



# ShaleNET Round 2 TAACCCT Grant Third-Party Evaluation Final Report

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Cover Photo: In PCT's Floorhand and Roustabout noncredit programs, students work extensively on PCT's rig simulator and aerial lift equipment—both purchased with grant funds—to learn and practice hand placement, safe operation, and the fundamental components of operating a drilling rig. In this picture, Roustabout students use the rig simulator to learn how to pull a drillstring (including the drillpipe) out of the drilling hole and replace it with a new one. PCT's rig simulator is one of only two in the United States owned by a college.

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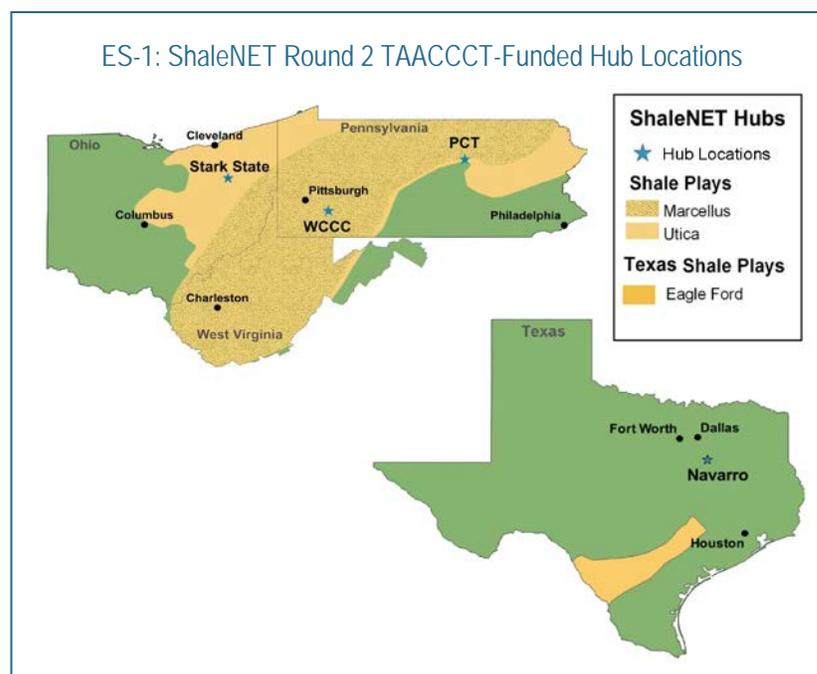
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## Executive Summary

Funded most recently by a Round 2 Trade Adjustment Assistance and Community College and Career Training (TAACCCT) grant from the U.S. Department of Labor (USDOL), the ShaleNET initiative was aimed at expanding the breadth and effectiveness of the training options and career pathways through which individuals could work towards careers in the shale oil and gas industry. A consortium of four educational institutions (referred to as “hubs”) located in three states received funding from the Round 2 TAACCCT grant: Pennsylvania College of Technology (PCT) and Westmoreland County Community College (WCCC) in Pennsylvania, Stark State College (Stark State) in Ohio, and Navarro College (Navarro) in Texas (see Exhibit ES-1). PCT was the leader of the consortium during the grant period. Each of these

institutions was located in or near three major shale gas and oil production plays: the Marcellus Shale Play (located under parts of Pennsylvania, West Virginia, Ohio, and New York), the Utica Shale Play (located under nearly all of the Marcellus Play, but covering a bit more of Ohio and Pennsylvania), and the Eagle Ford Shale Play (located under a large swathe of southern Texas).<sup>1</sup>



<sup>1</sup> A play is a shale formation that contains significant accumulations of natural gas.

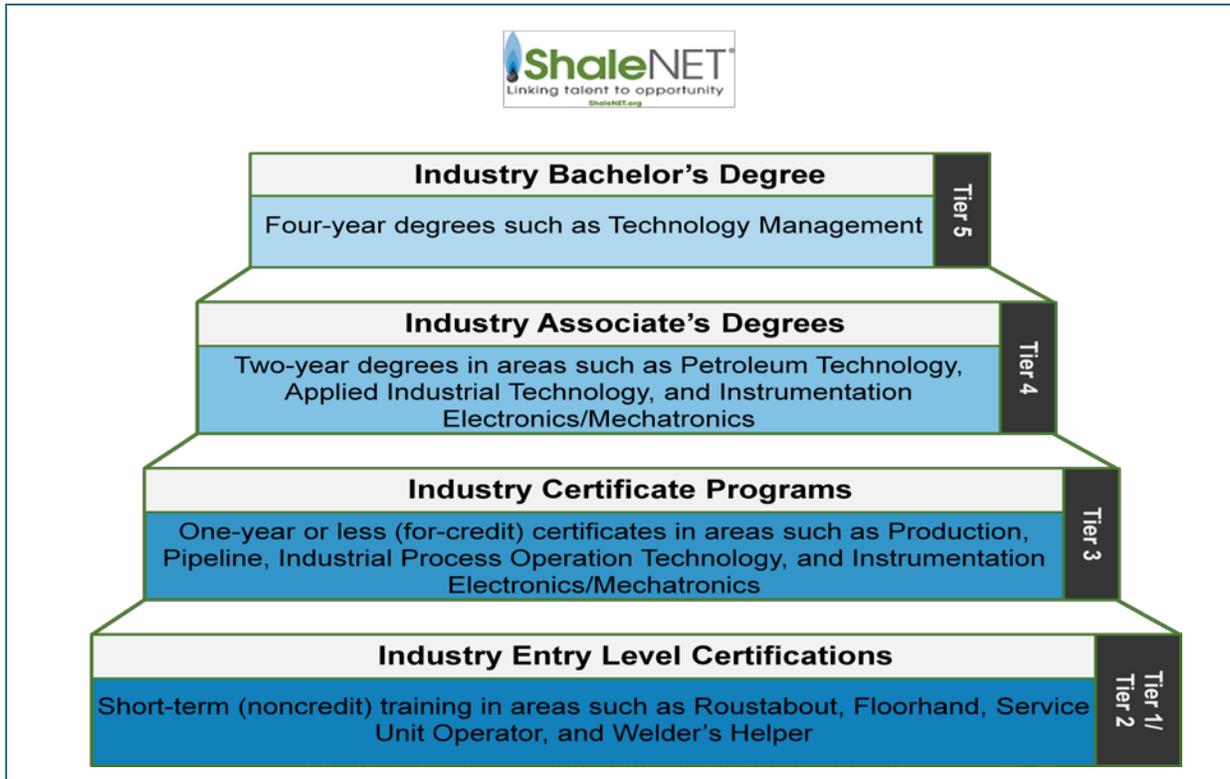
## Overview of the TAACCCT Grant-Funded ShaleNET Initiative

ShaleNET programs at each hub were led by a hub director, who, under the leadership of non-grant-funded college administrators, oversaw and managed grant- and ShaleNET-related tasks and staffs. Each hub also had at least one career counselor who served as the primary liaison with ShaleNET students, and a support technician who either provided administrative support for the grant (at PCT and WCCC), or maintained ShaleNET equipment and labs (at Navarro and Stark State). Finally, each hub used TAACCCT grant funds to hire at least one full-time instructor and multiple adjunct instructors whom taught the technical classes required for ShaleNET training programs

Hubs, in turn, were supported by two additional staff members based at PCT (the Grant Project Director and Data Manager). Two staff members from the Allegheny Conference on Community Development (ACCD), a ShaleNET Consortium partner and grant subcontractor, also assisted hubs. These ACCD staff members (the senior vice president of workforce and special projects and the workplace project manager) assisted hubs in two primary ways: (1) brokering relationships and supporting partnerships between the consortium and the oil and gas industry and policymakers and (2) providing the consortium with marketing materials and branding assistance.

A primary activity of ShaleNET hub staff members was to develop and enhance a series of stackable credential training programs that allowed individuals to follow career pathways in the shale oil and gas industry. ShaleNET's "stackable credential" model, is displayed in Exhibit ES-2. This iteration of the ShaleNET initiative focused primarily on developing new curricula for Tiers 3 and 4 and enhancing programs in Tiers 1, 2, 3, and 4.

Exhibit ES-2: ShaleNET Stackable Credential Model



Other key TAACCCT grant-funded ShaleNET activities included:

- enhancing the ShaleNET website, and carrying out other marketing and branding;
- providing students at each hub with support and assistance related to enrollment, academic and career planning, job placement, and life issues; and
- enhancing collaboration among hub members and partners through articulation agreements, hub and advisory committee meetings, consortium planning retreats and conference calls, and other ShaleNET consortium and hub activities.

## Overview of the Third-Party Evaluation of ShaleNET During the TAACCCT Grant

In July 2013, Social Policy Research Associates (SPR) was awarded a contract to serve as third-party evaluator for the ShaleNET initiative. SPR's evaluation of the ShaleNET initiative during the Round 2 TAACCCT grant was focused on answering the following high-level research questions:

- What administrative and partnership structures were established to guide the initiative?

- What was the nature of outreach to and assessment of prospective ShaleNET students, including TAA-eligible workers and veterans?
- How was each of the initiative’s major components developed and launched?
- What were the initiative’s outputs, outcomes, and impacts?

To examine these questions, SPR conducted a multi-method evaluation that included an analysis of the implementation, outcomes, and some impacts related to the ShaleNET initiative during the grant. To collect the data needed to conduct these analyses, the evaluation team carried out the following data collection activities: conducted three rounds of multi-day site visits to each hub; observed consortium planning retreats; extracted educational data from each consortium college, UI wage data from Pennsylvania, Texas, and Ohio, and survey data from the Marcellus Shale Coalition; conducted surveys of local workforce development board directors within hub service regions and employers who had hired ShaleNET participants.

## Key Findings regarding the ShaleNET Initiative During the Round 2 TAACCCT Grant

Overall, the ShaleNET Initiative operated quite successfully during the period of the Round 2 TAACCCT grant, despite having to face a number of serious challenges, including a major downturn in the oil and gas industry. This success, even in such a challenging external environment, provides further evidence of the strength of the ShaleNET Consortium and the value of its programming.

### Delivery of Training Programs and Student Support

The ShaleNET Consortium was generally quite successful in developing and enhancing ShaleNET training programs during the TAACCCT grant. As evidence of this success, ShaleNET TAACCCT-supported hubs were able to develop 19 new credit-bearing training programs—more than doubling the number of oil and gas training programs available across the four hubs.

The TAACCCT-supported hubs also obtained nearly 2.5 million dollars worth of additional equipment (almost a third of it donated by industry partners) for use by students and instructors in these programs and the 12 pre-existing ShaleNET training programs. This huge influx of new

**19** new credit-bearing programs, **doubling** the number of oil and gas programs



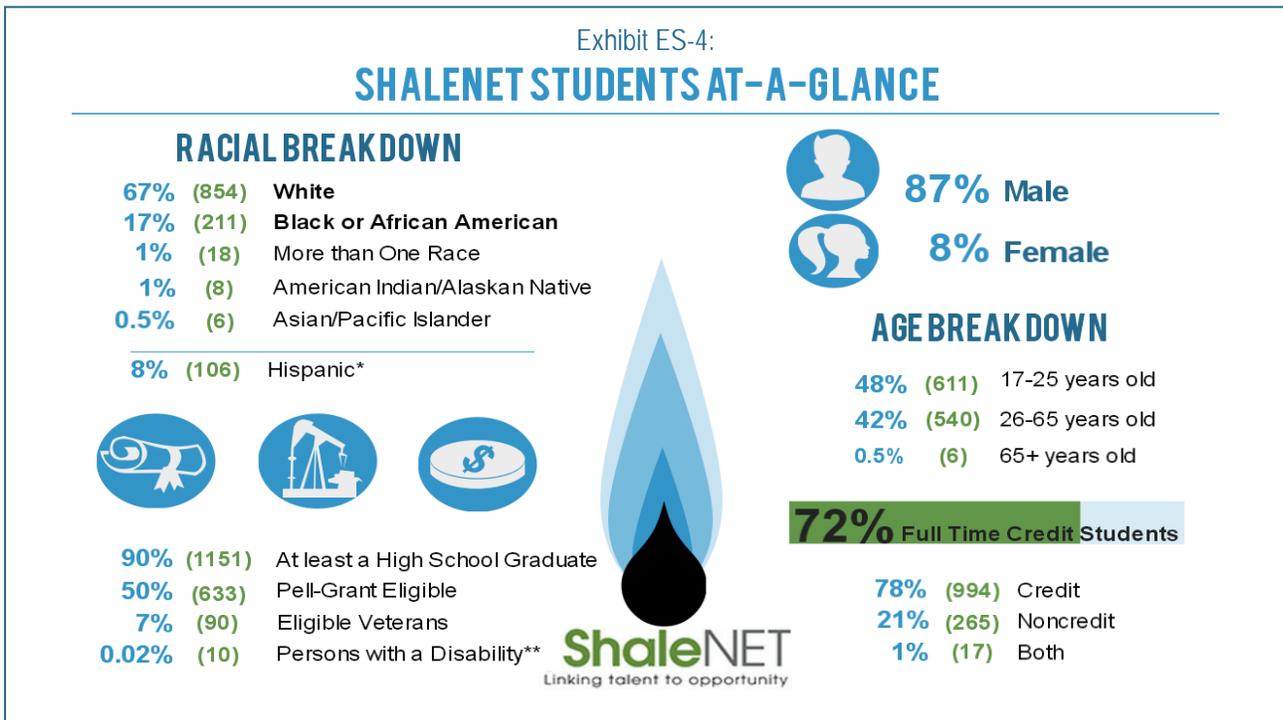
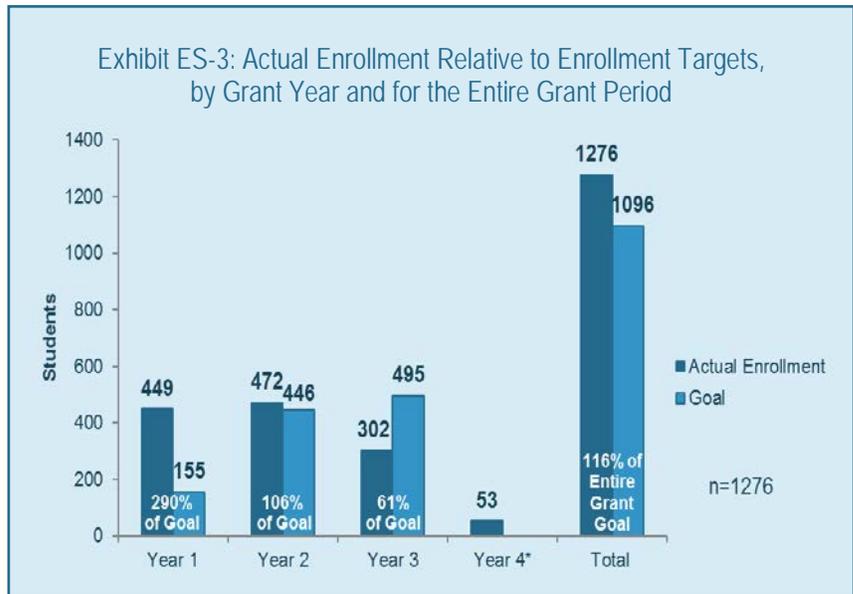
Nearly **\$2.5**

**million** worth of additional equipment across four hubs

equipment certainly enhanced the hands-on component of ShaleNET training programs, even though three of the four hubs were not able to develop the capacity to share video images of lab equipment with students in remote locations. Three of the four TAACCCT-funded hubs also used or leveraged grant funds to create new facilities specifically designed to house some or all ShaleNET program equipment.

The ShaleNET Consortium was also fairly successful in recruiting and enrolling participants into these new and enhanced training programs. Although enrollment declined during the second half of the grant period—and was a significant challenge

for noncredit programs at two hubs even earlier—ShaleNET hubs were able to enroll 1,276 unique participants, achieving 116 percent of the consortium’s overall enrollment goal for the grant (see Exhibit ES-3). These participants were primarily white and male, and most held at least a high school diploma, but they included a mix of ages ranging from 17 to 65 (see Exhibit ES-4).



Partly as a result of the major recruitment and enrollment challenges faced by noncredit programs, but also because of the consortium's focus during the grant, about 80 percent of ShaleNET participants enrolled in a credit program—either a Tier 4 AAS degree or, slightly less commonly, a Tier 3 certificate program.

The four TAACCCT-funded hubs were also generally successful in providing ShaleNET participants with enhanced support for academic and career planning and for dealing with life issues. Although career counselor turnover and heavy workloads at three of four hubs may have limited the amount of support some ShaleNET students received, students who did receive assistance were quite appreciative. These students commented that this assistance helped them to stay on track toward program completion and to find jobs after they graduated.

## Partnerships

During the grant, ShaleNET hubs and the consortium as a whole

were also quite successful in developing partnerships, particularly with

components of the oil and gas industry.

As an indication of the consortium's success in partnering with the industry, oil and gas companies, industry associations, and industry foundations contributed nearly 1.7 million dollars in funding and in-kind donations to ShaleNET TAACCCT-supported hubs during the grant period, as well as \$100,000 to the consortium as a whole to support the development of a strategic business plan for post-grant sustainability. Further, as a result of the consortium's multi-year partnership with industry giant Chevron, that partner had

agreed, as of the summer of 2016, to provide another \$456,920 to the three Appalachian Basin TAACCCT-supported hubs for 2016-2017 (as well as another \$297,093 to ShaleNET's newest Appalachian Basin hub, Pierpont Community and Technical College in West Virginia, which did not receive Round 2 TAACCCT grant funding).

**Industry partners contributed nearly \$1.7 million to ShaleNET TAACCCT-supported hubs during the grant period.** Chevron alone provided more than **\$500 thousand** of this overall amount as well as an **additional \$754,013 for 2016–2017** to the three Appalachian Basin TAACCCT-supported hubs and Pierpont Community and Technical College. It also provided the ShaleNET Consortium with **\$100,000 to support its business plan development process.**

The ShaleNET Consortium and hubs established three key partnerships with other educational institutions during the grant. The first of these was developed by the Navarro hub, with assistance from PCT, and was with the Eagle Ford Center for Research Education and Outreach (EFCREO) at Texas A&M Kingsville. This partnership enabled EFCREO to offer ShaleNET noncredit training programs.

Unfortunately, due to the downturn in drilling in the Eagle Ford Play, EFCREO discontinued offering these programs, and this partnership ended.

However, the ShaleNET consortium and another hub did succeed in establishing other educational partnerships that were ongoing as of the writing of this report. These included establishment of Pierpont Community and Technical College as the consortium’s affiliate hub for West Virginia in mid-2014 and the establishment in 2016 of the Ohio ShaleNET Share partnership between Stark State and two other community colleges in Ohio—Eastern Gateway and Hocking (see Exhibit ES-5). The latter partnership allowed students in a specific ShaleNET AAS program to complete 40 percent of their credits toward the degree at their home college (Hocking or Eastern Gateway) and 20 percent of the credits (including all of the most oil-and-gas specific) during an intensive summer session at Stark.



As of the end of the grant period, the ShaleNET Consortium and hubs had also developed some key partnerships with government-related bodies. For example, PCT developed partnerships with three nearby Pennsylvania counties and, as a result, had received \$195,000 in scholarship funding for residents of those counties to participate in PCT's noncredit programs. Further, during the latter portion of the TAACCCT grant, the Consortium's Appalachian Basin members (PCT, Stark State, WCCC, Pierpont, and ACCD) became involved with the Tri-State Shale Summit, a high-level collaborative formed by the governors of Ohio, Pennsylvania, and West Virginia to increase economic development related to the Marcellus and Utica shale plays. In addition, Stark State received a grant of more than \$500,000 from the Ohio Department of Higher Education to support implementation of its Ohio ShaleNET Share partnership.

Finally, three of the four Round 2 TAACCCT-funded hubs also developed fairly strong partnerships with the public workforce system, particularly the staff members of their closest WDBs and AJCs. Two of these hubs reported that as a result of these partnerships a number of their ShaleNET students received funding from WIA or WIOA to cover some or all of their ShaleNET tuition costs.

### Participant and Employer Outcomes

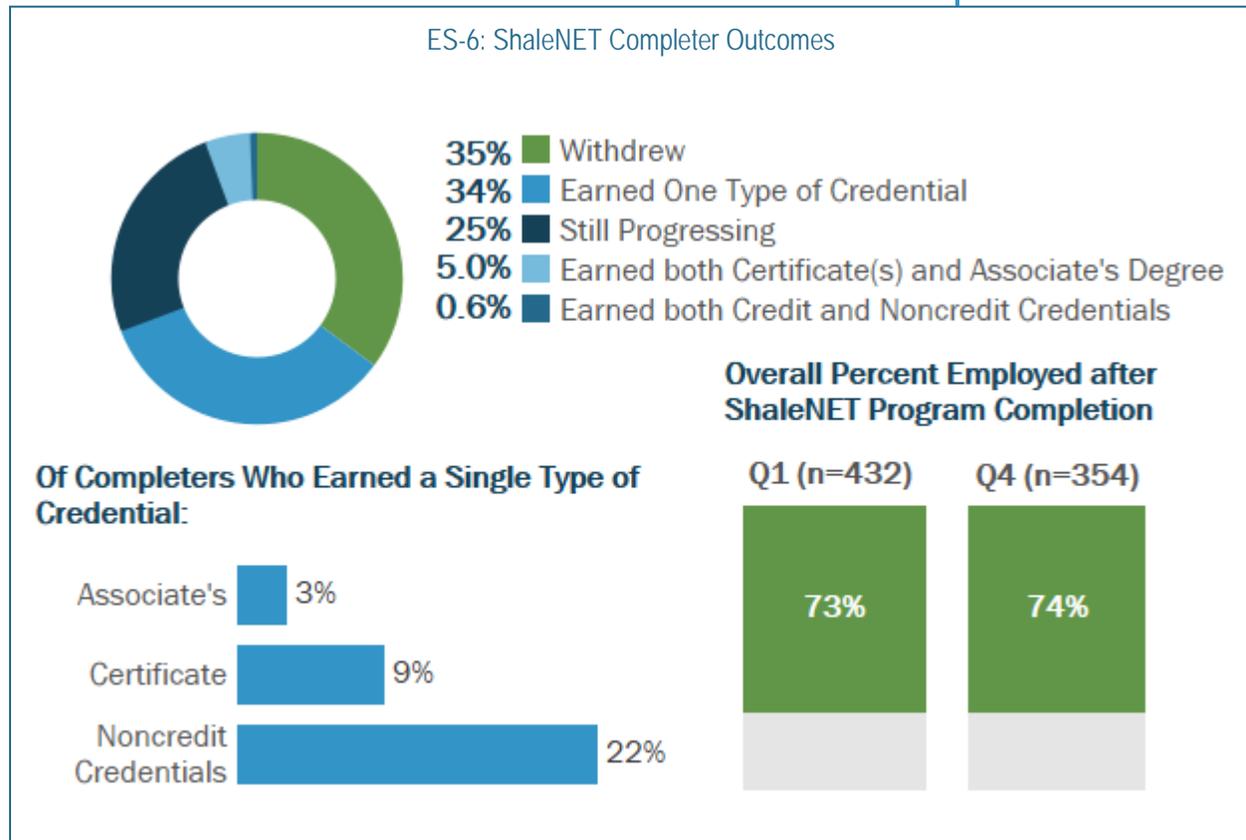
Likely as a result of the initiative's successful service delivery and partnership development, ShaleNET participants were generally quite successful in achieving positive educational and labor market outcomes. For example, approximately 65 percent of ShaleNET grant participants had either completed their ShaleNET programs or were still working toward completion as of the end of the grant period. Forty percent of these participants completed a program: 22 percent completed a noncredit program (and received, on average, five industry-recognized credentials); 9 percent completed a certificate program, 3 percent completed an AAS, and 6 percent completed more than one type of program (see Exhibit ES-6). Although the remaining 35 percent of

The Consortium's Appalachian Basin members (PCT, Stark State, WCCC, Pierpont, and ACCD) were involved with the



a high-level collaborative formed by the governors of Ohio, Pennsylvania, and West Virginia.

ShaleNET participants withdrew from their ShaleNET program (almost all of these withdrawals were from credit programs) and hub, this percentage is far lower than the 80 percent of community college students nationally who do not complete their programs.<sup>2</sup>



Labor market outcomes for ShaleNET completers were also generally quite strong, particularly during the early years of the grant before oil prices declined in mid-2014, sending the oil and gas industry into an economic contraction that seriously affected hiring in 2015. Overall, according to wage record data—which should be considered only a lower-bound estimate given its limitations—about three-fourths of ShaleNET completers throughout the grant period were employed in the first and fourth quarters after program completion. The rate of post-program employment, however, was quite a bit higher for participants who completed prior to 2015 (81 percent for those who completed in

<sup>2</sup> Of the cohort of students that entered a certificate or AAS program in 2010, only 19.5 percent completed their programs within 150 percent of the expected normal time. National Center for Education Statistics, *Digest of Education Statistics*, [http://nces.ed.gov/programs/digest/d14/tables/dt14\\_326.20.asp](http://nces.ed.gov/programs/digest/d14/tables/dt14_326.20.asp).

2014), particularly for noncredit program completers (90 percent). Further, a rigorous comparison of ShaleNET noncredit completers in Pennsylvania with recipients of other short-term employment services in the same state showed that ShaleNET program participation had a positive and significant impact on post-program employment and earnings, particularly in the years prior to the oil and gas industry downturn.

The ShaleNET Initiative during the TAACCCT grant also appeared to meet and ease the hiring needs of employers. Proof of this was the relatively high rate of post-program employment cited above. Several employer representatives stated that they chose to hire ShaleNET completers primarily because of their technical skills and knowledge of the industry and others stated that ShaleNET hires performed better than other similar employees across multiple work domains. Multiple employer representatives also stated that it was easy to hire ShaleNET graduates because career counselors provided them with information about graduates' qualifications and facilitated the process of setting up interviews with them.

### Sustainability

As a result of these generally successful outcomes, as well as the ShaleNET Consortium's early focus on sustainability, many ShaleNET programs and services were still operating as of September 2016 and were expected to continue to do so in the future. The majority of ShaleNET training programs were expected to continue enrolling new students, and two of the four TAACCCT-funded hubs were expected to retain their oil and gas career counselors through at least the end of the 2016-2017 academic year (and a third hub planned to replace its oil and gas career counselor sometime during 2016-2017). Further, all hubs reported that they had at least some ongoing funding for equipment maintenance and repair. Also, as part of the business planning process, hub representatives and ACCD continued to collaborate on an ongoing basis through both conference calls and in-person meetings.



However, some elements of the ShaleNET model—particularly at certain TAACCCT-funded hubs—had stopped operating as of the writing of this report or would end after September 30, 2016.

- Cross-consortium marketing of ShaleNET—including maintenance of the ShaleNET.org website and production of a quarterly newsletter and marketing materials—had ceased.
- Two of the hubs were expected to lose their TAACCCT grant-funded ShaleNET hub director as of September 30, 2016, and as they did not have equivalent college-funded oil and gas positions, they will likely be unable to conduct as much outreach to partners, particularly employers, as would be ideal.
- One of the hubs that no longer employed an oil-and-gas-focused career counselor also had no plans to replace that position; consequently it would continue to be hampered in its ability to support ShaleNET participants for the foreseeable future.
- Two hubs had lost one or more of their full-time instructors and thus had to rely more on adjunct instructors, making it more difficult for them to offer as many ShaleNET classes as needed (due to the challenge of finding enough qualified adjuncts).

Still, based on an assessment of the factors deemed by some experts to be critical to sustainability—and despite the ongoing oil and gas industry downturn—there were, as of the writing of this report, many reasons to be optimistic about ShaleNET’s future prospects:

- The consortium as a whole and three hubs had strong internal and external champions.
- Multiple sources of fairly stable funding were available, particularly for Appalachian Basin hubs.
- Collaboration among ShaleNET Consortium members was strong and ongoing.
- Core ShaleNET leaders at ACCD and the Appalachian Basin hubs had been retained.

#### SUCCESSFULLY SUSTAINED ELEMENTS OF THE SHALENET MODEL

The majority of ShaleNET training programs were expected to continue **enrolling new students**.

**Oil and gas career counselors** at two of four hubs were expected to remain through the 2016–2017 academic year. A third hub will replace their counselor sometime in 2016–2017.

All hubs had some **ongoing funding for equipment maintenance and repair**.

**Hub representatives and ACCD** continued to **collaborate** on an ongoing basis as part of the business plan development process.

- Strategic planning about how to best adapt the ShaleNET Initiative to changing circumstances and position it for future success was underway.
- Rigorous evaluation activities that could provide additional evidence of the ShaleNET Initiative's success were ongoing.

## Reasons to be Optimistic about ShaleNET Sustainability

ShaleNET has:



Strong internal & external champions



Retained core ShaleNET leaders



Multiple funding sources



A strategic planning process underway



A strong consortium



Ongoing rigorous evaluation activities

# I. INTRODUCTION

Funded most recently by a Round 2 Trade Adjustment Assistance and Community College and Career Training (TAACCCT) grant from the U.S. Department of Labor (USDOL), the ShaleNET initiative was aimed at expanding the breadth and effectiveness of the training options and career pathways through which individuals could work towards careers in the shale oil and gas industry. A consortium of four educational institutions (referred to as “hubs”) located in three states received funding from the Round 2 TAACCCT grant: Pennsylvania College of Technology (PCT) and Westmoreland County Community College (WCCC) in Pennsylvania, Stark State College (Stark State) in Ohio, and Navarro College (Navarro) in Texas. PCT was the leader of the consortium during the grant period. Each of these institutions was located in or near three major shale gas and oil production plays: the Marcellus Shale Play (located under parts of Pennsylvania, West Virginia, Ohio, and New York), the Utica Shale Play (underlying nearly all of the Marcellus Play, but covering a bit more of Ohio and Pennsylvania), and the Eagle Ford Shale Play (located under a large swathe of southern Texas).<sup>3</sup> The locations of the consortium colleges, or “hubs,” and the shale plays are displayed in Exhibit I-1.<sup>4</sup>

The ShaleNET initiative was aimed at expanding the breadth and effectiveness of the training options and career pathways through which individuals could work towards careers in the shale oil and gas industry.

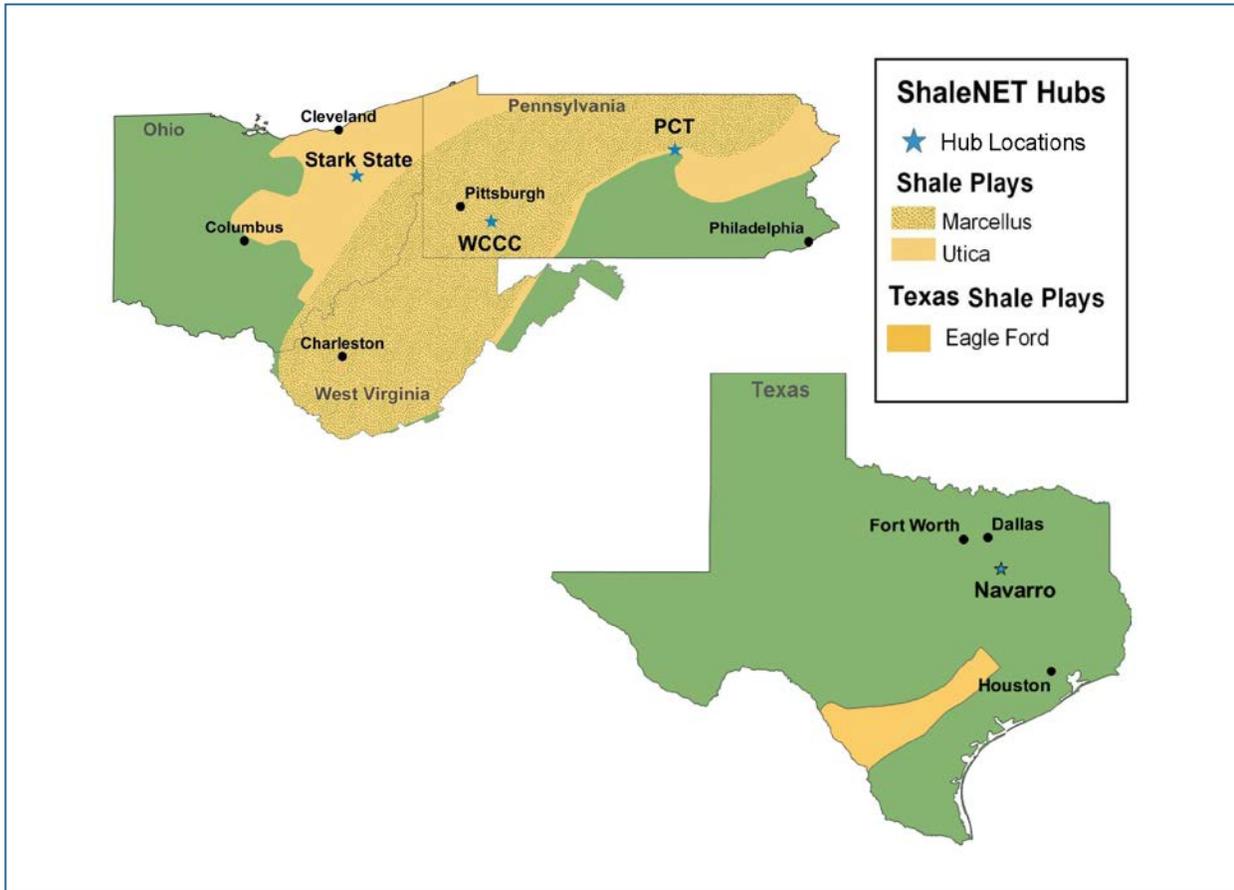
## The Shale Oil and Gas Industry in ShaleNET Hub Regions

The shale oil and gas industry includes all economic activities related to extracting oil and gas (and related products) from shale rocks using horizontal drilling and an extraction technology called hydraulic fracturing (also known as “fracking”), along with the activities involved in processing and transporting this oil and gas. Unlike the conventional oil and gas industry, which taps oil and gas reserves that flow freely from reservoir rocks into wells, the shale gas and oil industry extracts oil and gas that is not aggregated into reservoirs, but instead trapped within the microscopic pores in fine-grained shale rocks.

<sup>3</sup> A play is a shale formation that contains significant accumulations of natural gas.

<sup>4</sup> Within the ShaleNET consortium, all member colleges are referred to as “hubs” because they are meant to take the lead on ShaleNET activities in their respective regions, both in developing partnerships with other educational institutions and coordinating among those partners.

Exhibit I-1: ShaleNET Round 2 TAACCCT-Funded Hub Locations



### The Shale Gas and Oil Boom

Beginning about midway through the last decade, the shale oil and gas industry in the U.S. began experiencing a boom in drilling and production. This boom was caused by improvements in the horizontal drilling and hydraulic fracturing processes that made their use technologically and economically feasible across most shale plays. Among the shale plays that affected ShaleNET colleges, the Marcellus Shale Play was the first to experience this boom. According to Pennsylvania's Department of Labor and Industry, activities related to the Marcellus Shale Play became a rapidly growing segment of Pennsylvania's economy beginning in 2008, and from the second quarter of 2010 to the second quarter

of 2014, employment in “core” Marcellus Shale-related industries increased 96.7 percent.<sup>5</sup>

Other states in the Appalachian Basin also experienced rapid growth in the shale oil and gas industry during this same approximate period, partly due to activity related to the Marcellus Play, but also because of extraction activities in the Utica Shale Play. The Utica Play is larger than the Marcellus Play, covering nearly half of Ohio and two-thirds of Pennsylvania, and lies thousands of feet deeper (the Marcellus lies directly on top of much of the Utica). Because drilling and production in the Utica Shale Play did not begin until 2011 (and only a small portion of the Marcellus Play covers Ohio), rapid growth in Ohio’s shale oil and gas industry did not really begin to boom until 2011, with shale-related employment in the state increasing more than 98 percent from the second quarter of 2011 to the second quarter of 2014.

In Texas, where the TAACCCT-supported ShaleNET hub of Navarro College is located, the Eagle Ford Shale Play (see Exhibit I-1) experienced a rapid increase in drilling and production beginning in 2011. According to the Texas Railroad Commission, 16,988 new drilling permits were issued for the Eagle Ford Play from 2011 to 2014.

The increased rates of gas and oil production in these regions generated a major need for skilled and semi-skilled labor during the same periods. For example, in an early 2014 survey of 78 Marcellus Shale Coalition (MSC) members, 55 percent of respondents reported that a shortage of skilled workers was a significant problem.<sup>6</sup> Furthermore, 80 percent of these same survey respondents reported that they intended to hire in the southwest Pennsylvania region, and about one third of survey respondents anticipated hiring in Ohio and in central, northeast, and southeast Pennsylvania.

### Effects of Declining Prices

Even while the shale oil and gas industry was still growing overall, a decline in natural gas prices that began in 2012 started to slow down new exploration and drilling in the “dry gas”<sup>7</sup> north-central

From the second quarter of 2010 to the second quarter of 2014, employment in “core” Marcellus Shale-related industries increased 96.7 percent.

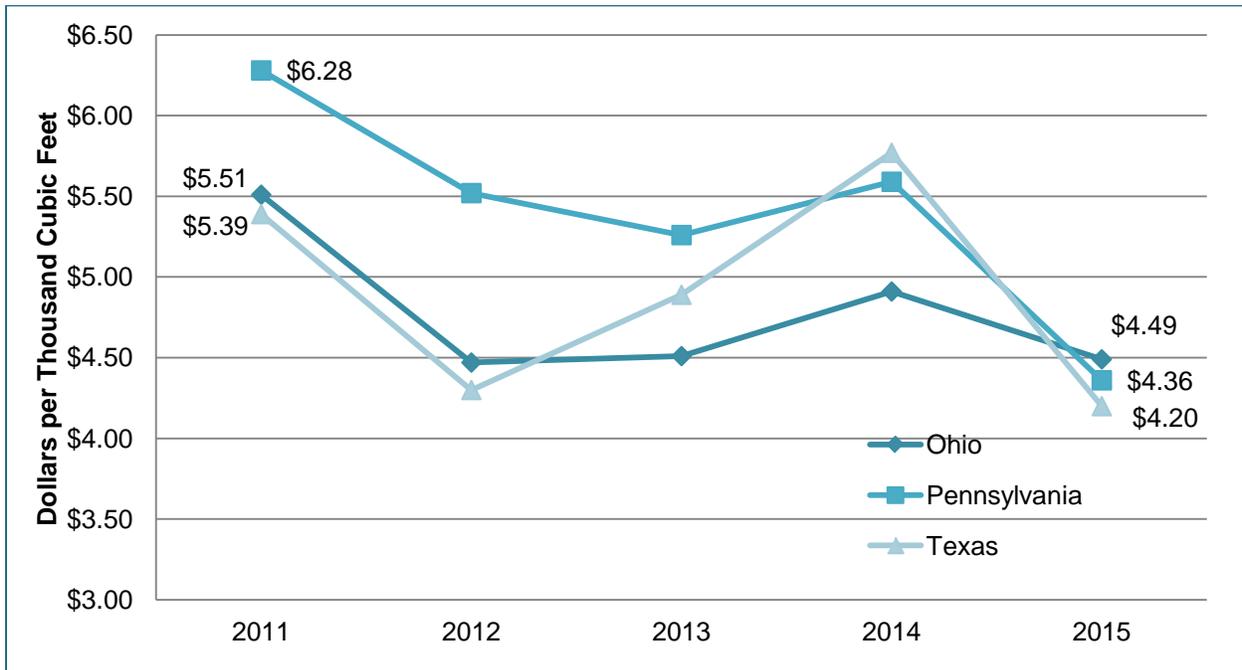
<sup>5</sup> “Core industries” are those that perform the main work of horizontal drilling and hydraulic fracturing operations (e.g., drilling and extraction of natural gas from shale rock).

