for entry into career pathways in the targeted industries. To this end, the project employed three main strategies:

- Align the STEM project activities with other regional STEM efforts, by involving employers, LWIBs, aligned programs, and educational institutions in project planning and oversight.
- Create a virtual Center of Excellence that will have the capacity to deliver services to large numbers of STEM adult participants and provide supportive resources to coaches and mentors.
- Recruit and enroll participants interested in STEM careers and provide them with career exploration services, STEM-related training, job placement supports, coaching from local STEM coaches, and mentoring from local employers.

In practice, the project design evolved somewhat in response to the recession. For example, the project served more recently dislocated workers, some of whom had higher levels of education and more experience with computer-based technologies than had been anticipated, as needs among this group grew during the recession. Project managers also broadened the initial training goals to include training in any skills area that fell under the H-1B categories.

Project Organization and Administration

Project Management and Oversight. An Advisory Council made up of representatives from grant partners, the project staff, and key partners met on a quarterly basis to provide project leadership. While the Central Massachusetts WIB served as the project's lead WIB, its director viewed the other two WIBs as equal partners, and all three WIBs worked collaboratively to design, implement, and manage the STEM project. A history of collaboration among the participating WIBs made it easier for them to work together on this particular project. Because they agreed about the overall focus of the grant, the WIBs were able to work towards shared project goals while simultaneously addressing the particular needs of their local workforce areas. The recession seemed to strengthen the commitment to collaboration among the participating WIBs. WIB managers agreed that this was an important grant. They recognized that only by collaborating with one another would they be able to leverage resources for their areas.

Executive directors of all the participating WIBs looked to the STEM project director to provide direction for the project as a whole. Although the original management plan was to designate the executive director of the lead WIB as the project director, the Advisory Council decided to hire a new individual for this position. The project director employed by the lead WIB was responsible for guiding participant recruitment, coordinating the efforts of the local STEM coaches, and developing and implementing the Center of Excellence. The project director was also responsible for carrying out the project's administrative tasks (e.g., monitoring and data collection and reporting) and coordinating activities across the participating workforce investment boards.

Project Staffing and Service Delivery Arrangements. The STEM project budget included sufficient funds to hire two STEM coaches for each participating WIB. Rather than designating two full-time STEM project staff members in each local area, however, the local WIBs decided to hire one full-time project staff member as the STEM coach in each local area and distribute the remaining funds across the existing American Job Center staff members. This was seen as a strategy for increasing project buy-in among Job Center staff members and managers and increasing the likelihood that the STEM positions would be retained after the end of the grant period.

STEM coaches were responsible for providing direct services to customers within the American Job Centers. These services included career exploration, coaching on STEM occupations, and providing information about opportunities for pursuing STEM training. In addition, STEM coaches conducted outreach to employers and job seekers, helped build relationships with employers and training providers, and collected and reported data to document project activities and accomplishments. Each STEM coach was stationed at the full-service Job Center in his/her local area as a primary worksite, but made regular visits to one or two satellite locations on a monthly basis.

Delivery of services to dislocated workers and youth interested in STEM fields was carefully coordinated between the STEM coaches, other American Job Center staff members, other project partners, and external training providers. Project partners and external providers furnished the majority of the STEM-related training. In fact, because the project had extremely limited training funds, participants were encouraged to co-enroll in similar programs that could provide such resources. WIA, for instance, primarily funded training for adult participants. Similarly, Upward Bound programs based at local community colleges provided many career exploration activities for youth. In addition, two of the participating WIBs designated separate youth specialists to oversee the STEM project's work with youth.

STEM Partnerships

Planning Partners. The STEMPower Advisory Council, which met quarterly to support project-planning efforts, was designed to elicit input from all project stakeholders and potential partners, including employers and employer associations. The council's 50+ members represented more than 18 industries in the region, as well as local training providers, educational institutions, and community-based organizations. To encourage participation from as many local employers as possible, the council used a three-tier employer participation model: employers at "Level 1" attended job fairs and/or other related events, those at "Level 2" participated on the

Council, and those at "Level 3" became involved in an ongoing mentorship relationship with a STEM participant.

One of the project's most important partners—involved in both the planning and implementation of the project—was Massachusetts Manufacturing Extension Partnership (MassMEP), a non-profit organization that helps Massachusetts manufacturers adopt new manufacturing technologies.

Economic development agencies were also actively involved in project planning and oversight. The project regularly interfaced with local economic development agencies, such as the Massachusetts Office of Business Development, City of Worcester's Office of Economic Development, and local chambers of commerce. Further, the project benefited from its ties to the state-level Massachusetts Economic Development Incentive Program.

Service Delivery Partners. MassMEP was a valuable partner for the project in terms of service delivery. As part of a national network of manufacturing extension partnerships funded by the U.S. Department of Commerce, MassMEP brought with it a large network of resources and partners upon which it could draw, including close working relationships with STEM educational institutions and manufacturing businesses. Throughout the demonstration period, MassMEP was often able to link STEM participants to training opportunities directly or refer them to other training providers. This organization also acted as a catalyst for the development of new STEM training opportunities, including the creation of linkages between short-term certificate-based training and longer-term degree programs.

Other important service delivery partners included local community colleges and youth programs. For example, the project collaborated with the University of Massachusetts Medical School's Regional Science Resource Center to provide STEM activities to participants, mostly youth, in Central Massachusetts. Since the STEM coaches did not directly provide occupational skills training to dislocated workers or direct services to youth interested in STEM careers, they often played the role of service broker or service coordinator for these STEM participants, connecting them with appropriate service delivery partners.

Leveraging of Funds from STEM Partners. In its application, the Massachusetts STEM project indicated that it would take advantage of $1.98 million in leveraged funds. Due to the economic downturn that occurred shortly after the project's launch, some of the funds anticipated from other partners did not materialize. However, other programs invested substantial amounts of training funds on behalf of STEM participants, including the WIA program, MassMEP, and local community colleges. Additionally, Monster.com, a private online job-search company, made in-kind contributions that helped the project develop its STEM website (which included online job search functionality) and American Job Center operators contributed IT support to the project.

STEM Centers of Excellence

Physical Centers. The STEMPower project developed both a virtual Center of Excellence and physical STEM Centers. At the physical Centers of Excellence, based at the region's three full-service American Job Centers, STEM coaches provided STEM career advising and coaching. Also at these centers, participants and members of the general public often accessed the project website to obtain supplemental information on a self-serve basis.

Virtual Centers. The platform for the project's virtual Center of Excellence was its www.STEMPower.org website, a central warehouse of information on STEM occupations, training providers, employers, and job openings in the region. This virtual STEM Center, managed and monitored by the project director, was envisioned as a resource for both enrolled STEM participants and members of the general public, as well as for STEM employers. A key feature of the site is that it allows jobseekers to post their resumes in response to a job opening and to post questions and solicit feedback from other website users. The site also hosted a number of discussion groups; during the course of the STEM project, job seekers, coaches, mentors, Advisory Council members, and individuals currently employed in STEM industries used these discussion groups to interact with one another. Each adult enrolled in the STEM project was required to create a personal profile on the website and join at least three "interest groups," which were organized by specific occupational fields (e.g., aerospace, biotech, engineering, manufacturing, architecture, computer-related occupations, and green jobs). As of the end of the 4th quarter of 2011, the website had over 1,200 registered users.

Although some users criticized STEMPower.org as being "too busy" and somewhat overwhelming, the project was happy with some of the ways that customers were able to use the website. They were also pleased with its ability to serve as a platform for informal "webinars" linking STEM job seekers and individuals with experience in a STEM occupation. The project recognized that it would have to develop a completely different virtual center to reach youth interested in STEM careers.

