

Workforce of Tomorrow

How will Southwestern Pennsylvania supply a flexible, skilled workforce to meet the needs of a transformed economy?

Center for Economic Development



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Smart Policy for Innovative Regions

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Who we are

The CED is affiliated with the H. John Heinz III School of Public Policy and Management at Carnegie Mellon University. Established in 1968 and renamed in 1992 in honor of the late U.S. Senator from Pennsylvania, the Heinz School improves the ability of the public, private and non-profit sectors to address important problems and issues facing society.

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This report represents a review and analysis of reports and data related to workforce issues in Southwestern Pennsylvania and how those issues relate to the challenges facing the professions of economic and workforce development.

It was compiled by Dr. Jerry Paytas, Acting Director of the Carnegie Mellon Center for Economic Development.

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This report does not represent the conclusions, views, or official positions of Carnegie Mellon University or any of its corporate officers.

Introduction

This report is a synthesis of research and analysis on the regional workforce and economy of southwestern Pennsylvania. One of the results of the economic restructuring of the past thirty years is the development of a more diverse and dynamic economy. Southwestern Pennsylvania is no longer reliant on one critical industry or a handful of large companies. The regional economy is more stable and less subject to both boom and bust economic cycles. While the problems resulting from this economic transformation are not new and have been much discussed, there has been less examination from the perspective of the regional workforce. Competitive pressures require a skilled and productive workforce, but it is no easy task to supply a flexible, skilled workforce to meet the changing needs of a variety of firms and industries, each with unique needs.

This report details the challenges faced by southwestern Pennsylvania to undertake this endeavor. Our response must consider a variety of new pressures on the workforce resulting from converging trends in technology and the economy. Communications technology has made it easier for companies to collaborate but requires new technical and management skills. Companies must develop new opportunities and markets that require them to understand, leverage and build their core competencies and human capital assets. The pressure to optimize processes and functions requires the efficient flow of information and resources within and between companies. When optimization fails, companies will outsource low-performing or high-cost activities and workers.

Challenges for Southwestern Pennsylvania

- Slow rate of job creation (See page 2).
- Lower wage service jobs replacing higher wage manufacturing jobs (See page 3).
- Shrinking population and labor force (See page 3).
- Inability to attract new migrants (See page 6).
- A skilled workforce is critical to productivity growth (See page 7).
- Unskilled jobs are disappearing (See page 7).
- SWPA does not have a large pool of skilled workers (See page 8).
- The skill gap is creating a wage gap (See page 9).
- Skilled jobs are hard to fill (See page 9).
- Regional employers can't do it alone (See page 10).
- And they don't know how to use the training system (See page 10).

Workforce of Tomorrow

The problem is not new...

Pennsylvania's economic competitiveness has been a source of concern for years. Slow growth in employment and population are the twin indicators of our malaise. Economists and demographers can argue whether people follow jobs or jobs follow people, but it is clear that neither jobs nor people have been coming to Pennsylvania. We cannot have a growing, healthy economy that creates good jobs without a growing and educated workforce.

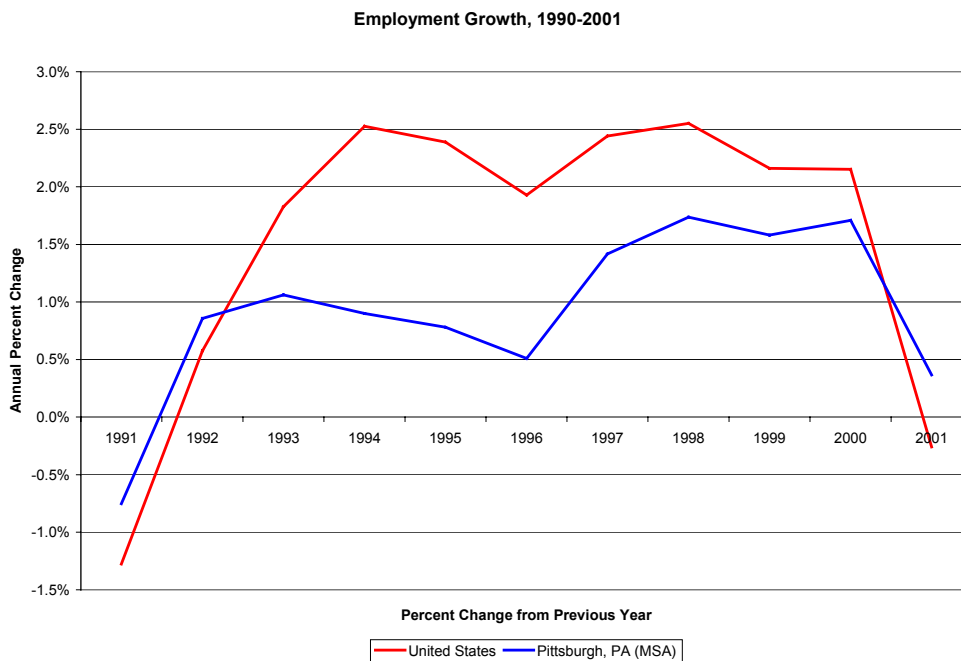
In the Pittsburgh region, employment growth since 1990 ranks 244th out of 319 MSAs. Growth in employment consistently lags the national average, except during recessions when Pittsburgh demonstrates greater resilience (Figure 1). While this is a positive sign, it should not be taken as an indication that the region has solved its slow growth problem.