<sup>6</sup> Founded in 2008, MSC is a 501(c)(6) membership organization registered in Pennsylvania, whose members primarily represent companies involved in the shale oil and gas industry.

<sup>7</sup> According to the Encyclopedia Britannica, “dry gas” is natural gas that consists primarily of methane, rather than heavier hydrocarbon compounds such as propane and butane.

and northeastern regions of the Marcellus Play (natural gas prices from 2011 to 2015 are shown in Exhibit I-2).

Exhibit I-2: Average Annual Natural Gas Citygate Price 2011-2015



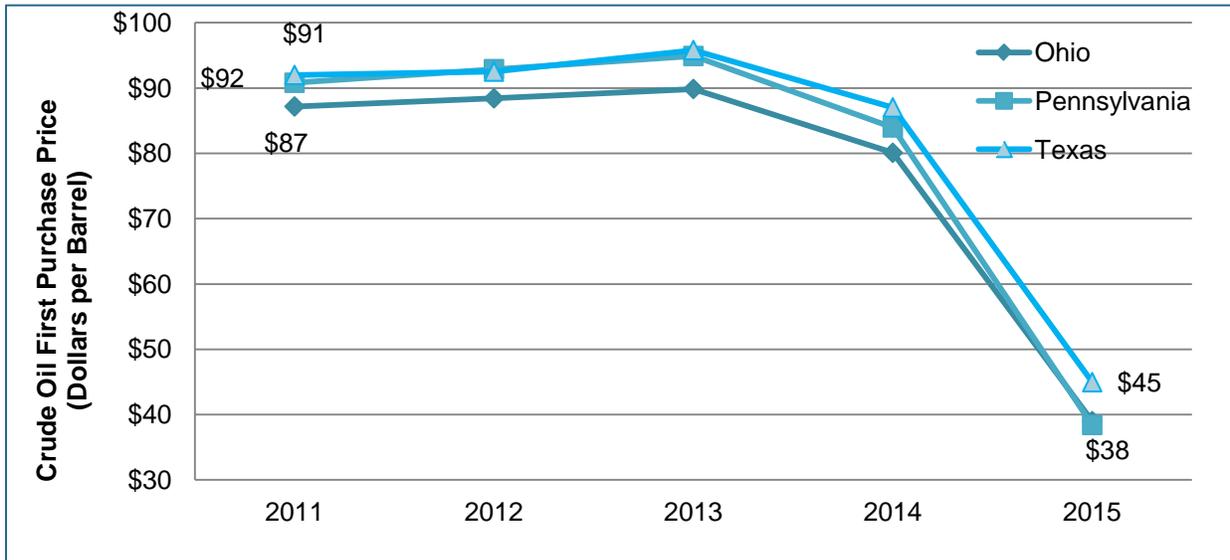
Note: According to the Energy Information Administration (EIA), citygate is a “point at which a distributing gas utility receives gas from a natural gas pipeline company or transmission system.”

Source: EIA, [http://www.eia.gov/dnav/ng/ng\\_pri\\_sum\\_dcu\\_nus\\_a.htm](http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm), August 2016

Still, because oil prices and related hydrocarbon prices remained high, new exploration and drilling in the “wet gas<sup>8</sup>” southwestern areas of the Marcellus, and in the Utica and Eagle Ford plays, continued growing at a rapid pace through mid-2014. However, in mid-2014, crude oil prices began a steep decline (see Exhibit I-3).

<sup>6</sup> According to the Encyclopedia Britannica, “wet gas” is natural gas “...that contains an appreciable proportion of hydrocarbon compounds heavier than methane (e.g., ethane, propane, and butane). The mixture may be gaseous or both liquid and gaseous in the reservoir; the heavier hydrocarbons are condensable when brought to the surface and are frequently separated as natural gas liquids (NGLs). Alternatively, the propane and other lighter compounds may be marketed as liquefied petroleum gas (LPG), and heavier hydrocarbons may be made into gasoline...”

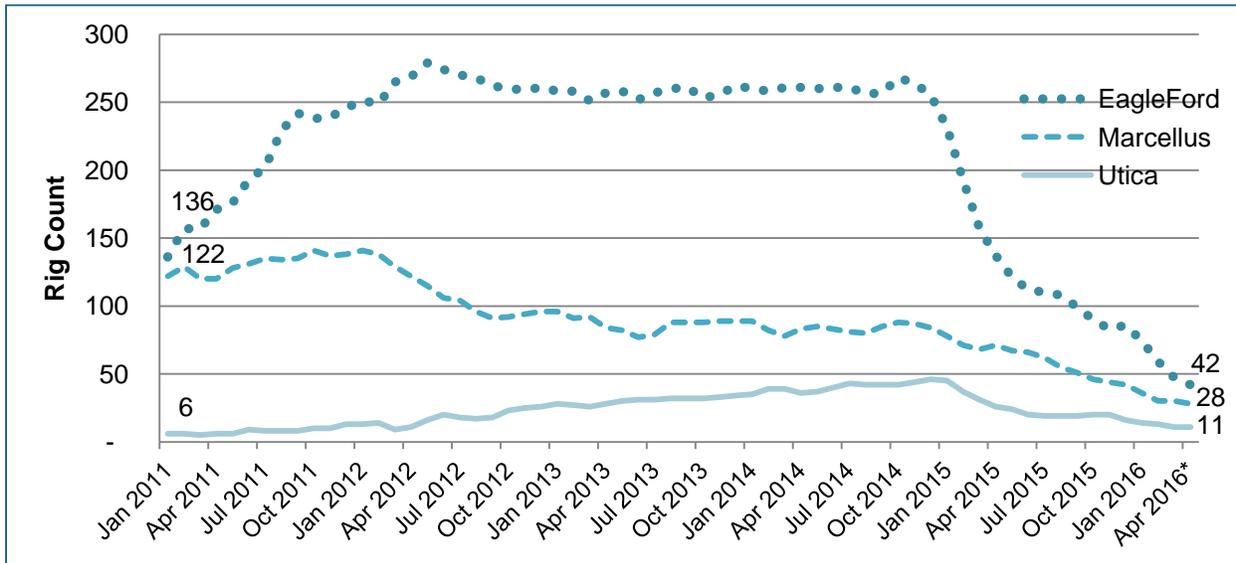
Exhibit I-3: Average Annual Crude Oil (First Purchase) Price 2011-2015



Note: According to the Energy Information Administration, the price for domestic crude oil is reported by the company that owns the crude oil the first time it is removed from the lease boundary.  
 Source: EIA, [http://www.eia.gov/dnav/pet/pet\\_pri\\_dfp1k\\_a.htm](http://www.eia.gov/dnav/pet/pet_pri_dfp1k_a.htm), August 2016

As a result of these price declines, exploration and drilling of new wells even in wet gas areas of the shale plays close to the ShaleNET hubs also began to decline over the same period, particularly in the Eagle Ford and Marcellus Plays (see the chart showing rig counts in each play from 2011 to 2015 in Exhibit I-4).

Exhibit I-4: Monthly Average Number of Active Drilling Rigs by Shale Play

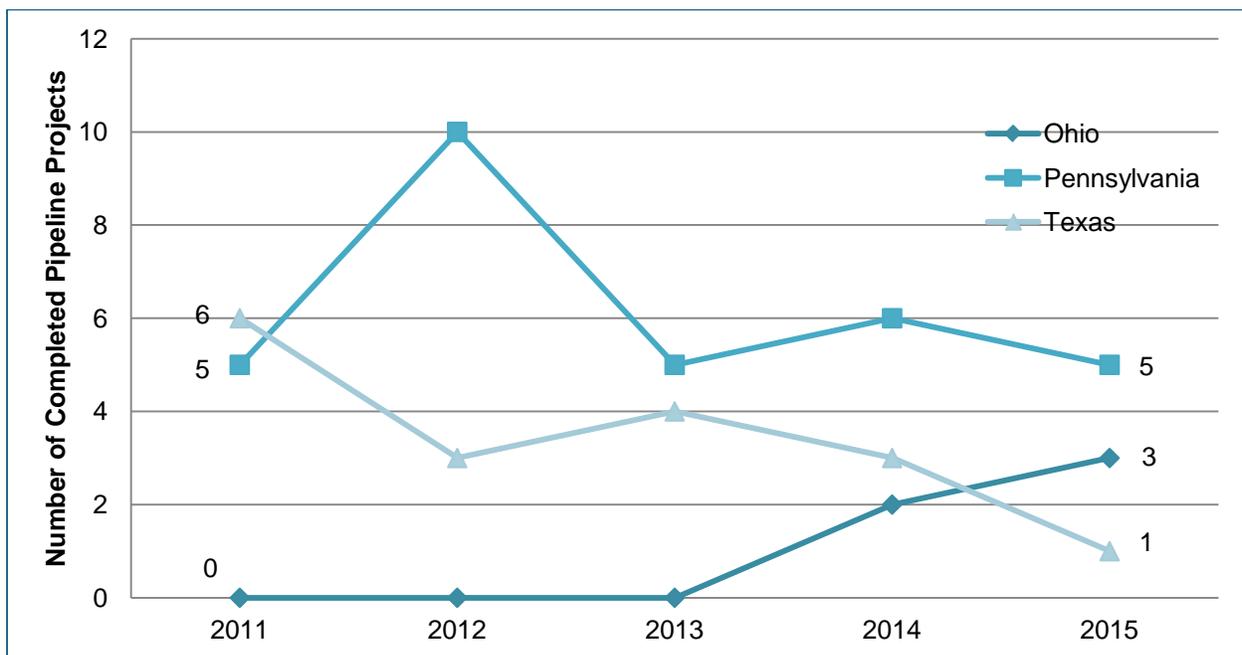


Note: Rig count refers to the number of active drilling rigs operating in a region.  
 Source: EIA, Drilling Productivity Report, <http://www.eia.gov/petroleum/drilling>, June 2016

Despite the decline in exploration and drilling of new wells, economic activity related to the shale oil and gas industry

continued, but at a more moderate pace compared to what occurred during the height of the boom. In addition, the focus of economic activity shifted from new drilling to the development of infrastructure for processing and transporting of gas and related products, which had been minimal in Ohio and Pennsylvania.<sup>9</sup> For example, the number of completed pipeline projects in Ohio and Pennsylvania, such as the Mariner East Pipeline, grew or stayed about constant over the past few years (see Exhibit I-5). In addition, in mid 2016, construction was begun near Pittsburgh on the first major ethane cracker plant built outside the Gulf Coast in 20 years.<sup>10</sup>

Exhibit I-5: Number of Completed Natural Gas Pipeline Projects by Year, 2011-2015



Note: As of December 2015, Texas has had the largest amount (n=103) of natural gas pipeline projects completed. Pennsylvania has had 84 pipeline projects completed, whereas Ohio has had only 18.  
 Source: Energy Information Administration, <http://www.eia.gov/naturalgas/data.cfm>, June 2016

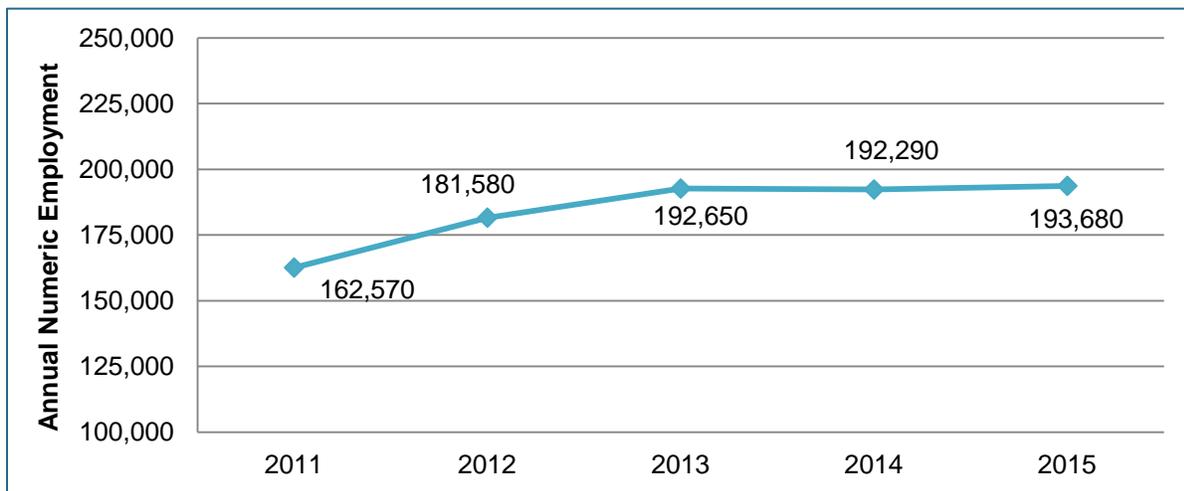
Consequently, although employment across all occupations in the oil and gas extraction industry did increase, albeit by a very small

<sup>9</sup> Although Pennsylvania was the site of the first large-scale extraction of crude oil in the U.S. in 1859, the oil and gas industry basically died out in the state in the early 1900s and remained dormant until the improvement of horizontal drilling and hydraulic fracturing brought the industry back to the region. As a result, Pennsylvania and other Appalachian Basin states such as Ohio and West Virginia, unlike Texas, had little oil and gas transportation and processing infrastructure in place when the shale oil and gas boom began in the region.

<sup>10</sup> An ethane cracker processes ethane gas into ethylene for use in manufacturing plastics, resins, adhesives and synthetic products.

number, from 2014 to 2015 (see Exhibit I-6), state-specific labor market data across occupations in the oil and gas extraction industry showed quite a bit of variation in employment by specific occupation during this same time period across the three ShaleNET states (see Exhibit I-7). For example, while the number of individuals employed as Wellhead Pumpers increased by 380 in Ohio between 2011 and 2015, the number of individuals employed as Wellhead Pumpers decreased in both Pennsylvania and Texas. Moreover, while the number of individuals employed as Rotary Drill Operators increased by more than a 1,000 in Pennsylvania and Texas, in Ohio the increase was much more modest.

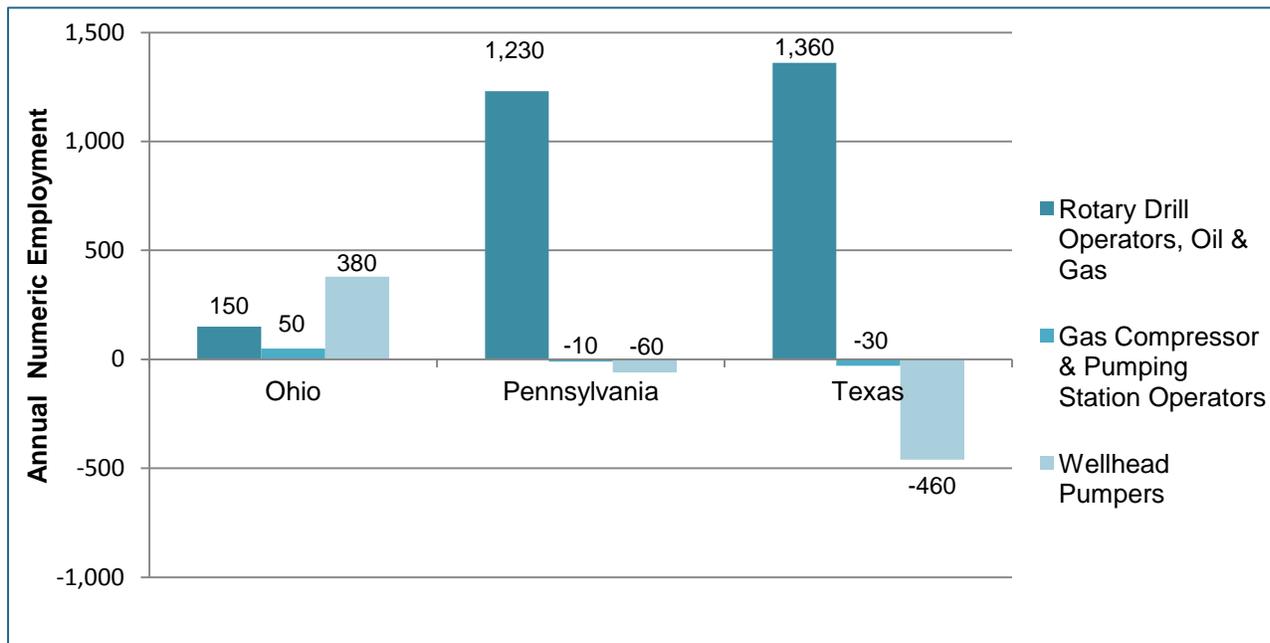
Exhibit I-6: Numeric Change in Annual Employment in the Oil and Gas Extraction Industry



Source: Occupational Employment Statistics, <http://www.bls.gov/oes/tables.htm>, August 2016

These differences in employment growth by specific occupation across the three ShaleNET states likely reflect the very different stages of development of their respective shale oil and gas industries during this time period. Whereas Ohio's shale oil and gas industry was still in its earliest stages of infrastructure development and thus continued to see modest growth in employment across most occupations despite the downturn in prices, both Texas and Pennsylvania with more developed industries saw declines in some occupations that were heavily affected by the price declines, but much larger increases in occupations that were less affected.

Exhibit I-7: Numeric Change in Average Annual Employment in Selected Oil and Gas Occupations across ShaleNET States 2012-2015



Source: Bureau of Labor Statistics Occupational Employment Statistics, <http://www.bls.gov/oes/tables.htm>, August 2016

## Origins of the ShaleNET Initiative

The ShaleNET initiative originated well before the consortium received the Round 2 TAACCCT grant, and was supported by several preceding federal and state grants. One of these grants was a one-year, \$250,000 USDOL Regional Innovation Grant awarded to the Westmoreland-Fayette Counties Workforce Investment Board (WIB) in 2007. The grant funded the Westmoreland-Fayette Counties WIB to work with WCCC and the Allegheny Conference on Community Development (ACCD) to prepare southwest Pennsylvania to capitalize on the increased activity related to the Marcellus Shale Play.<sup>11</sup> Around the same time, PCT received a Career Opportunity grant funded by the Pennsylvania Department of Labor and Industry to develop noncredit, entry-level training programs for workers in the oil and gas industry. Building on these two grants, in 2010, WCCC, PCT, and ACCD worked together to obtain a \$4.96 million USDOL-

<sup>10</sup> Founded in 1944, ACCD works with public and private sector partners to create a competitive economic climate and market the Pittsburgh region. Its affiliate organizations are the Greater Pittsburgh Chamber of Commerce, the Pennsylvania Economy League of Greater Pittsburgh, and the Pittsburgh Regional Alliance.

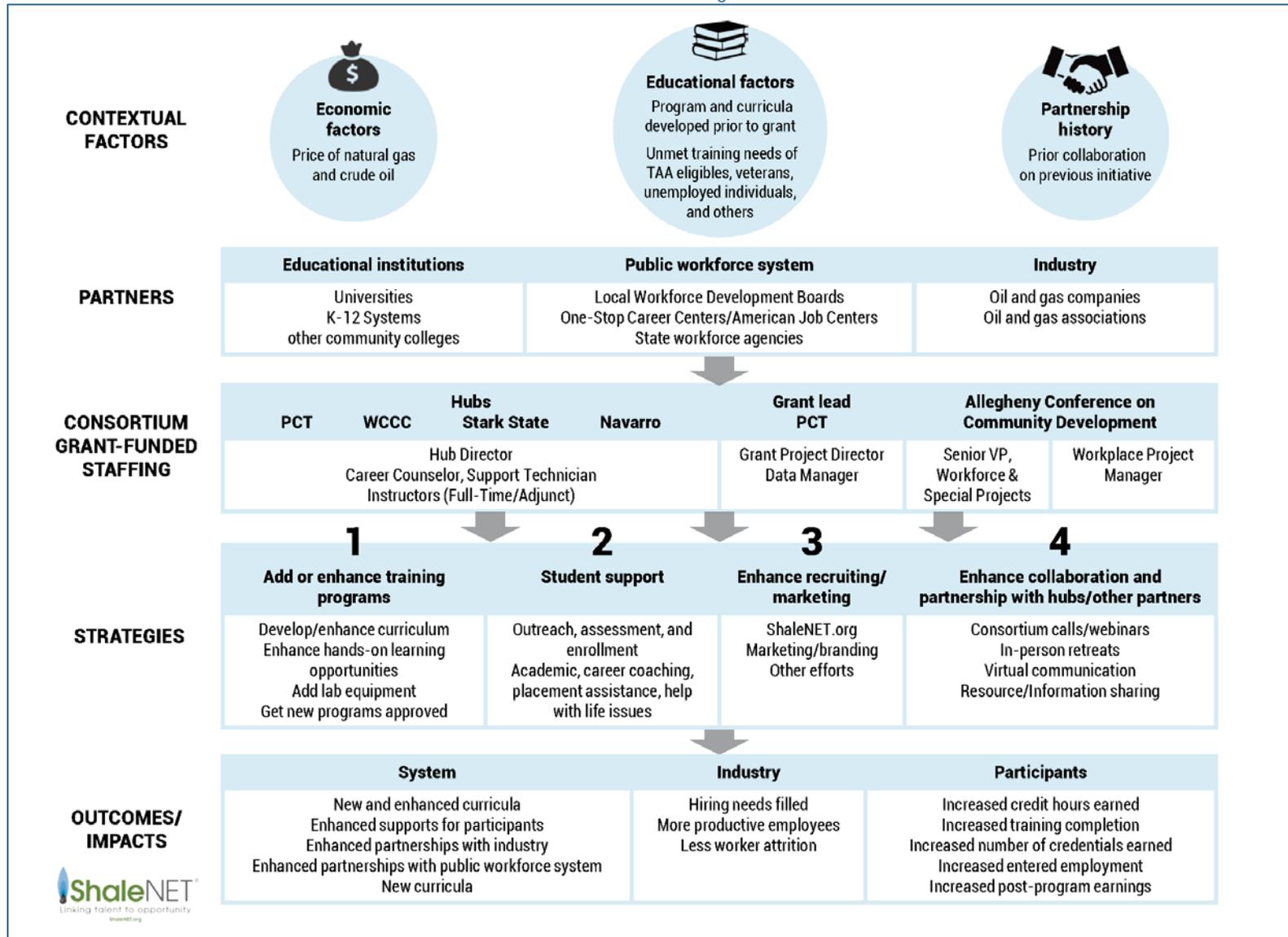
funded Community-Based Job Training (CBJT) grant. Through this CBJT grant, these partners—led by WCCC—developed the initial ShaleNET model, which finalized the creation of four short-term, noncredit training programs for workers in the oil and gas industry. WCCC and PCT, serving as the first two ShaleNET hubs, provided these training programs both directly and through a network of more than nineteen other public training providers, primarily community colleges, throughout the Appalachian Basin. One of these training providers was Stark State.

With the intention of further developing the ShaleNET initiative, WCCC, PCT, and ACCD joined again to apply for a Round 2 TAACCCT grant in 2012, this time with PCT serving as the ShaleNET consortium lead. To strengthen ShaleNET's presence in Ohio and expand it outside the Appalachian Basin, the ShaleNET stakeholders invited Stark State to serve as the ShaleNET hub for Ohio, and Navarro to be the hub for Texas.

## Overview of the TAACCCT Grant-Funded ShaleNET Initiative

The ShaleNET initiative sought to achieve a number of outcomes and impacts in the workforce training system and in the oil and gas industry, and for individual participants (see Exhibit I-8). For the workforce training system, key expected outcomes included new and enhanced career pathways training program curricula, particularly for credit-bearing programs; enhanced support for participants; enhanced partnerships with educational institutions, industry, and the public workforce system. For the shale oil and gas industry, expected benefits from the ShaleNET initiative included shortening the time it takes for companies to fill vacant positions with qualified workers and ensuring that newly hired workers are more productive and less likely to quit. Finally, participants who undertook the new or enhanced ShaleNET training opportunities were expected to earn increased numbers of credit hours, be more likely to complete their programs, obtain relevant credentials, and secure careers in the shale oil and gas industry.

Exhibit I-8: ShaleNET Logic Model



The middle three panels of Exhibit I-8 show the partners, staffing and key strategies of the ShaleNET initiative during the TAACCCT grant. As shown in the grant-funded staffing panel, each hub's ShaleNET programs were led by a hub director, who, under the leadership of non-grant-funded college administrators, oversaw and managed grant- and ShaleNET-related tasks and staffs. In addition, each hub had at least one career counselor who served as the primary liaison with ShaleNET students, and a support technician who either provided administrative support for the grant (at PCT and WCCC), or maintained ShaleNET equipment and labs (at Navarro and Stark State). Finally, each hub used TAACCCT grant funds to hire at least one full-time instructor and multiple adjunct instructors whom taught the technical classes required for ShaleNET training programs

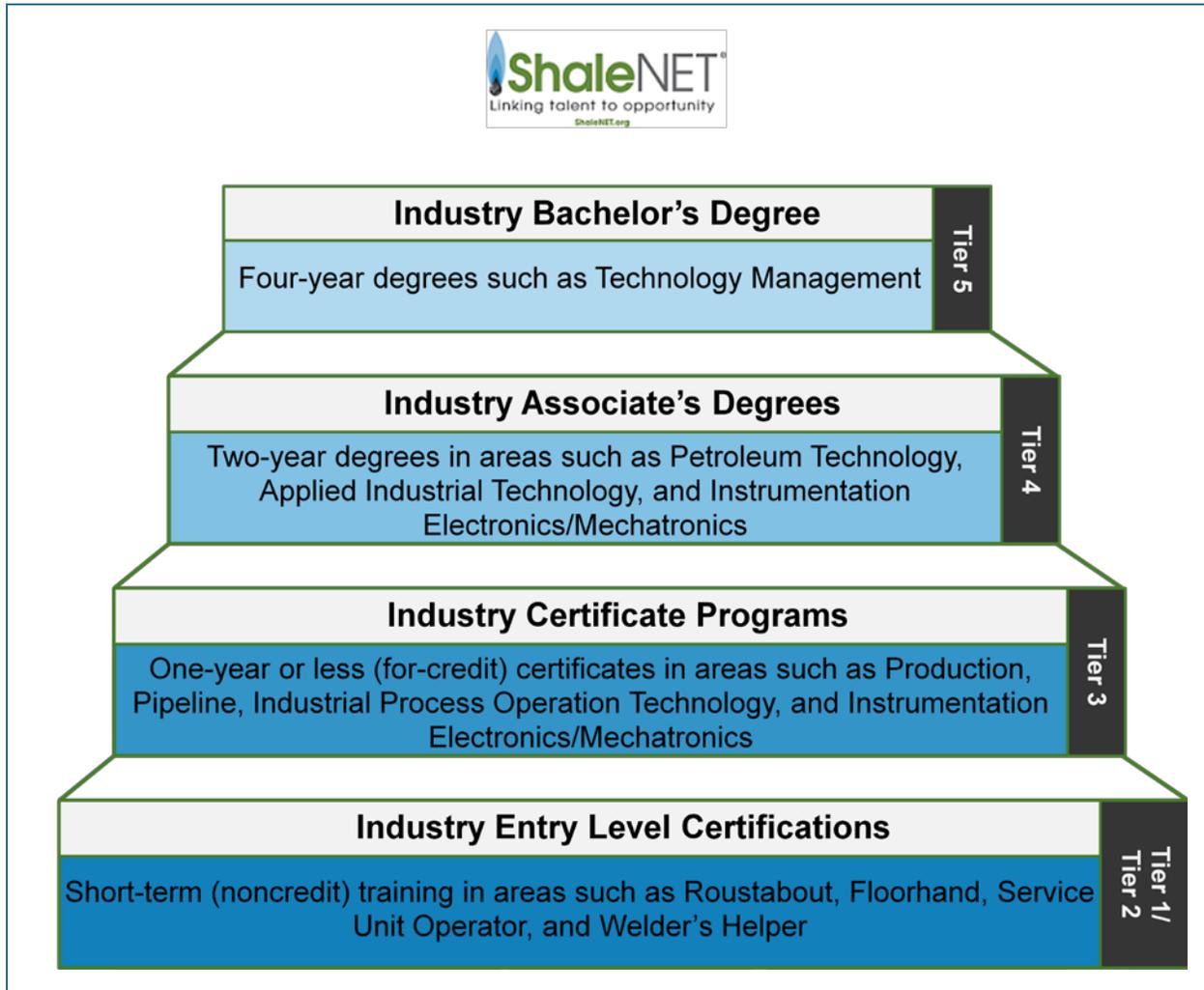
Hubs, in turn, were supported by two additional staff members based at PCT (the Grant Project Director and Data Manager). The project director coordinated all activities for the grant across consortium colleges, served as the primary point of contact with USDOL, developed grant-wide policies and procedures, and managed the contracts and work of all grant-wide contractors (except the third-party evaluator and the website and data system contractor). The data manager collected and reported performance data to USDOL and managed the third-party evaluation, website, and data system contacts.

The ShaleNET consortium also received substantial assistance from two ACCD staff members: the senior vice president of workforce and special projects and the workplace project manager. These ACCD staff members assisted the ShaleNET consortium in two primary ways: (1) brokering relationships and supporting partnerships between the consortium and the oil and gas industry and policymakers and (2) providing the consortium with marketing materials and branding assistance (these ACCD contributions are discussed in more detail in Chapter III).

All of these staff members carried out the key strategies shown in the strategies panel of Exhibit I-8. One of these key strategies was to develop and enhance a series of stackable credential training programs that allowed individuals to follow various career pathways in the shale oil and gas industry. ShaleNET's "stackable credential" model, displayed in Exhibit I-9, had five tiers. These tiers included short-term, noncredit, entry-level oil and gas training leading to basic industry-recognized certifications (Tiers 1 and 2), credit certificate programs of one year or less (Tier 3), two-year

associate's degree programs (Tier 4), and bachelor's degree programs (Tier 5).<sup>12</sup> This iteration of the ShaleNET initiative focused primarily on developing new curricula for Tiers 3 and 4 and enhancing programs in Tiers 1, 2, 3, and 4.

Exhibit I-9: ShaleNET Stackable Credential Model



<sup>11</sup> Note that among TAACCCT-supported hubs, only PCT offered a Tier 5 program, as it was the only hub to offer bachelor's degrees. Articulation agreements between the hubs allowed ShaleNET participants from other institutions to access PCT's bachelor's degree program. In addition, hubs developed articulation agreements with other four-year degree-granting institutions. These agreements are discussed in Chapter III.

A number of other key strategies were part of the ShaleNET initiative's service model: (1) enhancing the ShaleNET website, ShaleNET.org, and carrying out other marketing and branding efforts; (2) enhancing training programs and curricula at hub schools by acquiring new training equipment and developing virtual training scenarios and distance learning capacity; (3) providing students at each hub with support and assistance related to enrollment, academic and career planning, job placement, and life issues; and (4) enhancing collaboration among hub members and partners through articulation agreements, hub and advisory committee meetings, consortium planning retreats and conference calls, and other ShaleNET consortium and hub activities.

ShaleNET grant-funded staff members were supported in their efforts to implement these strategies by a wide range of partners. These included universities and colleges with which the consortium members developed articulation agreements, K-12 pipeline schools, the public workforce development system, and the shale oil and gas industry.

The top portion of the logic model details the important factors making up the context within which the ShaleNET initiative operated. It acknowledges that the initiative operated in the context of the relatively volatile shale oil and gas economy, with industry demand for workers dependent on the rise and fall of prices for gas and oil. It also notes the presence of some relevant preexisting institutional infrastructure, such as relevant training programs developed under prior grants, and pre-existing relationships among consortium hubs as well as between hubs and actors in the industry. Also relevant as context was the fact that workers receiving Trade Adjustment Assistance (TAA), veterans, unemployed individuals, and others had pressing unmet training needs.

## Overview of the Evaluation and This Report

In July 2013, Social Policy Research Associates (SPR) was awarded a contract to serve as third-party evaluator for the ShaleNET initiative. SPR's evaluation of the ShaleNET initiative during the TAACCCT Grant was focused on answering the following high-level research questions:

- What administrative and partnership structures were established to guide the initiative?
- What was the nature of outreach to and assessment of prospective ShaleNET students, including TAA-eligible workers and veterans?

- How was each of the initiative's major components developed and launched?
- What were the initiative's outputs, outcomes, and impacts?

To examine these research questions, SPR conducted a multi-method evaluation that included an analysis of the implementation, outcomes, and some impacts related to the grant-funded components of ShaleNET. Although the evaluation team had hoped to be able to conduct impact analyses for all of ShaleNET's training programs, SPR was unable to conduct impact analyses for any of ShaleNET's credit programs or for noncredit programs at Stark State for the following reasons: small numbers of program participants in these programs, particularly early in the grant; the length of most ShaleNET credit programs; delays in availability of Unemployment Insurance (UI) wage data; and challenges with identifying and obtaining data for suitable comparison groups. Consequently, we were only able to conduct an impact analysis of noncredit (Tier 1 and 2) participants served by the Pennsylvania hubs.<sup>13</sup>

To carry out this impact analysis, the evaluation compared the outcomes of ShaleNET noncredit participants to those of a matched comparison group using a quasi-experimental design. The comparison group was drawn from the population of individuals from the hubs' surrounding counties who obtained assistance with finding employment from federally-funded workforce programs in Pennsylvania during the same time period.

Data collection for the evaluation included three rounds of multi-day site visits to each hub that included interviews with grant and college-funded staff members, partner representatives (industry and workforce system), observations of ShaleNET classes and labs, and focus groups with ShaleNET participants. The SPR evaluation team also observed consortium planning and curriculum retreats; listened in on consortium conference calls; and obtained key consortium and hub documents. For the outcome and impact analyses, SPR staff members obtained extracts of educational data from each consortium college; and UI wage data from Pennsylvania, Texas, and Ohio. SPR also obtained survey data from the 2014 Marcellus Shale Coalition member survey, and surveyed all local workforce development board directors whose local areas fell within hub service regions. Finally, in early 2016, SPR attempted to conduct a web survey of

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<sup>13</sup> The Navarro hub did not offer any ShaleNET noncredit programs.

employers who had hired ShaleNET participants. However, due to the downturn in the oil and gas economy and turnover in the career counselor position at some hubs, the evaluation team was unable to obtain accurate contact information or reach more than a handful of these employers.

This Final Report is the last deliverable resulting from SPR's third-party evaluation of the Round 2 TAACCCT-funded aspects of the ShaleNET initiative. It uses data collected by research team members from the fall of 2013 through August 2016. Following this introductory chapter, Chapter II describes the training programs and student support provided by ShaleNET during the TAACCCT grant. Chapter III describes the partnerships developed by the ShaleNET consortium as a whole and by each Round 2 TAACCCT-funded member college during the same period. Chapter IV describes how students were recruited and enrolled into ShaleNET programs during the grant and presents a demographic profile of those students. Chapter V presents educational outcomes and labor market outcomes and impacts for ShaleNET participants during the Round 2 TAACCCT grant. Chapter VI describes the ShaleNET Consortium's efforts to sustain ShaleNET programs and services and the status of that effort as of the writing of this report. Chapter VII finishes out the report by presenting a brief summary and conclusion.

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## II. ShaleNET Training Programs and Student Support

This chapter describes two primary foci of the ShaleNET initiative: the ShaleNET training programs that were developed, enhanced, and delivered during the Round 2 TAACCCT grant's period of performance and the additional student support that was provided through the grant.

### ShaleNET Training Programs

As part of the ShaleNET TAACCCT grant, hubs developed and enhanced credit programs and enhanced and expanded the use of noncredit curricula developed under the prior CBJT grant. This section describes the training programs that were developed and delivered during the TAACCCT grant's period of performance, as well as how already existing programs were enhanced through grant activities.

#### Training Programs Operated during the TAACCCT Grant

Students enrolled in a total of 31 different ShaleNET training programs during the Round 2 TAACCCT grant across the four grant-supported hubs (see Appendix A for a complete list of these programs). These programs included six noncredit programs (Tiers 1 and 2) that resulted in multiple industry certifications, fourteen credit certificate programs of one year or less (Tier 3) and eleven two-year associate of applied science (AAS) degree programs (Tier 4).

ShaleNET's six Tier 1 and 2 noncredit programs were provided by three of the four hubs.<sup>14</sup> These programs lasted for two to three weeks, and provided students with training for entry-level jobs typically related to gas production. To mimic the industry jobs that program participants were training for, these classes were held every day (at PCT even during weekends), and lasted all day from eight or nine in the morning

ShaleNET hubs enrolled students in a total of 31 programs; 25 credit programs and 6 noncredit programs during the TAACCCT grant.

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<sup>14</sup> Navarro did not provide any noncredit programs.

until five p.m. or even later. In addition, because these programs emphasized hands-on instruction, participants spent about half of their time practicing with standard industry equipment, both inside and outside, no matter the weather. To enroll in these programs—as typically required by oil and gas employers for entry-level jobs—participants needed to first pass a drug screen, a background test, and a physical exam. Finally, because these were such short-term, employment-focused programs, three to five days of instruction on employability and job search skills were built into them. Although most participants who completed these programs immediately sought to find full-time employment, at PCT and Stark State, students could receive credit hours for completing some or all of a noncredit program if they articulated into a credit program.

The 14 Tier 3 credit certificate programs were also provided by three of the four hubs.<sup>15</sup> They trained ShaleNET participants for occupations related not only to production, but also to gas processing, pipelines, instrumentation and electronics (also called mechatronics), and field automation. As with ShaleNET's noncredit programs, all of these certificate programs emphasized hands-on learning, requiring participants to spend about a third of their time during technical courses in lab sections.

Each of ShaleNET's Tier 3 certificates could be stacked to earn a corresponding AAS degree. However, the number of programs that needed to be stacked to do so varied by hub. At the two hubs (Navarro and Stark State) that provided one-year certificate programs (requiring twenty-eight to forty credit hours for completion), students needed to complete only one certificate program, plus required general education courses, to obtain a ShaleNET associate's degree.<sup>16</sup> By contrast, at WCCC, which offered certificate programs that were only sixteen credit hours in length (and lasted for only a semester), students needed to complete multiple certificate programs to meet the technical requirements for a ShaleNET AAS. For example, WCCC's Mechatronics System AAS required students to complete the Mechatronics Systems Technician I and II certificate programs, as well as general education courses and some additional academic mechatronics courses, before they could receive the AAS degree.

Each of the Tier 3 certificates could be stacked to earn a corresponding AAS degree.

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<sup>15</sup> All but PCT offered Tier 3 certificate programs.

<sup>16</sup> Students sometimes also needed to take additional technical courses, depending on which certificate they completed and which AAS degree they chose to pursue.

All four TAACCCT-funded hubs offered at least one ShaleNET AAS degree. These 11 AAS degrees focused on the same oil and gas industry sectors as ShaleNET's certificate programs: production, processing, pipelines, instrumentation and electronics/mechatronics, and automation. Similarly, they were also very hands-on, requiring about a third of the time during technical courses to be spent in lab sections. However, the required completion of hub general education requirements in addition to technical classes meant that participants had to earn about double (or quadruple at WCCC) the number of credits for completion of an AAS as compared to a certificate (60-66 vs. 16-40).

ShaleNET's credit programs provided training focused on multiple oil and gas industry sectors: production, processing, pipelines, instrumentation and electronics/mechatronics, and automation.

One other key difference during the first half of the grant between some AAS degrees and certificates at Stark and Navarro was that students in certain AAS programs had to complete paid internships to earn their degrees.<sup>17</sup> Completion of an internship for these degrees was initially required because internships were seen—especially by employers—as a way for students to gain real “in the field” experiences, and because they often led to full-time jobs after program completion. Said the chair of Navarro's Oil and Gas Advisory Committee, “...the internship [requirement] is what sets this program apart from other programs out there...The internship is something we feel strongly about as employers.” However, as will be discussed below, these internship requirements were eliminated about halfway through the grant.