Use of Career Blueprints

The Massachusetts STEM project did not emphasize the use of career blueprints as an important part of its STEM project design. Project managers created a one-page form that they referred to as the career blueprint. This form was primarily used to guide the initial interviews between STEM coaches and prospective participants and as a way for coaches to "get acquainted" with customers. It did not play an important role in guiding service delivery after the initial meeting. Project staff members did not see the career blueprint as a value-added tool in part because they believed it duplicated the function of the individual employment plan (IEP) used to guide case management of WIA participants.

Services for Youth

While the STEMPower project in Massachusetts identified disadvantaged youth as a target group in its grant application, the project's work with youth was not as central to achieving its goals as was its work with adults. Primarily, the project endeavored to expose youth to STEM fields by connecting them to career exploration activities provided by project partners. The project rarely expended grant funds to provide direct services to youth and rarely enrolled youth as project participants. Nevertheless, services for youth varied considerably across the participating WIBs, with some local areas focusing on youth services more than others did. Three types of services were provided to youth across the project as a whole:

- *STEM-related career exploration activities provided by partner organizations and educational institutions.* The project offered several examples of these activities: in one local area, a university's veterinary school hosted an annual STEM career day for local middle school students; another local area reached out to incarcerated youth to provide an overview of opportunities in green construction that might be available to them upon their release.
- *STEM-related enrichment programs provided by partner organizations and educational institutions.* These programs gave youth more intensive exposure to STEM careers than the activities described above. For example, a regional technical training institute encouraged high school juniors to explore their interests in math and science through a one- to three-week summer program. Similarly, STEM youth participants who were co-enrolled in a local Upward Bound program were eligible to take part in a six-week math and science program at a state college.
- *STEM internship and summer job opportunities for older youth*. Although these internships—such as those offered by a public electric company to a select group of rising high school juniors and seniors—involved on-the-job training, the WIBs viewed these activities as career exploration rather than occupational skills training.

As part of the services they received from youth program coordinators, STEM youth often received informal coaching and mentoring and participated in academic support and college readiness activities.

Services for Adults

The primary focus of the STEMPower project in Massachusetts was on serving adults. As described above, the STEM coach was often a broker of services, encouraging eligible dislocated workers to co-enroll in other programs, such as WIA or Veterans' Affairs services, in order to receive maximum resources. The project provided its adult participants with the following services:

- *Individualized support for job searching and career exploration from STEM coaches.* STEM coaches helped participants write resumes, provided them with information on job openings and the overall STEM job market, offered guidance on setting career goals, and recommended additional services and resources. STEM coaches also helped participants find jobs, often by advocating on their behalf to prospective employers. STEM participants who were co-enrolled in other workforce development programs received STEM coaching and case management in addition to the supports provided by WIA or other program case managers and staff.
- *Access to funding for training in STEM-related fields.* Due to the project's limited resources, nearly all training for STEM adult participants was funded by WIA or TAA through co-enrollment and provided by off-site partners. The project drew largely on certificate programs offered by community colleges and MassMEP. Because participants were often eager to return to work as soon as possible and training funds became scarce, trainings programs concentrated on shorter-term programs lasting from six to 12 weeks. Because of the high demand for training during 2010, access to training was highly competitive and preference was often given to those perceived to have the highest chance for job placement after training.

In addition to receiving these services, STEM adult participants used the virtual tools available at STEMPower.org to obtain information about additional resources and opportunities. Also, while the project struggled to implement its mentoring component without much success, participants were invited to contact MassMEP staff members "24 hours a day" for mentoring and support.

The project encountered many unexpected challenges serving dislocated workers due to the recession. The region's American Job Centers were overwhelmed by a surge of dislocated workers needing services. In the North Central Massachusetts workforce investment area, for instance, the Job Center's weekly customer count rose from 25 to as high as 800 between 2008 and 2010—with no increase in staffing. In addition, as discussed above, the LWIBs had to shift their plans, resources, and attention to address the influx of highly educated and skilled workers rendered unemployed by the recession. Thus, the project was challenged to provide services to two groups of dislocated workers with very different needs—accelerated training programs for highly educated dislocated workers and training on basic computer skills and current job search practices to dislocated workers from traditional manufacturing industries.

Services Targeted to Employers and Incumbent Workers

At the onset of the STEM grant, the project director worked with American Job Center Business Services teams to put together focus groups with employers to identify the trends in STEM industries and employers' needs for worker skills. This information informed project activities. During project implementation, STEMPower involved employers in two ways: (1) by inviting employers to participate in the online STEM communities available on the STEM website and

(2) by working closely with MassMEP to refer participants to specific training opportunities that had been developed with active employer involvement.

As participants in the online STEM community, employers could post job listings, review posted resumes, and participate in webinars and discussion groups to provide information about STEM jobs to interested job seekers. This was particularly useful for small businesses that did not have elaborate procedures for advertising job openings.

Through the activities undertaken by MassMEP, the project supported ongoing collaboration between local employers and educational institutions. Although the project did not focus on serving incumbent workers, it did help design some retraining opportunities for newly dislocated workers. For example, the project helped connect workers laid off by Polaroid to a six-week training program that helped these workers transfer their skills to available jobs in bio-manufacturing.

Outcomes for Enrolled Participants

Exhibits B-6 through B-8 display the Massachusetts project's targeted outcomes as well as outcomes reported on the 12/31/11 Form 9134 Quarterly Progress Report (QPR) and in the individual-level program data submitted for the evaluation. Because both types of outcomes data may contain some inconsistencies (see Chapter VII for a more in depth discussion of data collection and reporting challenges), we report outcome information from both sources, even though they do not always agree.

As shown in Exhibit B-6, the Massachusetts project well exceeded its target enrollment goals; it enrolled at least 150 percent of the estimated number of participants. The exhibit also shows that Massachusetts enrolled greater number of participants in training than anticipated, according to both the QPR and the data submitted for the evaluation. However, the percentage of all participants that received training was lower than the percentage that the project had targeted. The project also reported success in seeing that its trainees successfully completed their program, with nearly all trainees having done so. Massachusetts trainees also exceeded the project's target for credential attainment, with approximately 78 percent of training completers obtaining a credential, compared to the 27 percent indicated in the target.

Exhibit B-6:
STEMPower MA Enrollment Outcomes

	Target[a]	QPR as of 12/31/11	Evaluation Outcome Data (Submitted April 2012)
Enrollment in project			
Total enrollees (Percent of target)	300	465 (155%)	536 (179%)
Training			
Number entered training)[b] (Percent of enrollees)	209 (97%)	312 (67%)	228 (43%)
Number completed training (Percent of trainees)[d]	n/a	323 (n/a)[c]	218 (97%)
Number completed credential (Percent of training completers)	79 (27%)	252 (78%)	n/a

"n/a" denotes data not available.

[a] This does not includes 1,200 youth who were expected to receive STEM career orientation at high schools and community-based organizations. The project did not enroll these youth.

[b] This does not include 90 individuals expected to participate in basic skills training provided by the Adult Education partner.

[c] As reported on the QPR, the percentage of participants that completed their training programs would be over 100 percent. As this appears to be an error, this percentage is omitted.

[d] For the Evaluation Outcome Data, the percentage of "completed training" is calculated out of the participants that were longer active in training. Trainees no longer active in training includes those who had finished their training program, either successfully or not. This measure excludes participants who were still enrolled in training at the time data were collected.

As shown in Exhibit B-7, according to the data submitted for the evaluation, nearly two-thirds of Massachusetts STEM exiters obtained employment. This is not at all consistent with the number reported on the QPR, which may substantially under-represent the number of participants that actually obtained employment.[43] However, the QPR data indicate that Massachusetts was successful in seeing that participants who got employed found training-related jobs. Massachusetts participants that obtained employment exceeded the earnings target of $14 per hour, with average hourly earnings of just over $21 per hour.

[43] See Chapter VII for a discussion of discussion of how the QPR definitions may have caused confusion and lack of consistency in the data submitted to ETA on Form 9134.