Compared to competitor states and the nation since 1990, Pennsylvania's:

- Employment grew by 10% – half the national rate.
- Population grew by less than 4% – the nation grew at over 3 times as fast.
- Job creation rate was in the lowest 10% of all states.
- Workforce is expected to grow by only 0.3% in the next 20 years while the nation's will grow by over 11%.

Excerpted from IssuesPA E-Alert, April 3, 2003

Figure 1: Pittsburgh vs. U.S. Employment Growth, Post 1990

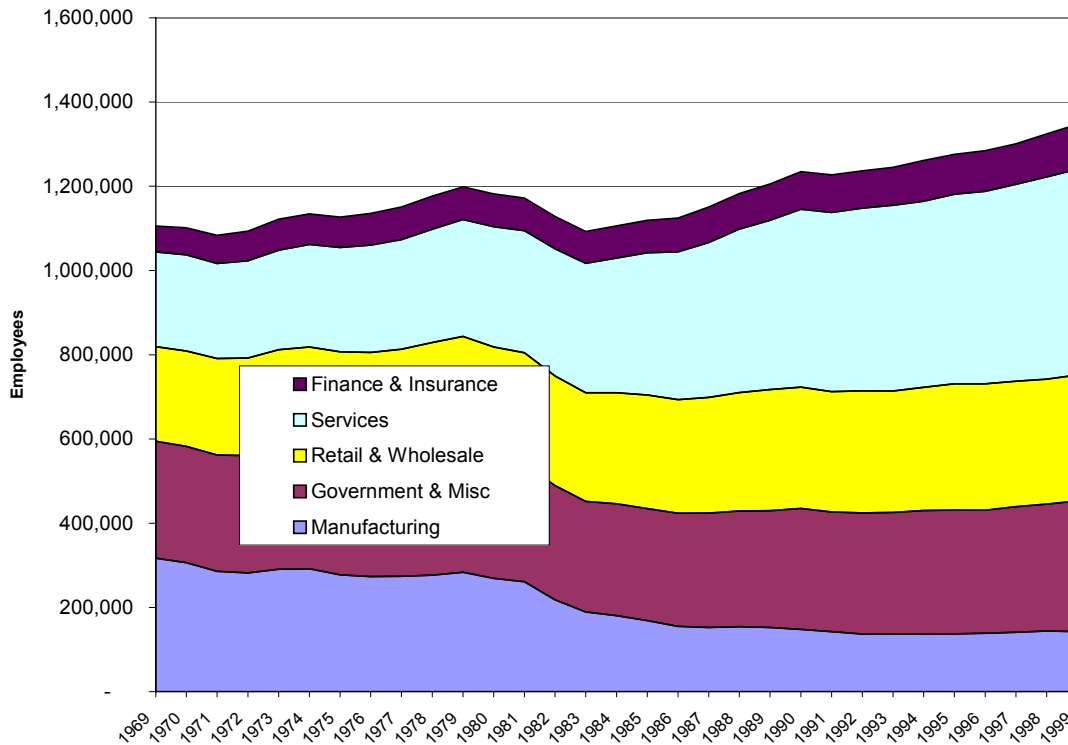


Source: U.S. Bureau of Economic Analysis.

Thirty Years of Transition in the Employment Base Without Growth...