### New Training Programs Developed under the TAACCCT Grant

In total, as of the end of the TAACCCT grant, ShaleNET hubs had developed eleven new certificate programs and eight new associate's degree programs. Although each hub developed at least one new program, Stark State developed the most programs (10) followed by WCCC (7), while PCT and Navarro each developed one. To develop a new program, ShaleNET hubs had to first assemble the sequence of courses required for completion of the program. In addition, if any of the required courses was not yet offered at the college developing the program, it had to

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<sup>17</sup> The specific degrees that required completion of an internship included Petroleum Technology AAS (at Navarro), and Petroleum Technology Pipeline Technician AAS, Petroleum Technology Instrumentation Electronics Technician AAS, and Petroleum Technology Production Technician AAS (at Stark).

develop curricula for those new classes as well. Happily for ShaleNET hubs, approximately three-quarters of the courses required for completion of their new training programs existed prior to the grant, thus hubs had to develop only a limited amount of new course material.

Hub faculty or staff members typically created the curricula for the new courses that did have to be developed. They based this new curricula on materials they had used previously, found online, or borrowed from other hubs. To supplement these efforts, one hub—Stark State—used grant funds to hire a curriculum developer in February 2015 who developed curricula for two new classes. After developing these curricula, the curriculum developer further refined them over the two semesters he spent teaching the new courses.

Hubs also received input and guidance from industry representatives on the development of new course curricula and for the overall structure of these new programs. Hub staff members and instructors solicited input from industry representatives during advisory or hub meetings (discussed in Chapter III), and by phone or email or during one-on-one meetings.

Once new programs were developed, ShaleNET hubs had to obtain approval to operate them. Obtaining approval was often a lengthy and complicated process. Some colleges had to obtain approval at a departmental level as well as from a college-wide curriculum review committee to operate their new programs. At two hubs, new ShaleNET staff members also had to obtain additional approval for their new programs from one or more external bodies. New programs at Stark State, for instance, had to gain approval from three entities: the Higher Learning Commission, the college's national accrediting body; the Ohio Board of Regents, a cabinet-level agency for the governor; and the Ohio Department of Higher Education, a state-level agency responsible for oversight of higher education programs. Given the complexity of these internal and external processes, some ShaleNET hubs benefited from having staff members with prior experience in gaining approval for new programs.

### Development of Key Enhancements for ShaleNET Training Programs

ShaleNET hubs attempted to develop several key enhancements for their training programs over the course of the grant. All of

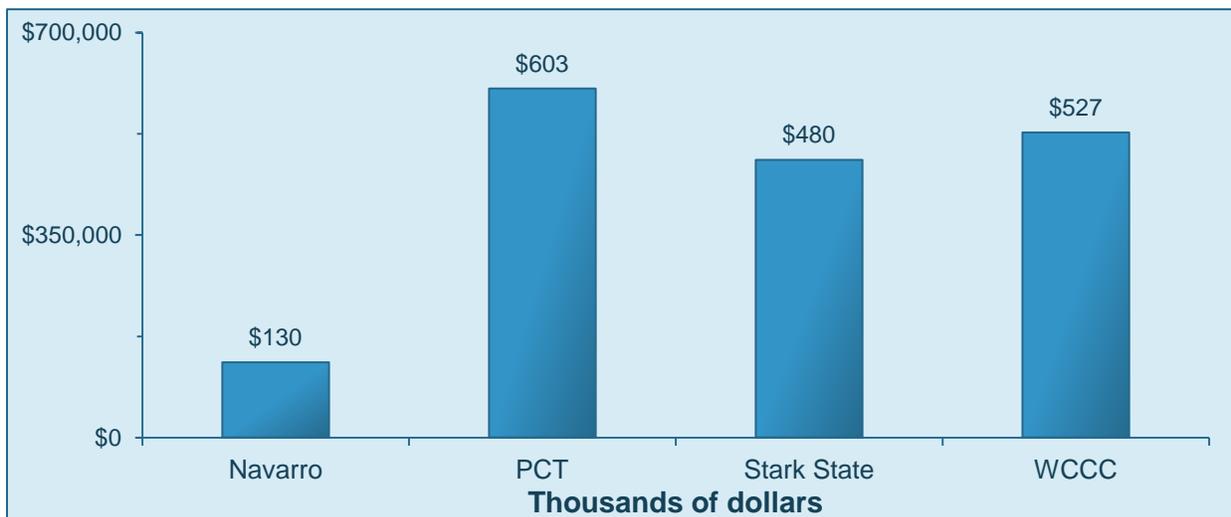
Approximately three-quarters of the courses required for completion of their new programs existed prior to the grant.

these enhancements were aimed at enhancing ShaleNET students' access to hands-on learning.

### *Addition of New Equipment to ShaleNET Training Programs*

One major way that ShaleNET hubs enhanced opportunities for hands-on learning in their training programs was through the addition of new equipment for use in course labs. They added this new equipment primarily by purchasing it with grant funds. As shown in Exhibit II-1, ShaleNET hubs spent a total of \$1,740,579 of TAACCCT grant funding on the purchase of equipment. While three of the hubs spent relatively similar amounts of their grant funds on equipment, Navarro spent much less, primarily because its ShaleNET programs were already largely in place prior to receipt of the TAACCCT grant.

Exhibit II-1: Total Grant Funds Spent on Equipment Expenditures by Hub as of March 31, 2016



*\*Note: Amounts rounded to nearest thousand.*

Among the most expensive of these pieces of equipment were “trainers,” specialized training devices designed to give students the opportunity for safe, hands-on practice. ShaleNET hubs purchased trainers of many types, including production well site trainers, mechatronics trainers, industrial electricity trainers, industrial wiring trainers, hydraulic trainers, and pneumatic trainers. In most cases, in addition to a specified number of student learning stations, these trainers came with accompanying curricula. ShaleNET hub staff members reported that their decisions to purchase trainers were often influenced by the availability of this accompanying lab curriculum. Developing lab curricula from scratch was so time-consuming that purchasing trainers that came with their own lab curricula was extremely

beneficial for ShaleNET instructors. The one potential downside of this approach was that the activities included in the lab curricula were not specifically focused on the shale oil and gas industry, as they would have been if developed by ShaleNET instructors.

In addition to trainers, hubs also purchased numerous pieces of equipment typically used in the shale oil and gas industry, such as gauges, relief valves, compressors, meter runs, and rigging equipment. Instructors used this equipment to demonstrate its operation but also to give students a chance to work with some of the actual equipment that they were likely to encounter if they went to work in the industry. (See Box II-1 for examples of the equipment purchased with TAACCCT grant funds.)

Box II-1: Examples of Equipment Purchased by ShaleNET Hubs

**ShaleNET hubs purchased a wide variety of equipment to enhance their training programs. The examples below highlight some of this equipment.**



New cut-away gas production unit and separator purchased by Stark State to demonstrate the process of separating wet gas into different components.



Amatrol pump system trainer purchased by WCCC. This system helped students learn how to operate, install, maintain, troubleshoot, and analyze centrifugal pump performance.



New pump valve purchased by Navarro to demonstrate the workings of similar pump valves in the field.

ShaleNET hubs were also able to add a significant amount of equipment to their training programs via in-kind or funding donations from industry partners. Based on conservative estimates, industry partners donated approximately \$735,000 in in-kind lab equipment—some new and some used—during the TAACCCT grant's period of operations.

Industry representatives played key roles in helping hubs set up this new and donated equipment. All four hubs reported that they would not have been successful in setting up this equipment without the assistance of industry representatives because of the substantial amount of time it took to set up the equipment and ensure it was operating properly.

Student focus group participants across all four hubs placed a high value on the hands-on learning in ShaleNET training programs afforded by this new and donated equipment. One student in PCT's Roustabout program commented that the hands-on training with the equipment was "very important" because even though he could learn information from a textbook, "actually doing the work would be difficult without having the hands-on learning provided by the program." One student enrolled in WCCC's mechatronics AAS commented that he chose the program largely because of the equipment he would have access to during the program. "At the other school, there was just one PLC trainer. Then I come up here [to WCCC] and there's a whole array of them and we could all actually work on them and do actual programming [on the PLC trainers] right off the bat."

Similarly, industry partners reported that the combination of hands-on practice with standard industry equipment and classroom learning made ShaleNET programs very useful. As one industry partner put it, "Their programs really meet our needs in terms of the coursework and the hands-on training that the college provides."

During the first half of the grant, a few students in focus groups complained about the slow pace with which grant-purchased equipment was set up and made available to students for use in labs. Other students complained that the lab curricula for using the new equipment was not well developed. ShaleNET hubs responded to these students' concerns in the latter half of the grant period, and by the end of grant operations, all four hubs had completed set up of all of their ShaleNET equipment and had made it available to students as part of course labs. During the final year of the grant, hub staff members also spent a significant amount of time developing and refining lab curriculum to ensure it met industry standards and provided students with effective hands-on learning.

Based on conservative estimates, ShaleNET hubs had received approximately \$735,000 in equipment donations from the oil and gas industry as of March 31, 2016.

### *Use of Grant Funds and Leveraged Resources to Develop New Training or Lab Facilities*

Three ShaleNET hubs used grant funds or other funding to create new training centers and/or lab space to house their new oil and gas programs and equipment. At PCT, the hub used grant funds to develop a new mechatronics lab in the college's workforce development building to house much of the equipment purchased with grant funds for its new ShaleNET mechatronics program. WCCC and Stark used state and industry funding to purchase and renovate existing buildings to create new training facilities for their ShaleNET programs. Stark's \$2.3 million Well Site Training Center, which opened in 2014, was designed specifically to house the hub's oil and gas equipment. Although WCCC's \$14 million Advanced Technology Center (also opened in 2014) was built for all of the college's technical training programs, rather than just ShaleNET, it provided an optimal environment for students and instructors to use the hub's ShaleNET equipment, with sufficient room, electrical power, and ventilation.

Three hubs used grant funds or other state and industry funding to purchase and renovate existing facilities to create new training centers or lab spaces to house their new ShaleNET equipment and labs.

These new facilities and lab spaces attracted positive attention for ShaleNET. For example, all three of these hubs reported being contacted by delegations of industry, public officials and community representatives from both within the U.S. and abroad, requesting tours and demonstrations of their oil and gas equipment.

### *Development of Distance Learning Options for Demonstration of Lab Equipment*

To provide students at satellite campuses or other locations with access to the equipment in their labs, the members of the ShaleNET consortium planned to enable remote access to their labs via the Internet. The plan was that students at remote locations would be able to watch and listen via the Internet to an instructor using ShaleNET lab equipment, without their locations having to set up their own labs or hire their own instructors. Initially, to carry out this approach, the ShaleNET consortium contracted with Applied Systems and Technology Transfer (AST2) to mount video cameras in each ShaleNET lab and to provide hubs with access to AST2's proprietary StormTool software for sharing the video images of the labs captured by these cameras via the Web.

Unfortunately, none of the hubs was ever successful in being able to use AST2's software and equipment to share video images of

their labs over the Internet. ShaleNET staff members and instructors cited multiple reasons for this lack of success. One was that hubs were unable to obtain access to the amount of network bandwidth needed for the software to work properly, especially when accessed by multiple users at one time. In addition, there were a number of technological glitches related to AST2's software that the company was unable to solve. Further, there were problems with the positioning and mounting of the cameras; at one hub, cameras fell off their mountings. While the ShaleNET consortium initially tried to work with AST2 to resolve these issues, late in the grant the consortium cancelled the remainder of its contract with AST2.

Although the consortium as a whole was unsuccessful in sharing video of lab operations via AST2's technology, the Navarro hub was successful in setting up distance-learning lab access through a contract with a different company called OneVision. The Navarro hub contracted with this company about half way through the grant period because of the hub director's concern about the lack of progress made by AST2. Consequently, in 2015, OneVision provided Navarro with four mobile carts, each with microphones, zoomable cameras, and two 70-inch television monitors. These carts were dispersed across three of the college's campuses (Corsicana, Fairfield, and Waxahachie). The equipment from one of these carts was then installed in Navarro's ShaleNET lab in Corsicana as well as at the other two campuses.

In early 2016, OneVision's system became operational and the hub was able to successfully show video of the well-site trainer in its Corsicana lab to ShaleNET students at the college's Fairfield campus. Another instructor used the system to teach two other ShaleNET courses. For each of these latter courses, the instructor used the system so that students could watch his lectures simultaneously from either the Corsicana or the Waxahachie campus. However, he did not use the system for the lab sections required for these two courses, because during those sections, students needed to use on-site lab equipment to conduct activities—they could not just watch it being demonstrated as the Fairfield students did. That meant that that he needed to hold labs for each campus at different times so he could be on-site at each campus during those lab sections to ensure that the students followed proper procedures during the labs. In addition, each campus had to have a lab fully outfitted with all of the equipment students needed to use during those labs.

Despite Navarro's success in making the OneVision system operational, the college's hub director was dubious about her

The Navarro hub was eventually successful in setting up distance-learning lab access for its ShaleNET classes through a contract with a different company called OneVision.

ability to maintain the system after the end of the grant. Although she had requested funding from her college to cover the annual OneVision maintenance cost of approximately \$40,000, she did not think the college would agree to provide the funding.

### *Development of 3-D Training Scenarios to Provide Simulated Hands-On Training*

Another planned enhancement to ShaleNET's training programs was the addition of virtual training scenarios using 3-D gaming software. The aim of these virtual training scenarios was to complement the lab curricula of ShaleNET courses by providing students with opportunities to practice using industry equipment in a simulated virtual environment before going into labs to practice on real versions of the same equipment. These scenarios were also intended to provide students with opportunities to practice decision-making and prioritization skills in addition to technical skills. Finally, the scenarios would enable instructors to assess their students' skills, because at the end of most simulations students received a score on how well they carried out any required activities within the simulations.

To develop the software to create these virtual training scenarios and to create an initial suite of nine as examples for instructors, PCT, on behalf of the ShaleNET consortium, contracted in August 2014 with Discovery Machine, a Pennsylvania-based company that specialized in the development of 3-D simulations for training purposes. Discovery Machine began developing the ShaleNET training simulation software by working closely with hub staff members and instructors—particularly at PCT—and industry representatives to collect comprehensive information about shale gas well sites. Using this information and the RESITE suite of software—a training and simulation authoring platform developed by Discovery Machine—the company and a PCT instructor worked together to create three-dimensional visuals and graphics for each piece of equipment commonly found on a well site as well as simulated supervisors and staff members who had the capacity to talk to each other. Discovery Machine then used these graphics to develop a customized the ShaleNET simulation

The ShaleNET consortium, contracted in August 2014 with Discovery Machine to create 3-D simulations for training purposes.

authoring platform, enabling hub faculty to create scenarios for their ShaleNET classes.<sup>18</sup>

Discovery Machine staff members and the same PCT instructor then worked together to develop the first nine scenarios to serve as examples for other ShaleNET instructors (See Appendix B for descriptions of these first nine scenarios and five others that were co-developed later by Discovery Machine and hub instructors; also see Box II-2 for an example of a visual from one of the scenarios).

Box II-2: Example from a Discovery Machine Well-Site Simulation Scenario



This is a 3-D image of a well-head and two valves co-created by Discovery Machine and a PCT instructor that was used as part of a training simulation scenario. The green arrows indicate that the valve in question could be turned either direction by a student depending on what the accompanying valve reads.

Once these first scenarios were developed, Discovery Machine staff members demonstrated them and the scenario authoring software at a ShaleNET retreat. In addition, this version of the software was provided to all hubs, and three of the four colleges

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<sup>18</sup> Once instructors developed scenarios using the software, those scenarios would become their intellectual property and could be given or sold to others without any fee provided to Discovery Machine. However, hubs would have to own licenses for Discovery Machine's simulation authoring platform software to enable students to use any of those scenarios.

downloaded it onto their colleges' computer systems.<sup>19</sup> Despite the value they saw in the example scenarios, and even after having access to the software for several months, most hub instructors still had not developed any of their own scenarios. They stated that they were too busy to have time to become adept enough at using the software to be able to create scenarios.

To deal with this challenge, the ShaleNET consortium contracted with Discovery Machine to once again work with hub instructors and subject matter experts to develop 14 more scenarios related to other oil and gas operations and ShaleNET competencies. Once these additional scenarios were developed, they were beta-tested by former noncredit students and a ShaleNET staff member in January 2016, provided to hubs shortly thereafter, and demonstrated to hub staff members at a ShaleNET retreat in early March 2016.

Despite the availability of these 23 scenarios in early 2016, as of the end of spring semester 2016, only one hub had used any of them in a ShaleNET course, and after a negative experience, even that instructor was not planning to use them again. He stated that his students had trouble understanding how to use the software to maneuver through the scenarios, but as he himself was still learning the software as well, he could not help them adequately. This led some of the students to comment on course reviews that his subject matter knowledge was inadequate, although he asserted that they were really commenting on the fact that he was not sufficiently skilled at using the Discovery Machine software (and he asserted that becoming sufficiently skilled would take many hours of practice). In addition, he reported that some students treated the scenarios like a game and used the software inappropriately to make their characters do things like jump off of the equipment.

ShaleNET hub staff members and instructors cited various other reasons for not using the virtual training scenarios:

- *Limited number of software licenses.* As part of the ShaleNET Consortium's contract with Discovery Machine, each hub was provided with a total of 10 software licenses. However, given that a typical ShaleNET class had more

Discovery Machine eventually created 23 virtual simulation scenarios for ShaleNET students to use as part of their training.

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<sup>19</sup> WCCC hub staff members were not able to download the software onto computers at their college because it was still in 'beta' form, and the college's information technology guidelines prohibited the installation of software that was not completely finalized.

than 10 students, some instructors were resistant to having students use the scenarios because they would need to have students use them at different times or double up on using them, which they felt would be too challenging logistically. Although they could have purchased additional licenses, these respondents commented that they did not have the funding to do so.

- *Lack of an online interface.* One hub instructor commented that while he would have loved to use the scenarios in his online introductory classes, the version of the software that was purchased with grant funds was not compatible with his college's online learning management system. Although Discovery Machine planned to add such capacity in a future upgrade, his college did not have the funds post-grant to pay for access to that upgrade.
- *The software was never fully finalized.* As noted in a footnote above, one college—WCCC—never allowed the software to be downloaded onto its computers because it was still 'beta' and the college's information technology guidelines did not allow software that was not in final form to be installed on college computers.

Despite these challenges, some hub staff members did discuss some possible ways they might make use of the software after they had had more time to become adept at using it. For example, hub staff members at one college mentioned that they might use some of the scenarios as part of future summer youth academic camps that focus on science, technology, engineering, and math. Staff members from another hub discussed the possibility of using the scenarios to support incumbent worker contract training programs offered by their college.

### Other Changes Made to ShaleNET Training Programs During the Grant

During the course of the grant, hubs had to make some other unplanned changes to their training programs. One change involved eliminating the requirement at Stark and Navarro that students in certain AAS programs had to complete paid internships to earn their degrees. These hubs made this change because they found it impossible to find enough internships for all students. According to one employer representative, this was due to the many health and safety rules employers had to comply with when they hired interns. "Now with the regulations for health care and safety, it is hard to bring individuals into the organization for work experience opportunities like... internships." In lieu of the internship,

*Now with the regulations for health care and safety, it is hard to bring individuals into the organization for work experience opportunities like... internships.*

– Industry partner, Navarro

these colleges developed and incorporated capstone courses at the end of students' academic programs that focused on hands-on learning opportunities and individual research projects.

Stark State also sought to make changes to the courses required for completion of some of its approved credit programs as part of an overall curriculum realignment process. This process was aimed at identifying a common set of required core courses across all of its ShaleNET programs. Stark State staff members carried out this curriculum realignment to make it easier for ShaleNET students to change their degree focus and complete more than one credential without significantly extending their time to completion. In addition, they wanted to focus program enrollment across fewer courses, so that the college would be more likely to have sufficient enrollment to offer those courses more often.

As demand for noncredit training declined over the life of the TAACCCT grant, due in part to reduced drilling activity, two hubs—PCT and WCCC—made changes to their ShaleNET noncredit programs to make them more broadly applicable across different sectors of the oil and gas industry, and even in other industries such as construction and manufacturing. PCT, for example, developed a shortened version of its roustabout program (from 21 to 15 days) by removing two components that were particularly focused on preparing new well sites, while WCCC combined its 21-day roustabout and floorhand programs into a single 21-day program. The hubs also changed the names of these programs: to Ready-to-Work Roustabout and Field Service Worker at PCT and to Service Unit Operator at WCCC. Although WCCC eventually stopped offering its Service Unit Operator program after summer 2015 due to a lack of demand, PCT continued to run its Roustabout Field Service Worker program through spring 2016 due to its success in placing program graduates in industries other than oil and gas (e.g., manufacturing, construction trades, etc.). According to PCT's hub director, "The transferrable skills that ShaleNET students acquire during the [noncredit] training have allowed approximately 40 percent of recent and former ShaleNET graduates to successfully transition into other industry sectors."

As demand for noncredit training declined over the life of the TAACCCT grant, due in part to reduced drilling activity, two hubs—PCT and WCCC—made changes to their noncredit programs to make them more broadly applicable across different sectors and industries.

## Counseling and Student Support

In addition to supporting the development, enhancement, and operation of training programs, the ShaleNET Round 2 TAACCCT

grant allowed hubs to enhance the counseling and student support provided to ShaleNET students. This enhanced support was considered essential to the initiative's success because many community college students face significant barriers that can, if unaddressed, cause them to drop out.<sup>20</sup> These barriers include being unprepared for college-level coursework, having competing work and family obligations, lacking experience in navigating complicated bureaucratic systems, lacking reliable transportation, and lacking the financial resources to cover their education costs.<sup>21</sup> Although a number of research studies have shown that additional counseling—especially when that counseling is required and provided throughout a program of study—is an effective way to improve student performance and increase completion rates, few community colleges have had the resources to provide anything beyond the most basic assistance.<sup>22</sup>

This section describes how ShaleNET hubs provided student support during the Round 2 TAACCCT grant. The section also details the types of support provided, including academic support, job search assistance, and job placement services.

### ShaleNET's Approach to Providing Student Support

ShaleNET's approach to providing student support was generally similar across hubs, with a few exceptions. Career counselors tried to meet in person with each prospective student at least once before that student enrolled in a ShaleNET program. These meetings were important for several reasons. First, career counselors could make sure that prospective students understood the requirements of both the program and the industry and were a good fit for the career they sought. "During the in-

*During the in-person meeting, she [the career counselor] kept asking me: 'Are you sure this is what you want?' Seeing her face-to-face made me more comfortable about what I was getting into.*

– ShaleNET student, PCT

<sup>20</sup> Of the cohort of students that entered a certificate or AAS program in 2010, only 19.5 percent completed their programs within 150 percent of the expected normal time. National Center for Education Statistics, *Digest of Education Statistics*, [http://nces.ed.gov/programs/digest/d14/tables/dt14\\_326.20.asp](http://nces.ed.gov/programs/digest/d14/tables/dt14_326.20.asp).

<sup>21</sup> Susan Schrivener and Erin Coghlan, "Opening Doors to Student Success: A Synthesis of Findings From an Evaluation at Six Community Colleges," MDRC (March 2011), [www.mdrc.org/sites/default/files/policybrief\\_27.pdf](http://www.mdrc.org/sites/default/files/policybrief_27.pdf). Community College Research Center, "What We Know About Nonacademic Student Supports," Teachers College, Columbia University (September 2013).

<sup>22</sup> Ibid. See also Eric Bettinger and Rachel Baker, "The Effects of Student Coaching in College: Evaluation of a Randomized Experiment in Student Mentoring," NBER Working Paper 16881, [www.nber.org/papers/w16881.pdf](http://www.nber.org/papers/w16881.pdf).

person meeting,” reported a student focus group participant at PCT, “she [the career counselor] kept asking me: ‘Are you sure this is what you want?’...Seeing her face-to-face made me more comfortable about what I was getting into.”

Career counselors also used these meetings to help students develop class schedules that were convenient and minimized commuting time and costs, and to ensure that students did not enroll in classes that would not count toward program completion. Student focus group participants commented on how helpful this assistance was to them. For example, one Navarro student said: “There are some classes that count for the same requirements, so if you take both you are basically wasting your time—I refer to it as double-dipping. Unless they meet with [the ShaleNET career counselor], a lot of students double-dip.”

Finally, these meetings helped career counselors establish relationships with students and ensure that students understood what help was available. Counselors asserted that having an established relationship made students more likely to seek help from them after program enrollment.

While the intention was to meet with all prospective students prior to enrollment, students in credit programs often did not do so. This was primarily due to the greater flexibility that credit students had in the ways that they could enroll in a ShaleNET program or course. While the only way to enroll in a noncredit ShaleNET program was to first meet with a ShaleNET career counselor, credit students could enroll in ShaleNET courses or programs online or through college admissions departments and thus bypass meeting with a ShaleNET career counselor. In addition, at one hub, credit students were initially not considered part of ShaleNET, and thus were not a focus for the hub’s career counselor. However, about midway through the grant, this hub recognized that the students in credit-bearing programs were indeed grant participants and the career counselor began reaching out to them.

Once credit students were enrolled in a ShaleNET program, ShaleNET did not require meetings between students and career counselors, but instead relied on students to seek out career counselors when they needed assistance. Career counselors also reported that they occasionally visited classes and informally checked in with instructors about student progress.

Credit students often did not meet with career counselors before enrollment. This was due to the greater flexibility that credit students have to enroll in a ShaleNET program or course.

By contrast, ShaleNET’s noncredit programs included built-in interaction between career counselors and students during the training program. This interaction consisted of approximately two days of classes on job search skills taught by the career counselor.

### Extent to Which ShaleNET Students Accessed Support from Career Counselors

Career counselors at the hubs that provided both credit and noncredit programs reported that noncredit students were more likely to receive assistance from ShaleNET career counselors. Indeed, some credit student focus group participants who did not have pre-enrollment meetings with career counselors said they did not realize that the career counselors were there to assist students—they thought career counselors were just available to assist faculty members. Another reason for the difference in use of ShaleNET career counselor support was that noncredit students could not typically access similar support elsewhere on campus, whereas credit students could.

### Modes of Interaction between Career Counselors and ShaleNET Students

Since many ShaleNET classes were held in the buildings where the career counselors’ offices were located, it was common for career counselors to meet in person with students. But career counselors also communicated with students over the phone and via email and text messages. In general, career counselors and students noted that career counselors used these remote means of communication to make themselves available to students much of the time. For example, one career counselor reported that she responded to phone calls and emails every day, including late at night and on weekends. Student focus group participants affirmed that career counselors were generally quite accessible, with one PCT student commenting that the hub’s ShaleNET career counselor was “pretty much available anytime.”

*She [The ShaleNET career counselor] is pretty much available anytime.*  
– ShaleNET student, PCT

### Specific Types of Support Provided by Career Counselors

During the TAACCCT grant, career counselors at ShaleNET hubs provided support to students in four different areas: academic coaching, career coaching, job search and placement assistance, and assistance with life issues. This section describes each of these types of support, including whether and how they differed for credit and noncredit students.

### Academic Coaching

ShaleNET career counselors provided many ShaleNET students, particularly credit students, with academic support.

- **Assisting with course selection.** At three of the ShaleNET hubs, career counselors worked with at least some credit students at the beginning of each semester to help them select classes. They did this to make sure that students did not enroll in classes that would not count toward completion of their programs of study.
- **Assisting with class schedules.** ShaleNET career counselors also sometimes helped credit students set up convenient class schedules. For example, the Stark State career counselor helped to set up schedules for students who lived far from campus so that they only had to attend classes two or three days a week. This career counselor noted that this assistance was particularly important for students with barriers such as significant work or family obligations or transportation difficulties.
- **Providing study skills assistance and access to tutoring.** Career counselors across all hubs provided many students with various types of assistance to help them succeed in their courses. For example, noncredit students usually received some information at the beginning of their programs about effective note-taking. Career counselors also commonly helped credit students with their study skills, or coordinated their access to tutoring offered elsewhere on campus.

### Career Coaching

ShaleNET career counselors provided many students with career counseling. Overall, this type of assistance was more commonly provided to noncredit students because, as was discussed above, it was integrated into their training programs.

- **Providing assistance with resume writing.** At all ShaleNET hubs, career counselors helped at least some students create or revise their resumes. For noncredit students, this assistance was provided individually as well as during the two class days focused on job search skills. With credit students, career counselors either provided this assistance one-on-one or referred students needing resume assistance to workshops facilitated by the college-wide campus career center. Students were quite appreciative of the resume assistance provided by ShaleNET career counselors. For example, one Stark State student said that his resume “looked a lot better after they helped me than when I first handed it to them.”

*It [the resume] looked a lot better after [the career counselor and hub director] helped me than when I first handed it to them.*

– ShaleNET student,  
Stark State

- **Providing information on conducting job searches and interviewing.** Career counselors also provided some ShaleNET students with information on how to conduct successful job searches and how to succeed in interviews. For noncredit students, training on these topics was embedded in the two program days dedicated to job search skill development. Other topics covered during these two days included how to research employers and review job descriptions carefully. Perhaps as a result of this training, one employer partner commented that ShaleNET noncredit students' greater knowledge of her company had helped them stand out during interviews. Although it was not part of their course curriculum, credit students could request and receive this type of assistance one-on-one from the career counselor as needed. In addition, at three hubs, career counselors (assisted by other hub staff members) also regularly referred students to the college's career center or arranged for that center to provide optional workshops on these topics specifically for ShaleNET students.

### *Assisting Students with Job Searches and Providing Placement Assistance*

Career counselors provided many ShaleNET students with assistance in finding suitable job or internship placements. As with career coaching, this type of assistance was somewhat more commonly provided to noncredit students.

- **Assisting students with their own independent job searches.** ShaleNET career counselors across all hubs conducted online job searches and created lists of available oil and gas positions and shared these with students in binders or via email or, at one hub, via Facebook.
- **Matching students to appropriate job or internship placements.** At three hubs, career counselors attempted to match at least some ShaleNET students with appropriate jobs or internships.<sup>23</sup> Typically, as a first step, these career counselors talked with students about their needs and preferences for a placement, including preferred locations, commuting distances, work environments, and shift schedules. For example,

At three hubs, career counselors attempted to match some ShaleNET students with appropriate jobs or internships.

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<sup>23</sup> At the fourth hub, although employers also often contacted the career counselor to recruit ShaleNET students, college policy did not allow her to recommend certain students but not others to employers. Consequently, the career counselor at this hub referred interested employers to the college's career center, and those employers worked with the career center to set up hiring events or to recruit from among all of the college's students.

the career counselor at WCCC had students rank a list of specific job characteristics according to what was most important to them. Next, the career counselor reviewed student skills (including transferable skills from experience in other industries), prior education, and work experience and then used several strategies to identify specific job openings that would be a good fit for each student. Counselors undertook two other activities intended to facilitate placement:

- *Recommending students to specific employers.* Career counselors contacted suitable employers that they had relationships with or cold called those that had appropriate open positions and suggested that they consider particular students. Stated one industry partner, “She [the career counselor] has reached out to me several times, letting me know that she has these candidates that will be graduating soon. They are good candidates, so I set them up for interviews.”
- *Coordinating hiring events or interviews onsite at hub colleges.* Career counselors contacted or were contacted by employers to set up interviews or hiring events at their hubs. For example, the career counselor at WCCC accepted “job orders” from employers. The employers let her know how many positions they needed to fill and she arranged for them to come to the hub and interview all of the students who she thought would be a good match for the employer’s needs.

### *Help Dealing with Life Issues*

A final type of student support provided by career counselors to some students was assistance in dealing with “life issues” such as challenges related to living arrangements, health, transportation, and family obligations. This assistance, although less common than other types of support, was provided about equally to credit and noncredit students.

- **Counseling students one-on-one about dealing with life challenges.** Career counselors provided advice and counseling about how to deal with these difficulties, typically through one-on-one meetings. Career counselors routinely assisted out-of-area noncredit students with finding suitable housing for the duration of their training programs. Focus group participants commented that this kind of assistance was particularly helpful.
- **Referring students to specific services such as financial aid, childcare, or transportation assistance.** For services that they could not provide directly, career

*She [the career counselor] has reached out to me several times, letting me know that she has these candidates that will be graduating soon. They are good candidates, so I set them up for interviews.*

— Industry Partner, PCT and WCCC

counselors provided students with referrals to other departments or agencies. Credit students were typically referred to other on-campus offices or departments, such as the college's financial aid office. Since noncredit students were not eligible for such services, career counselors instead referred them to external agencies such as American Job Centers (One-Stop Career Centers), public assistance agencies, and nonprofit agencies.

## Other Sources of Support for ShaleNET Students

While career counselors were the main providers of student support, other hub staff members also provided some assistance to ShaleNET students. For example, instructors across all hubs provided students with some academic advising, instructional assistance, and, in some cases, connections to employers for job or internship searches. For example, a student focus group participant at Navarro reported that he had met “a few times” with a ShaleNET instructor “to discuss different programs” and that the instructor had been “really good about walking me through the various types of jobs I could pursue.”

In addition, at WCCC and PCT, support technicians sometimes assisted students by answering basic questions about the program. In fact, the support technician at WCCC provided all student support during the period when the hub was without a career counselor due to turnover and was in the process of hiring a new one. Finally, hub directors also provided some assistance to students, particularly when career counselors were unavailable. For example, at Stark State and Navarro, hub directors took over all career counselor responsibilities during the months when those hubs had no career counselors due to staff turnover.

A student focus group participant at Navarro reported that a ShaleNET instructor had been “really good about walking me through the various types of jobs I could pursue.”

## Successes and Challenges in Providing Training Programs and Student Support

ShaleNET hubs faced a number of challenges related to providing training programs and student support, but also achieved some notable successes.

### Successes

- **Hubs enrolled students in 31 training programs and developed 19 new credit training programs.** These new programs more than doubled the number of ShaleNET programs available to students across the four hubs.

- **Hubs obtained nearly two and a half million dollars worth of equipment their training programs.** The addition of this new equipment represented a significant enhancement to ShaleNET programs' hands-on training components.
- **Three ShaleNET hubs created new training centers and/or lab space for their programs and equipment.** Three of the four ShaleNET hubs not only used grant funds to obtain new equipment, they also used or leveraged those funds to create new facilities specifically designed to house technical training programs and labs.
- **Twenty-three new virtual training scenarios were developed for ShaleNET.** ShaleNET's contractor, Discovery Machine, worked with ShaleNET instructors and other subject matter experts to co-create 23 training simulations that were available for use to enhance ShaleNET courses.
- **At all hubs, career counselors were successful in providing many ShaleNET students with several different types of support.** These forms of support included academic coaching, career coaching, job placement assistance, and assistance dealing with challenges related to living arrangements, transportation issues, and family obligations. Multiple student respondents commented on how helpful they found this support to be.
- **Two hubs collaborated extensively with their college career services departments.** At Stark State and Navarro, where most students are in credit programs, hub staff members arranged with their college's existing career services departments to provide job readiness training and services to ShaleNET students. This collaboration freed up the ShaleNET career counselor to focus on other duties.

## Challenges

- **Some students complained that lab equipment was installed too slowly and lab curriculum was poorly developed.** Early on in the grant, a few students complained about the slow pace with which grant-purchased equipment was made available for use in classes. Some also commented that the lab curricula for using the new equipment was also not well developed. However, by the end of the grant, all equipment purchased with grant funds was set up and hub instructors had spent considerable time developing lab curricula.
- **Three of four hubs were not successful in sharing images of their labs with remote locations.** Although ShaleNET's contractor, AST2, did mount cameras in three hub labs, none of the hubs was ever successful in being able to use AST2's software and cameras to share video

images of their labs over the Internet. However, by the end of the grant, one hub—Navarro—was successful in sharing video images of its main lab with its satellite campuses using a different contractor.

- **Only one hub had used the newly developed virtual training scenarios by the end of the grant.** Despite stating that they thought these scenarios would be a useful way to enhance their training programs, as of the end of spring semester 2016, only one ShaleNET instructor had used any of these scenarios in a ShaleNET course. And because he had not yet had time to fully master the software required to use the scenarios by the time he used them in class, he had a negative experience and stated that he was not planning to use any scenarios in a ShaleNET class again.
- **Developing sufficient numbers of internship placements for AAS students was extremely challenging.** Consequently, even though internship experience was highly valued by employers, both hubs that had required completion of an internship for certain AAS degrees eliminated that requirement about halfway through the grant.
- **Demand for ShaleNET noncredit training declined significantly over the life of the TAACCCT grant.** This was primarily due to reduced drilling activity across hub region shale plays. To attempt to overcome this challenge, two hubs—PCT and WCCC—made changes to their ShaleNET noncredit programs to make them more broadly applicable across different sectors of the oil and gas industry, and to other industries.
- **Challenging workloads prevented career counselors from more proactively reaching out to all ShaleNET students to ensure they had sufficient support.** Due to their many duties other than providing student support (such as recruitment and employer engagement), some career counselors had unmanageable workloads, which prevented them from conducting much outreach to students. Consequently, at these hubs, students may not have realized that they could go to the career counselor for help.
- **Three out of four ShaleNET hubs experienced one or more bouts of turnover in the career counselor position.** In addition, due to the lengthy hiring processes at these colleges, these positions remained unfilled for several months. During these periods, hub directors or support technicians tried to provide some of the services normally provided by career counselors, but were not able to offer comparable levels of assistance, due to the press of their other duties.
- **Because credit students could enroll in ShaleNET programs without first meeting with the ShaleNET**

**career counselor, many of these students had challenges with enrolling in the classes they needed to complete their programs.** While some of these credit students did eventually receive schedule-related assistance from the ShaleNET counselor, others never connected with the counselor.

- **Students at one hub complained that assistance with securing post-program employment was insufficient.** Said one focus group participant at this hub: “[Job search and job placement assistance] is the most critical part of the program...and they need to help us understand how to do it. I do not feel like I have the support I need.”

### III. ShaleNET Partnerships

Strategic partnerships were a central element of the ShaleNET initiative. This chapter describes the partnerships developed between the members of the consortium and the oil and gas industry, the public workforce system, and other educational entities under the ShaleNET initiative during the Round 2 TAACCCT grant.

#### Partnerships with the Oil and Gas Industry

During the grant, ShaleNET hubs engaged more than 66 unique oil and gas employers and industry associations across all grant-supported hubs and, based on conservative estimates, leveraged nearly 1.7 million dollars in contributions from those partners during the same period.

#### Hub-Level Industry Engagement

To generate industry engagement and support, ShaleNET hub staff members at all hubs—primarily hub directors, career counselors, instructors, and supporting college administrators—reported spending considerable time and effort conducting outreach to oil and gas industry representatives. These ShaleNET representatives reported that they regularly communicated with individual employers and industry groups—both those who were already ShaleNET partners and those who were being recruited—by phone, email, and in person. ShaleNET representatives from all four hubs invited industry representatives to attend their oil- and gas-related academic advisory groups and ShaleNET hub meetings, and they invited interested employers to tour hub facilities and see newly obtained equipment. ShaleNET representatives also often participated in meetings of industry associations that were relevant to their hub regions (such as the Marcellus Shale Coalition and the Ohio Oil and Gas Association), attended nearby industry trade shows and conferences, and made visits to local employers' facilities in order to meet with industry representatives and drop off information about the ShaleNET program.

As a result of this outreach, hubs developed partnerships with numerous oil and gas companies, ranging from large, multinational firms to small, local service companies. As partners, these companies supported ShaleNET hubs in the following ways:

ShaleNET TAACCCT grant-supported hubs received nearly \$1.7 million in contributions from employers and industry associations during the grant.