**Exhibit B-7:
STEMPower MA Employment Outcomes**

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)
Entered employment			
Number entered employment (Percent of training completers *for QPR*; percent of exiters *for Outcome Data*)	122 (41%)	75 (16%)[a]	335 (65%)[b]
Number entered training-related employment (Percent of trainees)	119 (41%)	75 (100%)[a]	n/a
Earnings			
Average earnings	$14.00 per hour	n/a	$21.09 per hour

"n/a" denotes data not available.

[a] According to the QPR instructions provided by ETA, this is defined as the percent of training completers regardless of enrollment status in the program. However, because of changes in the QPR definitions, some projects may have only included only training completers who obtained employment in the same quarter in which they completed training.

[b] In computing employment outcomes from the participant-level data provided by the projects, we have included all exiters, with the exception of individuals who were employed at the time of enrollment.

Notable Practices

Notable practices developed by The STEMPower project in Massachusetts are described below.

- The STEMPower.org website provided a virtual clearinghouse of STEM-related information and resources, as well as interactive tools that allowed dislocated workers, incumbent workers, employers, and workforce development staff members to communicate about STEM issues.
- Drawing on the virtual community of registered website users, the project arranged for employers to offer "Industry Insight" sessions that enabled dislocated workers to learn about specific STEM-related industries. These information-sharing sessions took place through conference calls with participation by local employers, their employees, and interested job seekers.
- Building on the strong employer relationships already developed by the project's manufacturing intermediary (MassMEP), the project was able to coordinate efforts by local employers, educational institutions, and even economic development agencies to develop the STEM-related skills of the regional workforce.
- The project emphasized co-enrollment of STEM participants in WIA as a way to leverage additional resources on behalf of participants. In coordinating its efforts with those of other workforce development programs, the project followed the strategy of "augmenting, not duplicating."

- The project took advantage of MassMEP's ability to promote STEM training for project participants and used the organization's innovative resources, including its mobile training unit, to bring STEM awareness and training opportunities to both in-school youth and dislocated workers.
- The project experimented with several mentoring models that proved to be more effective than traditional mentoring. One such practice was recruiting individuals who had recently completed STEM-related training programs to serve as mentors to new trainees.

Plans for Sustaining STEM Features Within the Region

The participating WIBs were eager to sustain features of the STEM project at the end of the grant period. Each WIB wanted to retain its STEM coach, but managers were not sure that they would be able to identify funds to make this happen. At the time of the final site visit, only one site had been able to secure funds for its STEM coach—and only for an additional six months.

Project managers were eager to sustain the STEMPower.org website as a compendium of STEM occupations and as a tool for supporting a virtual community of STEM employers and interested workers. To sustain the website, the WIBs estimated that they would need $10,000 a year for website maintenance, plus resources to train existing American Job Center staff members to use the different website functions and manage website content.

Finally, the partnering WIBs would like to continue to use the STEM Advisory Council as a source of regional guidance and oversight of STEM-related activities. Project managers expressed confidence that they would be able to build on the existing regional partnerships to support the region's STEM efforts moving forward.

Lessons Learned

- Flexibility is important. If the economic context changes radically during the course of project implementation, it may be necessary to adjust the project design.
- In some regions, the limiting factor in providing STEM-related training is not the supply of training providers or courses, but the funding available to support training.
- Traditional mentoring for dislocated workers can be difficult to implement, because many current STEM employees cannot afford to make long-term commitments to be STEM mentors and because many dislocated workers are not interested in having mentors.
- Virtual centers of excellence may offer an opportunity for WIBs to continue providing information on STEM careers on a self-service basis if projects cannot afford to retain dedicated STEM coaches.

Operation Workforce (Texas)

Grantee: Workforce Solutions of the Lower Rio Grande Valley

Project Service Area: Five workforce investment areas encompassing 23 counties along the Texas-Mexico border, stretching from Brownsville to El Paso. Includes the Brownsville, McAllen, Laredo, and El Paso metropolitan areas.

STEM Initiative Funding: $1,999,180

Targeted STEM Sectors: Manufacturing and Construction

Project Goals (from Grant Application):

- Serve 6,000 dislocated workers and disadvantaged youth
- Provide STEM-related education and training to 3,000 dislocated workers and 1,500 disadvantaged youth
- Over 2,600 youth and dislocated workers will complete a college degree, associate degree, or industry recognized credential in a STEM field.
- 1,100 dislocated workers will be employed in a STEM-related field after training
- 390 disadvantaged youth will be employed in a STEM-related field after training

Grant End Date: 1/4/2012

Project Context and Goals

Regional Context. The Rio Grande Valley is among the most economically disadvantaged region in the country. Stretching along the 1,000 mile-long border between Texas and Mexico, the region is populated by nearly 2 million people, approximately 85 percent of whom are Hispanic. More than one quarter of all families have incomes below the poverty level. Educational attainment is low throughout the region. Thirty-eight percent of residents 25 years or older have less than a ninth grade education. Only nine percent of those 25 years or older have a bachelor’s degree.

In the mid-2000s, manufacturing and construction were growing sectors of the regional economy; these were the sectors selected for inclusion in the STEM demonstration project. The recession brought this growth to a halt and caused many manufacturing and construction firms to shed workers and cease hiring. During much of the project period, unemployment rates in the McAllen and Brownsville metropolitan areas exceeded 11.0 percent, with somewhat lower rates of unemployment in the El Paso and Laredo metropolitan areas. Toward the end of the demonstration period, however, extraction of gas deposits from shale formations in the Laredo area created an economic boom that led to the creation of new jobs in the shale gas industry and created hope for a revitalization of the area economy.

Project Objectives and Priorities. The STEM proposal to ETA stated that the goal of the STEM project in Texas was to create an aligned system of education and training to promote successful STEM careers for adults and disadvantaged youth, with an emphasis on the construction and manufacturing sectors of the economy. The recessionary economic climate that existed regionally when the project was launched in 2009 caused project leaders to reassess these goals. Because employers were not hiring new workers in either construction or manufacturing, most of the participating local WIBs switched to funding training for health care careers, health care being the only STEM-related economic sector in which semi-skilled jobs were still available. However, when ETA reviewed project activities in early 2011, it informed the project that training for health care occupations was not a permitted activity under the STEM grant.

At this juncture, the Texas STEM project had to reinvent itself. Each local workforce investment area pursued a somewhat different strategy. Several local areas shifted their focus to providing STEM activities to in-school youth and college students, for whom employment was not an immediate goal. These activities were designed to encourage students to complete their high school education and transition to post-secondary education in STEM-related fields. Following the advice of the STEM project manager, local areas retaining a focus on adults began to emphasize preparing participants for entry-level jobs in relatively non-technical areas within the construction trades and manufacturing sectors. This approach was motivated by a belief that if the project helped participants start at the bottom of the career ladder in STEM industries, they would eventually be able to advance up occupational ladders in the industry through subsequent work experience and training.

Project Organization and Administration

Project Management and Oversight. Although it was reported that representatives from the participating WIBs, local education agencies, and employers collaborated in developing the original application for the STEM grant, this collaboration was not carried over into project management after the grant was received. There was no formal regional steering or advisory body for the STEM project. The lack of a policy oversight body made it difficult to maintain a shared vision about the STEM grant and its goals during the implementation phase and seemed to make some local WIB directors less committed to the success of the project.

The designated project manager was the grantee WIB's contracts administrator; this individual received part-time assistance from another staff member referred to as the STEM coordinator. The project manager tended to emphasize budgeting, reporting, and monitoring issues in his communications with other workforce investment areas, rather than providing technical assistance on how to develop innovative programming that might expand services to employers and workers in STEM sectors. Much of the responsibility for programmatic leadership of the project was devolved to the STEM coach in the grantee WIB, who was designated as the "lead coach." During his 18-month tenure with the project, this individual applied his STEM industry expertise to develop a career blueprint process and act as the "master trainer" and technical assistance provider for the other STEM coaches. However, because this individual was a recently hired employee of the grantee WIB who was not clearly senior in rank or position to the STEM coaches in the other participating WIBs, he was not viewed by other WIB managers as having supervisory authority over their own STEM coaches.