Slow growth is one defining trend, but a large part of the story of the region is the transition in the economic base from manufacturing to services (Figure 2). Virtually all of the regional job growth during those thirty years occurred in services, adding more than 260,000 jobs, while manufacturing lost more than 174,000. Manufacturing, which accounted for 29% of the jobs in the region in 1969, accounted for only 11% by 1999, whereas service jobs grew from 20% to 36% of total employment during the same period. This transition impacts the region’s ability to maintain high quality of life for its residents because jobs in the service industries pay an average wage nearly \$13,000 less than manufacturing.

Figure 2: SWPA Employment, 1969-1999

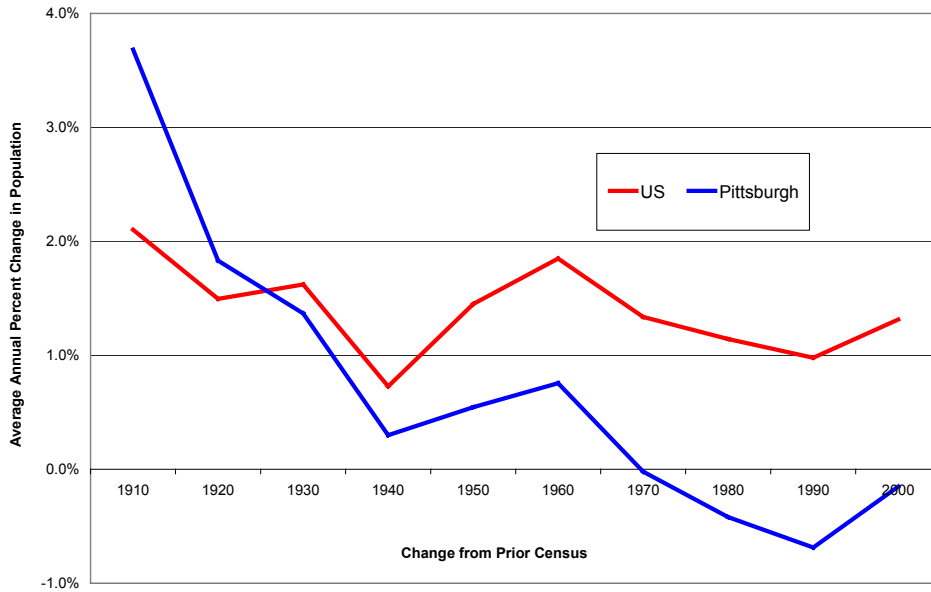


Source: U.S. Bureau of Economic Analysis.

Fewer jobs, fewer people

Since 1930 the rate of population growth in the Pittsburgh MSA has lagged the U.S. growth rate. Beginning in 1970 and continuing through every decennial census to 2000, the Pittsburgh MSA has lost population (Figure 3). This is not one of the cases where consistency is a good thing. The rate of decline hit bottom in the 1990 census, but it remained negative in 2000.

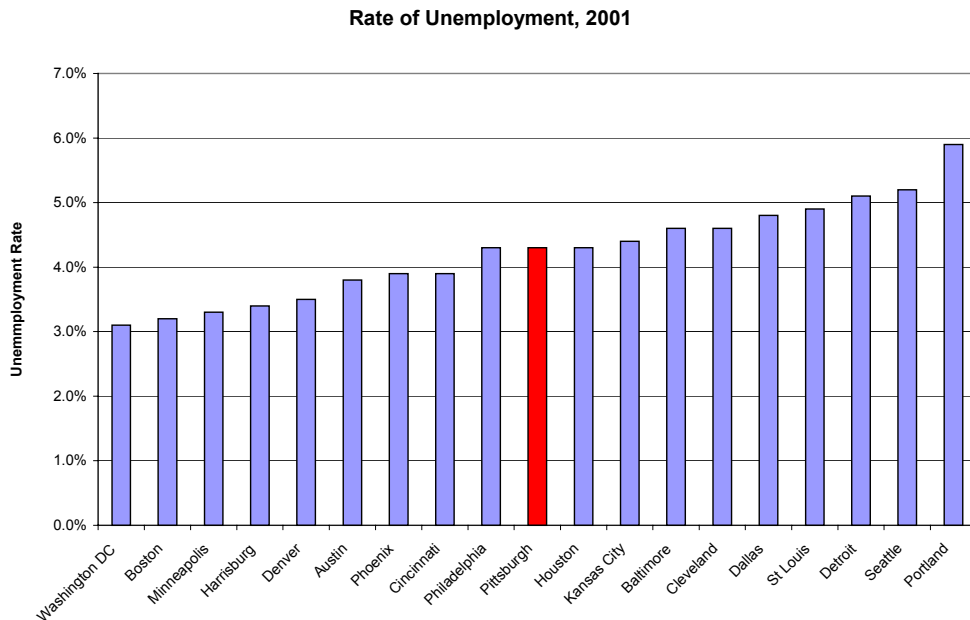
Figure 3: Population Growth in Pittsburgh and United States, 1900-2000



Source: U.S. Bureau of the Census.