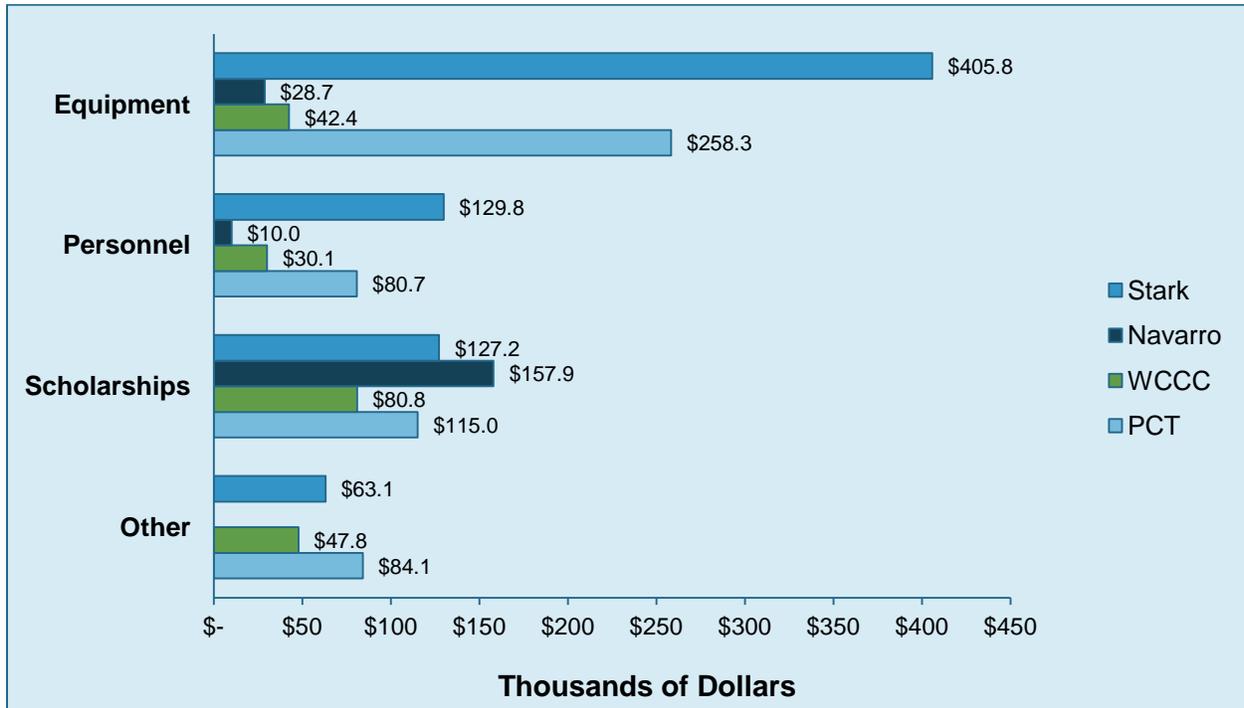
- **by participating in hub meetings or advisory councils.** Many employer partners participated in ShaleNET meetings, both advisory council meetings and quarterly hub meetings. These meetings provided industry representatives with opportunities to learn more about ShaleNET, to give their input about program design and activities, and to explore how ShaleNET training programs could help them to meet their workforce needs. One industry partner reported that “the meetings are very useful because industry representatives come together and discuss our skilled labor needs and how the [hub] can fill that void.”
- **by providing advice on core competencies and curriculum development.** All ShaleNET hubs reported that employers and industry association representatives provided valuable input and feedback about core competencies and training components in their programs. For example, industry representatives were instrumental in helping ShaleNET hubs to set up their well site equipment, maintain it, and use it to provide meaningful hands-on learning opportunities to students.
- **by helping to identify potential instructors for ShaleNET courses.** At all hubs, ShaleNET staff members reported that industry representatives assisted them with identifying appropriate individuals to serve as ShaleNET instructors. In addition, at some hubs, industry representatives themselves taught certain classes and, as company employees, were more readily able to take students on tours of their company’s facilities and arrange for their colleagues to visit their classes. For example, at WCCC, a regional manager for a major oil and gas company taught several classes and arranged for various staff members from his company to visit and took his students on visits to several nearby company facilities. One of these participants commented about how important these field trips and visits were: “After we learn something in class and do the labs, then he takes us into the field so we can match up the book-work with the real world.”
- **by providing leveraged resources by funding scholarships and donating equipment and supplies.** All hubs reported receiving generous support from employers and industry associations. As noted in Chapter II, by the end of grant operations, the four TAACCCT-supported ShaleNET hubs had received approximately \$735,000 in donations related to equipment from industry partners. They had also received approximately \$481,000 in scholarship funding, \$251,000 in support for personnel costs (both in-kind and in earmarked financial contributions), and \$195,000 in contributions for other purposes (see Exhibit III-1). As shown in the exhibit, hubs

*The meetings are very useful because industry representatives come together and discuss our skilled labor needs and how the [hub] can fill that void.*

— Industry partner,  
Navarro

varied in the amount of donations they received, with Stark receiving the most.

Exhibit III-1: Leveraged Resources by Type and School



- by providing work-based learning opportunities for ShaleNET participants.** Oil and gas companies afforded ShaleNET students opportunities for work-based learning. At all hubs, these opportunities included tours of employer facilities or well sites (see Box III-1); employers also provided some students with paid internships. Several students in focus groups talked about the importance of these opportunities to get out into the field and interact with real industry equipment and workers.

### Consortium-Wide Industry Engagement

In addition to these hub-specific industry outreach and employer involvement activities, the ShaleNET consortium also carried out industry outreach and engagement activities at the consortium level. These efforts were primarily conducted by ACCD, working in collaboration with the lead hub, PCT.

### Box III-1: Industry Representatives Offer Tours to ShaleNET Students



Students at WCCC traveled to a nearby community to visit an oil and gas company's compressor facility. This tour provided students with a first-hand account of the work environments and employment opportunities available in the oil and gas industry. Students were also able to see the importance placed on safety training and equipment maintenance.

ACCD's employer engagement efforts on behalf of ShaleNET included both general marketing to the oil and gas industry and concentrated relationship-building focused on industry-leading firms. General marketing efforts to employers were part of ACCD's overall marketing assistance to ShaleNET, and included production of a quarterly electronic newsletter that was emailed to many partners, particularly oil and gas industry representatives. ACCD also developed outreach kits and materials for hub staff members to use when they attended industry events; ACCD staff members used these materials themselves when they attended oil- and gas-related trade shows and events to market ShaleNET, most often in the greater Pittsburgh area.

ACCD also worked to develop partnerships between ShaleNET and specific industry-leading multinational oil and gas companies. ACCD's efforts on this front resulted in a donation from Chevron of nearly \$1.4 million dollars over three academic years during the grant, shared among the three ShaleNET Round 2 TAACCCT-funded hubs located in the Appalachian Basin (PCT, Stark State, WCCC), as well as ShaleNET's new West Virginia hub, Pierpont

ACCD's employer engagement efforts resulted in a donation from Chevron of nearly \$1.4 million dollars over three academic years (2014-2015 to 2016-2017) split between the three TAACCCT-funded ShaleNET hubs located in the Appalachian Basin (PCT, Stark State, WCCC) and the new West Virginia hub, Pierpont.

Community and Technical College (Pierpont's relationship to the other ShaleNET hubs is described below).<sup>24</sup> This donation was primarily to support scholarships, career counselors, marketing, and curriculum development. Chevron also provided ACCD with \$100,000 to support ShaleNET's sustainability efforts (ShaleNET's sustainability efforts are described in more detail in Chapter VI).

## Partnerships with Educational Institutions

ShaleNET hubs tried to develop three types of partnerships with educational institutions under the Round 2 TAACCCT grant: “spoke” partnerships with educational institutions within existing hub regions, partnerships with new hubs in new regions, and articulation agreements with schools that offered four-year degree programs.

### Expansion of ShaleNET Training Programs via “Spoke” Partnerships

ShaleNET developed a unique “hub and spokes” model for developing partnerships with non-consortium educational institutions. The idea behind this structure, which was first developed under the ShaleNET CBJT grant, was to connect the primary institutional hub in each region or state with numerous other institutional “spokes” located within that region or state. These educational-partner spokes could then provide either all aspects of a ShaleNET oil and gas training program or just certain portions of the program, with students transferring to a hub college to complete the remaining program components. Each hub, in turn, was to be connected nationally to other hubs through the consortium, which stewarded the ShaleNET brand.

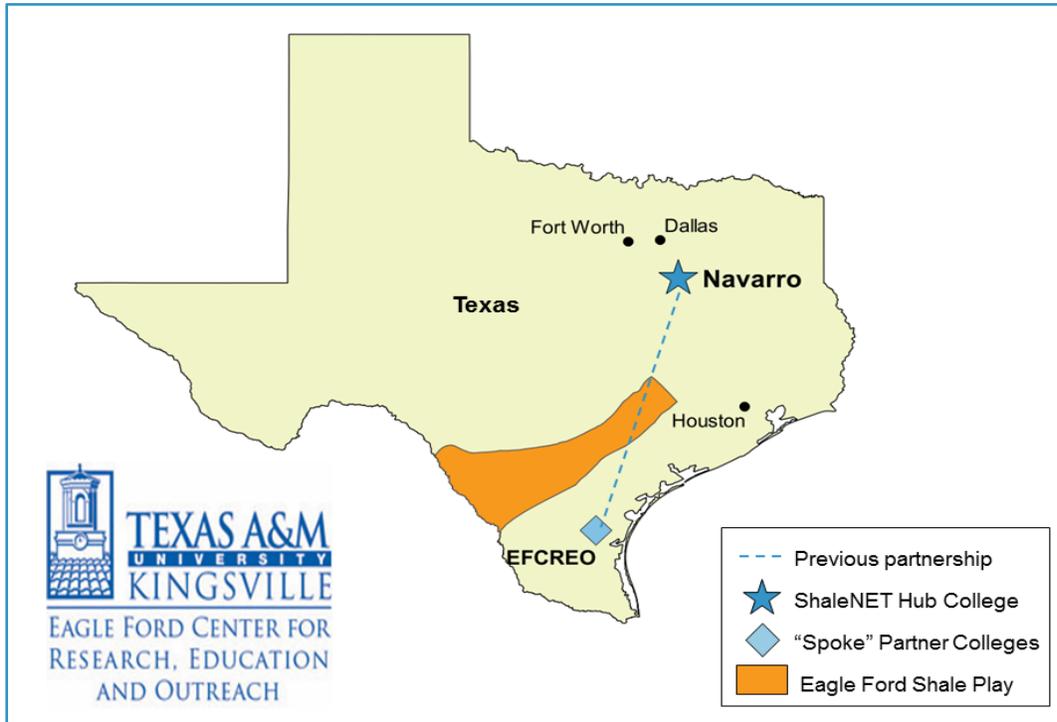
At the outset of the ShaleNET TAACCCT grant, most of the spokes developed during the CBJT grant dropped away. However, later on in the grant period, the two new hubs—Stark State and Navarro—both developed new spoke partnerships. The first of these was Navarro's partnership, developed with the assistance of PCT, with the Eagle Ford Center for Research, Education, and Outreach (EFCREO) at Texas A&M University, Kingsville (see Box III-2 for a visual illustration of the partnership).

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<sup>24</sup> The exact amount provided to the three ShaleNET TAACCCT-funded hubs was \$965,403; Chevron provided \$423,176 to Pierpont.

Under this partnership arrangement, EFCREO ran at least two sessions of ShaleNET noncredit classes in spring and summer 2014. Unfortunately, once oil prices dropped in late 2014, there was no longer demand for this type of training in the Eagle Ford Play region and EFCREO discontinued offering these classes and the partnership was also discontinued.

Box III-2: Hub and Spoke Example – Texas Example



Stark State also tried to develop similar noncredit spoke partnerships. The first such partnership the hub attempted was with Kent State University, Tuscarawas (KSU-Tuscarawas) in Ohio. Much like the relationship between Navarro and EFCREO, the partnership between Stark State and KSU-Tuscarawas was intended to allow KSU-Tuscarawas to provide Tier 1 and 2 ShaleNET noncredit training programs. Unfortunately, despite spending significant time and resources on recruiting, KSU-Tuscarawas was not able to recruit a sufficient number of students to run these noncredit training programs and the partnership never came to fruition. Stark State also worked with Hazard Community and Technical College (Hazard) in Kentucky with the intention of developing a partnership in which Hazard would deliver Tier 1 and 2 noncredit training to laid-off coal miners. Despite the progress made in initial discussions, Hazard determined that in a climate of

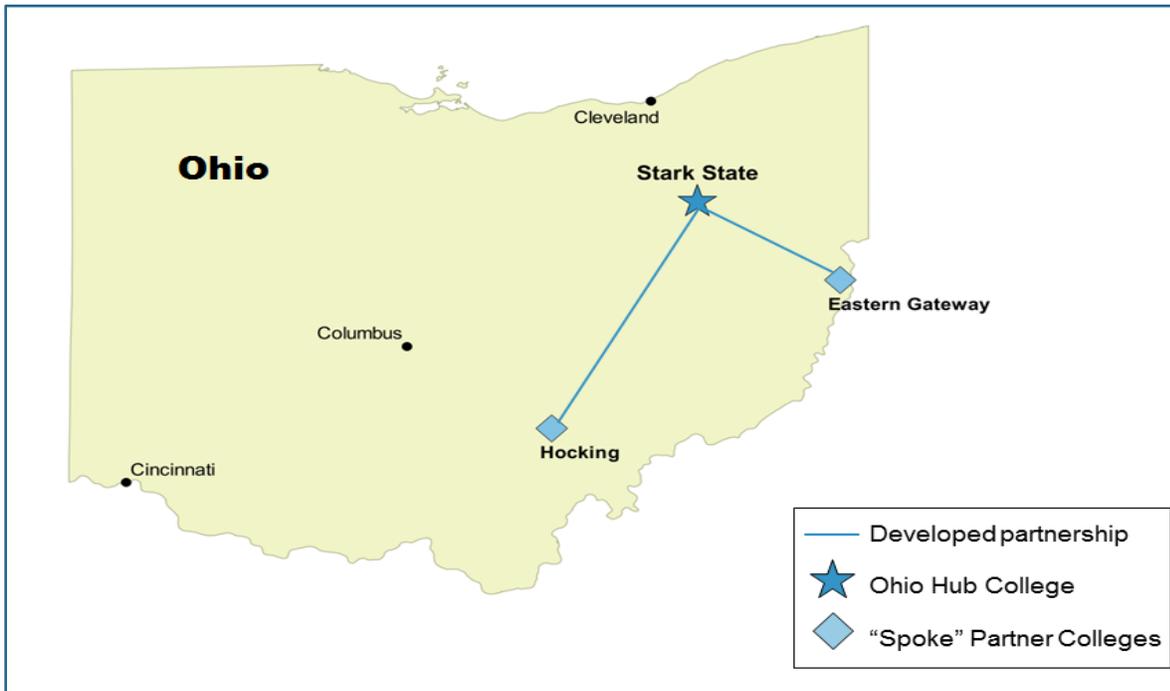
falling prices, work in the oil and gas industry was no longer a demand occupation and the partnership was not pursued.

Subsequent to its unsuccessful efforts with KSU-Tuscarawas and Hazard, Stark State began developing a different type of spoke partnership with Hocking and Eastern Gateway Colleges in Ohio, as part of the college's plans to develop an Ohio ShaleNET Share Consortium. (See Box III-3 for a visual illustration of Stark's planned hub and spokes consortium.) This new type of partnership (called a 40/20 academic share partnership) would allow students to complete 40 units of a ShaleNET Instrumentation and Measurement Technician AAS program at their home college, taking primarily required general education courses as well as certain core technical courses. These students would then complete the remaining 20 units required for the AAS (and for an Instrumentation and Measurement Technician certificate) at Stark State primarily via accelerated summer "boot camps," making use of Stark State's well-developed oil and gas lab space and equipment to complete their credentials.

Stark State completed agreements in 2015 with Hocking and in 2016 with Eastern Gateway to implement these 40/20 academic share partnerships, and was planning to begin enrolling students as soon as the Ohio Department of Higher Education and the Ohio Higher Learning Commission granted approval for these new pathways. Once the partnerships with Hocking and Eastern Gateway were operating smoothly, Stark hoped to add additional Ohio colleges to this Ohio ShaleNET Share Consortium.

Stark State has developed a 40/20 academic share partnership with Hocking and Eastern Gateway Colleges in Ohio, creating the Ohio ShaleNET Share Consortium.

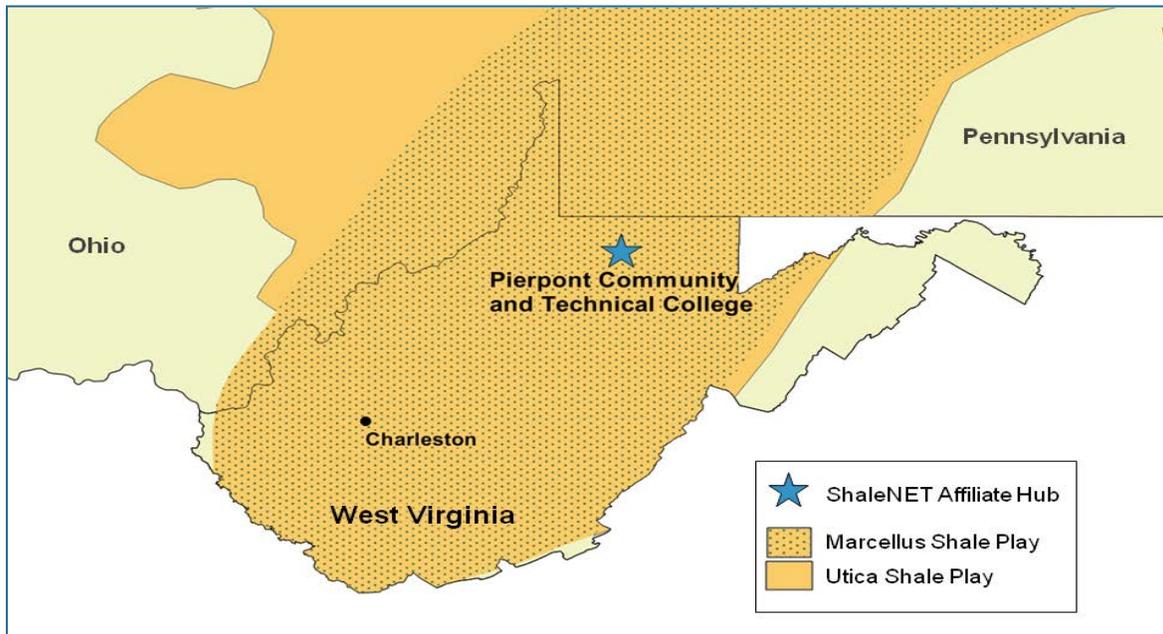
Box III-3: Hub and Spokes Example--Ohio ShaleNET Share Consortium



### Expansion to New Regions

In addition to developing new spoke partnerships, the ShaleNET consortium also tried to expand its training programs into new target states and regions by establishing affiliate hubs in those places. The designation of Pierpont Community and Technical College (Pierpont) in West Virginia as an affiliate hub in September 2014 was a key milestone in these expansion efforts (Box III-4 shows Pierpont's location).

Box III-4: Location of ShaleNET's New Affiliate West Virginia Hub, Pierpont Community and Technical College



Pierpont was recruited as a new affiliate hub due to its strategic location in West Virginia, an Appalachian Basin state that—like Ohio and Pennsylvania—experienced rapid growth in shale gas and oil production from the mid-2000s through 2014. In addition, by the time it was recruited, Pierpont had already developed significant capacity to operate shale oil and gas training programs. As of 2014, the college had garnered approximately \$900,000 in state and corporate funding, and had used these funds to build a nineteen-acre outdoor oil and gas training center, hire a petroleum technology program coordinator, and develop a petroleum technology certificate that stacked into a petroleum technology AAS and an applied process technology AAS. Pierpont had also successfully offered numerous sessions of ShaleNET's Floorhand noncredit training.

After agreeing to become an affiliate ShaleNET hub, Pierpont continued to develop its oil and gas programs. For example, using funding from a Round 3 TAACCCT grant, in 2015, the college purchased several large pieces of oil and gas-related equipment and simulators to enhance its training programs. In addition, in mid-2016, using funding provided by Chevron, Pierpont hired a career counselor to provide its oil and gas students with specialized academic and career counseling. Finally, in summer 2016, the college completed construction of a 65,000-square-foot advanced technology center to house all of its oil and gas-related

labs and equipment, along with most of its other workforce development program labs.

In addition to expanding into West Virginia, ShaleNET hubs were actively engaged during the TAACCCT grant meeting with representatives from both the United States and abroad regarding the ShaleNET training model. For example, hub staff members communicated with interested colleges in Colorado, Illinois, Kentucky, and Montana. Several hubs also hosted international delegations, from countries such as Brazil, Ukraine, and the United Kingdom.

### Development of Tier 5 Articulation Agreements

To increase opportunities for ShaleNET students to advance their education beyond the Technology Management degree (Tier 5) already offered by PCT, ShaleNET hubs developed articulation agreements with universities that offer oil- and gas-related bachelor's degrees. For example, Stark State developed an articulation agreement with Ohio University (OU), to make it easier for Stark State associate's degree graduates to enter four-year programs at OU.

### Other Educational Partnerships

In addition to developing articulation partnerships with four-year universities, ShaleNET hubs also developed partnerships with high schools in their geographic areas. For example, all four hubs allowed local high school students to dual-enroll in classes that provided both college and high school credits.

ShaleNET hubs also received valuable input from other educational institutions about key pieces of the ShaleNET curricula, including the core competencies for each of the tiers within the stackable credential model and the design and setup of lab equipment. For example, ShaleNET staff members at PCT worked closely with Reading Community College in Pennsylvania to research lab design and equipment setup and to gain insight about establishing a mechatronics degree program. PCT also presented curricula for the ShaleNET stackable credential model at the University of Illinois Fabricated Geomembrane Institute to obtain peer review of its programs.

## Partnerships with the Public Workforce System

ShaleNET hubs also focused on developing partnerships with the public workforce system, including workforce development board (WDB) members and staffs and state and local agencies with staff members funded by the Workforce Investment Act (WIA),<sup>25</sup> the Wagner-Peyser Act, and Jobs for Veterans State Grants (JVSG). The goal of developing partnerships with these public workforce system stakeholders was to enhance ShaleNET recruitment efforts, especially recruitment of USDOL target populations such as veterans and individuals receiving TAA services.

### Efforts to Engage with the Public Workforce System

ShaleNET staff members initiated contact with public workforce partners by conducting visits to American Job Centers (AJCs) and WDBs and by making presentations about ShaleNET to staff members affiliated with both. Efforts to engage AJC program staff members and WDB members are displayed visually in Exhibit III-2 and described below.

Exhibit III-2: AJC Engagement with ShaleNET, by Hub

AJC Activity	Navarro	PCT	Stark State	WCCC
Posted information about ShaleNET in AJC resource rooms		X	X	X
Referred prospective students	X	X	X	X
Funded training for eligible ShaleNET students (with TAA or WIA funds)		X	X	X
Provided job search and job placement assistance to ShaleNET graduates	X	X	X	X
Participated in ShaleNET advisory board/hub meetings		X	X	X

**AJC Engagement.** Staff members from all four hubs visited their local AJCs to present information about ShaleNET to program

<sup>25</sup> In July 2014, WIA was superseded by the Workforce Innovation and Opportunities Act (WIOA).

partners, with staff members from three hubs reporting that they conducted formal information sessions during these visits. Following these presentations, AJC staff members were able to advise job seekers about ShaleNET programs and recruit individuals for program participation, sometimes even conducting information sessions for AJC customers about available ShaleNET training programs. Three of the four hubs also invited local AJC program staff members to attend advisory board and/or hub meetings.

AJC engagement was made easier because the career counselors at two hubs had previously worked at AJCs, and three hubs had strong institutional relationships with their nearest AJCs—with one AJC even located on the college's campus. These connections helped significantly with outreach efforts.

Two of the hubs reported that, as one result of these partnerships with AJCs, a number of ShaleNET noncredit students received WIA funding to help cover the cost of participating in training. Seventy-four percent of surveyed WDB staff members reported that ShaleNET training programs were eligible to receive this funding (see Exhibit III-3). In addition, 58 percent of these WDB respondents also reported that their WIA staff members referred customers to ShaleNET and 53 percent said that WIA staff members provided information about ShaleNET to their customers.

**Workforce Board Engagement.** ShaleNET hub staff members also contacted WDB members and their staffs to inform them about ShaleNET programs. In total, ShaleNET hubs attempted to engage with a total of twenty-three workforce boards, primarily in Ohio, Pennsylvania, and Texas.<sup>26</sup> Although all hubs made some effort to work with the WDBs in their regions, three of them made particularly concerted efforts to do so, spending significant staff member resources on the effort. The outreach at these three hubs included conducting presentations at local WDB meetings and coordinating information sessions for board staff members about ShaleNET. ShaleNET staff members also invited local WDB members and their staffs to participate in advisory board and/or hub meetings. Lastly, ShaleNET staff members worked to keep local WDBs informed about the progress of ShaleNET initiatives by sending out the quarterly electronic newsletter produced by

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<sup>26</sup> ShaleNET hubs in Pennsylvania also targeted one workforce board in West Virginia for outreach.

ACCD. While ShaleNET hubs conducted outreach to multiple boards within their states, hubs reported that they had the strongest working relationships with those workforce boards that were in close geographic proximity to their campuses.

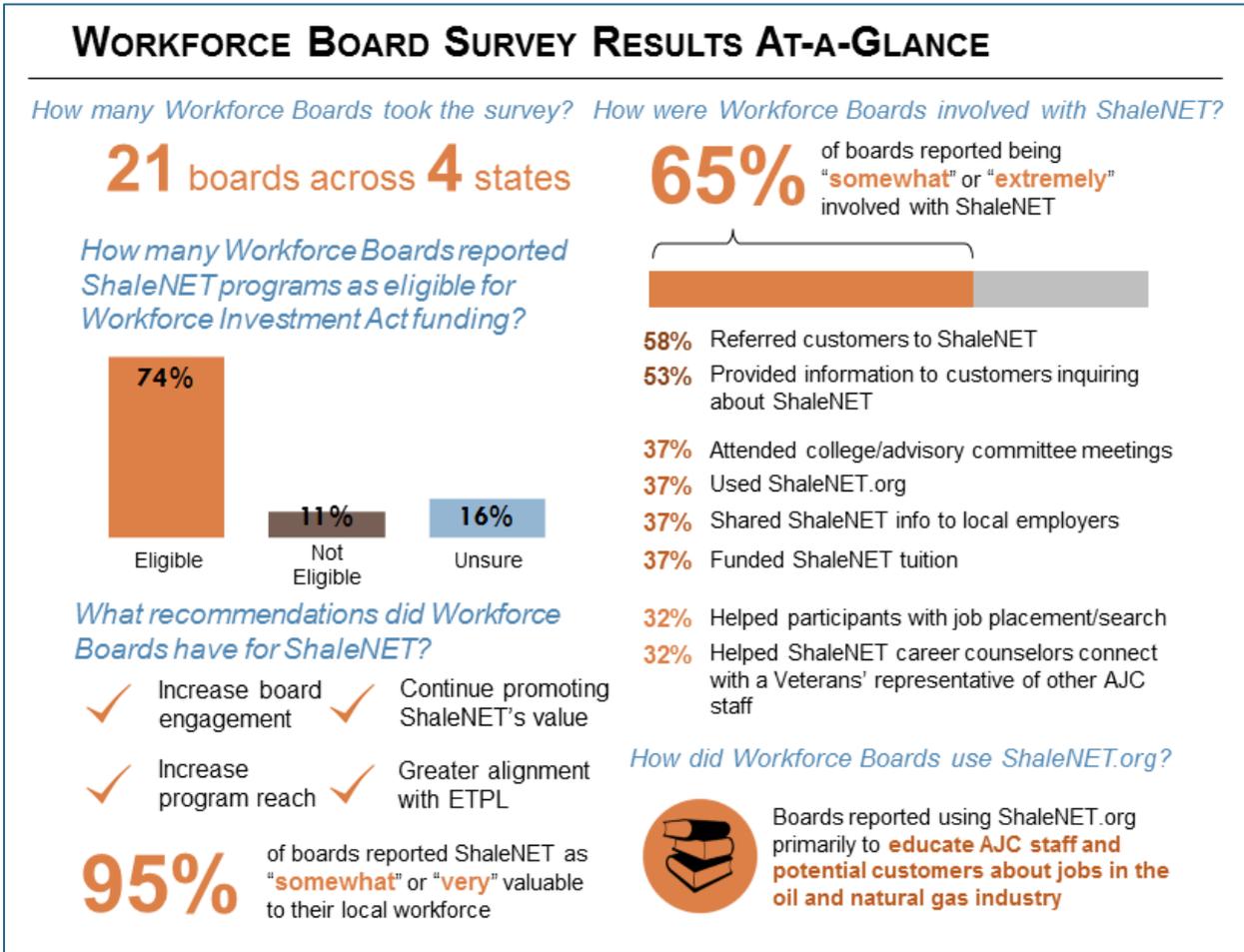
Results from the survey of workforce board directors (displayed in Exhibit III-3) showed that these efforts were fairly successful. For example, respondents from 85 percent of the responding boards reported being “somewhat” or “extremely” knowledgeable about ShaleNET programs; 95 percent reported that ShaleNET was “somewhat” or “very” valuable to their local workforce area; and 65 percent reported being “somewhat” or “very” involved in ShaleNET. A sample of workforce board directors interviewed in 2016 corroborated these results, and even noted that despite the downturn in drilling activity, they continued to work closely with their ShaleNET partners.

Staff members from 85 percent of workforce boards reported being “somewhat” or “extremely” knowledgeable about ShaleNET programs and 95 percent reported that ShaleNET was “somewhat” or “very” valuable to their local workforce area.

**Engagement with Other Public Workforce Partners.** In addition to the efforts described above, ShaleNET staff members worked to connect with state-level public workforce staff members responsible for analyzing labor market information. PCT staff members approached the Center for Workforce Information and Analysis (CWIA) unit of the Pennsylvania Department of Labor and Industry with a request that it analyze both labor market demand and industry growth related to the Marcellus Shale Play. Consequently, starting in July 2012, CWIA began publishing its *Marcellus Shale Fast Facts* publication, which provided the most current available data on Marcellus Shale-related economic activity in Pennsylvania.<sup>27</sup>

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<sup>27</sup> To view *Marcellus Shale Fast Facts*, visit [www.portal.state.pa.us/portal/server.pt?open=514&objID=1222103&mode=2](http://www.portal.state.pa.us/portal/server.pt?open=514&objID=1222103&mode=2).



## Other Partnerships

ShaleNET hubs and ACCD conducted numerous information sessions and provided tours of their facilities for public officials at the federal, state, and local levels to inform them about the ShaleNET grant and available training opportunities. These information sessions helped to heighten awareness of the ShaleNET program and to increase its credibility and support among public officials.

In Pennsylvania, these efforts led to additional funding for ShaleNET training, by means of Act 13 impact fees on oil and gas drilling in certain counties surrounding PCT. Act 13 provided for

<sup>28</sup> Twenty-one of twenty-three WIBs responded to the survey, for a response rate of 91 percent.

the imposition of an “unconventional gas well” fee (also called an impact fee) on horizontal drilling, and for the distribution of the funds derived from those fees to local and state governments. As a result of meetings with the boards of commissioners of the surrounding counties of Lycoming, Tioga, and Bradford, PCT received \$195,000 to support scholarships for its noncredit ShaleNET training programs.

According to one of the county commissioners who initially approved this support for ShaleNET, his county decided to provide these funds because although there was a huge amount of new economic activity related to oil and gas in the county, relatively few county residents were benefitting because they were not trained for work in the industry. “We were concerned, as elected officials and community leaders, ...[that] we were getting all these out-of-state workers moving in. We needed some sort of a program to get the [local] folks working in the industry...” He also said that he would support continuing to provide this funding to ShaleNET because of the program’s success. “I think they [ShaleNET] hit a home run. Getting family-sustaining jobs for those who would never have had the opportunity... the unemployed, underemployed...it’s awesome.”

As discussed in Chapter III, ShaleNET programs at Stark and WCCC received additional funding from their states and their colleges to fund the development of new oil and gas training facilities. WCCC received a Pennsylvania capital improvement grant for its new advanced technology center, as well as donations from a number of nonprofits. Stark State received a ten million dollar Ohio capital appropriation, which the college used to consolidate academic programs at several downtown locations into a single training center.

*I think they [ShaleNET] hit a home run. Getting family-sustaining jobs for those who would never have had the opportunity... the unemployed, underemployed...it's awesome.*

-- Former Lycoming County Commissioner

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## IV. Recruitment and Enrollment of ShaleNET Students

This chapter describes the recruitment activities of the ShaleNET Consortium during the grant period and the challenges consortium members faced in carrying out those activities. The chapter then presents enrollment results for the grant period and summarizes the characteristics of ShaleNET enrollees.

### Recruitment Practices

According to goals established with USDOL, the four ShaleNET hubs were committed to enrolling a total of 1096 participants during the grant's expected three years of program operation. Per-year goals were set as well. In addition, consortium members knew that enrollment numbers would be a key determinant of both success and the ability of ShaleNET to outlive the period of TAACCCT grant funding. For these reasons, recruitment of individuals into the ShaleNET programs was a critical facet of the initiative.

### Overall Recruitment Strategies

According to hub staff members, word-of-mouth recommendations were very important for ShaleNET recruitment. These recommendations typically came from students who had already enrolled in or completed a ShaleNET program and were pleased with the experience and the doors it opened. "I believe so much in the program," said one student focus group participant at Stark State, "that I recommended to a friend of mine that he apply." At Navarro, a hub that had offered most of its ShaleNET programs prior to the grant, word-of-mouth recommendations brought in more students than any active recruitment strategies.

Although word-of-mouth recruitment by satisfied students worked well for the hubs that had offered oil and gas training programs prior to the beginning of ShaleNET, hubs that created new ShaleNET training programs could not rely on it bringing in adequate numbers of students. At these hubs, not quite half of student focus group participants (15 of 31) reported learning about ShaleNET through word-of-mouth recommendations.

*I believe so much in the program that I recommended to a friend of mine that he apply.*

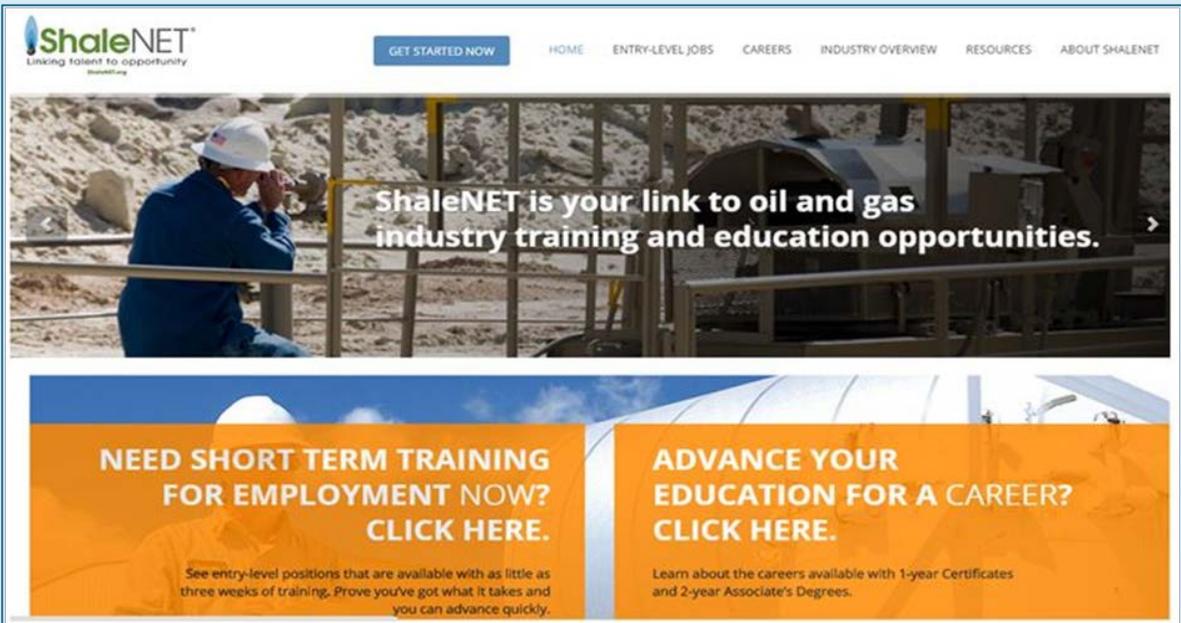
–ShaleNET student, Stark State

The most commonly used active recruitment strategy was to conduct outreach within the college. For example, career counselors at all four hubs marketed ShaleNET at their colleges' career fairs and other college-sponsored events and worked closely with various college departments—student affairs, admissions, and financial aid—to orient staff members in those departments to ShaleNET so that they could refer suitable students. All hubs also used their college's own websites for recruitment, providing detailed descriptions of their ShaleNET programs, contact information, and links to ShaleNET's own website (described below).

The ShaleNET.org website was also an important outreach tool for all the hubs, particularly early on during the grant. Interested individuals typically found this site through Internet searches for oil and gas industry training programs or through referrals from ShaleNET hub staff members or partners. Once on the website's homepage (depicted in Box IV-1), individuals could learn about the shale gas and oil industry via a series of short videos, as well as about careers in the industry. The site also had extensive information on the ShaleNET training programs available at each hub, and prominently displayed hub contact information allowed prospective students to contact hub staff members to learn more.

For recruitment purposes, one of the key features of the website was a two-tier registration process. Visitors were initially asked to register by providing only their name, email address, zip code, and a password. Once they provided this basic information, the ShaleNET website encouraged them to go through a more complete four-step registration process. Once this full registration process was complete, the website automatically generated an email to the nearest ShaleNET career counselor, who saved the information for use by hub staff members.

## Box IV-1: ShaleNET.org Website



On the ShaleNET.org home page (pictured above), users could access the following features:

- An industry overview, consisting of five short videos that provide basic information about the oil and gas industry, including the location of the largest shale plays and a description of the entire process of producing energy from shale rock, from extraction of gas via hydraulic fracturing to distribution to end users.
- Detailed job descriptions and videos describing the shale oil and gas jobs available to those who complete each tier of ShaleNET training.
- A resource section featuring a searchable and downloadable Career Guide, which contains information on forty-seven available shale oil and gas careers.
- Information about the ShaleNET consortium and the TAACCCT grant.
- Contact information for each hub, including the names and email addresses of career counselors and hub directors

Early on in the grant period, ShaleNET career counselors reported that they made extensive use of an ACCD-created ShaleNET Facebook page to recruit students, particularly for noncredit programs. They did so by posting information and pictures about ShaleNET training programs, including key dates for upcoming noncredit programs. Respondents said that the Facebook page was an effective marketing tool because program alumni used it to post about the program and about the jobs they got after completing their certificates or degrees.

## Recruitment Efforts Targeted at Special Populations

ShaleNET’s hubs also made extensive efforts to recruit members of DOL’s priority populations for TAACCCT grants—veterans and TAA-eligible individuals. However, as the hubs found that efforts to recruit these special populations were much more challenging and time consuming than anticipated and did not yield high returns in terms of student enrollment, hub staff members began focusing more of their efforts during the latter half of the grant on recruiting students from secondary schools. Hubs’ efforts to recruit each of the priority groups and high school students are described below.

**Veterans.** ShaleNET staff members briefed local Disabled Veterans’ Outreach Program specialists, local Veterans’ Employment Representatives, and local Veterans Administration staffs on the ShaleNET initiative so that these veteran-serving staff members could refer veterans to ShaleNET. ShaleNET staff members also obtained funding for special scholarships from industry to serve veterans and gained approval for their noncredit programs to be eligible for G.I. Bill funding.