Project Staffing and Service Delivery Arrangements. In each of the five participating local workforce investment areas, the STEM project staff consisted of a single STEM coach. The STEM grant covered one-half of the personnel costs of the STEM coach position; the remaining costs were covered by the local boards. This cost-sharing arrangement was intended to give WIBs a greater sense of "ownership" of the STEM coaches and make it more likely that they would retain these staff members at the end of the grant period. Unfortunately, in several regions, the arrangement had the unintended effect of encouraging the local American Job Center managers to turn the STEM coach into a full-time WIA case manager.

STEM coaches were expected to carry out a variety of functions within their local workforce systems. In their official job descriptions, they were called on to build bridges between STEM employers, educational entities, and the public workforce investment system. As part of this responsibility, the coaches were expected to be subject-matter experts on STEM skills sets, STEM training and training providers, and local STEM employers and their labor market needs. Coaches were called on to create and strengthen regional STEM partnerships, leverage and align STEM resources from a variety of funding sources and entities, conduct outreach, and recruit potential participants and employers.

STEM coaches often found that American Job Center managers expected them to be full-service case managers for the STEM participants (STEM participants were always co-enrolled in WIA and the STEM project.) As case managers, their job duties included completing the paperwork associated with WIA eligibility, conducting assessment and intake for new customers, performing data entry, and compiling data for reports to ETA. In practice, STEM coaches found that their day-to-day case management responsibilities often got in the way of them carrying out the partnership-building aspects of their jobs.

The individuals initially recruited for the STEM coach positions had a broad mix of appropriate skills enabling them to carry out all of their intended functions; however, the project experienced a high rate of turnover in the STEM coach positions. Within 18 months, all of the initial STEM coaches had left their jobs. Finding replacements for these key project staff members was time consuming and disruptive of project operations in some local areas. Turnover of project staff members continued over the course of the demonstration period; in response, most of the local workforce areas participating in the grant started assigning existing American Job Center staff members to the STEM coach positions. The notion of the STEM coach as a specialist was replaced by the reality of the STEM coach as a WIA case manager with a caseload of individuals interested in construction and manufacturing jobs.

STEM services targeted to youth were coordinated by the STEM coach or by a WIA youth program staff member within the American Job Center network. Education agency partners often participated in the delivery of services to youth.

STEM Partnerships

Planning Partners. A variety of organizations indicated their support of the project proposal to ETA, including the participating workforce investment boards, universities and community colleges, a number of local school districts, individual employers, and business associations. However, as noted above, no project advisory committee was formed after the grant was awarded to facilitate partner contributions to implementation planning or project oversight.

Service Delivery Partners. Service delivery partners included the American Job Center network and local education and training institutions. WIA case managers within the American Job Center network participated in the project by referring individuals interested in STEM occupations to the STEM coaches. In some sites, American Job Center staff members also worked with the STEM coach to provide case management to customers co-enrolled in STEM and WIA; in other local areas, American Job Center managers assigned all case management responsibilities for co-enrolled customers to the STEM coaches.

Education partners' primary role was to provide STEM-related training to project participants. Throughout the demonstration period, the project referred participants to offerings at community colleges, four-year colleges, and other education providers that were on the American Job Center network's approved provider list for the delivery of occupational skills training to STEM participants using Individual Training Accounts (ITAs). During the first year, when WIA training funds were plentiful, training often included "scholarships" covering two years of training at a local college. Later in the demonstration period, the project often referred participants for shorter-term, certificate-based training.

Employers were not generally involved in planning or delivering services for adults. Although some of the STEM coaches tried to involve local businesses in developing customized training to prepare workers for expected job openings, employers were generally not responsive to these efforts because they were laying off workers in the bad economy, not hiring new workers. Toward the end of the grant period, as the economy improved, the project started working with companies involved in gas extraction to develop short-term training to prepare young adults for work in the gas-shale fields in South Texas.

Leveraging of Funds from STEM Partners. Each local workforce investment area was able to field a full-time STEM coach because of the requirement, noted above, that it use WIA program funds to support half the cost of the coach's position. In addition, the Texas project leveraged training funds from the WIA program and other available training programs within the American Job Centers. It also used project funds to support closely aligned regional initiatives that predated the STEM initiative.

During the first year of demonstration project operations, the project was able to leverage two funding streams associated with the American Recovery and Reinvestment Act (ARRA) to supplement grant funds. During the summer of 2009, several local areas worked closely with their WIA youth contractors to use national Summer Youth Employment Program funding to develop STEM-related summer jobs for eligible youth interested in STEM occupations. ARRA funds also were available during 2009, during the early months of project operations, to support WIA-funded occupational skills training for older youth and adults. After ARRA funds were exhausted, the amount of WIA training funds available to support training for STEM project participants diminished.

For youth-focused STEM programming, the project contributed a small amount of grant funds to an existing initiative with closely aligned goals. These funds were used to support a state-funded system of regional technical assistance centers that were developing innovative teaching materials to integrate engineering and technology concepts into the K-12 curriculum and providing STEM-related training to K-12 teachers and administrators.

STEM Centers of Excellence

Physical Centers. With the exception of the grantee WIB, which designated two centers of excellence, each WIB chose to have one physical STEM Center of Excellence. In each area, the American Job Center with the highest amount of customer traffic and easiest accessibility was chosen as the Center of Excellence site. The STEM Center of Excellence was the physical location at which the STEM coach was available to serve customers. In addition, most STEM Centers had a dedicated computer or computers that STEM customers could use to access career exploration software and a library of resource materials related to STEM occupations (developed by the STEM coach).

Virtual Centers. The STEM project in Texas did not develop a virtual STEM Center of Excellence.

Use of Career Blueprints

The first lead STEM coach developed a comprehensive design for career blueprints and shared the forms and processes he developed with other WIBs. The career blueprint itself was the culmination of a detailed assessment process completed jointly by the STEM coach and the customer that covered basic skills, as measured by the TABE reading and math tests, as well as work values and interests, as measured by the assessment tools included in O*NET.[44] Customers were also encouraged to use O*NET's online database, which allowed them to explore detailed information about different STEM-related careers. The resulting career blueprint set out a sequenced program of study for the occupational cluster in which the customer was interested. The career blueprint process as proposed by the lead STEM coach was very complete, but it also was very ambitious. It assumed that STEM project participants would be interested in exploring different careers and developing a long-term career plan within a selected career cluster; it also required that the STEM coaches be comfortable using a wide range of assessment and career exploration tools.

Because the lead STEM coach had only limited authority over the practices used by other STEM coaches throughout the project area, the actual use of career blueprints varied from local area to local area. During site visits to four of the five local workforce investment areas over the course of the demonstration period, the evaluators observed a wide range of practices regarding the use of the career blueprint. In some local workforce investment areas it appeared that the career blueprint process had fallen into disuse. The local area using career blueprints most enthusiastically was one focusing on providing STEM-related activities for in-school youth. Within this local area, the STEM career blueprint was embraced by WIA youth staff members as an improvement over the existing method of developing short-term employment plans for youth because they could be used to develop long-term education and training plans.

Services for Youth

Throughout the demonstration project period, the participating local workforce investment areas served in-school youth, recent high school graduates, and out-of-school youth. The STEM coaches generally served recent high school graduates and other out-of-school youth alongside dislocated workers and other adults. In several cases, the STEM coaches recruited high school graduates interested in continuing their education in a STEM field at the college level and provided them with financial support for a two-year or four-year degree program. One LWIB recruited students who were already enrolled in a college-level degree program in a STEM field and invited them to compete for a one-year $1,000 scholarship. Outreach for this activity was coordinated with organizations interested in promoting diversity in STEM education, such as the Society of Mexican-American Engineers and Scientists.

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[44] O*NET is an online tool for career exploration and job analysis developed by the U.S. Department of Labor and available at http://www.onetonline.org/.

As noted above, in-school youth received increased attention as a target group for the STEM project after the project learned that it could not use grant funds to train adult participants for health care careers. Youth enrolled in the STEM project were co-enrolled in the WIA youth program and were generally served by a WIA youth staff member alongside other WIA youth. Specific youth-focused activities varied from local area to local area within the project region. Some examples are described below:

- *Dual enrollment in community college courses for high-school students interested in STEM studies*. In one LWIA, STEM funds were used to support enrollment in STEM-related college courses for youth who were working toward their AA degrees while they were still in high school.
- *A "STEM Challenge" for teams of high school students*. One LWIA held a citywide contest that invited teacher-mentored teams of high school students to develop business plans for products that used technology to solve important local problems. A jury of local businesses judged the business plans and selected the winning plan.
- *STEM work experience opportunities.* WIA youth program staff members in one LWIA developed summer work experience positions for about ten high school youth with a rural telephone cooperative that provides fiber optics for Internet and data connectivity.
- *A science academy developed as part of a summer program for college-bound youth.* In another LWIA, the WIA youth program staff worked with a local junior college to create a new STEM focus within an ongoing ten-week College Bound summer program for high school students that was targeted to first-generation college students and other disadvantaged youth. Activities included college-level courses, career exploration activities, and hands-on projects and field trips. The cost of developing and implementing the science academy was shared by the STEM grant and the WIA youth program.

Although each of the youth-focused STEM activities described above served relatively small numbers of youth, together they were exemplary because they helped develop active partnerships between educational institutions and local workforce investment boards and paved the way for further cooperative projects. Youth who participated in these activities indicated that they were motivated to continue their science studies through enrollment in community college courses during and after high school.

Mentoring was not developed as a formal component of the STEM project in Texas. However, project staff members said that teachers and work-experience supervisors often acted as mentors to youth enrolled in the program.

Services for Adults

Project services for adults had two key components: (1) the career coaching provided by the STEM coach and (2) funding (supplemented by WIA training funds and supportive services) that paid for STEM-related training. The project plan was to support participants in one- or two-year courses of study at local community colleges. The project also planned to use both internships and on-the-job training contracts for participants. Although these latter services were of great interest to customers, the project was not successful in arranging them for more than a few participants because employers were reluctant to participate.

Because the high educational requirements established for participation—a high school diploma or GED and 11th-grade-level reading and math skills—did not match the characteristics of the majority of the customers seeking services from the American Job Centers in the five LWIAs, it was difficult for the STEM project to enroll large numbers of qualified individuals. Project staff members developed several different strategies for recruiting adult participants, including (1) building referral relationships with educational institutions to get referrals of students already enrolled in STEM-related course work who might need financial aid, and (2) advertising in public media for individuals interested in STEM "scholarships."

It appears that the STEM coaches broadened their focus over time to include adults and dislocated workers who were interested in eight- to ten-week training programs. The training provided to these customers consisted primarily of short-term construction or manufacturing certificate courses.

Services Targeted to Employers and Incumbent Workers

The STEM project in Texas did not offer any training services to employers on behalf of incumbent workers. Although the project intended to prepare participants to meet the workforce needs of local employers, the recession made it difficult to engage employers in designing any new training offerings. The project referred all participants to existing training courses available through ITAs in each of the local workforce investment areas.

Outcomes for Enrolled Participants

Exhibits B-8 through B-10 display the Texas project's targeted outcomes as well as outcomes reported on the 12/31/11 Form 9134 Quarterly Progress Report (QPR) and in the individual-level program data submitted for the evaluation. Because both types of outcome data may contain some inconsistencies (see Chapter VII for a more in depth discussion of data collection and reporting challenges), we report outcome information from both sources, even though they do not agree.

As shown in Exhibit B-8, the QPR indicates that Texas had enrolled a great deal fewer participants than its ambitious enrollment targets.

Exhibit B-8:
Operation Workforce TX Enrollment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted May 2012)[a]
Number enrolled (Percent of target)			
Adults	4,333	n/a	n/a
Youth	2,167	n/a	n/a
Total	6,500	1,461 (22%)	152

"n/a" denotes data not available

[a] Individual outcome data for Operation Workforce TX could only be obtained for the 152 participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group. Therefore, the percent of the enrollment target is not reported.

According to the evaluation data shown in Exhibit B-9 (which applied only to 152 individuals whose activities were coded as STEM-funded in the project database), Texas exceeded the planned percentage of participants enrolled in training. Taking into account a larger number of participants, the QPR data suggests that the actual percentage was much lower. Data submitted to the evaluation indicates that over 95 percent of trainees completed their programs successfully, though the QPR, referring to a larger group of participants, indicates that only 49 percent of trainees completed training. Regarding credential attainment, the two data sources agree that the project exceeded the 60 percent target it set for itself.

Exhibit B-9:
Operation Workforce TX Training Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted May 2012)[a]
Training			
Number entered training (Percent of enrollees)	4,500 (69%)	733 (50%)	150 (99%)
Number completed training (Percent of trainees)[b]	n/a	360 (49%)	144 (96%)
Number achieving credential (Percent of trainees/training completers)[c]	2,699 (60%)	239 (66%)	139 (97%)

[a] Individual outcome data for Operation Workforce TX could only be obtained for the 152 participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group. Therefore, the percent of the enrollment target is not reported.

[b] For the Evaluation Outcome Data, the percentage of "completed training" is calculated out of the participants that were longer active in training. Trainees no longer active in training includes those who had finished their training program, either successfully or not. This measure excludes participants who were still enrolled in training at the time data were collected.

[c] The "target" percentage is of all trainees, while the QPR and individual outcomes percentages are of all training completers.

As shown in Exhibit B-10, data indicate that about 40 percent of Texas training completers entered employment. Using the QPR data, which includes more participants, but may undercount employment outcomes (because of confusion about the QPR reporting definitions), the number of individuals who entered employment was about 9 percent of all enrolled individuals. Of participants who entered employment, the project target was to have about 72 percent enter training-related fields. According to both sources of data, Texas did not meet this goal. However, those participants that did obtain employment exceeded the earnings target of about $11 per hour, with average hourly earnings of nearly $15 per hour.

Exhibit B-10:
Operation Workforce TX Employment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted May 2012)[a]
Entered employment			
Number entered employment (Percent of training completers *for QPR*; percent of exiters *for Outcome Data*)	n/a	133 (37%)[b]	61 (49%)[c]
Number entered training-related employment (Percent of exiting training completers)	1,950 (72%)[b]	58 (44%)[d]	32 (62%)[e]
Earnings			
Average earnings (for one quarter and hourly)	$10,363 ($10.79 per hour for a 40-hour work week over 3 months)[f]	n/a	$14.90 per hour

"n/a" denotes data not available.

[a] Individual outcome data for Operation Workforce TX could only be obtained for participants whose activities were coded as STEM-funded in the database. Thus, due to challenges in recording data, these data represent only a portion of the participants served through the Texas project and may not be representative of the larger group. Therefore, the percent of the enrollment target is not reported.

[b] Of credentialed training completers.

[c] In computing employment outcomes from the participant-level data provided by the projects, we have included all exiters, with the exception of individuals who were employed at the time of enrollment.

[d] Of training completers regardless of enrollment status in the program.

[e] Of 52 exiting participants with data on training-related employment.

[f] Targeted earnings are the average of the targets for Dislocated Workers ($11,272), Disadvantaged Youth ($8,749) and New Emerging Workforce ($11,068) in the first full quarter of employment.