As a result of these efforts, 90 veterans (based on self reports) enrolled in ShaleNET programs. This was seven percent of ShaleNET students overall, which was two percentage points lower than the percentage of veterans estimated to reside in the three hub states (see Exhibit IV-1).

ShaleNET’s hubs developed specific outreach strategies and made extensive efforts to recruit veterans and TAA-eligible individuals, but found these efforts did not yield high returns in terms of actual enrollments.

Exhibit IV-1: Veteran Population in ShaleNET Hub States

	Population Estimate for Adults over 18	Estimated No. of Veterans	Veterans as a Percent of State Population
<b>Pennsylvania</b>	10,013,055	906,384	11.0%
<b>Ohio</b>	8,877,924	834,358	10.6%
<b>Texas</b>	19,004,447	1,564,501	12.1%

Source: U.S. Census, 2010-2014 American Community Survey, 5-year estimates.

**TAA-eligible Individuals.** ShaleNET career counselors worked with state and local workforce system partners and state TAA coordinators to recruit TAA-eligible students. For example, hub staff members from all four colleges visited local AJCs and provided their TAA-serving staff members with information about ShaleNET. In the fall of 2014, ShaleNET staff members from the Ohio and Pennsylvania hubs also met individually with TAA program coordinators from both states to discuss ShaleNET and

to seek guidance on effective ways to reach TAA-eligible individuals.

Because none of the ShaleNET hubs' student information systems collected data on TAA eligibility, no reliable data were available on the hubs' success in enrolling TAA-eligible individuals. However, hub staff members did report that despite their intensive efforts, they felt that they had not had great success in enrolling these individuals.

**High School Students.** By the latter half of the grant period, secondary school students had also become a primary target group across all Round 2 TAACCCT-supported hubs. Attending high school career fairs, meeting directly with high school guidance counselors to inform them about ShaleNET programs, and conducting information sessions for high school students were common ways that hubs recruited this population. As shown later in the chapter, these efforts were fairly successful, as 23 percent of ShaleNET participants were between the ages of 16 to 19 years of age (see Exhibit IV-8).

*ShaleNET has to get into the high schools. High school students need to understand what kind of opportunity exists within the industry. If I had known then what I know now, I would be a veteran in the oil and gas industry.*

–ShaleNET student, PCT

## Recruitment Challenges

Although the ShaleNET hubs were able to achieve the grant's overall enrollment goals using the practices discussed above (see next section), they faced several significant challenges in recruiting students, especially noncredit students. These challenges and hubs' attempts to overcome them are described below.

- **Prospective students and their families held negative perceptions about employment opportunities in the oil and gas industry.** By the end of the grant period, the greatest recruitment challenge faced by ShaleNET hubs was the negative perception of the economic health of the oil and gas industry held by prospective students and their families. Hub staff members from all four hubs stated that program recruitment became significantly more challenging once reduced gas and oil prices led to decreased drilling activity and industry layoffs. To combat these perceptions, hub staff members stated that they worked very hard to inform students and their families that jobs continued to be available in the oil and gas industry outside of drilling and that ShaleNET programs provided students with skills that were transferrable to other growing employment sectors.
- **Hubs were prohibited from using grant funds for direct marketing.** USDOL imposed limitations on using grant funds for media advertisements, radio announcements, direct mail campaigns, and other forms of direct marketing. Hub staff members asserted that because of these

limitations they were hampered in their ability to effectively market ShaleNET programs and combat negative perceptions about employment opportunities in the oil and gas industry.

- **Several key staff members responsible for recruitment left their positions during the grant period.** During the grant, all four hubs experienced turnover of key staff members (career counselors and hub directors) who were responsible for outreach and recruitment and they were typically unable to replace these staff members quickly. While these positions were unfilled, those hubs were hampered in their ability to conduct recruitment activities. In addition, when those staff members left, they took with them relationships with many recruitment partners. Although hubs were eventually able to bring on replacement career counselors or hub directors to assist with recruitment, it took time to develop their capacity to rebuild recruitment partnerships and recruit effectively.
- **Students could not use federal financial aid to pay for noncredit programs.** Unlike students enrolled in ShaleNET's credit programs, students enrolled in noncredit programs were not eligible for federal financial aid. As a result, students typically had to pay out of pocket for their training, and this was a strong recruitment disincentive. To overcome this challenge, hubs secured \$504,000 in scholarship funding from industry associations, corporate sponsors, and public programs. As part of their recruitment activities, hubs marketed the availability of these scholarships.
- **Many noncredit recruits could not meet ShaleNET's noncredit program eligibility requirements.** ShaleNET's noncredit programs required recruits to pass a drug test, background check, and physical exam. Hub staff members reported that many individuals who were recruited for these programs could not be enrolled because they did not meet these eligibility criteria. To overcome this challenge, hub staff made sure to inform potential students of these requirements and tried to recruit many more students than the minimum number required to run a program.

## Enrollment Results

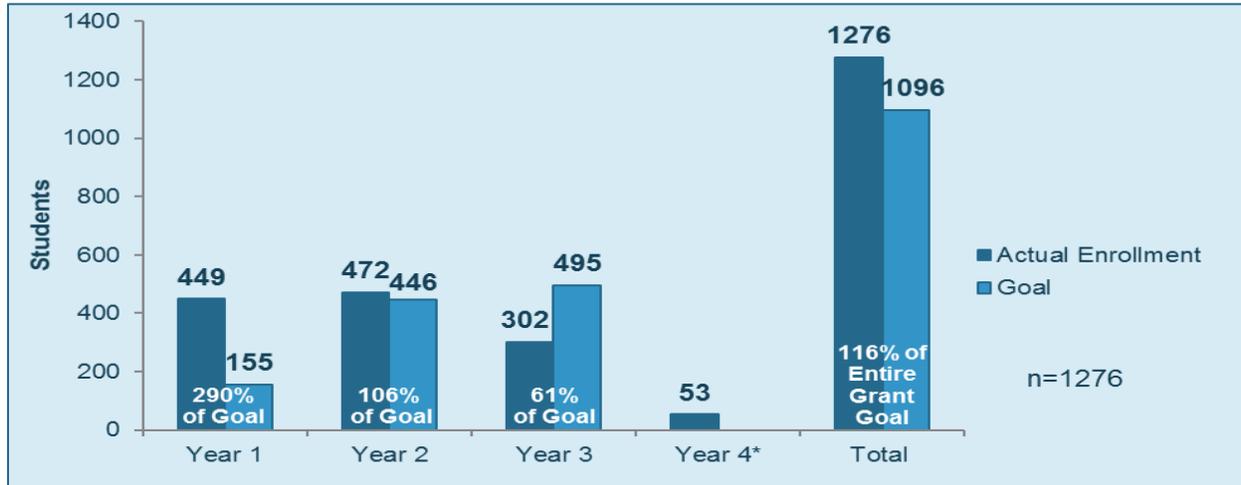
As of March 31, 2016,<sup>29</sup> ShaleNET hubs had enrolled a total of 1,276 unique students<sup>30</sup>. This number is 116 percent of the

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<sup>29</sup> Enrollment and demographic data was obtained through Fall 2015 for all ShaleNET training programs; two hubs, WCCC, and Navarro did also provide data on enrollment for spring semester 2016, and PCT provided enrollment and demographic data for participants enrolled through March 31, 2016.

cumulative enrollment goal for the grant period (see Exhibit IV-2). While ShaleNET’s TAACCCT-funded hubs were able to exceed the overall enrollment targets for the first two years of grant operations, the number of students enrolling in ShaleNET declined as the initiative progressed, and the ShaleNET consortium was not able to achieve its enrollment goal for the grant’s third year of operations (some reasons for this decline in enrollment were discussed in the recruitment challenges section above).

Exhibit IV-2: Actual Enrollment Relative to Enrollment Targets, by Grant Year and for the Entire Grant Period



Source: Demographic data about ShaleNET participants was obtained from each hub’s student information systems. Note: Five students had missing graduation dates; data for these students was added to the Year 4 enrollment levels since a grant year could not be determined for these individuals. \*No goal was set for Year 4 of the grant, as grant enrollment was originally required to end by Year 3. However, because USDOL provided the ShaleNET Consortium a six-month extension of program operations into Year 4, new ShaleNET participants continued to enroll for the first six months of Year 4. The grant began October 1st, 2012. Grant years ran from October 1st to September 30th of the following year. For Navarro because the program was already operational as beginning. Some of their participants had declared their ShaleNET program prior to October 1st, 2012. They were included because they did participate in ShaleNET during the grant period.

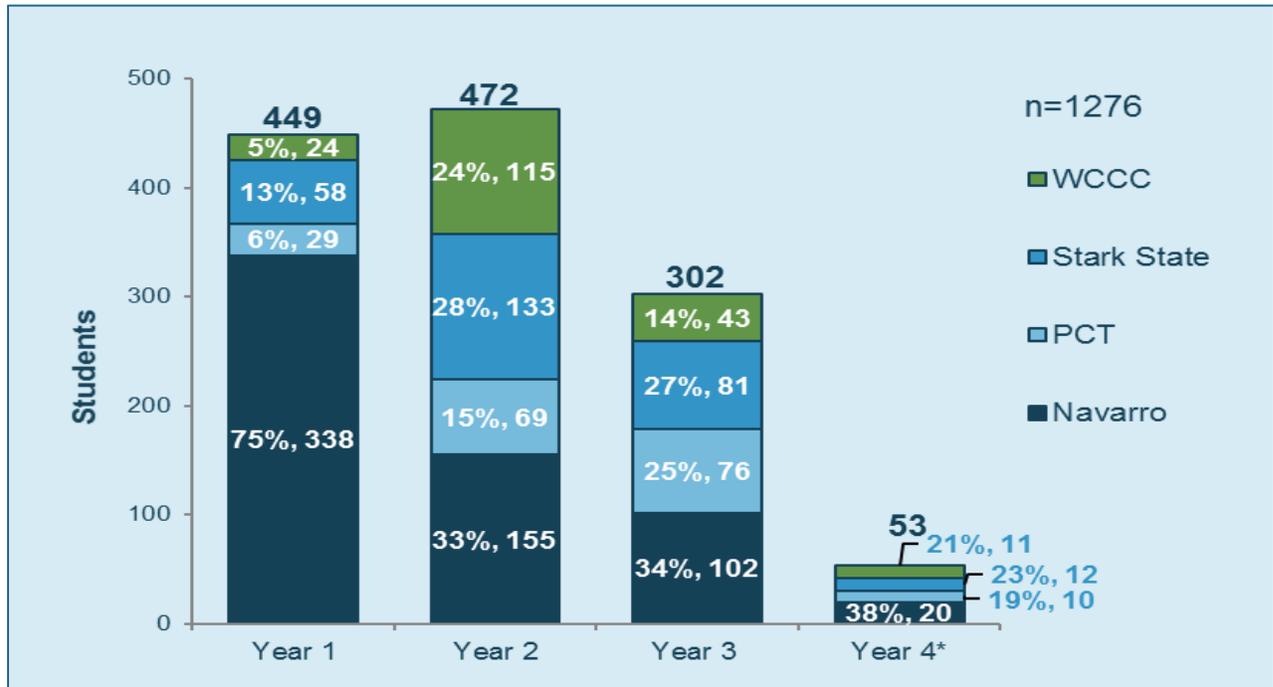
### Hub Contributions to ShaleNET Enrollment Over Time

Each hub’s contribution to each grant year’s total enrollment varied as the initiative progressed. In the first year, the bulk of the initiative’s total enrollment (75 percent) was generated by the

<sup>30</sup> ShaleNET’s participant enrollment number of participants in this report are lower than in the final performance report submitted to USDOL (which reports participants through 3/31/2015) because SPR received participant data through Fall 2015 semester for three hubs and through 3/31/2015 for one hub. In addition, the evaluation team—in order to appropriately report program completion and withdrawals—defined participation differently for credit students; instead of including as a participant every student who enrolled in a ShaleNET course, we defined program participants as those individuals who declared a ShaleNET program.

Navarro hub (see Exhibit IV-3 below). Navarro had such high enrollment levels relative to the other hubs during the first year because all of Navarro’s ShaleNET programs were already operating at the outset of the grant, whereas the remaining three hubs were developing new Tier 3 and Tier 4 training programs and obtaining approval to operate these programs during the first year of grant operations.

Exhibit IV-3: Contribution of Each Hub to Each Year’s Total Enrollment



Source: Demographic data about ShaleNET participants was obtained from each hub’s student information systems. Note: Five students had missing graduation dates; data for these students is added to the Year 4 enrollment levels since a grant year could not be determined for these individuals.\*USDOL provided the ShaleNET Consortium a six-month extension of program operations into Year 4; new ShaleNET participants continued to enroll for the first six months of Year 4.

By the second year of the grant, each hub’s contribution to the enrollment totals became more equal. The other three hubs had received approval to begin enrolling students in most of their new ShaleNET programs, resulting in significant increases in their enrollment. By contrast, Navarro’s enrollment declined. The pattern of relatively equal enrollment contributions continued over years three and four, even as enrollment overall declined.

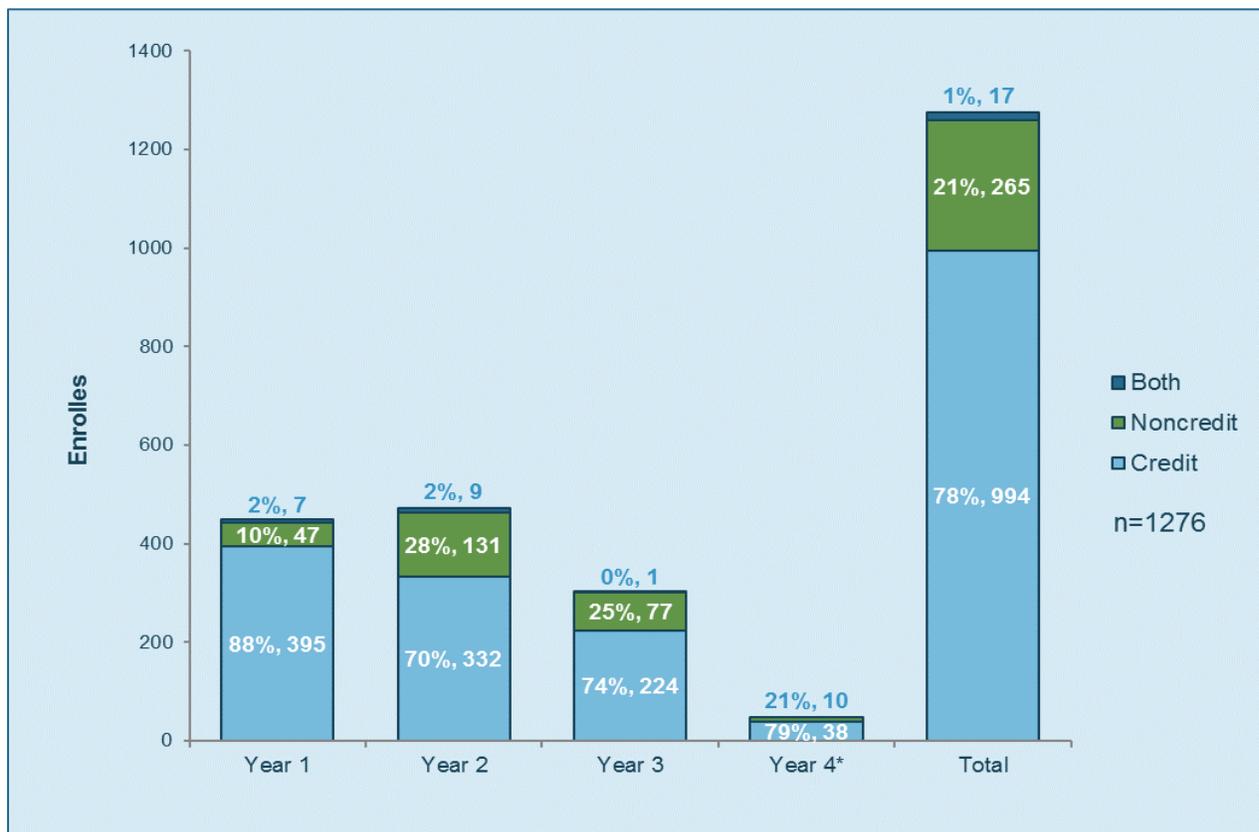
### Student Enrollment by Type and Tier of Program

Overall, nearly 80 percent of ShaleNET students enrolled in a credit program during the grant (Tiers 3 and 4), while only about a fifth enrolled in a noncredit program (see Exhibit IV-4). The percentage of ShaleNET students who enrolled in credit programs

peaked at 88 percent in the first year of the grant (primarily due to Navarro’s heavy contribution of credit enrollees), and stayed at 70 percent or higher throughout the remainder of the grant. Across hubs, Navarro had the highest number and percentage of credit enrollees among its ShaleNET students (620, 100 percent), followed by Stark (247, 84 percent), WCCC (171, 67 percent), and PCT (33, 18 percent).

These results fit with the ShaleNET consortium’s focus during the TAACCCT grant on developing new credit-bearing shale oil and gas programs to complement the already-developed noncredit programs.

Exhibit IV-4: Credit vs. Noncredit Enrollment, by Grant Year and the Entire Grant Period

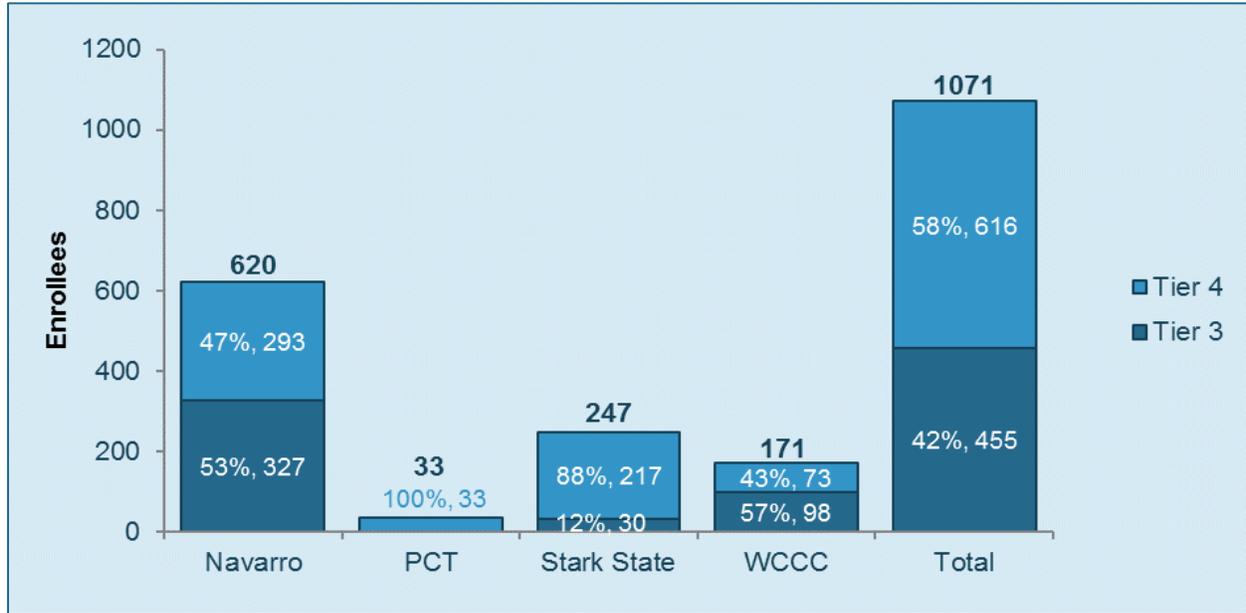


Source: Demographic data about ShaleNET participants was obtained from each hub’s student information systems. Note: Five students had missing graduation dates; data for these students is added to the Year 4 enrollment levels since a grant year could not be determined for these individuals. \*USDOL provided the ShaleNET Consortium a six-month extension of program operations into Year 4; new ShaleNET participants continued to enroll for the first six months of Year 4.

Among credit students overall, a higher percentage of students (58 percent) enrolled in a ShaleNET associate’s degree program versus a Tier 3 certificate program (42 percent). By hub, however, these percentages varied widely. WCCC and Navarro enrolled only 43 and 47 percent of their credit students, respectively, in

AAS programs, whereas 88 percent of credit students at Stark State enrolled in AAS programs.

Exhibit IV-5: Enrollment in Tier 4 vs. Tier 3 ShaleNET Programs, by Hub and for all Hubs

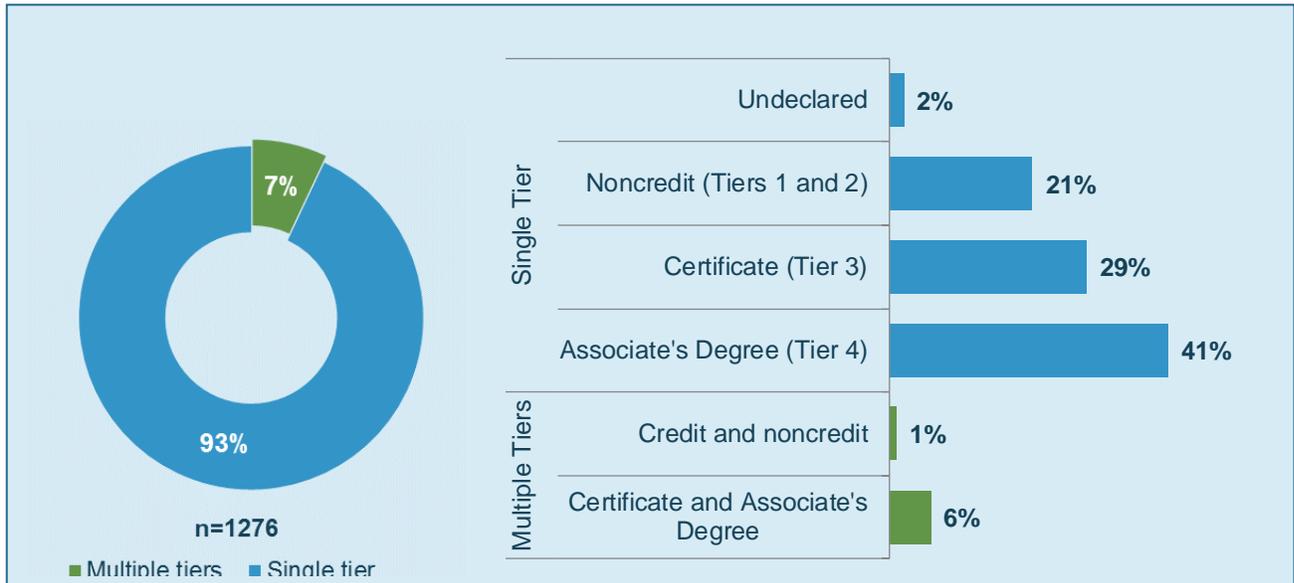


Source: Demographic data about ShaleNET participants was obtained from each hub's student information systems. Note: Data was not available for a small number of participants because ShaleNET enrollees had not declared a ShaleNET major by the time SPR received data. This graphic represents enrollment in programs, so some students are counted multiple times if they enrolled in more than one program of study during the course of the grant period, thus the total number of enrollees in tiers 3 and 4 is higher than the unduplicated numbers of credit students presented in previous exhibits.

### ShaleNET Program Stacking

As discussed in Chapter I, one key component of the ShaleNET model was the ability of students to progress up an oil and gas career ladder in chunks by stacking their ShaleNET training programs across one or more program tiers and earning industry-recognized credentials from each tier of training. However, despite the availability of numerous stacking options, the vast majority of ShaleNET participants (93 percent) enrolled in a single type (Tier) of program (see Exhibit IV-6).

Exhibit IV-6: ShaleNET Enrollment in Single Versus Multiple Tiers



Source: Demographic data about ShaleNET participants was obtained from each hub's student information systems.

Among the seven percent of ShaleNET students who did enroll in programs across more than one tier, most (six percent) enrolled in both a Tier 3 certificate program (or more than one) and a Tier 4 Associate's degree program. The remainder (one percent) enrolled in both a credit (Tier 3 or 4) program and a ShaleNET noncredit program. WCCC had the most students (62) who enrolled in programs in more than one tier, mostly Tiers 3 and 4 (see Exhibit IV-7).

Exhibit IV-7: Student Enrollment in Multiple Tiers by Hub

	Certificate (Tier 3) & AAS (Tier 4)	Credit (Tier 3 or 4) & Noncredit (Tier 2)
<b>Navarro</b>	21	Not Applicable
<b>PCT</b>	Not Applicable	1
<b>Stark State</b>	6	4
<b>WCCC</b>	50	12

Source: Demographic data about ShaleNET participants was obtained from each hub's student information systems.

ShaleNET students and staff members gave several reasons for why these students enrolled in multiple types of programs. Some students did so to mitigate perceived risk: concerned that they would not be able to complete an associate's degree, either because of the cost of being in training for so long or because the program could be too difficult, they either signed up for both the associate's degree and a certificate or first completed a certificate or noncredit program and then later signed up for an associate's

or certificate program. Stated one WCCC student who was concerned that he would not be able to complete his general education requirements to earn an associate's degree: "I'm gonna try to get it [associate's degree], but I need to get back to work to be honest with you. So if I don't...they [the certificates] might get my foot in the door [for a job]."

Other students enrolled in multiple tiers to maximize the number of credentials they could earn and include on their resumes and thus become more appealing to employers. Some credit students stated that they enrolled in their hub's noncredit programs to gain more hands-on oil and gas experience that would also make them stand out to employers. For example, one credit student at PCT stated, "We can get jobs with our mechatronics degree, but the Roustabout training sets us apart from those that do not have it."

Because of the way ShaleNET hubs set up their programs, students noted that stacking them to earn multiple credentials was easy. Stated one Navarro student, "[because] I already had most of my gen[eral] ed[ucation] requirements when I enrolled [in ShaleNET]... getting an associate's degree is kind of easy. Just as easy as getting a certificate is."

Despite the ease of stacking, many students chose not to stack because of the costliness of classes or because they needed to return to the workforce full-time as quickly as possible to support themselves and their families. Said one noncredit student at WCCC, "I was really happy that I could come in here and do the training and find a job all in three weeks...we are surviving on her [wife's] income at present, but I still need to work."

However, the number of students who stack ShaleNET programs may increase over time, as a number of focus group participants indicated that although they were currently enrolled in only one type of program, they planned to return to enroll in other program tiers after working for a period of time. Said one Navarro student: "the reason I did the certificate was mainly for time. You know. I do have three kids. I'm a mom. And it is for me to get my foot in the door. And then when I do have the money I can return to further my education."

*I'm gonna try to get it [associate's degree], but I need to get back to work to be honest with you. So if I don't...they [the certificates] might get my foot in the door [for a job].*

-- ShaleNET student at WCCC

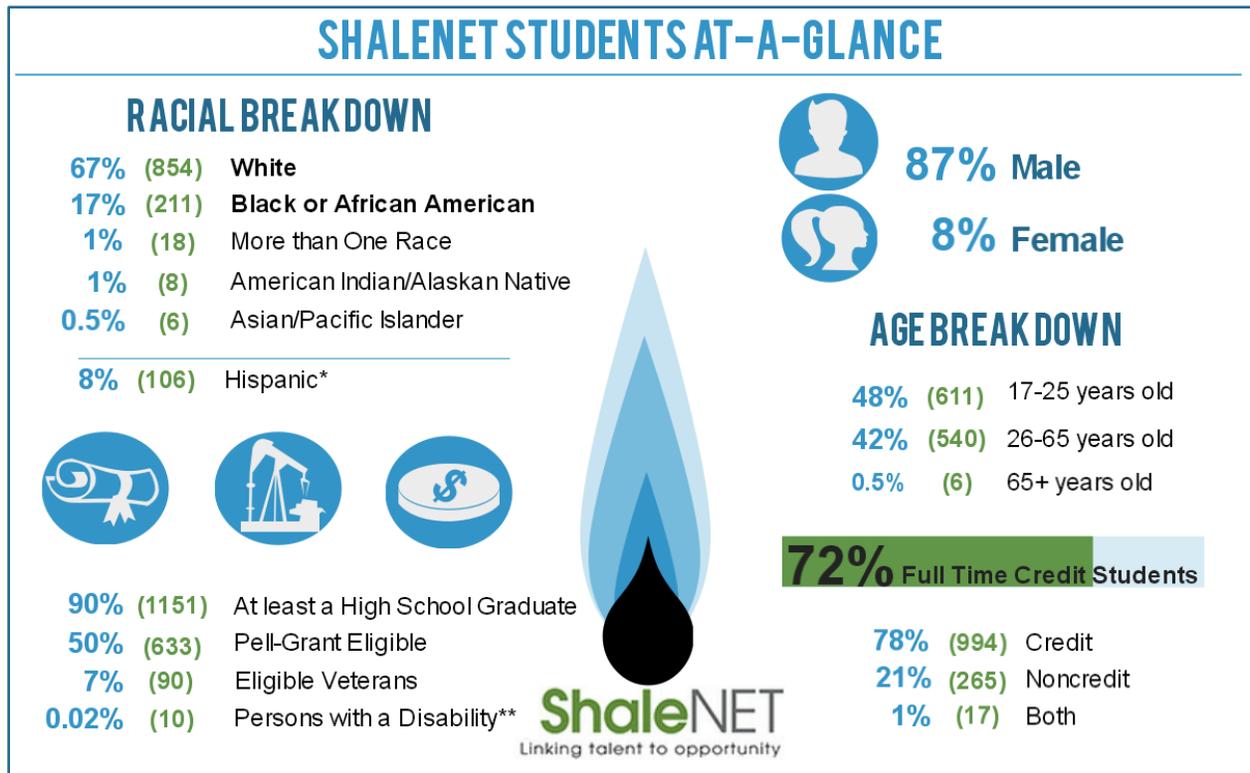
*[Because] I already had most of my gen[eral] ed[ucation] requirements when I enrolled [in ShaleNET]... getting an associate's degree is kind of easy. Just as easy as getting a certificate is.*

-- ShaleNET student at Navarro

## Characteristics of ShaleNET Students

The typical ShaleNET participant was a white man between the ages of 16 and 26 who was in a full-time credit program and had completed his high school diploma (see Box IV-2).

Box IV-2: Key Characteristics of ShaleNET Students



Source: Demographic data about ShaleNET participants was obtained from each hub’s student information systems. Note: This data represents demographic information from all four hubs. In a number of instances, individual-level data was missing for some students across key data elements such as gender, race, ethnicity and age. The breakdown of missing data is as follows: 5 percent gender (62 cases), 7 percent race (86 cases), 6 percent ethnicity (78 cases) and 9 percent age (119 cases). Hispanic is reported in two different ways. All participants who reported Hispanic are included in the 8 percent number. Within the racial categories, there were 7 percent of participants who reported a single race/ethnicity as Hispanic. People who reported a combination of Hispanic and another race category are included in the “More than One Race” category. \*\*The data on “Persons with a Disability” represents data from only two hubs—Navarro and PCT.

Across hubs and tiers, student demographic characteristics—gender, race, and age—were similar to those for the program overall (see Appendix C). There was one notable difference between credit and non-credit students, however. As shown in Exhibit IV-8 below, ShaleNET credit students tended to be slightly younger than those enrolled in noncredit programs.<sup>31</sup> Fifty-one

<sup>31</sup> Navarro did not offer any noncredit ShaleNET programs.

percent of credit students were between the ages of 16 to 25 compared to only 28 percent of noncredit students.<sup>32</sup>

Exhibit IV-8: Age of ShaleNET Participants by Program Type

	Credit Enrollment		Noncredit Enrollment	
	Sample Size	Percent	Sample Size	Percent
<b>17-19</b>	271	27%	13	5%
<b>20-25</b>	257	26%	62	23%
<b>26-65</b>	387	39%	144	54%
<b>65+</b>	4	0%	2	1%
<b>Missing data</b>	75	8%	44	17%
<b>TOTAL</b>	994	100%	265	100%

Source: Demographic data about ShaleNET participants was obtained from each hub's student information systems. Note: This data represents demographic information from all four hubs. Across the four hubs demographic data on age was missing in 119 cases, which accounts for 9 percent of the 1276 students enrolled in ShaleNET programs over the life of the grant. In addition, this exhibit does not display the 17 students who were enrolled in both credit and noncredit programs.

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<sup>32</sup> The distributions of demographic characteristics in this report differ from those in the final grant performance report submitted to USDOL for two reasons. First, as noted above, this report is based on fewer participants than the grant performance report. Second, data on demographics for this report were obtained primarily from college student information systems, whereas the demographic data included in the USDOL grant performance report was obtained from multiple sources.

## V. Participant and Employer Outcomes and Impacts for ShaleNET Programs

In this chapter, we present findings on educational and labor market outcomes for ShaleNET participants who enrolled in ShaleNET programs, primarily between fall 2012 and fall 2015.<sup>33</sup> We also describe findings on the impact of participation in noncredit ShaleNET programs on labor market outcomes. Finally, we present some findings on outcomes for employers.<sup>34</sup> As discussed in the Introduction chapter, participant educational outcomes were calculated using data collected from each ShaleNET hub, while labor market outcomes were calculated using UI wage record data obtained from Pennsylvania, Texas, and Ohio.<sup>35</sup> Note that labor market outcome data from Ohio (for students who completed ShaleNET programs at Stark State) is only included in two of the labor market outcome exhibits because those data were not received in time to include them in all analyses.

### Educational Outcomes for Participants

As of December 31, 2015, approximately 40 percent of participants (n=490) had completed one or more ShaleNET credentials since the beginning of the grant on October 1, 2012 (Exhibit V-1). The largest proportion (22 percent) completed a noncredit program, 9 percent completed a credit certificate, 6 percent earned multiple types of credentials, and 3 percent completed an associate's degree. Among those participants who earned multiple types of credentials, most earned both an

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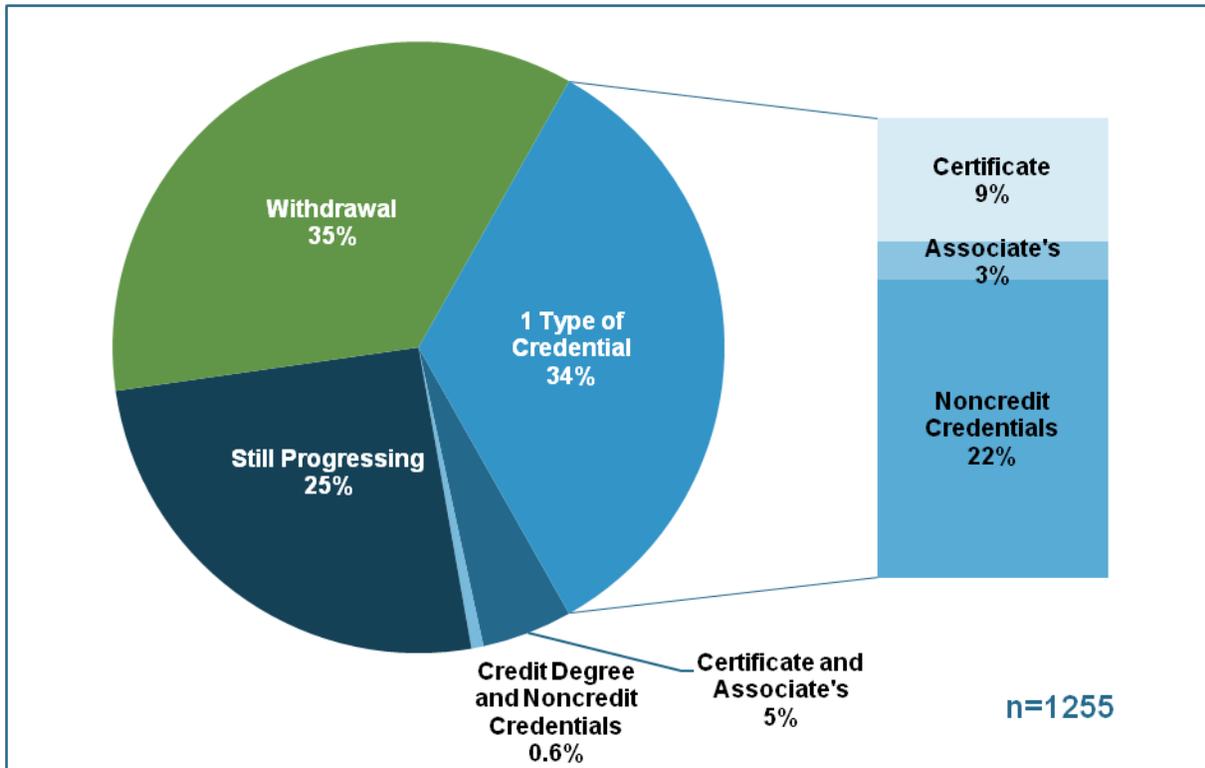
<sup>33</sup> One hub reported data on noncredit enrollees after Fall 2015 and three hubs reported on credit enrollees after Fall 2015, but the majority (approximately 90 percent) of participant data are from between Fall 2012 and Fall 2015. For our analyses of educational outcomes for credit and noncredit programs, we include participants who enrolled between Fall 2012 and Spring 2016 (but before March 31, 2016); due to UI wage data reporting delays, we do not include any participants who completed after December 31, 2015.

<sup>34</sup> The employer outcomes section is based on data collected via an online survey in early 2016 of employers that either partnered with ShaleNET or hired a graduate or intern of the program; a survey in spring 2014 of employers who were members of the Marcellus Shale Coalition; and phone or in-person interviews conducted with eight employer partners in 2013, 2014, and 2015.

<sup>35</sup> SPR calculated the educational outcomes using data from each hub's student information systems and obtained information on industry-recognized credentials from each hub's program managers.

associate's degree and a certificate (five percent of participants). Only 0.6 percent of participants completed both credit and noncredit credentials. The portion completing both credit and noncredit credentials is likely to be higher in later years after more students complete their credit programs (which are much longer than noncredit programs).

Exhibit V-1. Degrees and Noncredit Certificates Earned by ShaleNET Participants



Source: Hub student information systems. Notes: Types of credentials earned included Associate degrees and certificates (for credit programs) and noncredit industry-recognized credentials. Data on credit degrees earned are through the Fall 2015 semester, except for the two hubs that provided partial degree earned data for Spring 2016. The sample size is 1,255 and excludes participants who did not have a declared major in the data received from the hubs. Withdrawals are defined as students not enrolled at the college in Fall 2015 and Spring 2016, except for at Stark, where withdrawals are measured for Fall 2015 only, because of data availability.

Of participants who had not earned a credential as of December 31, 2015, 25 percent were still enrolled and progressing toward that goal, while about one third (35 percent) had withdrawn from their college.<sup>36</sup>

<sup>36</sup> We received data in Spring 2016 and reporting delays may have caused underreporting in the Spring 2016 enrollment information we received. To compensate for these possible reporting delays we defined withdrawal to include anyone not enrolled in *both* Fall 2015 and Spring 2016. Note that ShaleNET's overall

The portion of participants who earned a noncredit credential, associate's degree, or certificate varied by hub, depending on what portion of its students were enrolled in noncredit versus credit programs. For example, 83 percent of PCT's participants earned some type of credential primarily because the bulk of the hub's ShaleNET participants took part in a 2-3 week noncredit program during which they earned from 4 to 7 industry-recognized credentials. Similarly, at WCCC, which also served a large portion of noncredit students, 74 percent of participants earned some type of credential. By contrast, Navarro and Stark State, where all (or nearly all) participants pursued one-year certificates or two-year associate's degrees, had much lower overall credential completion rates because so many students had not had enough time to complete their programs by the end of the grant period (see Exhibit V-2).

Exhibit V-2. Types of Credentials Earned, by Hub

	Overall (n=1255)	Navarro (n=599)	PCT (n=184)	Stark (n=283)	WCCC (n=189)
% Types of Credentials Earned	39%	23%	83%	22%	74%
Noncredit Credential	22%	0%	82%	16%	40%
Certificate	9%	11%	0%	0%	25%
Associate's Degree	3%	3%	1%	5%	0%
Certificate and Associate's	5%	9%	0%	0%	4%
Credit Degree & Noncredit Credential	1%	0%	0%	0%	4%

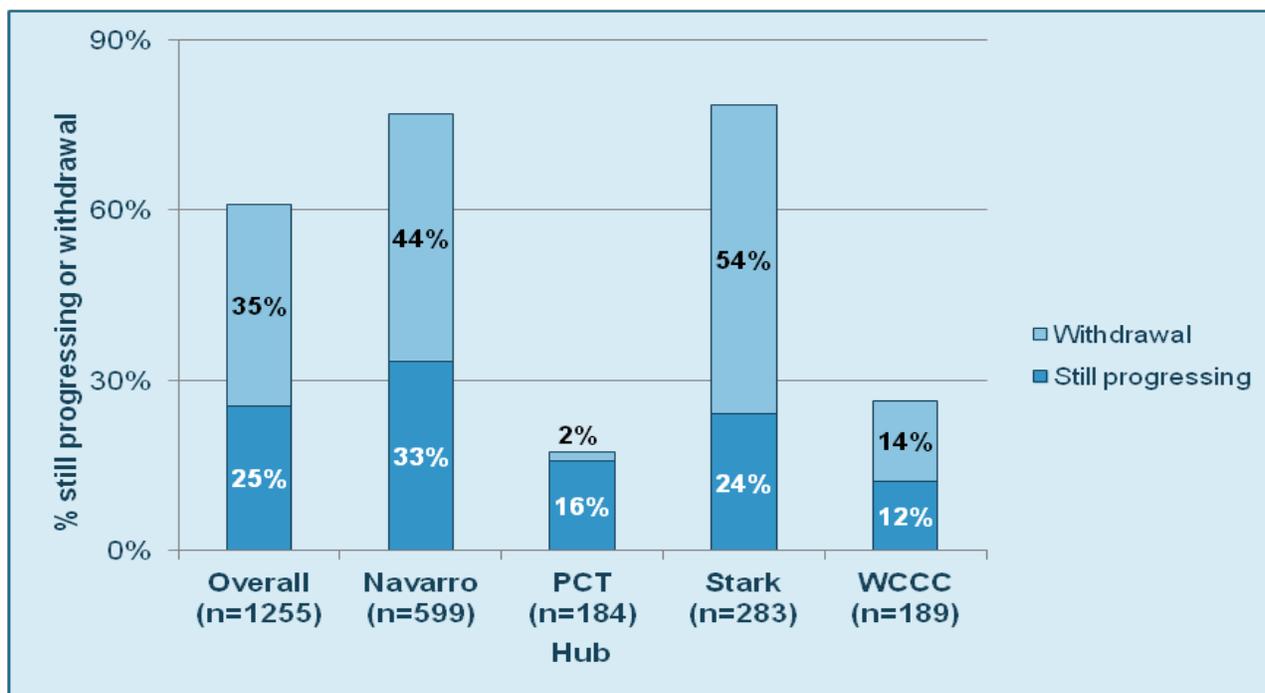
Source: Hub student information systems. Notes: This table shows the percent of ShaleNET participants that earned different types of credentials. The types of credentials are Associate degrees and certificates (for credit programs) and noncredit industry-recognized credentials.

For similar reasons, both Stark and Navarro also had higher overall percentages of participants who were still progressing toward their credentials (24 percent and 33 percent, respectively) (Exhibit V-3). Further, because credit students were more likely to withdraw from their programs without earning a credential, Navarro and Stark also had higher overall withdrawal rates (54 percent and 44 percent, respectively).

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withdrawal rate is much lower than the national rate for community colleges. According to the U.S. Department of Education, among students who started as full-time, first-time students at public two-year degree-granting institution in 2010, about 80 percent did not graduate with an associate's degree or certificate within 150 percent of normal time. 150 percent of normal time for a two-year associates degree would be three years (i.e., 1.5 x 2). See National Center for Education Statistics, *Digest of Education Statistics*, [http://nces.ed.gov/programs/digest/d14/tables/dt14\\_326.20.asp](http://nces.ed.gov/programs/digest/d14/tables/dt14_326.20.asp).

Exhibit V-3. Still Progressing and Withdrawals, by Hub



Source: Hub student information systems. Notes: Withdrawals are defined as students not enrolled at the college in both Fall 2015 and Spring 2016, except for at Stark where they are measured for Fall 2015 only, because of data availability. “Still progressing” refers to participants who have neither obtained at least one credential nor withdrawn.

### Credit Participant Educational Outcomes

Among the 952 ShaleNET participants who enrolled in a credit-bearing program during the grant period, as of the end of fall semester 2015, about one fifth had earned a credential, another third were still progressing toward achieving a credential, and 45 percent had withdrawn from the program and the college (see Exhibit V-4). By hub, WCCC had the highest portion of credit enrollees who had obtained a credential (56 percent), a result that was likely due to that fact that it was the only hub that offered single-semester certificates.<sup>37</sup> PCT, meanwhile, which offered only a single credit program—an associate’s degree—had the highest percentage of students who were still progressing in their

<sup>37</sup> As discussed in Chapter II, WCCC offered certificates that required only 16 credits for completion and could be earned in a single semester. By contrast, Stark and Navarro offered only year-long certificate programs, and PCT offered no certificate programs.

programs (88 percent). Finally, Stark had the highest percentage of credit students who had withdrawn (65 percent).<sup>38</sup>

Exhibit V-4. Degrees Earned by ShaleNET Credit Participants

	Overall Credit				
	Participants (n=982)	Navarro (n=599)	PCT (n=33)	Stark (n=237)	WCCC (n=113)
<b>Credit Degrees Earned</b>	<b>22%</b>	<b>23%</b>	<b>3%</b>	<b>6%</b>	<b>56%</b>
Certificate	12%	11%	0%	0%	49%
Associate's Degree	4%	3%	3%	6%	0%
Certificate and Associate's	6%	9%	0%	0%	7%
<b>Still Progressing</b>	<b>33%</b>	<b>33%</b>	<b>88%</b>	<b>29%</b>	<b>20%</b>
<b>Withdrawals</b>	<b>45%</b>	<b>44%</b>	<b>9%</b>	<b>65%</b>	<b>24%</b>
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: Hub student information systems. The sample includes only students who are pursuing a credit certificate or associate's degree. Withdrawals are defined as students not enrolled at the college in Fall 2015 and Spring 2016, except for at Stark where they are just measured for Fall 2015 only, because of data availability.

Due to the large number of credit participants who were still working on their credentials, we also examined the ratio of credits earned to credits attempted as a measure of how well students were doing academically (e.g., what percentage of their classes they had passed) and thus whether they were likely to complete their programs in the future. Based on data from two hubs (PCT and WCCC), we found that ShaleNET credit students were able to complete on average between 83 and 97 percent of the credits they attempted, and so had not failed many classes.<sup>39</sup>

### Noncredit Participant Educational Outcomes

Likely in large part because of the short duration of their programs, 99 percent of ShaleNET noncredit participants completed their training programs; only one percent withdrew.<sup>40</sup>

<sup>38</sup> One reason Stark's withdrawal rate may be higher than the others is because it is based only based on enrollment status in Fall 2015 because enrollment status for Spring 2016 was not available. For the other hubs withdrawal is defined as not being enrolled in both the Fall 2015 and Spring 2016.

<sup>39</sup> One hub could not provide credits attempted/earned data in time to included in the report. Another hub's credits earned data included data on transfer credits, which could not be separated out with the available data, so it was not included in these calculations.

<sup>40</sup> Because of the cohort structure of noncredit programs and the fact that none were still in progress as of March 31, 2015, no noncredit participants were still progressing toward program completion as of the end of the grant.

ShaleNET noncredit program participants had the opportunity to earn not just a single credential in each program, but an average of five industry-recognized credentials if they completed the entire program. Consequently, the 281 ShaleNET noncredit program completers earned a total of 1,604 credentials during their program participation (see Exhibit V-5; Appendix D also provides a list of each of the industry-recognized credentials awarded by each program).

Exhibit V-5: Industry-Recognized Credentials Earned in ShaleNET Noncredit Programs

Hub	Tier 1/2 Noncredit Programs	# of Students Enrolled	% Completing	# of Credentials Awarded	Avg. # of Credentials Awarded per Student
<b>PCT</b>	Roustabout Field Service Worker – 15 Day	20	100%	80	4
	Roustabout Field Service Worker – 21 Day	102	99%	697	7
	Floorhand	27	100%	162	6
	Welder’s Helper	3	100%	15	5
<b>Stark State</b>	Floorhand	46	100%	230	5
<b>WCCC</b>	Service Unit Operator (Roustabout and Floorhand hybrid)	84	100%	420	5
	<b>Total</b>	<b>282</b>	<b>99% (281/282)</b>	<b>1604</b>	<b>5.7</b>

Source: Hub noncredit program managers. Notes: Navarro is not included in this table because they did not offer any noncredit programs.

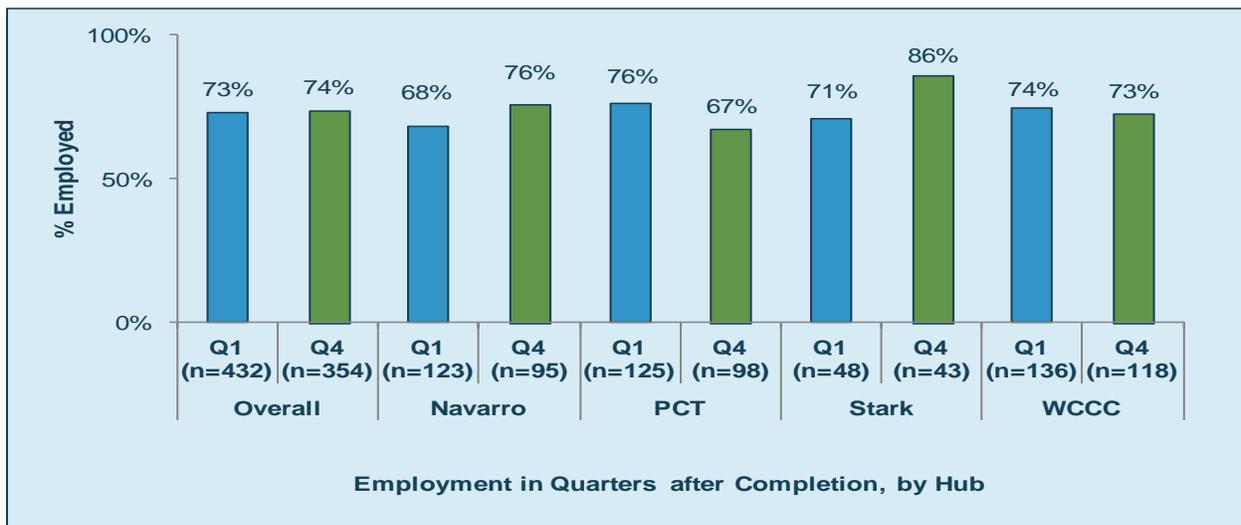
## Labor Market Outcomes and Impacts for Participants

Based on UI wage record data, about three-quarters of ShaleNET participants from Navarro, PCT, Stark, and WCCC were employed in both the first quarter and fourth quarters after program completion (see Exhibit V-6).<sup>41</sup> Although these employment rates

<sup>41</sup> Note that UI wage data are reported in calendar quarters and thus we report labor market outcomes in this chapter in calendar quarters as well. These quarters are defined as follows: Quarter 1, January through March; Quarter 2, April through June; Quarter 3, July through September; Quarter 4, October through December. Information about the employment status of ShaleNET completers was obtained from Pennsylvania and Texas state UI wage records. As noted at the beginning of this chapter, wage record data

were fairly high, they and all the others presented in this chapter likely underestimate ShaleNET completer employment because they do not include out-of-state employment. Thus, given the highly mobile nature of workers in the oil and gas industry and the close proximity of both WCCC and Stark to the borders of neighboring states, it is likely that a number of ShaleNET completers who did not appear in the wage data provided by the state in which their ShaleNET hub was located were not unemployed, but were instead employed in another state.

Exhibit V-6. Employment in the Quarters after Completion



Source: Texas, Pennsylvania, and Ohio state UI wage data. Notes: Employment after completion is defined as having positive earnings in the quarters after completion of a ShaleNET program. The sample size decreased over time because state wage record data were available only through the first quarter of 2016. When we restricted the sample to the group who had data for all four quarters, 1st quarter employment rates generally improved: 75% (overall), 72% (Navarro), 81% (PCT), 70% (Stark) and 75% (WCCC).

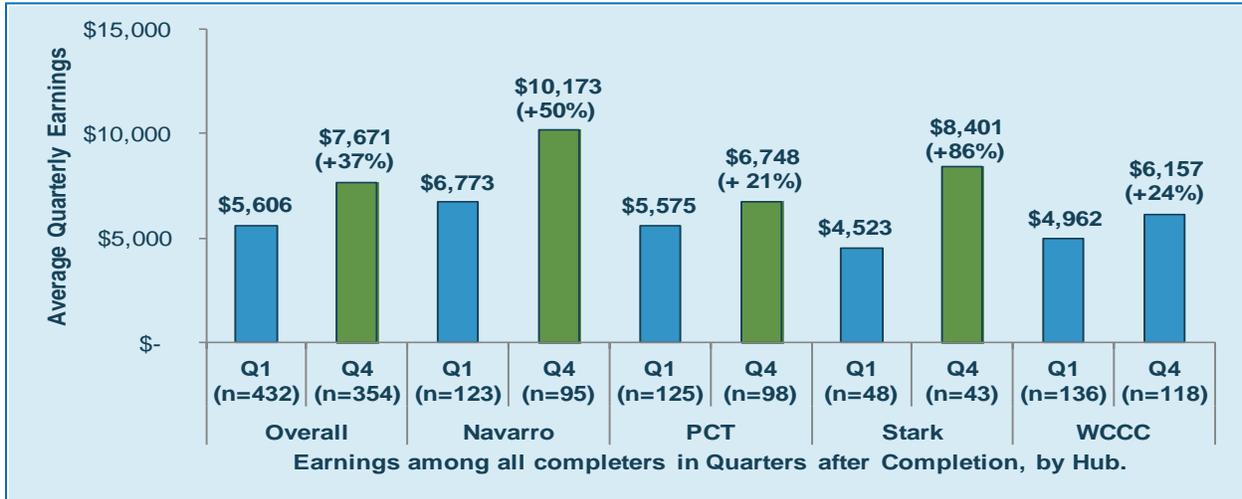
Overall, ShaleNET completers had average quarterly earnings of \$5,606 in their first quarter after completing the program, with Navarro’s completers earning the most (\$6,773), and Stark completers earning the least (\$4,523) (see Exhibit V-7)<sup>42</sup>. Over the following three quarters, these average quarterly earnings

from Ohio were not available in time to include in this report. The post-completion wage data for Pennsylvania and Texas cover the period from the fourth quarter of 2012 to the first quarter of 2016. The period for Ohio wage data is the fourth quarter of 2013 to the first quarter of 2015. Consequently only ShaleNET participants who completed prior to December 31, 2015 were included in this analysis, with the exception of Stark where only completers prior to December 31, 2014 were included. A small number of completers (approximately 40) were also excluded from this analysis because their ShaleNET exit quarter was not identifiable in the wage data received from the states.

<sup>42</sup> These averages include all completers, including those who were unemployed.

increased overall by about 37 percent, with the highest rate of increase at Stark.

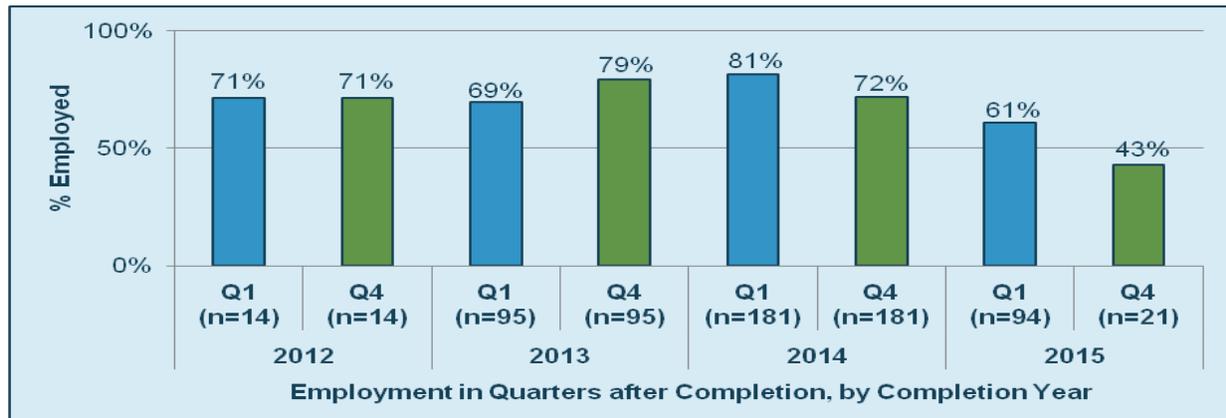
Exhibit V-7. Average Quarterly Earnings in the Quarters after Completion



Source: Texas, Pennsylvania, and Ohio state wage records. Notes: The average wage is calculated for all completers including those who had zero earnings in a quarter. The sample size decreases over time because state wage record data were available only through the first quarter of 2016.

Although the overall employment rates for ShaleNET completers remained fairly constant over the year following program completion, this result masks the fact that participants who completed a ShaleNET program in 2015—after the major drop in oil prices discussed in Chapter I—were much less likely to be employed than those who completed in prior years, particularly 2014 (see Exhibit V-8).

Exhibit V-8. Employment in the Quarters after Completion for ShaleNET Completors at Navarro, PCT, and WCCC, by Completion Year

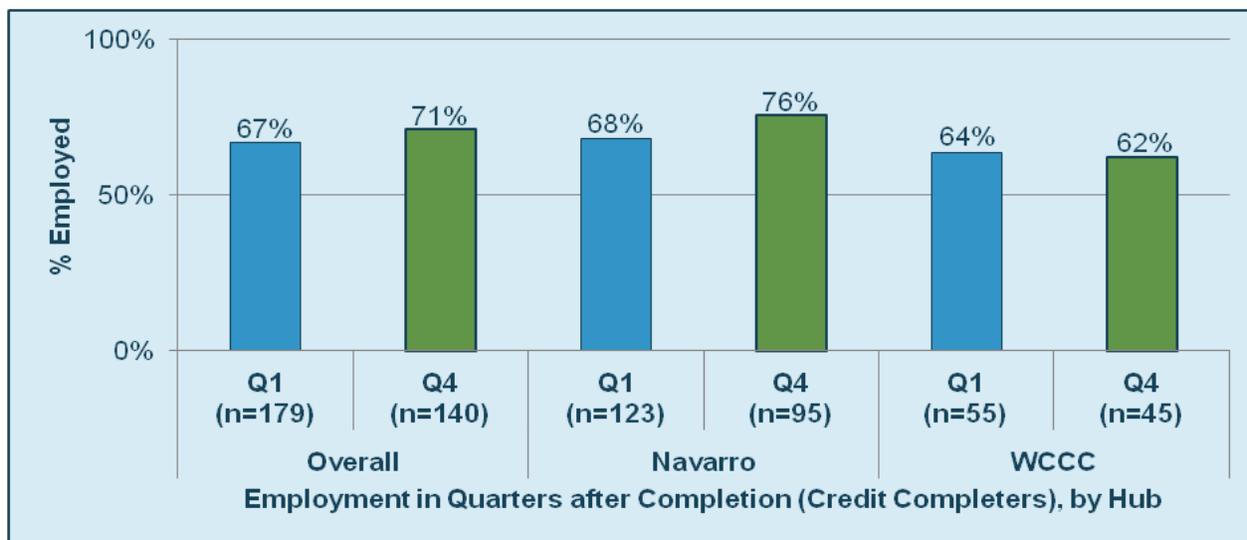


Source: Texas and Pennsylvania state UI wage data. Notes: Employment after completion is defined as having positive earnings in the quarters after completion of a ShaleNET program. The sample size decreased over time because state wage record data were available only through the first quarter of 2016.

## Credit Program Completer Labor Market Outcomes

As compared to ShaleNET completers overall, employment rates for credit completers were slightly lower in the first quarter after the exit quarter (see Exhibit V-9).<sup>43</sup> However, by the fourth quarter, the employment rate for credit completers increased to 71 percent. By hub, Navarro's credit completers were somewhat more likely to be employed than WCCC's in both quarters.

Exhibit V-9. Employment in the Quarter after Completion for ShaleNET Credit Completers



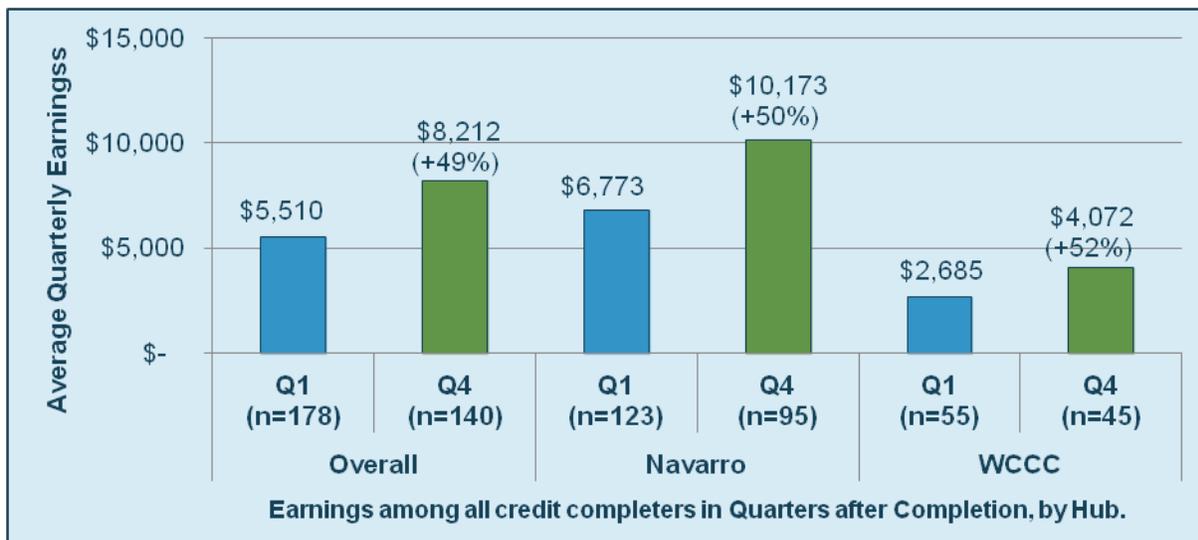
Source: Texas and Pennsylvania state UI wage data. Notes: Employment after completion is defined as having positive earnings in the quarters after completion of a ShaleNET program. The sample size is 179 in the first quarter after completion and excludes completers who completed in 2016 because post completion wage record data were not available for this group. The overall number includes the PCT completer. The sample size decreases over time because state wage record data were available only through the first quarter of 2016. The noncredit and credit groups are not mutually exclusive. Eighteen participants had missing information on their noncredit/credit status in the state administrative data and were included in the overall numbers but not in the noncredit and credit analysis.

ShaleNET credit completers had average quarterly earnings of \$5,510 in their first quarter after completing the program, with Navarro's completers earning the most (\$6,773) and WCCC's

<sup>43</sup> Note that these analyses did not include PCT or Stark State completers. For PCT, credit completers were not included because the number was too small to guarantee anonymity. For Stark State, as noted above, wage data were not received from the state in time to be included in these analyses. For Navarro only, we were also able to obtain information from UI wage records on the industry of employment for credit completers as follows: 43 percent were employed in the crude petroleum and natural gas extraction industry (n=31) or in support activities for oil and gas operations (n=5); 10 percent were employed in manufacturing; 10 percent in retail trade; 7 percent in administrative and support or waste management and remediation services; the remaining 30 percent were in all other industries. The full distribution across industries can be found in Appendix E.

completers earning the least (\$2,685) (see Exhibit V-10).<sup>44</sup> Over the following three quarters, these average quarterly earnings increased overall by about 49 percent, with WCCC’s completers having a slightly higher rate of increase.

Exhibit V-10. Average Quarterly Earnings of ShaleNET Credit Completers at Navarro and WCCC



Source: Texas and Pennsylvania state wage records. Notes: The average earnings is calculated for all completers including those with zero earnings in a quarter. The sample size decreases over time because state wage record data were available only through the first quarter of 2016. The overall percent change is lower than the percent change for each subgroup because the Q1 sample and Q4 sample are different groups. When the sample is constant across Q1 and Q4 (n=140), the percent change is 40% overall, 33% for Navarro, and 88% for WCCC.

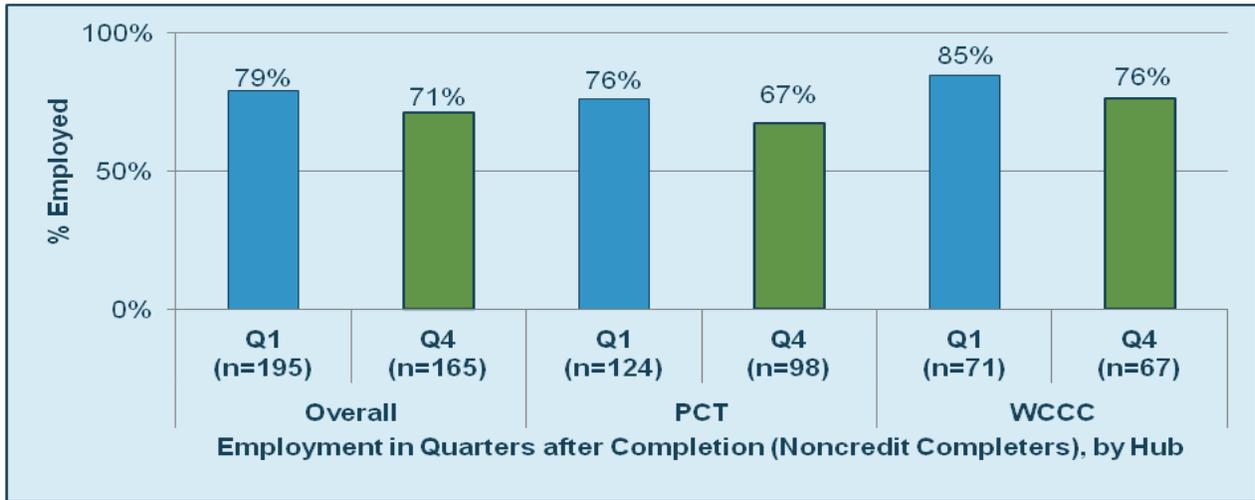
### Noncredit Completer Labor Market Outcomes

Noncredit completers had a higher employment rate than credit completers in the first quarter after completion, 79 percent versus 67 percent (see Exhibit V-11).<sup>45</sup> By hub, this rate was higher for WCCC completers than for PCT completers (85 percent versus 76 percent). However, these employment rates decreased over the next three quarters after completion, both overall and by hub.

<sup>44</sup> Average earnings in the first quarter after program completion, restricted only to those who were employed, were \$8,071 overall, \$9,676 at Navarro, and \$4,219 at WCCC.

<sup>45</sup> Due to wage data reporting delays, these results include only data on noncredit completers who finished their programs prior to December 31, 2015. Further, these results do not include any Stark State noncredit completers, as UI wage data from the state of Ohio were not available in time to include Stark in the this analysis. Results for Navarro are not included in this analysis as the hub had no noncredit participants.

Exhibit V-11. Employment in the Quarter after Completion for ShaleNET Noncredit Completers, by Hub

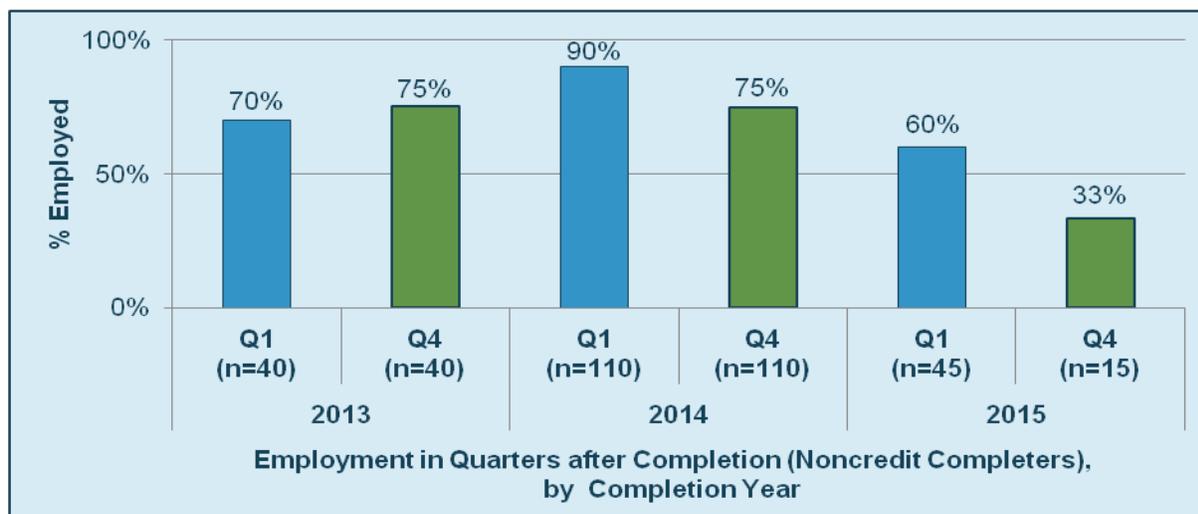


Source: Texas and Pennsylvania state UI wage data. Notes: Employment after completion is defined as having positive earnings in the quarters after completion of a ShaleNET program. The sample size is 195 in the first quarter after completion and excludes completers who completed in 2016 because post-completion wage data were not available for this group. The sample size decreases over time because state wage record data were only available through the first quarter of 2016.

Much of this decline was due to the much lower employment rates of 2015 noncredit completers (see Exhibit V-12). These poor results for 2015 completers are unsurprising since these individuals finished their programs after the precipitous decline in oil prices and the accompanying decline in drilling activity across shale plays that was described in Chapter I.<sup>46</sup>

<sup>46</sup> As discussed in Chapter II, most of ShaleNET’s noncredit programs were focused on preparing participants for gas extraction-related activities, rather than activities related to transporting or processing gas and gas-related products.

Exhibit V-12. Employment in the Quarter after Completion for ShaleNET Noncredit Completers, by Completion Year

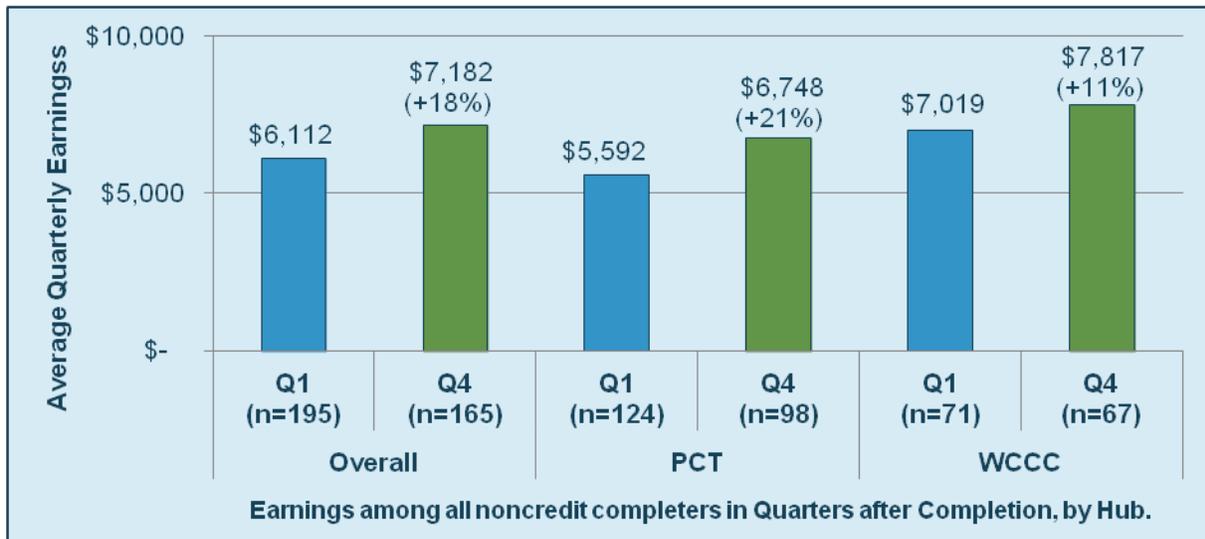


Source: Pennsylvania state wage records. Notes: Employment after completion is defined as having positive earnings in the quarters after completion of a ShaleNET program. The sample size decreases over time because state wage record data were available only through the first quarter of 2016.

Average quarterly earnings for noncredit completers were \$6,112 in the first quarter after program completion, which was higher than for credit completers (see Exhibit V-13).<sup>47</sup> However, noncredit completers' average quarterly earnings increased much less (18 percent) over the following three quarters. By hub, although PCT noncredit completers' earnings increased by 10 percentage points more than those of WCCC completers between the first and fourth quarters after program completion, WCCC completers' earnings were higher in both of those quarters.

<sup>47</sup> Average earnings in the first quarter after program completion, restricted only to those who were employed, were \$7,739 (overall), \$7,377 at PCT, and \$8,306 at WCCC.

Exhibit V-13. Average Quarterly Earnings after Completion for ShaleNET Noncredit Completers



Source: Texas and Pennsylvania state UI wage data. Notes: The average earnings in a quarter is calculated for everyone with positive earnings in a given quarter. The sample size decreases over time because earnings data were available only through the first quarter of 2016.

### Noncredit Completer Labor Market Impacts

To increase the rigor of our analysis of labor market outcomes for noncredit completers, in addition to computing the employment and earnings outcomes presented above, we also compared those outcomes to the outcomes of a matched comparison group that received other short-term services to help them find employment. This comparison group was selected using propensity score matching. Conducting a matched comparison group analysis (also referred to as a quasi-experimental analysis) is one way to estimate a program’s impacts, which are the changes that can be attributed to a particular intervention.<sup>48</sup> By conducting such an impact analysis, we can more confidently attribute ShaleNET completers’ labor market outcomes to ShaleNET, rather than to outcomes those participants would have

<sup>48</sup> Another, even more rigorous way to compute impacts is to randomly assign individuals eligible for the program to two groups, one that receives program services and one that does not, and to use the group that does not receive services as the comparison group. This method of creating a comparison group controls for unobservable differences between the groups (such as motivation), and thus allows for differences observed after exposure to the program to be attributed to the program. One limitation of using a matched comparison group rather than a randomly assigned comparison group is that the lack of randomization prevents such attributions from being made with as much confidence (Shadish, Cook, and Campbell, 2001).

achieved even if they had not participated in a ShaleNET program.<sup>49</sup>

Our comparison group population was comprised of individuals who received employment-related services from other federally funded employment programs, such as the Employment Service or WIOA Adult or Dislocated Worker programs, in Pennsylvania, and exited services between the third quarter of 2013 and the fourth quarter of 2015. We drew our comparison group from two groups:

- **Non-Training Group:** This population excluded all individuals who received some sort of training because training received through these alternative programs was almost always much longer than the two- to three-week ShaleNET noncredit programs.
- **Staff-Assisted Services Group:** This population was a subset of the Non-Training Group as it also excluded any individuals who accessed services without assistance from program staff members.

In addition, we subdivided the above populations by time. One group included the entire sample. The second was restricted to those for whom we had four quarters of outcome information (i.e., those who completed on or before March 31, 2015). The latter population allowed us to examine all four quarters for the same matched sample.

We then used two propensity score matching methods (nearest neighbor and caliper) to construct different matched comparison groups from all of these populations, and compared the outcomes for each of these groups to those of ShaleNET completers to estimate the impacts of ShaleNET noncredit programs. (Appendix

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<sup>49</sup> SPR was able to examine the labor market impacts of ShaleNET's noncredit programs only at the two Pennsylvania hubs (PCT and WCCC) because either there were too few completers during the period for which we could obtain UI wage data, or we were unable to obtain data for an appropriate comparison population from which to select a matched comparison group, which, ideally, would have been a group drawn from the eligible ShaleNET program applicant population. In the case of Pennsylvania noncredit ShaleNET programs, we did have access to a large Pennsylvania database (CWDS) with information on individuals who would have been eligible for ShaleNET. However, for the other hub with a sufficiently large number of participants who were enrolled long enough to complete their ShaleNET programs (Navarro), finding a suitable comparison group made up of individuals who would have been eligible for ShaleNET was more challenging. We did consider and initially select another technical training program at the college (welding) to serve as the comparison group, but then decided against doing so because the small size of the comparison group population (welding enrollees) would have made it very difficult to construct sufficiently matched comparison groups using propensity score matching, and due to the very late arrival of the Texas UI wage data, we did not have time to do so.

F provides a more detailed description of the methodology used to carry out these analyses.)

### Findings

Participation in ShaleNET noncredit programs had a positive and significant impact on employment in the first, second, and third quarters after completion relative to the Non-Training comparison groups. For example, participation in a ShaleNET noncredit program was associated with a 1.87 higher likelihood of employment in the first quarter after completion. For the sample who completed their ShaleNET programs prior to the first quarter of 2015, that greater likelihood of being employed increased to between 3.07 and 3.18 depending on the model (Exhibit V-14).<sup>50</sup>

Exhibit V-14. Estimates of the Impact of ShaleNET Noncredit Program Participation versus Two Comparison Groups on the Likelihood of Employment in the Quarters after Program Completion

Impacts relative to Non-Training Group (i.e., received any other federally-funded employment service for more than one day, except training)					
Model	All	Sample completing between 2013 and 2015 1st quarter			
	Q1 (n=353)	Q1 (n=302)	Q2 (n=302)	Q3 (n=302)	Q4 (n=302)
Model 1 Nearest Neighbor	1.87*	3.07*	1.73*	1.54	1.01
Model 2 Caliper	1.81*	3.18*	1.74*	1.53	1.01
Impacts relative to Staff-Assisted Services Group (i.e. received any staff-assisted federally-funded employment service, except training)					
Model	All	Sample completing between 2013 and 2015 1st quarter			
	Q1 (n=305)	Q1 (n=245)	Q2 (n=245)	Q3 (n=245)	Q4 (n=245)
Model 1 Nearest Neighbor	1.5	1.99*	1.1	0.89	0.8
Model 2 Caliper	1.49	1.69	0.88	0.56	0.52*

Notes: \* indicates significance at the .10 level. Model 1 uses nearest neighbor matching and the logit model controls for county of residence, earnings in the third quarter prior to participation, gender, age, and race/ethnicity. Model 2 uses caliper matching and the same logit model as Model 1. The models in the Staff-Assisted Services group section include education level as an additional matching variable, the details on why are explained in the appendix. The sample sizes are slightly lower for the caliper matching group because of the .001 radius restriction (353 v 344 and 302 v 296).

Although impacts were less consistent when ShaleNET completers were compared to comparison groups made up of

<sup>50</sup> Since we had wage data only through the first quarter of 2016, the first quarter of 2015 was chosen as a threshold, so that each of the four quarters after completion would include the same sample. This allowed us to select one comparison group for all four quarters.

individuals who received only staff-assisted employment services, there were positive impacts for ShaleNET completers who finished their ShaleNET programs between the third quarter of 2013 and the first quarter of 2015 (see Exhibit V-14). Indeed, the decline in estimated impacts between the 1<sup>st</sup> quarter after completion and the 4<sup>th</sup> quarter imply that ShaleNET’s impacts were quite strong when the oil and gas extraction sector was doing well, but less so when the sample included participants who entered the labor market when the oil and gas extraction sector was in a deep economic contraction, as it was during the second half of 2015.