Notable Practices

Overall, this project was not able to demonstrate effective strategies for working with adults to promote STEM careers. In working with in-school youth, the project was somewhat more successful, because of its ability to develop coordinated efforts involving both workforce investment boards and local educational institutions. Under different economic conditions or with a different organizational configuration, the project might have been more successful. It was difficult for the project to get back on track after project staff members had invested much of their energy in training individuals for health care careers, which were not allowable under the grant.

WIB and American Job Center managers in one of the local areas visited late in the project period identified the career blueprint for youth as one of the most important accomplishments of the project. Respondents said that the focus on career exploration and long-term planning for education and career development required by the career blueprint offered a big improvement over the short-term focus of the individual employment plans the local WIA program had previously used for youth.

Plans for Sustaining STEM Features within the Region

During the final quarter of grant operations, the STEM project manager was still more focused on implementing grant activities (and spending out the substantial funding remaining in the project budget) than on planning to sustain STEM features within the region. As noted earlier, by the end of the grant period, many of the local workforce investment areas participating in the STEM grant in Texas had already departed from the staffing model of having a STEM coach with experience and expertise in STEM occupations.

Two features of the STEM project may be sustained in several local areas: the use of the career blueprint as a model for conducting assessment and service planning for youth served by the WIA program, and cooperative projects between educational institutions and workforce development boards that encourage high school youth to go to college and continue their STEM studies.

Lessons Learned

- Without the strong involvement of policy-level staff—e.g., through an advisory committee—it can be difficult for project staff members to keep their attention focused on the goal of developing innovative programming.
- The top-level leaders within a local workforce investment area (that is, WIB directors and American Job Center managers) must be committed to the goal of developing and promoting innovative practices if those practices are to be introduced to the system at the staff level (e.g., used by STEM coaches).
- Each of the above items is especially important in any project involving multiple workforce investment areas.

Northern Willamette Valley STEM Initiative (Washington and Oregon)

Grantee: Southwest Washington Workforce Development Council (SWWDC)

Project Service Area: Three workforce investment areas and one county from a fourth, encompassing nine counties—Clark, Cowlitz, Wahkiakum, Columbia Counties in Washington, and Multnomah, Washington, Yamhill, Polk, and Marion Counties in Oregon. Includes the Portland and Salem metropolitan areas.

STEM Initiative Funding: $2,000,000

Targeted STEM Sectors: Bioscience, Solar and Alternative Energy, Manufacturing, and Information Technology

Project Goals (from Grant Application):

- Enroll 500 disadvantaged youth and 350 dislocated workers
- 62 percent of enrolled youth will enter post-secondary training or employment
- 85 percent of enrolled adults will enter post-secondary training
- A total of 236 individuals will enter employment in a STEM field

Grant End Date: 1/4/2012

Project Context and Goals

Regional Context. The nine-county region included in the STEM project has strong STEM industry employment in manufacturing, green energy, and computer and information technology. Although the region has a strong system of community colleges, and universities, unemployed and dislocated workers often lack skills needed by local employers, which presents a barrier to economic growth and expansion of STEM industries in the region. County unemployment rates, which ranged from six to eight percent at the time the STEM grant application was written, had increased to from nine to fifteen percent by the time of the first evaluation site visit to the project in early 2010. The number of customers seeking services from American Job Centers increased three-fold after the onset of the recession and there was an influx of higher-wage workers who had been laid off.

Project Objectives and Priorities. The STEM project in Washington and Oregon was organized around the unifying goal of promoting regional economic development and ensuring a robust regional economy for the future. To support this goal, the key objectives of the project were to attract new individuals to STEM occupations, build the technical skills of the regional workforce, and support the development of new forms of training that were responsive to the needs of specific employers or employer groups.

The STEM project managers recognized that the project staff members from each participating LWIB had different interests and priorities within these general objectives and offered different skills. Thus, rather than trying to implement a standardized STEM project throughout the region, they allowed participating LWIBs to vary the groups they targeted and the particular services they provided under the STEM project. Over time, this specialization became even more marked. One WIB focused more heavily on recruiting and serving dislocated workers interested in transferring to STEM fields; another gave priority to recruiting and serving in-school youth interested in STEM occupations. Participating LWIBs exchanged information about what they were learning.

Project Organization and Administration

Project Management and Oversight. In developing the STEM project proposal, the lead Workforce Investment Board worked closely with an industry-led "regional workforce council" developed for a previous WIRED grant. Although the project initially planned to use this group as an ongoing advisory council for the STEM grant, it did not end up playing a very active day-to-day role. The executive director of the lead LWIB, who worked closely with the other participating LWIB directors, provided overall grant oversight.

An LWIB staff member was assigned the role of project manager; this individual administered project-funded activities, coordinated the work of the three grant-funded STEM coaches, and oversaw the activities carried out by the project's grant-funded mentoring partner. About midway during the grant period, the STEM project manager left her position and another project manager was hired. The transition occurred smoothly, without creating any difficulties for the project.

The Washington and Oregon STEM project manager allowed each LWIB substantial leeway to develop the types of STEM activities that were the highest priority in its area. Despite variations in the services they provided under the grant, the participating LWIBs had a unified philosophy about what they were trying to accomplish and all sought to leverage other funds to support regional STEM goals whenever possible.

Project Staffing and Service Delivery Arrangements. One full-time STEM coach was hired to conduct outreach for the STEM project in each of the participating local workforce areas. The three STEM coaches had their salaries and benefits paid for by the STEM grant, but each had a different employer of record (the non-profit organization that administered mentoring for STEM participants in one LWIA, the local community college's workforce development department in another LWIA, and the LWIB itself, in the third local area).

Each coach was responsible for building relationships with STEM employers and STEM training providers and providing services to both youth and adult participants in the STEM grant.[45] To meet with dislocated workers or out-of-school youth who were interested in STEM careers, the STEM coaches visited all American Job CentersAmerican Job Centers in their local areas. Other staff members within the American Job Centers provided information about the STEM project to all customers during orientation sessions. If customers were interested in STEM occupations or training, the regular Career Center counselors helped them make appointments to meet with the STEM coach, who provided most of the ongoing case management and career counseling for STEM project participants. Any dislocated worker interested in STEM training was co-enrolled in both WIA and the STEM project, so that the participant could take advantage of the support services (tuition, books, supplies, and equipment) and training funds that were available from the WIA program.

Since in-school youth do not generally come to American Job Centers, the STEM coaches worked to recruit in-school youth by developing agency partnerships with schools or WIA youth program contractors. Staff members from the agency partners assisted with recruitment and some case management services, but generally relied on the STEM coaches to provide expertise on STEM occupations and training offerings.

STEM Partnerships

Planning Partners. The STEM project benefitted from a history of collaboration among economic development, workforce development, and educational partners established under previous grants, including ETA's WIRED grant. Key policy staff members from (1) the participating LWIBs, (2) nConnect, the non-profit organization that organized and implemented the mentoring component of the grant, and (3) local educational institutions that offer degrees and certificates in STEM fields collaborated in developing the STEM grant application and planning for project implementation. In addition, members of the employer-led regional workforce council that had been developed for the previous ETA WIRED grant participated in the development of the original project proposal.

Service Delivery Partners. As previously described, several organizational partners—including a community college and a nonprofit agency—were the official employers of the STEM coaches. In addition, the same nonprofit agency received project funding to operate mentoring services for adults and youth in two of the participating local workforce investment areas. Each STEM coach also worked closely with the WIA case managers in each of the twelve American Job Centers

[45] STEM services to residents in the one county from a 4th LWIB were provided by the STEM coach working for the LWIB that received the STEM grant.

across the region and developed close referral and coordination linkages with youth-serving agencies, local school districts, and education and training providers.