We also estimated the impact of ShaleNET noncredit participation on earnings, and found that it was associated with higher earnings in the quarters after completion relative to both sets of comparison groups who received alternative employment services other than training (see Exhibit V-15).

Exhibit V-15. Estimates of the Impact of ShaleNET Noncredit Program Participation versus Two Comparison Groups on Earnings in the Quarters after Program Completion

Impacts relative to Non-Training Group (i.e., received any other federally-funded employment service for more than one day, except training)					
Model	All	Sample completing between 2013 and 2015 1st quarter			
	Q1 (n=353)	Q1 (n=302)	Q2 (n=302)	Q3 (n=302)	Q4 (n=302)
Model 1 Nearest Neighbor	2538.61*	2852.9*	2710.15*	2606.31*	2150.93*
Model 2 Caliper	2550.68*	2866.57*	2726.08*	2616.05*	2121.78*
Impacts relative to Staff-Assisted Services Group (i.e. received any staff-assisted federally-funded employment service, except training)					
Model	All	Sample completing between 2013 and 2015 1st quarter			
	Q1 (n=305)	Q1 (n=245)	Q2 (n=245)	Q3 (n=245)	Q4 (n=245)
Model 1 Nearest Neighbor	2356.85*	2660.94*	2678.14*	1809.75*	2290.45*
Model 2 Caliper	2062.45*	2461.14*	2150.14*	1231.38	1584.31

Notes: \* indicates significance at the .10 level. Model 1 uses nearest neighbor matching and the logit model controls for county of residence, earnings in the third quarter prior to participation, gender, age, and race/ethnicity. Model 2 uses caliper matching and the same logit model as Model 1. The models in the Staff-Assisted Services group section include education level as an additional matching variable, the details on why are explained in the appendix. The sample sizes are slightly lower for the caliper matching group because of the .001 radius restriction (353 v 344 and 302 v 296).

## Employer Outcomes

The high proportion (73 percent) of ShaleNET completers who were employed in the first quarter after completion demonstrated that many employers met their hiring needs with ShaleNET graduates. In this section we describe the reasons employers

gave for why they hired ShaleNET completers and how they reported that ShaleNET had eased their hiring processes. These findings are based 11 employer survey responses from 2016; on interviews with 8 employer representatives conducted in 2013, 2014, and 2015; and on results from a survey conducted by the MSC of its members in spring 2014.<sup>51</sup>

## Reasons Employers Gave for Hiring ShaleNET Students

Employer representatives who worked at companies that hired ShaleNET graduates (5 of 11 respondents) indicated that they hired ShaleNET graduates primarily for their technical skills and knowledge of the industry.

Four of five of these respondents also indicated that employees hired through ShaleNET programs were much or somewhat better than other similar employees with respect to safety standards and their general knowledge of the oil and gas industry. One survey respondent also noted that ShaleNET “.oil and gas students have a very well-rounded knowledge base.”

Additionally, three of five employers representatives indicated that employees hired through ShaleNET programs were much better or somewhat better than other similar employees in their:

- Quality of work
- Ability to follow directions
- Understanding of when to involve a supervisor in addressing a problem
- Ability to work well on a team

Six of eight employer representatives who responded to a similar question on the 2014 MSC member survey, reported that the ShaleNET graduates who they had hired were either more ready or somewhat more ready to work at their oil and gas companies than graduates of other training programs.

## Reasons Employers Liked Training Provided by ShaleNET

Employer survey respondents indicated that the most useful aspects of ShaleNET’s training were that it provided general knowledge about the industry (n=8), job-specific training (n=6),

*[ShaleNET] oil and gas students have a very well-rounded knowledge base.*

--- ShaleNET employer

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<sup>51</sup> SPR added several questions pertaining to ShaleNET to MSC’s 2014 members survey and was provided with those results by MSC in Fall 2014. The response rate for MSC’s 2014 survey was 30 percent (78 of 262).

and knowledge about safety standards (n=6).<sup>52</sup> They also expressed their general appreciation for the training provided through the ShaleNET program. One respondent explained that he liked ShaleNET training programs because they provided participants with “well-rounded [information] on various aspects of the industry and general knowledge of [industry] safety and technical requirements.”

### How ShaleNET Eased the Hiring Process

Many employer representatives indicated that relying on ShaleNET hubs made it easier for their companies to meet their hiring needs. One employer respondent said, regarding her company’s interaction with ShaleNET, that “to date, hiring has been efficient and flawless.”

Close to half of employer survey respondents (5/11) indicated that ShaleNET made hiring easier because it gave them access to qualified applicants. Three indicated that ShaleNET eased hiring because ShaleNET graduates were well prepared to work in the industry.

In qualitative interviews with employer representatives, those respondents also indicated that ShaleNET eased their hiring by giving them access to more, and better-trained applicants, and by being responsive to their requests for qualified applicants.

This sentiment was aptly summed up by one employer who said, “Overall, I love working with [ShaleNET]. The career counselor always sends me quality students that are willing to work hard. The ease of working with her makes them [ShaleNET] a great asset to me. They are very responsive, which is what I love.”

Another employer had the following to say about working with WCCC’s career counselor: “Their oil and gas career [counselor] ... is so good to work with and is just so proactive. If I have a job order I will send it .... She would contact me and say, ‘Can you come next week, I have ten students lined up.’ When I arrived for the interviews, she

ShaleNET training programs provided participants with “well-rounded [information] on various aspects of the industry and general knowledge of [industry] safety and technical requirements.”

-- ShaleNET Industry Partner

*Overall, I love working with [ShaleNET]. The career counselor always sends me quality students that are willing to work hard. The ease of working with her makes them [ShaleNET] a great asset to me. They are very responsive, which is what I love.*

-- ShaleNET Employer

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<sup>52</sup> A total of 11 employers responded to the 2015 employer survey. Five of the 11 worked at companies that hired ShaleNET graduates, which is why in some instances the number of respondents is reported as 5 and in others it is reported as 11.

had the students' resumes and transcripts ready to go. She was just so proactive, I couldn't help but go there to recruit.”



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## VI. Sustainability

A key goal for both the ShaleNET Consortium and the TAACCCT grant was to sustain the operations of the ShaleNET initiative, including its training programs, training equipment, student support services, outreach to partners, and coordinating activities among consortium members. To assess how successful the consortium and the hubs have been in realizing this goal, we begin by describing the extent to which ShaleNET programs and activities were still operating as of June 2016 and whether they are expected to continue to operate in the future. The chapter then describes the efforts that ShaleNET hubs and the consortium have made to sustain those programs and activities. It concludes with an assessment of the ShaleNET Consortium's prospects for future sustainability.

### Status of ShaleNET Programs and Activities After the End of TAACCCT Grant Funding

As of June 2016, nearly three months after the end of TAACCCT grant funding for program operations, the majority of ShaleNET activities and programs funded by the grant were still operating.<sup>53</sup> However, only about half of all grant-funded staff members and full-time instructors were still employed.

#### Training Programs

The majority of ShaleNET training programs continued to operate after TAACCCT grant program funding ended on March 31, 2016 and were expected to accept new enrollees during the summer or fall of 2016 (see Exhibit VI-1). The bulk of the programs that were expected to continue (24) were credit programs; only one ShaleNET credit program—WCCC's Petroleum Technology AAS degree—was not slated to accept any new students in fall 2016 and was expected to close after the spring 2017 semester. Hub respondents attributed the continuation of nearly all of these programs to

Across all four TAACCCT-funded hubs, 25 of 31 ShaleNET training programs were still expected to enroll students in the summer or fall of 2016.

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<sup>53</sup> Although all TAACCCT grant funding for ShaleNET did not end until September 30, 2016; after March 31, 2016, grant funding could only be spent on evaluation and reporting activities, such as preparation of this final report.

continued sufficient enrollment numbers; they stated that as long as they had enough students declaring their programs and enrolling in classes, they would continue.<sup>54</sup>

Noncredit ShaleNET programs, in contrast, had not fared as well. Of the six noncredit programs, only one—PCT’s Roustabout Field Service Worker—was still expected to enroll students in the summer or fall of 2016. In fact, noncredit programs in general had seen declining student demand well before the end of grant funding. Due to this low demand, neither of the other TAACCCT-funded hubs that provided ShaleNET noncredit training—Stark and WCCC—had enrolled any students in these programs since 2014 or 2015, respectively.

Only one ShaleNET noncredit program at one hub—PCT’s Roustabout Field Service Worker—was expected to enroll students in the summer or fall of 2016.

### Equipment for Training Programs

Another key aspect of ShaleNET’s training programs was that they provided students with many opportunities for hands-on instruction using newly obtained lab equipment. This equipment required regular maintenance and repair, the cost of which could be significant. Consequently, the ShaleNET hubs needed to have funding to cover these costs after the end of TAACCCT grant funding. Fortunately, all hubs reported that they did have at least some ongoing funding from their institutions for equipment maintenance and repair. However, respondents at two hubs reported that those funds may be insufficient due to the number of new pieces of equipment and their complexity. Both of these hubs, though, reported that they do have plans for dealing with any funding shortfall in this area: they may shift funds from other budgets, ask their institutions for more funding, requesting donations from industry, or having students carry out the repair and maintenance work.

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<sup>54</sup> Note that during the TAACCCT grant, Navarro had offered its ShaleNET programs to students at two of its satellite campuses, Fairfield and Waxahachie, but due to low enrollment at those much smaller locations, the hub director was uncertain whether those programs would continue at those campuses.

Exhibit VI-1: Status of ShaleNET Training Program Enrollment, Post-TAACCCCT Grant

Enrollment Status	Navarro	PCT	Stark State	WCCC	Total
Noncredit programs that enrolled during TAACCCT grant	N/A	4	1	1	6
Noncredit programs expected to enroll July-December 2016	N/A	1	0	0	1
Credit programs that enrolled during TAACCCT grant	4	1	11	9	25
Credit programs expected to accept new enrollees in fall 2016	4	1	11	8	24

During the grant period, two hubs used TAACCCT grant funds to hire a support technician who could carry out equipment maintenance and repairs. However, because those hubs were not able to find funds to continue those positions after TAACCCT grant funding ended, they had to rely on other staff members to fill this role, and were concerned that this arrangement might result in equipment not being repaired as quickly as needed.

As discussed in Chapter II, hubs also used the TAACCCT grant to pay for software licenses to provide students with access to virtual training. While two of the four hubs indicated that they would be able to find other funding to pay for the virtual training software licenses (perhaps by increasing student fees), the other two hubs indicated that they would not.

One hubs also used grant funds to pay for software allowing video images of lab equipment to be shared among sites. However this hub reported that it did not expect to be able to pay for continued access to this software due to the high annual cost (approximately \$40,000 per year).

### Student Support

As discussed in Chapter II, ShaleNET provided students with additional academic support and career coaching, with most of this assistance provided by ShaleNET career coaches. As of June 2016, only two of the four TAACCCT-grant funded hubs (PCT and Stark State) still employed an gas and oil-focused career

counselor (see Exhibit VI-2). The two hubs that still employed their career counselors had secured funding for the positions at least through the end of the 2016-2017 academic year from Chevron.<sup>55</sup> Consequently, the two hubs left without career coaches—Navarro and WCCC—were unable to continue to provide much additional support for ShaleNET students in 2016. Fortunately, for oil and gas students at WCCC, however, Chevron awarded funding for the hub to replace its gas and oil-focused career counselor during the 2016-2017 academic year.

### Outreach to Partners

Outreach to partners, particularly oil and gas industry partners, was another central activity of the ShaleNET initiative. As discussed in Chapter III, most of this outreach at the hub level was conducted by hub directors and career counselors. Consequently, colleges where the hub director positions were expected to be eliminated by September 30, 2016—and that did not have equivalent college-funded positions, such as the Oil and Gas and Environmental Technologies Coordinator at Stark or the Director of Energy Programs at WCCC—were unlikely to be able to continue to carry out significant partnership-building activities related to their oil and gas programs. Navarro, which also eliminated its ShaleNET career counselor position, was likely to have even less capacity for partnership building than PCT, since the latter had managed to retain its career counselor.

At the consortium level, much of ShaleNET's partnership-building activities were carried out by ACCD, particularly by ACCD's Senior Vice President (Sr. VP.), Workforce and Special Projects. Because her position was a permanent one not supported by the TAACCCT grant, her role in partnership development with industry and policymakers did not substantially change after March 31, 2016 and she continued to be quite active in those efforts during the spring and summer of 2016.

As of June 2016, only PCT and Stark State still employed an oil and gas-focused career counselor; later in 2016, however, WCCC received funding from Chevron to replace its gas and oil-focused career counselor.

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<sup>55</sup> ShaleNET's affiliate hub, Pierpont, which did not receive support from the Round 2 TAACCCT grant, also received funding to hire a career counselor to support its oil and gas students in 2016 with funding from Chevron.

Exhibit VI-2: Status of ShaleNET Staffing After the end of TAACCCT-Grant Funding

Grant-Funded Position	Navarro		PCT		Stark State		WCCC	
	No. of Staff as of 6/16	Will Remain after 9/30/16?	No. of Staff as of 6/16	Will Remain after 9/30/16?	No. of Staff as of 6/16	Will Remain after 9/30/16?	No. of Staff as of 6/16	Will Remain after 9/30/16?
Hub Director	1	No	1	No	1	Yes*	1	No**
Career Counselor	0	N/A	1	Yes	1	Yes	0	N/A***
Support Technician	0	N/A	0	N/A	0	N/A	0	N/A
Full-time Oil and Gas Instructors	0****	N/A	2	Yes	1	Yes	0	N/A
% Grant-funded Staff Members Expected to Remain After Sept. 30	0%		60%		75%		0%	

\*Stark's hub director was made the college's permanent Oil and Gas and Environmental Technologies Coordinator in 2015 and was expected to remain in that position indefinitely. \*\*WCCC did have a Director of Energy Programs supported by the college who was expected to remain in that position indefinitely. \*\*\*WCCC, however, did plan to hire a new gas and oil-focused career counselor sometime in 2016-2017 using funding from Chevron. \*\*\*\*Navarro did have a permanent full-time petroleum technology instructor funded by the college who was expected to remain in that position indefinitely.

### Coordination Activities

Coordination among ShaleNET hub staff members via regular conference calls and occasional in-person planning retreats was also an important activity supported by the TAACCCT grant. As discussed in Chapter I, these activities were primarily organized by the ShaleNET Grant Director, who was employed by PCT, with assistance provided by the grant's Data Manager, also employed by PCT.

Although the regular ShaleNET monthly conference calls and planning retreats ceased after March 31, 2016, hub directors and some hub administrators continued to participate in monthly conference calls as part of ShaleNET's business plan development efforts (ShaleNET's business planning efforts are

discussed in more detail below). In addition, on August 11, 2016, representatives from the Ohio and Pennsylvania hubs and ACCD participated in an in-person business planning session held in Pittsburgh Pennsylvania.<sup>56</sup> Although these regular conference calls and in-person planning sessions were held for the specific purpose of developing a business plan for ShaleNET (and facilitated by the contractor selected to develop that plan), they fulfilled the function of maintaining communication and coordination among the ShaleNET hubs.

### Joint Marketing, Data Reporting, and Evaluation Efforts

Other grant-supported activities carried out as part of the ShaleNET Initiative included cross-consortium marketing, joint performance reporting, and an evaluation of ShaleNET during the grant.<sup>57</sup> The marketing activities—primarily maintenance and enhancement of the ShaleNET website by a contractor and production of a quarterly newsletter and marketing materials by ACCD—ceased after March 31, 2016. Joint performance reporting of all hubs was also expected to cease after completion of the grant’s final report in November, 2016.

Evaluation of the ShaleNET initiative, however, was planned to continue as the RAND Corporation received a National Science Foundation (NSF) grant to conduct a quasi-experimental impact evaluation of ShaleNET from 2015 through mid-2019. Although the ShaleNET Data Manager position based at PCT was not expected to be maintained after September 30, 2016, RAND’s NSF grant did include some funding for an information technology staff person at WCCC to support data retrieval efforts.

Evaluation of the ShaleNET initiative was planned to continue via the RAND Corporation, which received a National Science Foundation grant to conduct a quasi-experimental impact evaluation of ShaleNET from 2015 through mid-2019.

### ShaleNET Sustainability Efforts

Throughout the grant period, ShaleNET hubs and the consortium as a whole carried out a number of activities intended to sustain ShaleNET programs and activities beyond the end of Round 2 TAACCCT grant funding.

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<sup>56</sup> A representative from the West Virginia hub also participated by phone.

<sup>57</sup> This final report is a product of the grant-supported evaluation.

## Sustainability-related Activities at the Hub Level

To create a foundation for sustaining their ShaleNET programs, the four TAACCCT-supported hubs developed support within their colleges for continuing programming and cultivated external champions and external sources of support.

### *Developing Internal Support*

ShaleNET hubs began carrying out activities to develop internal support for their programming early on in the grant period, in some cases immediately after the grant was awarded. An important tactic was to engage with college leaders and convince them of the importance of ShaleNET. The purpose of this engagement was to make college leaders ShaleNET program champions who would eventually support sustaining ShaleNET with college resources. As part of this engagement process, ShaleNET hub directors and their supervising college administrators tried, with varying levels of success, to meet regularly with college leaders to keep them informed about ShaleNET's activities and successes.

To demonstrate success, ShaleNET hubs needed to show high student enrollment numbers. In part, this was because a primary source of funding for classes and training programs (including the cost of instructors, classrooms, lab space, overhead, etc.,<sup>58</sup>) was student tuition and fees and state funding assistance for credit programs matched to enrollment;<sup>59</sup> generally, if hub leaders could show that they had enrolled sufficient numbers of students to allow their colleges to “break even” and cover program costs, college administrators would typically agree to maintain those programs. As the hub director at Stark put it, “It [sustainability] starts with getting students here.” Another hub leader stated: “That’s the best way to try to convince somebody in leadership [to keep training programs operating]. You’ve got to show success in [enrollment] numbers.”

ShaleNET hub directors and their supervising college administrators tried, with varying levels of success, to meet regularly with college leaders to keep them informed about ShaleNET's activities and successes.

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<sup>58</sup> Note that although this overhead does include some student advising, it is usually quite minimal, consisting of a few academic and career advisors to serve all students; these break-even models did not include the costs of providing a counselor just to serve ShaleNET students, which would increase required enrollment substantially and likely above the number of students who could be safely and effectively accommodated in lab courses due to the amount of available equipment and the need for close instructor supervision.

<sup>59</sup> Note that some states were in the process of changing the way they funded community colleges, to make that funding take into account completion outcomes.

ShaleNET hubs had different break-even enrollment numbers, but they generally averaged from ten to sixteen students for individual credit classes and from six to eight students for noncredit courses.<sup>60</sup> For his oil and gas programs overall, the hub director at Stark State stated that his break-even number was 80 students. Unfortunately, as discussed in Chapter IV, achieving and maintaining break-even enrollment levels was quite challenging for the ShaleNET program, especially once oil prices fell precipitously in mid-2014.

Another way that colleges tried to build internal support for sustaining ShaleNET functions was to consolidate those functions under other college offices offering similar functions. For example, in spring 2016, PCT folded its remaining ShaleNET staff under its pre-existing ShaleTEC program, which provided contract training, among other services, for the oil and gas industry. At Stark, hub leadership had explored the possibility of the ShaleNET career counselor position being moved under the college's admissions office, which had funding from the college to employ staff members with similar advising roles.

Hubs' efforts to develop internal support for sustaining their programs was sometimes helped and sometimes hurt by changes in college leadership that occurred during the grant period. For example, a change in college president at one hub led to a shift in college priorities away from the ShaleNET program, and thus resulted in less support for sustaining the program; by contrast, at another hub, a new president turned out to be a much stronger program supporter than her predecessor, and her support was likely one reason for the college's willingness to use its own resources to maintain key elements of ShaleNET programming.

#### *Developing External Champions and Support*

Hubs also tried to develop external support for sustaining their programs. One important strategy was to engage with government policy makers, elected officials, staff members of philanthropic organizations, and industry representatives to demonstrate the value of ShaleNET programming in hopes that those individuals would become program champions who would support ShaleNET programs and their continuation.

*That's the best way to try to convince somebody in leadership [to keep training programs operating]. You've got to show success in [enrollment] numbers.*

--ShaleNET hub administrator

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<sup>60</sup> Although noncredit courses had lower break-even numbers, they were typically quite expensive since, as cost recovery programs, they had to be completely supported by student tuition and fees. Their cost, and the fact that students were typically not able to use federal student aid to cover tuition and fees, made recruitment for noncredit programs even harder.

To carry out this strategy, ShaleNET hubs provided tours of ShaleNET labs and other facilities to many key government and industry leaders, including the Governor of Pennsylvania, who visited PCT in April 2015 to meet with ShaleNET staff and students and tour some of its oil and gas training facilities. ShaleNET representatives also sought to keep government and industry representatives updated on ShaleNET and its activities. For example, PCT's Vice President for Workforce Development testified at a hearing of the U.S. House of Representatives' Sub-Committee on Energy and Power about ShaleNET in April 2015.

One engagement strategy was to invite key government and industry leaders to visit hubs to learn about their ShaleNET programs.

Some of those who toured training facilities and met with ShaleNET staff members provided financial support. For example, as described in Chapter III, after meetings with county commissioners, PCT's ShaleNET program received \$195,000 in Act 13 funding to support scholarships for ShaleNET students. In addition, as was also described in Chapter III, many industry partners donated equipment, staff time, and funding for scholarships after meeting with hub staff members or visiting ShaleNET facilities. Industry companies also supported hubs by contracting with them to have hub instructors develop and provide customized training or to use the hubs' specialized oil and gas training facilities.

Another way that hubs attempted to develop external support for sustaining ShaleNET was to apply for state, federal, or foundation grants that would help fund their programs. For example, as discussed in Chapter III, Stark State applied for and received a grant of more than \$500,000 from the state of Ohio in mid-2016 that would cover some of the costs of the ShaleNET career counselor, the Oil and Gas and Environmental Technologies Coordinator, and adjunct instructors after the end of TAACCCT grant funding.

### Consortium Efforts

Consortium-wide sustainability efforts were led primarily by ACCD's Sr. VP. According to one hub respondent, her role was pivotal because of ACCD's high-level connections with government policymakers and oil and gas industry leaders and

because of her skills in working with these high-level partners.<sup>61</sup> “It [ACCD’s work] is well beyond my pay grade,” said this respondent, “and I am grateful she [ACCD’s Sr. VP.] is there to navigate the process.” A representative from Chevron, ShaleNET’s biggest industry supporter, also praised the Sr. VP.’s connections with the ShaleNET hubs: “The Conference [ACCD] in general has been very helpful...because she [the Sr. VP.] knows all the ShaleNET players, so she has insight, she has history with them, so if I'm looking for a piece of information, sometimes I can just ask her, or if I need help with a relationship, she can help.”

The consortium’s efforts to ensure ShaleNET sustainability began almost immediately after the TAACCCT grant was awarded. As ACCD’s Sr. VP. stated, “Our goal all along was to find a way to make all of this effort [ShaleNET] sustainable.” As the grant progressed, ever greater amounts of time were devoted to discussions of sustainability during consortium conference calls and planning retreats. The bulk of these discussions—and indeed most of the consortium’s sustainability activities—focused on developing support for ShaleNET among government policymakers and oil and gas industry leaders.

### *Building Support among Government Policymakers*

Members of the ShaleNET Consortium engaged with government policymakers by presenting information on ShaleNET at as many appropriate government forums as possible. To learn about how to arrange these presentations and participate effectively, the consortium relied heavily on ACCD’s staff members. For example, ACCD helped to arrange for ShaleNET hub leaders to meet with key federal legislators and cabinet agency staff members during a trip to Washington.

ACCD was also instrumental in helping ShaleNET get involved in the 2015 Tri-State Shale Summit (TSSS), a venue that proved to be important for raising ShaleNET’s profile among state governments. The TSSS was held in Morgantown West Virginia to discuss how the states of Pennsylvania, West Virginia, and Ohio could collaborate in the development of the Marcellus and Utica shale plays. At TSSS, the three states signed a three-year

*Our goal all along was to find a way to make all of this effort [ShaleNET] sustainable.*

*--ACCD's Sr. VP.,  
Workforce and Special  
Projects*

The three-year regional memorandum of understanding signed by the governors of Ohio, Pennsylvania, and West Virginia at the 2015 Tri-State Shale Summit (TSSS) specifically cited ShaleNET as a model of how a tri-state workforce collaborative could operate.

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<sup>61</sup> Many of ACCD’s high level contacts originated from its board of directors which was made up entirely of chief executive officers (CEOs) of large Pittsburgh-area businesses.

regional memorandum of understanding in which they agreed to work together on issues of workforce training and economic development related to oil and gas extraction. As a result of ACCD's advocacy, as well as the involvement of hubs, this memorandum specifically cited ShaleNET as a model of how a tri-state workforce collaborative could operate. According to ACCD's Sr. VP., the idea resulting from TSSS was to scale "...the ShaleNET curriculum by making it the foundational technology curriculum for manufacturing and energy that would be shared by all the training providers in the tri-state region who had become part of the collaborative..." Following the TSSS, ACCD played a key role in keeping this high-level collaboration moving by convening subsequent meetings in 2016.

ACCD staff members also helped the ShaleNET Consortium to connect with government agencies that might be able to fund ShaleNET activities. For example, ACCD worked to connect ShaleNET to the Appalachian Regional Commission (ARC), a federal-state partnership that funds projects in Appalachia, where three of the four TAACCCT-funded hubs are located. Further, ACCD staff members kept track of government grant opportunities, passing on to the consortium any that seemed appropriate for ShaleNET.

### *Building Support in the Oil and Gas Industry*

Another major focus of consortium-wide sustainability efforts was engaging the support of the oil and gas industry, particularly large, industry-leading companies. To build this support, ACCD staff members, particularly the Sr. VP., met repeatedly with company leaders, both alone and with ShaleNET hub representatives, to tout ShaleNET activities and successes and describe its needs.

As discussed in Chapter III, these efforts paid off quite successfully when ACCD was able to help broker a commitment from Chevron to provide nearly \$1.4 million in support for the ShaleNET hubs in Pennsylvania, Ohio, and West Virginia from 2015 through 2019. As of the writing of this report, this support had paid for student scholarships, enhancements to ShaleNET course curricula, and program marketing, and career counselors at PCT and Stark State through at least the end of the 2016-2017 academic year (and will cover the cost of a ShaleNET career counselor at WCCC in 2016-2017).

According to a Chevron representative, the company decided to provide this level of support for ShaleNET because its leaders "saw value with the energy curriculum and the stackable credentials and the training for workers, whether it was folks coming out of high school or maybe displaced workers, that it

could lead folks to the energy industry.” Once company leaders learned about ShaleNET’s needs following the end of TAACCCT grant funding, they wanted to ensure that hubs could continue to provide all components of the ShaleNET model, including the enhanced student support provided by the dedicated ShaleNET career counselors. This representative said that although Chevron wouldn’t typically want to fund a salaried position, the company recognized “there was definitely a need for somebody that knew ShaleNET, knew the students, knew the workforce in the area” and decided that funding career counselor positions “was a good investment.”

However, this representative also stated that because Chevron would not be able to provide support for ShaleNET for more than a few more years, it was particularly appreciative that hubs were in the process of developing other sources of funding for key elements of their ShaleNET programs. According to the representative, one hub’s request for funding only 60 percent of its career counselor’s time in 2016-2017 indicated the hub was “thinking ahead” and knew that that it needed “to come up with other ways to fund these positions.”

### *The Strategic Business Planning Process*

Chevron also donated \$100,000 to ACCD to support the development of a strategic business plan for ShaleNET. The explicit purpose of this grant was to enable the ShaleNET Consortium to make additional progress in determining how to sustain its key components. ShaleNET consortium representatives had begun discussing the need for professional assistance to develop a strategic business plan as early as 2014 in order to guide the consortium’s transition away from a reliance on grant funding.

Once again, ACCD played a key role in convincing Chevron to provide this uncommon type of support, both through one-on-one meetings and by arranging for a Chevron representative to attend a ShaleNET retreat. At the retreat, this representative witnessed for herself the consortium’s need for help in developing a business plan. She decided that funding the development of the plan was a way “to align all [the hubs] moving forward” and “make sure ShaleNET stayed a cohesive group.”

In late 2015 and early 2016, ACCD began coordinating with hub representatives to develop a statement of work to guide the selection of a contractor that would develop the ShaleNET business plan. The individuals drafting the statement of work

*Our company's leaders "... saw value with the [ShaleNET] energy curriculum and the stackable credentials and the training for workers, whether it was folks coming out of high school or maybe displaced workers, that it could lead folks to the energy industry."*

--Chevron representative

*ACCD played a key role in convincing Chevron to provide financial support for ShaleNET's business planning process, both through one-on-one meetings and by arranging for a Chevron representative to attend a ShaleNET retreat.*

recognized that the business planning effort would need to determine whether the ShaleNET model could be broadened to work with other sectors, such as advanced manufacturing. With the reduction in demand for workforce training in the oil and gas industry, they knew that it would be necessary to make ShaleNET relevant in other industries if it was to survive and thrive. Consequently, the final statement of work for the business plan development process called for the contractor to carry out the following primary activities <sup>62</sup>:

- Identify and characterize programmatic and physical assets of the ShaleNET hubs that can be leveraged to scale the ShaleNET Consortium.
- Make recommendations as to whether and how ShaleNET could become the central training platform for energy and manufacturing occupations in the tri-state area (West Virginia, Pennsylvania, and Ohio). These recommendations also needed to be applicable to northeastern Texas.
- Develop optimistic, realistic, and pessimistic scenarios on the use of a new broader ShaleNET training model by energy and manufacturing employers.
- Develop a value proposition for the new ShaleNET model, including what its governance, operational, and organizational structure should look like, and what funding would be needed to achieve those structural changes.

In March 2016, the consortium used this statement of work to select a contractor to develop a business plan. During the rest of the spring of 2016, as noted above, this contractor held regular conference calls with ShaleNET consortium members, conducted interviews with key hub staff members, and reviewed relevant documents. On August 11, 2016, the contractor also facilitated a six-hour planning meeting in Pittsburgh attended by staff members from Chevron, ACCD, PCT, WCCC, Stark State, and a representative from the Pierpont affiliate hub. Participants discussed findings to date along with the strengths and weaknesses of the ShaleNET Initiative and its opportunities and possible threats. Session participants also spent time brainstorming a ShaleNET vision and mission statement, as well as a possible future governance structure.

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<sup>62</sup> Paraphrased from: "ShaleNET Business Plan: Key Deliverables." February 23, 2016.

When asked about their perceptions of the business plan development process in late May and early June 2016, ShaleNET Consortium representatives reported that it was too early to tell how successful the process would be, and were disappointed it would not be completed sooner. Said one hub representative: “The process has not gotten very far...They have a good reputation, but the jury is still out.” A second hub representative commented that he was disappointed that the business plan would not be completed until months after the end of the TAACCCT grant, by which time a number of hub staff members might no longer be working for ShaleNET.

## Conclusion: Prospects for ShaleNET Sustainability Moving Forward

As of the time of the writing of this report, it was still unclear how successful the ShaleNET Consortium would be in sustaining its activities. However, in this final section of the chapter, we discuss the prospects for ShaleNET’s future sustainability by assessing the status of the following eight factors, each of which, according to an oft-used sustainability assessment, is important for sustainability.<sup>63</sup>

**Factor 1. A Supportive internal and external environment with strong champions who can bring in resources.** As of the end of the TAACCCT grant, the ShaleNET Consortium and member hubs had developed a number of strong internal and external champions that had the ability to bring in resources to support ShaleNET activities. For instance, two of ShaleNET’s hub colleges had extremely supportive senior leaders who could and had provided ShaleNET with access to college resources; ACCD was also extremely supportive and had connected ShaleNET with various potential sources of government and industry sources of funding. ShaleNET also had a number of powerful external champions, including local, state, and federal policymakers, and oil and gas industry representatives. All of these external champions had the ability to bring resources to the consortium, as demonstrated by the more than three million

The ShaleNET Consortium and member hubs had a number of strong internal and external champions that could bring in resources.

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<sup>63</sup> Paraphrased from “Program Sustainability Assessment Tool v2.” Center for Public Health Systems Science. Washington University. St Louis, MO. August 2013. Licensed under a Creative Commons Attribution-NonCommercial-ShareAlike License. All Rights Reserved.

dollars in funding and in-kind contributions that had been provided to ShaleNET by fall 2016 by such champions.

However, despite the strong support described above, both hubs and the consortium faced some key challenges related to internal and external support. For example, some hubs finished the TAACCCT grant facing serious challenges from within their own colleges, including budget cuts that resulted in lost staffing even before the end of the grant and new leaders who did not prioritize ShaleNET's programming. In addition, due to the turmoil in the oil and gas industry brought on by low oil and gas prices, many industry representatives who had been strong supporters of ShaleNET were no longer employed by the same companies; indeed, some of those companies were no longer even operating in hub regions.

**Factor 2. A Consistent and diversified base of financial support and a strong external economy.** As of the end of the TAACCCT grant, the ShaleNET Consortium and participating hubs had access to several sources of financial support, one of which appeared relatively stable, and there were predictions of strong employment growth in the oil and gas sector over the next decade.

- **Stable college funding for credit programs.** Given the typical community college course and program funding model, as long as ShaleNET's credit programs were able to maintain "break-even" enrollment numbers, funding for those programs seemed likely to continue.
- **Flexible grant funding from Chevron through 2019.** The likely availability of this flexible funding to support scholarships, key staff positions, and other needs through 2019 provided a measure of stability to ShaleNET.
- **Strong history of smaller contributions from diverse sources.** ShaleNET's TAACCCT-funded hubs had received small contributions throughout ShaleNET's history from a variety of sources; it was likely that these contributions would continue.
- **Projections of strong future employment growth in oil and gas industry occupations.** Despite the downturn in oil and gas prices during the second half of the grant, the U.S. Bureau of Labor Statistics predicted strong national growth in employment in oil and gas extraction, crude oil pipeline construction and maintenance, and support

The ShaleNET Consortium and participating hubs had access to several sources of financial support, one of which appeared relatively stable, and there were predictions of strong employment growth in the oil and gas sector over the next decade.

activities for mining (which includes oil and gas extraction) between 2014 and 2024.<sup>64</sup>

Despite the positive elements related to funding and the economy discussed above, certain aspects of ShaleNET's post-grant funding environment also presented serious challenges to its long-term sustainability:

- **Drop in oil prices.** Despite the prediction for robust future employment growth in the oil and gas industry, the key overriding challenge for ShaleNET at the end of the TAACCCT grant was the ongoing low price of oil. As discussed in Chapter I, drilling across hub regions had dropped precipitously as a result of these low prices, affecting demand for ShaleNET completers by employers. Consequently, individuals were less interested in enrolling in ShaleNET programs (thus putting funding based on enrollment at risk) and companies were less able to provide support for ShaleNET. As one hub representative stated, "It's very bad timing [for the grant to be ending now] because of the state of the industry. It is very challenging."
- **Heavy reliance on grant funding from one major industry donor.** Although Chevron promised to provide funding for ShaleNET's Ohio, Pennsylvania, and West Virginia hubs through 2019, a company representative made it clear that that funding would likely end after that time.

**Factor 3. Strong partnerships with key stakeholders.** The partnerships among the ShaleNET hubs in the Appalachian Basin and ACCD appeared to be fairly strong as of the end of the TAACCCT grant. The consortium, which began under the first ShaleNET grant, was significantly strengthened through regular interactions between hub staffs and ACCD staff members during the TAACCCT grant. In particular, the in-person multi-day ShaleNET planning retreats that were hosted on a rotating basis by each hub provided consortium leaders the opportunity to get to know each other better, during both the intensive day-long meetings and the informal dinners that typically followed those meetings. These strong relationships among hub leaders should help the consortium to move forward cohesively to implement sustainability plans.

*It's very bad timing [for the grant to be ending now] because of the state of the industry. It is very challenging.*

--ShaleNET consortium representative

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<sup>64</sup> U.S. Bureau of Labor Statistics, "National Employment Matrix, Employment by Occupation within Selected Industries." <http://data.bls.gov/projections/nationalMatrixHome?ioType=i>. Accessed August, 2016.

**Factor 4. Strong and effective leadership, staffing and organizational systems.** The TAACCCT grant provided funding for each hub to hire staff members to manage ShaleNET activities and provide services, thus allowing each to develop leadership, staff capacity, and organizational systems for ShaleNET activities. Although, there was also a great deal of staff turnover at all levels during the grant, which weakened hub capacity,<sup>65</sup> at the Ohio and Pennsylvania hubs, core hub leaders remained on board who should be able to carry ShaleNET beyond the end of grant funding.

**Factor 5. Capacity to carry out high quality evaluations that report short and long-term outcomes and are used to inform programming and demonstrate results.** Despite the many lags and challenges faced in accessing data, between SPR's evaluation of ShaleNET's activities during the Round 2 TAACCCT grant and the RAND Corporation's follow-on evaluation funded by NSF, the ShaleNET consortium should have access to rigorous evaluation results that—if positive—should be very persuasive to external government and industry champions regarding their continued support for ShaleNET. As a Chevron representative stated, "We're going to look at the RAND results, big time [when considering what to support in the future]." In addition, hubs' greater familiarity with their own colleges' student information systems (developed through having to provide SPR and RAND with data), may make it easier for hubs to access such data for their own purposes and use it to make ongoing programming improvements.

**Factor 6. Ongoing adaptation based on evaluation data and environmental changes to ensure continuing effectiveness.** The ShaleNET Consortium demonstrated its openness to adapting its programming based on evaluation results and changes to the external environment several times during the TAACCCT grant, and as of the writing of this report was in the process of considering other significant adaptations:

- **Broadening ShaleNET's sector focus.** As part of its ongoing business planning process (described above), the ShaleNET Consortium was considering whether to

*We're going to look at the RAND results, big time [when considering what to support in the future].*

*--Chevron representative*

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<sup>65</sup> As of the end of the TAACCCT grant, three of four hubs had experienced turnover across all grant-funded positions except full-time instructor. In addition, three hubs had lost one or more of the original non-grant funded administrators who had supervised grant staff. Further, the overall grant director, based at PCT, left her position nearly six months prior to the end of the grant.

broaden ShaleNET's focus to include related sectors such as advanced manufacturing. However, making this shift may not be easy. One consortium representative stated the problem clearly: "To try to instantly morph ShaleNET into an advanced manufacturing program is disingenuous... There's a core [set of skills the two industries share]. But the things that we [ShaleNET] teach about drilling technology and rigging...and well completions, those don't transfer to a rubber manufacturing plant in Dayton. The core does. But to say that [teaching those core skills] is the same thing [as teaching advanced manufacturing] is not true."

**Factor 7. Strategic communication with stakeholders and the public to effectively market the program.** Through its website, quarterly newsletter, and the extensive outreach conducted by hubs and ACCD during (and even before) the TAACCCT grant, the ShaleNET Consortium was fairly successful in communicating strategically with government, industry, and other stakeholders. However, as funding for most of these activities ended with the end of TAACCCT grant funding, ShaleNET's consortium-wide strategic communications—and thus its ability to effectively market the program to potential students and funders—would be seriously hampered unless new funding sources were found to continue these activities.

**Factor 8. Strategic planning to guide the direction, goals, and strategies of programming and funding.** ShaleNET was in the process of carrying out an intensive strategic planning process that would guide the consortium's future direction and goals, as well as its programming and funding strategies. However, as this process was still ongoing as of the writing of this report, it was not yet clear that it would provide the consortium with the answers needed to sustain ShaleNET in the future.

Overall, based on an assessment of these eight factors, there are many reasons to be optimistic that ShaleNET activities will be sustained to some degree over the long term, although the ShaleNET Consortium is also likely to face a number of challenges in doing so.