Leveraging of Funds from STEM Partners. The LWIBs participating in the Washington and Oregon project were successful in leveraging other funding streams by closely coordinating activities funded with the STEM grant with other ongoing aligned STEM-related activities funded from other sources. For example, one of the participating LWIBs aligned the grant-funded STEM internships it developed for in-school youth with an existing state-funded internship program that also promoted post-secondary STEM education for economically disadvantaged youth. This enabled the project to benefit from participation by high-school counselors and work-based coordinators employed by the school districts, who worked with the project's STEM coach to develop and monitor student internships with STEM employers. The leveraging of other funding streams tended to lower the visibility of the STEM grant as a separate program, but this occurred without losing the STEM focus of the grant-funded activities.

STEM Centers of Excellence

Physical Centers. The managers of the STEM project in Washington and Oregon decided that all twelve American Job Centers in the participating LWIBs would be designated as STEM Centers of Excellence. To implement the STEM Centers of Excellence system-wide, the STEM coaches depended on other staff members within American Job Centers to refer interested customers and provide some of the day-to-day case management of customer progress. The STEM Centers of Excellence were closely identified with the STEM coaches; as one STEM coach explained, "The physical STEM Center of Excellence is wherever I am." The most important value added by the STEM Center of Excellence (in addition to being the site at which customers could arrange for training funds for STEM-related training), was the personalized case management and career coaching provided by the STEM coach.

Virtual Centers. The STEM project in Washington and Oregon did not develop a virtual STEM Center of Excellence in the form of an informational website or access to online services.

Use of Career Blueprints

Although career guidance and assistance with career planning was recognized as an important part of the services provided by STEM coaches, particularly for youth, STEM coaches in this project were not enthusiastic about developing and using a new "career blueprint" as a tool to guide STEM career planning. For adults, STEM project staff members generally expected customers seeking STEM training already to have a good sense of their career goals and training interests. They viewed the requirement for a career blueprint as adding paperwork to their work duties without adding value to the STEM services they provided to participants. Each of the different local project sites developed its own form—often an adaptation of the Individual Employment Plan used for WIA—that it referred to as a career blueprint.

Services for Youth

The activities provided to disadvantaged in-school youth were one of the notable strengths of the Washington and Oregon STEM project. The project tested several different designs for STEM components for youth:

- *Give high-school students an opportunity for learning about STEM topics through hands-on activities in an applied context* by offering a three-day intensive "STEM Institute" that focused on the geology of Mount St. Helens, a nearby national park. This activity was developed by the grantee LWIB in coordination with several other partners, including the U.S. Forest Service, U.S. Geological Survey, and Mount St. Helens Institute, a non-profit educational institution. As part of this activity, 29 students from seven local high schools listened to a wide variety of special lectures, took part in GPS-based scavenger hunts, and networked. This activity was carefully documented to provide a model for developing future STEM Institutes on other topics.
- *Offer youth the opportunity to interact in a variety of ways with STEM professionals who can share information about STEM careers.* With assistance from its non-profit organizational partner, nConnect, the Washington and Oregon STEM project tested a variety of mentoring models, ranging from "traditional" face-to-face long-term mentoring lasting at least six months, to a broader range of mentoring options that included informational interviews with STEM employers, online mentoring, and "speed mentoring" with employer representatives during group networking sessions. Youth responded positively to these mentoring opportunities. The project concluded that face-to-face contact was often more successful than online mentoring in establishing a good relationship between a youth and his/her mentor. Another variant of mentoring that was popular with students participating in STEM internships was receiving regular mentoring from their work supervisors.
- *Provide STEM work experience to economically disadvantaged high school students through internships.* Interested high school students were matched with local employers who supervised them for a 90-hour project-based internship in a STEM work setting. Students learned about a broad range of STEM-related occupations, from mechanical engineering to horticulture. The STEM coach met with internship participants on a weekly basis to talk about their experiences. Both the STEM coach and the school counselor tracked students' progress toward meeting their "learning objectives plan" and conducted final exit interviews with interns and their supervisors. Participating students earned $500 stipends at the completion of their internships. Those interested in post-secondary education were eligible to apply for a needs-based college scholarship grant sponsored by the state and could work with the STEM coach on their college planning. Participants reported that they were able to apply their internship experiences to

their school courses, which has helped them to be more attentive to their schoolwork.

- *Offer incarcerated youth online vocational training in metalwork and woodworking.* One LWIB participating in the project delivered this vocational training to youth incarcerated in two juvenile justice facilities. Participants worked on a self-paced online curriculum, supplemented by hands-on practice sessions using toolkits brought to the site by the project instructor. Staff members faced several challenges in implementing this component.

The STEM project indicated that it hoped to be able to continue its most successful youth activities (internships, face-to-face mentoring, and STEM Institutes) in the future. The strong relationships developed between the workforce development system and high schools, community colleges, and businesses provided a strong foundation on which to build ongoing STEM activities for youth. At the time of the last evaluation site visit, the grantee was hopeful that it could obtain state funding to continue the STEM internship program for another year.

Services for Adults

In the difficult economic context of the recession, the STEM project in Washington and Oregon struggled to produce positive results for dislocated workers interested in STEM occupations and careers. Across the participating LWIBs, STEM services provided to dislocated workers were limited to providing STEM-related occupational skills training in H-1B approved STEM sectors or cross-cutting occupations. In all three local workforce investment areas, adults were only enrolled in the project if they were interested in participating in STEM training. All STEM project participants were co-enrolled in WIA to take advantage of WIA funding support for training as well as supportive services. The different service components developed to provide STEM services to adults are described below.

- *Use Individual Training Accounts (ITAs) to support individuals who wanted to enroll in STEM-related courses available from local education and training providers*. During the first year of the STEM project, occupational training funds were widely available under ARRA funding supplements to the WIA program budget, and the STEM coaches could leverage substantial amounts of WIA training funds. After the first year, ARRA funds had been expended and less WIA funding was available to supplement the STEM project funds allocated for training. Given these financial constraints, the LWIBs often had to modify the types of training they could offer to dislocated workers.[46]

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[46] In some local areas, the STEM coaches who were not already familiar with STEM training had to find out more about STEM course offerings and training costs at the outset of project operations. One STEM coach said that it came as a rude shock to learn that an average two-year welding course at a local community college cost nearly $15,000. Since this LWIB had only budgeted an average of $1,000 of training funds per STEM participant, she had to revise dramatically her expectations about what types of training the project could offer.

- *Offer short-term STEM-related courses designed to prepare students for entry-level STEM jobs.* A local community college that had experience working with small and medium-sized local employers to design and implement customized training courses in specific STEM-related fields used the STEM grant funding to offer several STEM-related courses, including a “Manufacturing Foundations Training Course” that covered foundation skills for machine manufacturing.
- *Develop on-the-job training contracts with local employers*. One of the participating LWIBs used some of its STEM training funds for this activity.
- *Develop mentoring models attractive to adults.* Although dislocated workers tended to be less interested in mentoring than youth, the project found that adults were more interested in being matched to an individual with experience in a STEM field if that person was referred to as an “advocate” or “job coach,” rather than as a mentor.

This project had to redesign its adult services to respond to the changing economic context and to the fact that WIA training funds were less available to help support STEM training than had been anticipated. The project also found that many of the dislocated workers who requested assistance from the project were interested in returning to employment as quickly as possible. As a result, much of the training provided to individuals enrolled in the project was shorter than had been anticipated. As noted above, the project was able to take advantage of an existing community college model for involving employers in the development of short-term customized training for entry-level workers in STEM fields.

Services Targeted to Employers and Incumbent Workers

Although the STEM project did not use grant funds to provide training to incumbent workers, it actively involved employers in its grant-funded activities whenever possible. One priority was to involve employers in the development of training curricula leading to industry-recognized certificates. As illustrated by the success of the “Manufacturing Foundations Training Course” at Portland Community College, the project expected that employer involvement would substantially increase the likelihood that a student would be hired after successfully completing training.