## VII. Summary and Conclusion

This final chapter summarizes the findings of the previous six chapters and draws some general conclusions about the extent of the ShaleNET initiative's success during the period of the Round 2 TAACCCT grant.

### Delivery of Training Programs and Student Support

The ShaleNET Consortium was generally quite successful in developing and enhancing ShaleNET training programs during the TAACCCT grant. As evidence of this success, ShaleNET TAACCCT-supported hubs were able to develop 19 new credit-bearing training programs—more than doubling the number of oil and gas training programs available across the four hubs.

The TAACCCT-supported hubs also obtained nearly 2.5 million dollars worth of additional equipment (almost a third of it donated by industry partners) for use by students and instructors in these programs and the 12 pre-existing ShaleNET training programs. This huge influx of new equipment certainly enhanced the hands-on component of ShaleNET training programs, even though three of the four hubs were not able to develop the capacity to share video images of lab equipment with students in remote locations. Further, three of the four TAACCCT-funded hubs used or leveraged grant funds to create new facilities specifically designed to house some or all ShaleNET program equipment.

The ShaleNET Consortium was also fairly successful in recruiting and enrolling participants into these new and enhanced training programs. Although enrollment declined during the second half of the grant period—and was a significant challenge for noncredit programs at two hubs even earlier—ShaleNET hubs were able to enroll 1,276 unique participants, achieving 116 percent of the consortium's overall enrollment goal for the grant. These participants were primarily white and male, and most held at least a high school diploma, but they included a mix of ages ranging from 17 to 65. Partly as a result of the major recruitment and enrollment challenges faced by noncredit programs, but also because of the consortium's focus during the grant, about 80

ShaleNET TAACCCT-supported hubs developed 19 new credit-bearing training programs—more than doubling the number of oil and gas training programs available across the four hubs.

TAACCCT-supported hubs also obtained nearly 2.5 million dollars worth of additional equipment (almost a third of it donated by industry partners) to enhance their ShaleNET training programs.

percent of ShaleNET participants enrolled in a credit program— either a Tier 4 AAS program or, slightly less commonly, a Tier 3 certificate program.

The four TAACCCT-funded hubs were also generally successful in providing ShaleNET participants with enhanced support for academic and career planning and for dealing with life issues. Although career counselor turnover and heavy workloads at three of four hubs may have limited the amount of support some ShaleNET students received, students who did receive assistance were quite appreciative. These students commented that this assistance helped them to stay on track toward program completion and to find jobs after they graduated.

ShaleNET TAACCCT-supported hubs enrolled 1,276 unique participants, achieving 116 percent of the consortium's overall enrollment goal for the grant.. about 80 percent of these participants enrolled in either an AAS or a certificate program.

## Partnerships

During the grant, ShaleNET hubs and the consortium as a whole were also quite successful in developing partnerships, particularly with components of the oil and gas industry. As an indication of the consortium's success in partnering with the industry, oil and gas companies, industry associations, and industry foundations contributed nearly 1.7 million dollars in funding and in-kind donations to ShaleNET TAACCCT-supported hubs during the grant period. This included \$508,483 donated by Chevron alone, as a result of the consortium's multi-year partnership with the industry giant.<sup>66</sup> Further, in 2016, Chevron provided ACCD with \$100,000 to support the consortium's business plan development process, and the three Appalachian Basin Round 2 TAACCCT-supported hubs with \$456,920 for 2016-2017 (as well as \$297,093 to Pierpont for the same academic year).

Industry partners contributed nearly \$1.7 million to ShaleNET TAACCCT-supported hubs during the grant period.

Chevron alone provided nearly \$1.4 million over three academic years (2014-2015 to 2016-2017), to the three Appalachian Basin Round 2 TAACCCT-supported hubs, as well as to ShaleNET's newest hub, Pierpont Community and Technical College in West Virginia.

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<sup>66</sup> Including its contribution to the non-TAACCCT-supported hub, Pierpont, Chevron donated \$634,566 to ShaleNET hubs for the 2014-2015 and 2015-2016 academic years.

The ShaleNET Consortium and hubs established three key partnerships with other educational institutions during the grant. The first of these was developed by the Navarro hub, with assistance from PCT, and was with EFCREO at Texas A&M Kingsville. This partnership enabled EFCREO to offer ShaleNET noncredit training programs. Unfortunately, due to the downturn in drilling in the Eagle Ford Play, EFCREO discontinued offering these programs, and this partnership ended. However, the ShaleNET consortium and another hub did succeed in establishing other educational partnerships that were ongoing as of the writing of this report. These included establishment of Pierpont Community and Technical College as the consortium's affiliate hub for West Virginia in mid-2014 and the establishment in 2016 of the Ohio ShaleNET Share partnership between Stark State and two other community colleges in Ohio—Eastern Gateway and Hocking. The latter partnership allowed students in a specific ShaleNET AAS program to complete 40 percent of their credits toward the degree at their home college (Hocking or Eastern Gateway) and 20 percent of the credits (including all of the most oil-and-gas specific) during an intensive summer session at Stark.

Three key educational partnerships developed during the grant included one with EFCREO at Texas A&M Kingsville in 2014, establishment of Pierpont Community and Technical College as the consortium's affiliate hub for West Virginia in mid-2014, and the establishment in 2016 of the Ohio ShaleNET Share partnership.

As of the end of the grant period, the ShaleNET Consortium and hubs had also developed some key partnerships with government-related bodies. For example, PCT developed partnerships with three nearby Pennsylvania counties and, as a result, had received \$195,000 in scholarship funding for residents of those counties to participate in PCT's noncredit programs. Further, during the latter portion of the TAACCCT grant, the consortium's Appalachian Basin members (PCT, Stark State, WCCC, Pierpont, and ACCD) became involved with the Tri-State Shale Summit, a high-level collaborative formed by the governors of Ohio, Pennsylvania, and West Virginia to increase economic development related to the Marcellus and Utica shale plays. In addition, Stark State received a grant of more than \$500,000 from the Ohio Department of Higher Education to support implementation of its Ohio ShaleNET Share partnership.

The Consortium's Appalachian Basin members (PCT, Stark State, WCCC, Pierpont, and ACCD) were involved with the



a high-level collaborative formed by the governors of Ohio, Pennsylvania, and West Virginia.

Finally, three of the four TAACCCT-funded hubs had also developed fairly strong partnerships with the public workforce system, particularly the staff members of their closest WDBs and AJCs. Two of these hubs reported that as

a result of these partnerships a number of their ShaleNET students received funding from WIA or WIOA to cover some or all of their ShaleNET tuition costs.

## Participant and Employer Outcomes

Likely as a result of the initiative's successful service delivery and partnership development, ShaleNET participants were generally quite successful in achieving positive educational and labor market outcomes. For example, approximately 65 percent of ShaleNET grant participants had either completed their ShaleNET programs or were still working toward completion as of the end of the grant period. Forty percent of these participants completed a program: 22 percent completed a noncredit program (and received, on average, five industry-recognized credentials); 9 percent completed one or more certificate program, 3 percent completed an AAS, and 6 percent completed more than one type of program. Although the remaining 35 percent of ShaleNET participants withdrew from their ShaleNET program (almost all of these withdrawals were from credit programs) and hub, this percentage is far lower than the 80 percent of community college students nationally who do not complete their programs.

Labor market outcomes for ShaleNET completers were also generally quite strong, particularly during the early years of the grant before oil prices declined in mid-2014, sending the oil and gas industry into an economic contraction that seriously affected hiring in 2015. Overall, according to wage record data—which should be considered only a lower-bound estimate given its limitations—about three-fourths of ShaleNET completers were employed in the first and fourth quarters after program completion. The rate of post-program employment, however, was quite a bit higher for participants who completed prior to 2015 (81 percent for those who completed in 2014), particularly for noncredit program completers (90 percent). Further, a rigorous comparison of ShaleNET noncredit completers in Pennsylvania with recipients of other short-term employment services in the same state showed that ShaleNET program participation had a positive and significant impact on post-program employment and earnings, particularly in the years prior to the oil and gas industry downturn.

Approximately 65 percent of ShaleNET grant participants had either completed their ShaleNET programs or were still working toward completion as of the end of the grant period.

Labor market outcomes for ShaleNET completers were also generally quite strong, particularly during the early years of the grant before oil prices declined in mid-2014.

The ShaleNET Initiative during the TAACCCT grant also appeared to meet and ease the hiring needs of employers. Proof of this was the relatively high rate of post-program employment cited above. Several employer representatives stated that they chose to hire ShaleNET completers primarily because of their technical skills and knowledge of the industry and others stated that ShaleNET hires performed better than other similar employees across multiple work domains. Multiple employer representatives also stated that it was easy to hire ShaleNET graduates because career counselors provided them with information about graduates' qualifications and facilitated the process of setting up interviews with them.

## Sustainability

As a result of these generally successful outcomes, as well as the ShaleNET Consortium's early focus on sustainability, many ShaleNET programs and services were still operating as of September 2016 and were expected to continue to do so in the future. The majority of ShaleNET training programs were expected to continue enrolling new students, and two of the four TAACCCT-funded hubs were expected to retain their oil and gas career counselors through at least the end of the 2016-2017 academic year (and a third hub planned to replace its oil and gas career counselor sometime during 2016-2017). Further, all hubs reported that they had at least some ongoing funding for equipment maintenance and repair. Also, as part of the business planning process, hub representatives and ACCD continued to collaborate on an ongoing basis through both conference calls and in-person meetings.

### Sustained Elements of the ShaleNET Model as of the End of the Round 2 TAACCCT Grant

- ✓ Most ShaleNET training programs were expected to continue enrolling new students.
- ✓ Both PCT and Stark State planned to employ an oil and gas career counselor through at least the end of the 2016-2017 academic year and WCCC planned to replace their oil and gas counselor sometime during 2016-2017.
- ✓ All hubs had some ongoing funding for equipment maintenance and repair.
- ✓ The ShaleNET Consortium continued to collaborate as part of the business plan development process.

However, some elements of the ShaleNET model—particularly at certain TAACCCT-funded hubs—had stopped operating as of the writing of this report or would end after September 30, 2016.

- Cross-consortium marketing of ShaleNET—including maintenance of the ShaleNET.org website and production of a quarterly newsletter and marketing materials—had ceased.

- Two of the hubs were expected to lose their TAACCCT grant-funded ShaleNET hub director as of September 30, 2016, and as they did not have equivalent college-funded oil and gas positions, they will likely be unable to conduct as much outreach to partners, particularly employers, as would be ideal.
- One of the hubs that no longer employed an oil-and-gas-focused career counselor also had no plans to replace that position; consequently it would continue to be hampered in its ability to support ShaleNET participants for the foreseeable future.
- Two hubs had lost one or more of their full-time instructors and thus had to rely more on adjunct instructors, making it more difficult for them to offer as many ShaleNET classes as needed (due to the challenge of finding enough qualified adjuncts).

Still, based on an assessment of the factors deemed by some experts to be critical to sustainability—and despite the ongoing oil and gas industry downturn—there were, as of the writing of this report, many reasons to be optimistic about ShaleNET’s future prospects:

- The consortium as a whole and three hubs had strong internal and external champions.
- Multiple sources of fairly stable funding were available, particularly for Appalachian Basin hubs.
- Collaboration among ShaleNET consortium members was strong and ongoing.
- Core ShaleNET leaders at ACCD and the Appalachian Basin hubs had been retained.
- Strategic planning about how to best adapt the ShaleNET Initiative to changing circumstances and position it for future success was underway.
- Rigorous evaluation activities that could provide additional evidence of the ShaleNET Initiative’s success were in progress.

## Final Comments

Overall, the ShaleNET Initiative operated quite successfully during the period of the Round 2 TAACCCT grant, despite having to face a number of serious challenges, including a major downturn in the oil and gas industry. This success, even in such a challenging external environment, provides further evidence of the strength of the ShaleNET Consortium and the value of its programming.

## Appendix A: ShaleNET Training Programs that Enrolled Students During the Round 2 TAACCCT Grant

Hub	Noncredit Programs (Tiers 1 & 2)	New or Existing	Certificate Programs (Tier 3)	New or Existing	Associate's Degree (Tier 4)	New or Existing
<b>Navarro</b>	None		Oil and Gas Training (40 credit hours)	Existing	Petroleum Technology (Reduced from 65 credit hours to 60 credit hours effective March 1, 2015)	Existing
			Industrial Technology (30 credit hours)	Existing		
			Automation (28 credit hours)	New August 2013		
<b>PCT</b>	Roustabout Field Service Worker 21 days	Existing	None		Mechatronics Engineering Technology (66 credit hours)	New August 2013
	Roustabout Field Service Worker 15 days	Existing				
	Floorhand	Existing				
	Welder's Helper	Existing				
<b>Stark State</b>	Floorhand 21 days	Existing			Technical Science with major or minor in Petroleum Technology (63 credit hours)	Existing
	Welder's Helper	Existing	Pipeline Technician (34 credit hours)	New April 2013	Petroleum Technology Pipeline Technician (63 credit hours)	New July 2013
			Petroleum Industrial Mechanics Technology (34 credit hours)	New December 2012	Petroleum Industrial Mechanics Technology (63 credit hours)	New January 2013
			Industrial Process Operation	New	Industrial Process Operation	New

Hub	Noncredit Programs (Tiers 1 & 2)	New or Existing	Certificate Programs (Tier 3)	New or Existing	Associate's Degree (Tier 4)	New or Existing
			Technology (32 credit hours)	December 2012	Technology (62 credit hours)	January 2013
			Petroleum Technology Instrumentation Electronics Technician (34 credit hours)	New November 2013	Petroleum Technology Instrumentation Electronics Technician (63 credit hours)	New November 2013
			Petroleum Technology Production Technician (31 credit hours)	New April 2014	Petroleum Technology Production Technician (63 credit hours)	New May 2014
<b>WCCC</b>	Service Unit Operator (hybrid of Roustabout and Floorhand)	Existing	Petroleum and Industrial Process Operation Technology (16 credit hours)	New August 2013	Applied Industrial Technology with oil and gas components (65 credit hours)	Existing
			Mechatronics Systems (16 credit hours)	New August 2013	Mechatronics (65 credit hours)	New August 2014
			Mechatronics Systems Technician I (16 credit hours)	New August 2014	Petroleum Technology (63 credit hours)	New August 2014
			Mechatronics Systems Technician II (16 credit hours)	New August 2014		
			Pipeline Mechanic (16 credit hours)	New August 2014		
			National Gas and Oil Technology (18 credit hours)	Existing		

## Appendix B: Examples of ShaleNET Virtual Training Scenarios

Scenario	Description
1. <i>Meter Run Face-to-Face Tour</i>	This scenario is designed as a face-to-face overview after the student has been exposed to the principles of operating a meter run. It gives an introduction to the specifics of meter runs such as the type of valves utilized and their operation, orifice plates, design considerations, and other meter run features. Instructors have the ability to run the scenario as a visual aid or have students follow along on their computers. There is no assessment built into this simulation, it is for demonstration purposes.
2. <i>Open Meter Run Face-to-Face</i>	This scenario is a practice activity and includes all the equipment associated with an actual producing natural gas well site, The simulation takes place at the pad measurement meter. The instructor may or may not open the meter run properly in order to demonstrate proper and improper processes for doing so.
3. <i>Open Meter Run</i>	This scenario is a practice activity and includes all the equipment associated with an actual producing natural gas well site. In this instance the action will take place at the pad measurement meter. The student is expected to open the meter run properly, without causing damage to the components.
4. <i>Open Meter Run Face-to-Face</i>	This scenario is a practice activity and includes all the equipment associated with an actual producing natural gas well site, In this instance the action takes place at the pad measurement meter. The instructor may or may not open the meter run properly in order to demonstrate proper and improper processes for doing so. The student can follow along on their machines and do the same thing as the instructor.
5. <i>Open Wellhead</i>	This scenario includes all the pertinent equipment necessary to produce natural gas from a well site but has no character interactions. This scenario is based off the idea that the student will open the meter run simulation, and open separator simulation throughout the course. Eventually, they would run a simulation that allows them to open the entire well site.
6. <i>Insufficient Fluid Level 1</i>	This activity is designed to be included in a two-part activity focused on diagnosing and resolving issues with dump valves. Part 1: Hands on lab focusing on disassembly and re-assembly of different types of dump valves. The lab also covers the various causes of issues they will encounter in the field and how to diagnose and resolve those issues.
7. <i>Insufficient Fluid Level 2</i>	This activity is designed to be included in a two-part activity focused on diagnosing and resolving issues with dump valves. Part 2: occurs in the RESITE simulation and assesses the student's ability to troubleshoot and resolve common issues that occur in dump valves in the field. It does this through a 3D immersive environment which provides context through geospatial, audio, and visual representations of real world equipment and locations. This scenario allows the student to observe device failures not conducive to using real life equipment (due to cost and safety concerns) while providing real life stressors such as multiple wellheads, connected equipment, and backstory.

Scenario	Description
8. <i>H2S Assessment</i>	In this scenario the student will be quizzed on various aspects of a sour gas well site as they are led by a virtual instructor around the site. There is no audio for the character in order to give the student a more relaxed/no pressure environment. This assessment is modeled after a multiple choice quiz.
9. <i>Housekeeping</i>	The student will be confronted with an assortment of materials and items on this well location, some of these may be necessary, others are materials that will require reporting so that they may be retrieved or disposed of as necessary. The student will have a limited amount of time to assess these items.
10. <i>RESITE Simulation Tour</i>	This scenario is designed for the student to learn how to interact with the simulation by walking through a well site and interacting with the virtual lease operator and the equipment on the site. It is designed such that the real world instructor can walk the students through, but the virtual character can also take the students through on their own time.
11. <i>Sour Gas Tour</i>	This scenario gives an introduction to a sour gas well (Hydrogen sulfide). It orients the student to the layout, equipment, and basic operation of typical sour gas wells found throughout the United States. The student will interact with a virtual lease operator to learn basic vocabulary and gain a basic understanding of hazards associated with sour gas wells and Hydrogen sulfide. The learner will also be presented with a warning message about random exploration of well site and dangers associated with this activity. Learner interactions with any of the equipment on this site will end the scenario in failure.
12. <i>Wellsite Tour Face-to-Face</i>	This scenario is designed to be run by the instructor in the front of the room. It orients the student to the layout, equipment, and basic operation of typical natural gas wells found throughout the United States. The student will interact with virtual lease operator to develop a basic understanding of basic vocabulary and processes on a wellsite. The student will also be asked to open a wellhead on the site after being told how to do it.
13. <i>Wellsite Tour</i>	This scenario orients the student to the layout, equipment, and basic operation of typical natural gas wells found throughout the United States. The student will interact with virtual lease operator to develop a basic understanding of basic vocabulary and processes on a wellsite. The student will also be asked to open a wellhead on the site after being told how to do it.
14. <i>Workover Inspection</i>	This scenario uses various wellhead configurations to present information about Wellhead construction and operations and verifies the students understanding of this material by having them identify and operate this equipment in a realistic manner. The scenario provides real time data (pressure, Temperature) that students may use to resolve / determine various anomalies associated with producing wellheads and the equipment associated with them.

## Appendix C: Demographic Data by Type of ShaleNET Training Program (Credit, Non Credit or Both)

Across All Hubs	Credit		Non-Credit		Both		Total	
Gender	n	%	n	%	n	%	n	%
Male	864	87%	233	88%	17	100%	1114	87%
Female	84	8%	16	6%	0	0%	100	8%
Missing	46	5%	16	6%	0	0%	62	5%
<b>Total N</b>	<b>994</b>	<b>100%</b>	<b>265</b>	<b>100%</b>	<b>17</b>	<b>100%</b>	<b>1276</b>	<b>100%</b>
Race								
White/ Caucasian	645	65%	193	73%	16	94%	854	67%
Black/ African American	170	17%	41	15%	0	0%	211	17%
Asian/Pacific Islander	3	0%	3	1%	0	0%	6	0%
American Indian/ Alaskan Native	7	1%	1	0%	0	0%	8	1%
Native Hawaiian or other Pacific Islander	0	0%	0	0%	0	0%	0	0%
Latino(a)	86	9%	6	2%	1	6%	93	7%
More than One Race	15	2%	3	1%	0	0%	18	1%
Missing	68	7%	18	7%	0	0%	86	7%
<b>Total</b>	<b>994</b>	<b>100%</b>	<b>265</b>	<b>100%</b>	<b>17</b>	<b>100%</b>	<b>1276</b>	<b>100%</b>
Hispanic								
Yes	98	10%	7	3%	1	6%	106	8%
No	840	85%	236	89%	16	94%	1092	86%
Missing	56	6%	22	8%	0	0%	78	6%
<b>Total N</b>	<b>994</b>	<b>100%</b>	<b>265</b>	<b>100%</b>	<b>17</b>	<b>100%</b>	<b>1276</b>	<b>100%</b>
Age Categories								
17-19	271	27%	13	5%	5	29%	289	23%
20-25	257	26%	62	23%	3	18%	322	25%
26-65	387	39%	144	54%	9	53%	540	42%
65+	4	0%	2	1%	0	0%	6	0%
Missing	75	8%	44	17%	0	0%	119	9%
<b>Total N</b>	<b>994</b>	<b>100%</b>	<b>265</b>	<b>100%</b>	<b>17</b>	<b>100%</b>	<b>1276</b>	<b>100%</b>

Source: Demographic data about ShaleNET participants was obtained from each Hub's student information systems.

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## Appendix D: ShaleNET Noncredit Program Credentials

Hub	Tier 2 Noncredit Programs	Number and Name of Industry-Recognized Credentials Noncredit Students were Expected to Earn by Program
<b>PCT</b>	Roustabout Field Service Worker – 15 Day	<ol style="list-style-type: none"> <li>1. PEC Safety / Safeland USA: Basic Orientation</li> <li>2. Medic Plus: First Aid / CPR</li> <li>3. National Safety Council: Defensive Driving</li> <li>4. JLG Industries, Inc: Safe Operation of Aerial Work Platforms</li> </ol>
	Roustabout Field Service Worker – 21 Day	<ol style="list-style-type: none"> <li>1. PEC Safety / Safeland USA: Basic Orientation</li> <li>2. Crosby Group: Land-Based Fundamentals of Rigging</li> <li>3. Medic Plus: First Aid / CPR</li> <li>4. National Safety Council: Defensive Driving</li> <li>5. JLG Industries, Inc: Safe Operation of Aerial Work Platforms</li> <li>6. JLG Industries, Inc: Safe Operation of Rough Terrain Forklift</li> <li>7. PCT: Heavy Equipment Operator Certificate of Completion</li> </ol>
	Floorhand	<ol style="list-style-type: none"> <li>1. PEC Safety / Safeland USA: Basic Orientation</li> <li>2. Crosby Group: Land-Based Fundamentals of Rigging</li> <li>3. Medic Plus: First Aid / CPR</li> <li>4. National Safety Council: Defensive Driving</li> <li>5. JLG Industries, Inc: Safe Operation of Aerial Work Platforms</li> <li>6. JLG Industries, Inc: Safe Operation of Rough Terrain Forklift</li> </ol>
	Welder's Helper	<ol style="list-style-type: none"> <li>1. PEC Safety / Safeland Basic USA: Basic Orientation</li> <li>2. Medic Plus: First Aid / CPR</li> <li>3. National Safety Council: Defensive Driving</li> <li>4. JLG Industries, Inc: Safe Operation of Aerial Work Platforms</li> <li>5. JLG Industries, Inc: Safe Operation of Rough Terrain Forklift</li> </ol>
<b>Stark State</b>	Floorhand	<ol style="list-style-type: none"> <li>1. International Association of Drilling Contractors / Safeland and Safegulf: Rig Pass</li> <li>2. Heart Association: Basic First Aid / CPR</li> <li>3. National Safety Council: Defensive Driving</li> <li>4. Aerial Work Platform</li> <li>5. Rough Terrain Forklift</li> </ol>
<b>WCCC</b>	Service Unit Operator (Roustabout and Floorhand hybrid)	<ol style="list-style-type: none"> <li>1. PEC Safety / Safeland: Basic</li> <li>2. The Crosby Group: Basic Rigging</li> <li>3. CPR/Basic First Aid</li> <li>4. National Safety Council: Defensive Driving</li> <li>5. Aerial Work Platform</li> <li>6. Rough Terrain Forklift</li> </ol>

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## Appendix E: Navarro ShaleNET Credit Completers Industry of Employment

Industry of Employment (NAICS Code)	Q1		Q2		Q3		Q4		Total	
	n	%	n	%	n	%	n	%	n	%
11 - Agriculture, Forestry, Fishing and Hunting	0	0%	0	0%	0	0%	0	0%	0	0%
21 - Mining, Quarrying, & Oil & Gas Extraction*	0	0%	0	0%	0	0%	0	0%	0	0%
22 - Utilities	3	4%	3	3%	3	4%	3	4%	12	4%
23 - Construction	5	6%	5	6%	4	5%	3	4%	17	5%
31-33 - Manufacturing	8	10%	5	6%	6	7%	3	4%	22	7%
42 - Wholesale Trade	6	7%	5	6%	6	7%	5	7%	22	7%
44-45 - Retail Trade	8	10%	11	13%	10	12%	10	14%	39	12%
48-49 - Transportation and Warehousing	3	4%	5	6%	6	7%	7	10%	21	6%
51 - Information	1	1%	1	1%	1	1%	1	1%	4	1%
52 - Finance and Insurance	0	0%	0	0%	0	0%	0	0%	0	0%
53 - Real Estate and Rental and Leasing	1	1%	2	2%	2	2%	1	1%	6	2%
54 - Professional, Scientific, & Technical Serv.	0	0%	1	1%	1	1%	1	1%	3	1%
55 - Management of Companies and Enterprises	1	1%	0	0%	0	0%	0	0%	1	0%
56 - Administrative and Support and Waste Management and Remediation Services	6	7%	7	8%	6	7%	4	6%	23	7%
61 - Educational Services	4	5%	4	5%	4	5%	3	4%	15	5%
62 - Health Care and Social Assistance	1	1%	1	1%	1	1%	1	1%	4	1%
71 - Arts, Entertainment, and Recreation	0	0%	0	0%	0	0%	0	0%	0	0%
72 - Accommodation and Food Services	4	5%	4	5%	1	1%	1	1%	10	3%
81 - Other Services (except Public Admin.)	1	1%	2	2%	3	4%	2	3%	8	2%
92 - Public Administration	5	6%	6	7%	4	5%	3	4%	18	6%
99 - Missing	0	0%	0	0%	0	0%	0	0%	0	0%
211111 - Crude Petroleum and Natural Gas Extraction	31	37%	30	34%	32	39%	29	40%	122	37%
211112 - Natural Gas Liquid Extraction	0	0%	0	0%	0	0%	0	0%	0	0%
213111 - Drilling Oil and Gas Wells	0	0%	0	0%	0	0%	0	0%	0	0%
213112 - Support Activities for Oil and Gas Operations	5	6%	3	3%	3	4%	3	4%	14	4%
Denominator	84	100%	87	100%	83	100%	72	100%	326	100%
*except 211111 ;211112; 213111; 213112)										

Source: Texas state UI wage records

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## Appendix F: Impact Analysis Methodology

This appendix provides a more detailed description of the methodology used by the SPR evaluation team to estimate the impacts of participation in the Pennsylvania hubs' ShaleNET noncredit programs on labor market outcomes. As discussed in Chapter V, we did so using propensity score matching to create comparison groups matched to ShaleNET noncredit program completers and then compared the differences in outcomes. Below we provide additional details about how we constructed our matched comparison groups.

### Comparison Groups

Our comparison group population was comprised of individuals who received employment-related services from other federally funded employment programs, such as the Employment Service or the Adult or Dislocated Worker programs in Pennsylvania, between the third quarter of 2013 and the fourth quarter of 2015 and exited during those same time periods. The Pennsylvania Department of Labor and Industry (DLI) provided SPR with a data extract from its Commonwealth Data System (CWDS) that contained demographic and wage information for these exiters. We restricted our comparison group sample to the (16,255) exiters who were residents of PCT's home county (Lycoming) and WCCC's home county (Westmoreland).

Ideally our comparison group population would have been further restricted to the subset of individuals who received employment services of similar intensity to ShaleNET's two- to three-week noncredit training programs. Because of data limitations, however, we could not identify the specific services the comparison group received, therefore we instead further restricted our comparison group population in two other ways.

### *Non-Training Comparison Group Population*

First, we created a Non-Training comparison group population, where we excluded exiters from among the CWDS sample who had received only a single day of service as well as those who enrolled in a training service. We did this because although ShaleNET noncredit programs were significantly longer than a single day, they were also much shorter than nearly all training programs available through federally-funded workforce programs.

After these exclusions our comparison group population comprised 6,275 individuals. We then excluded exiters with any missing demographics resulting in a final comparison group population of 5,777 individuals. Finally, Since we also wanted to examine outcomes for the four quarters after exit, we created a second - Non-Training group population (n=3,947) that was restricted to those who had 4 quarters of outcome information (i.e. those who completed on or before March 31, 2015). This allowed SPR to compare ShaleNET completer outcomes for the same matched comparison group for all four quarters. Information on this comparison group population is presented in Exhibit F-1 below.

### *Staff Assisted Comparison Group Population*

In addition to the Non-Training comparison group population described above, we created a second matched comparison group population that included participants who were known to have received staff assisted services. We accomplished this by using a nuance in the CWDS data collection structure. Information on the highest level of education an individual had completed prior to participation was a required data field only for those who received staff assisted services. Consequently, so that we could match on education levels and ensure that our comparison group population had received more than just light touch services, we restricted our sample of exiters in Lycoming and Westmoreland counties to just those who had data on highest level of education they had completed prior to participation. This limited our sample to just 585 exiters. As with the Non-Training group population, we then further restricted this population to those who had four quarters of outcome data, which reduced this comparison population to 371 individuals.

Exhibit F-1. ShaleNET Noncredit Participant Comparison Group Population

<b>Comparison Group Population</b>	<b>Number</b>
Total Non-Training group population	5,777
Non-Training group population with four quarters of outcome data (individuals who exited on or prior to March 31, 2015)	3,947
Total Staff-Assisted group population	585
Staff-Assisted group population with four quarters of outcome data (individuals who exited on or prior to March 31, 2015)	371

### *Matching Methods and Models*

We selected our matched comparison groups from each of the four groups using nearest neighbor matching and caliper matching on propensity scores. We used matching with replacement and we choose a caliper of .001, which was smaller than the

recommended standard of 0.2 of the standard deviation of the logit of the propensity<sup>67</sup>.

We used the following matching variables for selecting the Non-Training groups used in the analysis: were county of residence<sup>68</sup>, wages in the 3<sup>rd</sup> quarter prior to participation, gender, age at participation, and race. For the Staff-Assisted comparison group population, we used county of residence<sup>69</sup>, education level prior to participation, wages in the 3<sup>rd</sup> quarter prior to participation, gender, age at participation, and race.

Once we had selected our matched comparison groups, we estimated the impacts of ShaleNET participation on employment and earnings using the following two models:

$$Pr(Employed-QJ_i = 1) = \text{logit}^{-1}(\beta_0 + \beta_1' \text{Characteristics}_i + \beta_2 * \text{ShaleNET}_i + \beta_3 * \text{Calendar-Qt}_i + \varepsilon_i)$$

$$\text{Wage-QJ} = \text{logit}^{-1}(\beta_0 + \beta_1' \text{Characteristics}_i + \beta_2 * \text{ShaleNET}_i + \beta_3 * \text{Calendar-Qt}_i + \varepsilon_i)$$

Note that in these models: J ranges from the 1<sup>st</sup> quarter after completion to the 4<sup>th</sup> quarter after completion; ShaleNET is an indicator variable that is 1 for ShaleNET participants and 0 for the matched comparison group; characteristics is a vector of participant demographics (gender, age, and race) and wages in the 3<sup>rd</sup> quarter prior to participation;<sup>70</sup> and calendar-Qt is the calendar quarter the individual completed training.

## Balance Tests

To ensure that our nearest neighbor matching and caliper matching processes produced balanced samples, we conducted balance tests. The results of these tests are depicted below in Exhibit F-2.

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<sup>67</sup> Austin, P. C. (2011). Optimal caliper widths for propensity-score matching when estimating differences in means and differences in proportions in observational studies. *Pharmaceutical Statistics*, 10(2), 150–161. <http://doi.org/10.1002/pst.433>

<sup>68</sup> For ShaleNET participants we assumed the county of residence was the same as their ShaleNET hub because we did not have information on their home address.

<sup>69</sup> For ShaleNET participants we assumed the county of residence was the same as their ShaleNET hub because we did not have information on their home address.

<sup>70</sup> For the Staff-Assisted sample, the vector includes education level prior to participation.

Exhibit F-2. Balance Test Results

Panel A: Matched Comparison Groups for Q1 Whole Sample

NON-TRAINING GROUP (No restriction by time)

Variable	Nearest neighbor matched sample					Caliper Matched Sample				
	Mean		t-test	V(T)/		Mean		t-test	V(T)/	
	Treated	Control	%bias	t	p> t	Treated	Control	%bias	t	p> t
County of Residence	97.51	98.52	-4.60	-0.43	0.67	99.35	100.48	-5.10	-0.44	0.66
Mean wage in third quarter prior	3467.00	3568.30	-1.60	-0.20	0.84	3762.20	3865.00	-1.60	-0.18	0.86
Exit Quarter	20143.00	20143.00	-0.20	-0.02	0.99	20144.00	20144.00	0.20	0.02	0.99
Gender	0.96	0.97	-4.20	-0.85	0.40	0.95	0.97	-4.60	-0.85	0.40
Age at Participation	33.53	34.54	-7.40	-0.74	0.46	33.91	34.89	-7.20	-0.67	0.50
White	0.80	0.80	0.00	0.00	1.00	0.81	0.79	4.80	0.40	0.69
Black or African American	0.14	0.13	3.50	0.30	0.77	0.14	0.14	-2.00	-0.16	0.88
Hispanic	0.04	0.05	-6.80	-0.51	0.61	0.04	0.04	-3.80	-0.28	0.78
Asian or Other race	0.02	0.01	9.30	1.00	0.32	0.02	0.01	10.30	1.00	0.32

STAFF ASSISTED GROUP (No restriction by time)

Variable	Nearest neighbor matched sample					Caliper Matched Sample				
	Mean		t-test	V(T)/		Mean		t-test	V(T)/	
	Treated	Control	%bias	t	p> t	Treated	Control	%bias	t	p> t
County of Residence	96.83	93.71	13.80	1.36	0.17	95.92	93.91	8.90	0.71	0.48
Mean wage in third quarter prior	3480.30	3290.00	3.40	0.36	0.72	4000.80	3513.50	8.60	0.66	0.51
Exit Quarter	20143.00	20143.00	-2.50	-0.24	0.81	20143.00	20144.00	-10.60	-0.83	0.41
Gender	0.96	0.95	1.40	0.25	0.81	0.94	0.94	0.00	0.00	1.00
Age at Participation	33.57	32.96	4.30	0.44	0.66	34.13	33.79	2.40	0.19	0.85
White	0.80	0.85	-11.80	-1.23	0.22	0.78	0.84	-14.30	-1.16	0.25
Black or African American	0.14	0.12	4.50	0.46	0.65	0.17	0.14	6.90	0.53	0.59
Hispanic	0.04	0.03	3.00	0.28	0.78	0.03	0.02	4.70	0.45	0.65
Asian or Other race	0.02	0.02	-4.90	-0.38	0.70	0.02	0.01	7.60	0.58	0.56
Associate's Degree	0.06	0.04	8.60	0.92	0.36	0.06	0.04	6.70	0.59	0.56
BA Degree	0.12	0.13	-1.80	-0.16	0.88	0.10	0.14	-13.80	-0.99	0.32
High School or GED	0.69	0.69	1.20	0.11	0.91	0.69	0.66	5.40	0.41	0.68
Other vocational degree	0.03	0.05	-9.30	-0.79	0.43	0.03	0.04	-9.60	-0.72	0.47
Post BA degree	0.02	0.02	0.00	0.00	1.00	0.03	0.03	0.00	0.00	1.00
Some College	0.06	0.07	-1.90	-0.21	0.84	0.09	0.08	5.80	0.47	0.64

Panel B: Matched Comparison Groups for Q1-Q4, Sample of Participants completing between 2013 and 2015 1<sup>st</sup> quarter

**NON-TRAINING GROUP (Sample completing between 2013 and 2015 1st quarter)**

Variable	Nearest neighbor matched sample					Caliper Matched Sample				
	Mean		t-test	V(T)/		Mean		t-test	V(T)/	
	Treated	Control	%bias	t	p> t	Treated	Control	%bias	t	p> t
County of Residence	99.42	101.83	-10.80	-0.91	0.36	100.65	103.23	-11.50	-0.93	0.35
Mean wage in third quarter prior	3375.60	3441.30	-1.10	-0.12	0.90	3548.70	3603.20	-0.90	-0.09	0.92
Exit Quarter	20141.00	20141.00	-6.60	-0.59	0.56	20142.00	20142.00	-4.70	-0.41	0.68
Gender	0.96	0.98	-5.00	-1.01	0.31	0.96	0.98	-5.30	-1.01	0.31
Age at Participation	34.06	32.07	14.90	1.39	0.17	34.40	32.48	14.30	1.29	0.20
White	0.79	0.84	-11.90	-1.01	0.31	0.81	0.85	-9.10	-0.77	0.44
Black or African American	0.16	0.13	12.20	0.95	0.34	0.15	0.11	10.90	0.86	0.39
Hispanic	0.03	0.03	0.00	0.00	1.00	0.02	0.02	0.00	0.00	1.00
Asian or Other race	0.01	0.04	-24.00	-1.43	0.15	0.01	0.02	-6.40	-0.45	0.65

**STAFF ASSISTED GROUP (Sample completing between 2013 and 2015 1st quarter)**

Variable	Nearest neighbor matched sample					Caliper Matched Sample				
	Mean		t-test	V(T)/		Mean		t-test	V(T)/	
	Treated	Control	%bias	t	p> t	Treated	Control	%bias	t	p> t
County of Residence	99.04	96.90	9.50	0.82	0.41	96.00	97.20	-5.30	-0.34	0.74
Mean wage in third quarter prior	3385.30	2961.10	7.90	0.77	0.44	3972.10	3285.00	12.80	0.78	0.44
Exit Quarter	20141.00	20141.00	-5.80	-0.53	0.60	20141.00	20142.00	-13.70	-0.86	0.39
Gender	0.96	0.96	0.00	0.00	1.00	0.93	0.93	0.00	0.00	1.00
Age at Participation	34.00	32.93	7.60	0.76	0.45	34.46	33.27	8.50	0.59	0.56
White	0.80	0.83	-7.70	-0.72	0.47	0.83	0.80	6.00	0.40	0.69
Black or African American	0.16	0.16	0.00	0.00	1.00	0.14	0.18	-10.20	-0.65	0.52
Hispanic	0.03	0.03	0.00	0.00	1.00	0.03	0.03	0.00	0.00	1.00
Asian or Other race	0.01	0.00	11.20	1.42	0.16	0.01	0.00	11.00	1.00	0.32
Associate's Degree	0.06	0.04	7.20	0.75	0.46	0.06	0.04	9.40	0.72	0.47
BA Degree	0.13	0.15	-6.10	-0.49	0.62	0.11	0.14	-8.00	-0.48	0.64
High School or GED	0.70	0.64	13.60	1.20	0.23	0.69	0.58	23.90	1.48	0.14
Other vocational degree	0.04	0.08	-21.50	-1.46	0.15	0.03	0.08	-28.10	-1.45	0.15
Post BA degree	0.02	0.03	-4.40	-0.38	0.70	0.03	0.05	-17.10	-0.83	0.41
Some College	0.05	0.07	-6.70	-0.71	0.48	0.09	0.13	-13.20	-0.77	0.45

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