Another priority for employer involvement was to encourage employers to work with youth-serving agencies and schools by sponsoring student interns at their companies and encouraging employees to mentor youth interested in STEM occupations. The STEM project was very successful in this regard, as evidenced by the fact that it secured internship sites for 135 high school students during the grant period.

Outcomes for Enrolled Participants

Exhibits B-11 through B-13 display the Washington and Oregon project’s targeted outcomes as well as outcomes reported on the 12/31/11 Form 9134 Quarterly Progress Report (QPR) and in the individual-level program data submitted for the evaluation. Because both types of outcomes data may contain some inconsistencies (see Chapter VII for a more in depth discussion of data collection and reporting challenges), we report outcome information from both sources, even though they do not agree.

For the Washington and Oregon project, the data obtained from the project show outcomes only for total enrollees, while the individual-level data break out adults and youth, and includes data on some outcome measures only for adult enrollees. This project was only able to provide individual-level data for two of the three participating entities, so the "evaluation outcome data" understates the number of enrollees, trainees, and individuals who completed training, obtained certificates, and entered employment.

As shown in Exhibit B-11, both data sources indicate that the Washington/Oregon project enrolled somewhat fewer youth and adult participants than targeted. However, the project was able to provide participant-level data for only two of the three local WIBs, so the actual numbers enrolled are higher than those reported here.[47]

Exhibit B-11:
STEM Initiative Washington/Oregon Enrollment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)[a]
Number enrolled (Percent of target)			
Adults	350	n/a	285 (81%)
Youth	500	n/a	223 (45%)
Total	850	689 (81%)	508 (74%)

[a] Evaluation outcome data could only be obtained for two of the three WIBs in the WA/OR project; thus, numbers presented here underestimate the number of actual enrollees.

According to the QPR and participant-level evaluation data shown in Exhibit B-12, the Washington and Oregon project exceeded the planned percentage of participants who entered training, although, once again, the actual number of individuals who entered training was less than anticipated. Data submitted to the evaluation indicates that over 90 percent of trainees completed their programs successfully, though the QPR indicates that a lower percentage of trainees did so (62 percent). Regarding credential attainment, the project exceeded both raw number and percentage targets, according to both data sources. The evaluation data, which

[47] Because the project in Washington/Oregon completed its grant operations at the end of December 2011, the project coordinator in one of its participating WIBs was no longer employed in the spring of 2012 when the evaluator collected participant-level data for use in the outcome analysis. As a result, the grantee was not able to obtain participant-level records for project participants who had been served in the jurisdiction of this local WIB.

included information on only one of the participating WIBs, indicated that 92 percent of adult trainees in that WIB completed credentials.

Exhibit B-12:
STEM Initiative Washington/Oregon Training Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)[a]
Number entered training (Percent of enrollees)			
Adults	298 (85%)	n/a	254 (91%)
Youth	310 (62%)	n/a	167 (75%)
Total	608 (72%)	495 (72%)	420 (83%)
Number completed training (Percent of trainees)[b]			
Adults	n/a	n/a	239 (95%)
Youth	n/a	n/a	n/a
Total	n/a	305 (62%)	n/a
Number achieving credential (Percent of training completers)[c]			
Adults	97 (32%)	n/a	234 (99%)[d]
Youth	173 (56%)	n/a	n/a
Total	270 (44%)	271 (89%)	n/a

[a] Evaluation outcome data could only be obtained for two of the three WIBs in the WA/OR project; thus, numbers presented here may underestimate the number of trainees, training completers, and credential recipients.

[b] For the Evaluation Outcome Data, the percentage for "completed training" was calculated out of the participants that were longer active in training. Trainees no longer active in training includes those who had finished their training program, either successfully or not. This measure excludes participants who were still enrolled in training at the time data were collected.

[c] The "target" percentage is of all trainees, while the QPR and individual outcomes percentages are of all training completers.

[d] Credential outcomes include data from one of the three WIBs only.

As shown in Exhibit B-13, the evaluation data indicate that, for the two WIBs that submitted data, 75 percent of the individuals who completed training in the Washington and Oregon project entered employment. Although this percentage is lower than the 90 percent anticipated in the project's application for the STEM grant, it is among the highest achieved by the five STEM grantees.[48] The Washington and Oregon project aimed to have 95 percent of its participants who

[48] The QPR reported that a much smaller percentage of participants obtained employment; however, this report likely under-represents the number of participants that actually obtained employment. See Chapter VII for a

completed training and entered employment go into training-related fields. However, according to the QPR, only about three-fourths of these participants entered into training-related jobs. Participants who obtained employment earned just over $16 per hour, on average, missing the targeted hourly earnings by less than one dollar.

Exhibit B-13:
STEM Initiative Washington/Oregon Adult Employment Outcomes

	Target	QPR as of 12/31/11	Evaluation Outcome Data (Submitted June 2012)[a]
Entered Employment			
Number entered employment (Percent of training completers *for QPR*; percent of exiters *for Outcome Data*)	236 (90%)	120 (39%)[b]	191 (68%)[c]
Number entered training-related employment (Percent of participants entering employment)	224 (95%)	92 (77%)	n/a
Earnings			
Average earnings	$17.00 per hour	n/a	$16.11 per hour

"n/a" denotes data not available.

[a] Evaluation outcome data could only be obtained for two of the three WIBs in the WA/OR project; thus, employment outcomes may not include all participants with positive employment outcomes.

[b] According to the QPR instructions provided by ETA, this is defined as the percent of training completers regardless of enrollment status in the program. However, because of changes in the QPR definitions, some projects may have only included only training completers who obtained employment in the same quarter in which they completed training.

[c] In computing employment outcomes from the participant-level data provided by the projects, we have included all exiters, with the exception of individuals who were employed at the time of enrollment.

discussion of how the QPR definitions may have caused confusion and lack of consistency in the data submitted to ETA on Form 9134.

Notable Practices

The activities supported by the STEM Initiative grant to Washington and Oregon had several particularly notable aspects. The project

- developed effective STEM services for youth interested in pursuing STEM careers by partnering with a non-profit organization with previous experience in mentoring in-school youth and linking them with STEM workers;
- built strong community partnerships that enabled it to leverage community resources from other education and training programs;
- developed a STEM internship program for in-school youth that was successful in providing hands-on STEM work experience to high-school youth and weaving mentoring services and counseling about post-secondary training into the service mix; and
- actively involved employers in developing customized training to prepare individuals for entry-level STEM occupations.

Plans for Sustaining STEM Features Within the Region

At the time of the final site visit, the grantee was writing proposals to try to secure additional funding to keep alive some of the key elements of the STEM project—including the STEM internship program. As long as the region can continue to write and receive discretionary grants to support training for high-growth occupations, the community college will be able to work with employers to develop customized training that will continue to develop the regional STEM workforce.

During the final evaluation site visit, the executive directors of two of the participating LWIBs identified two additional STEM workforce training priorities that need attention: upgrade the skills of experienced STEM workers whose skills are not "current" and provide academic and financial support to help local students complete their college studies in a STEM field.

Lessons Learned

- Experimenting with a variety of different mentoring models may be a way of developing more effective alternatives to traditional long-term, face-to-face mentoring relationships. Youth value opportunities to develop information sharing and supportive relationships with experienced adults who are not formal mentors, such as STEM coaches, internship work supervisors, and classroom teachers. For adults, the label "mentor" may be a barrier to developing beneficial relationships for the exchange of information and support about STEM training and occupations.
- Internships that provide in-school youth with extended exposure to a STEM workplace and an opportunity to use STEM skills to solve practical problems can be very effective in engaging youth in their current STEM studies and encouraging them to consider STEM careers.

- Providing vocational training to incarcerated youth involves logistical challenges that need to be resolved. Although online courses may allow incarcerated youth to access vocational training, they do not allow for hands-on practice to accompany the online lessons. In addition, after youth are released back to their home communities, it is often difficult to maintain contact with them and thereby provide ongoing case management and job search support.