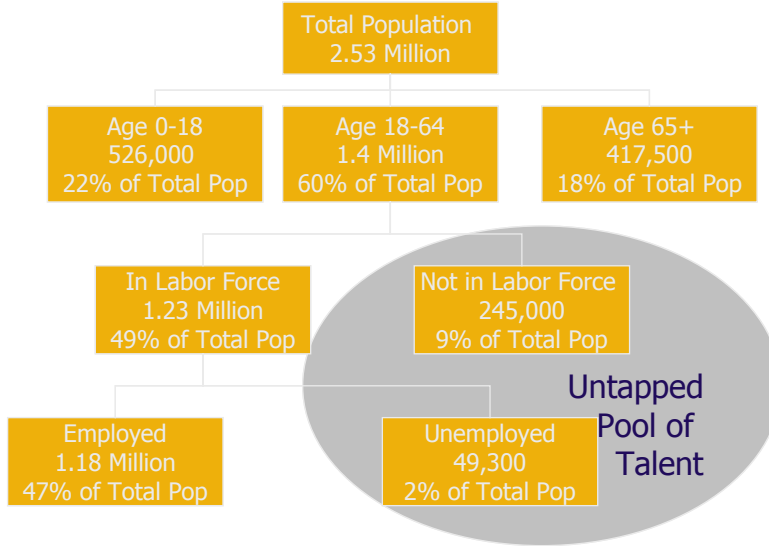
While our population is shrinking, the regional labor market is not as tight as other metropolitan areas (Figure 4). Pittsburgh’s unemployment rate is in the middle of most comparable MSAs. There is not much room for improvement, but if we made better use of our existing labor force, for example comparable to Minneapolis at 3.3% unemployment, it would translate into another 12,000 persons employed.

Figure 4: Unemployment rates in select MSAs



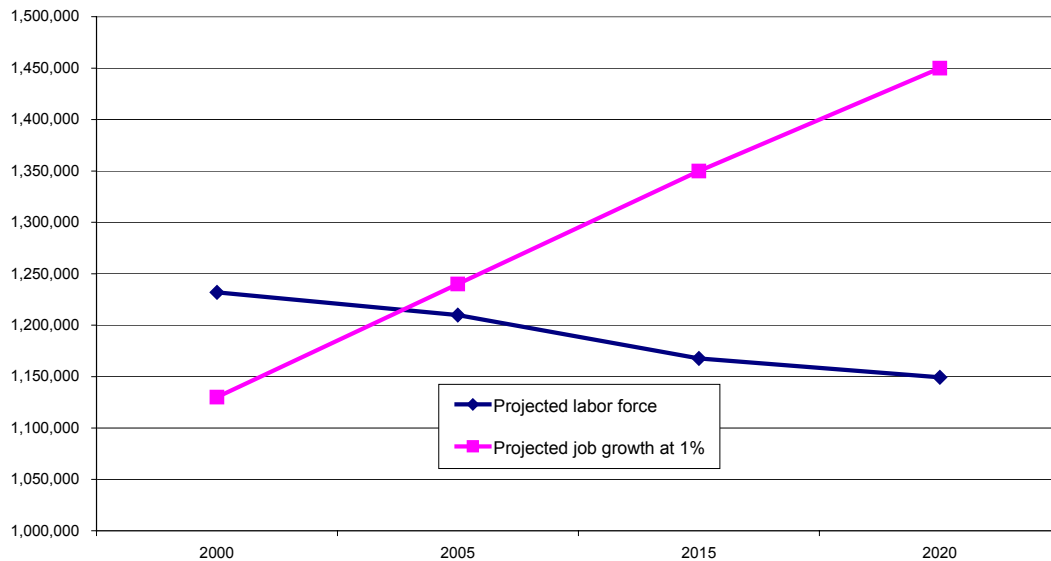
Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics.

Figure 5: Underutilized Resources



Our economic and demographic trends combine in unfavorable ways. One possible result is that if employment continues to grow at even a modest growth of one percent, there will not be enough people to fill the approximately 12,000 jobs created annually (Figure 6). The jobs available could exceed the regional labor force by 2005.¹

Figure 6: Projected Labor Force and Job Growth



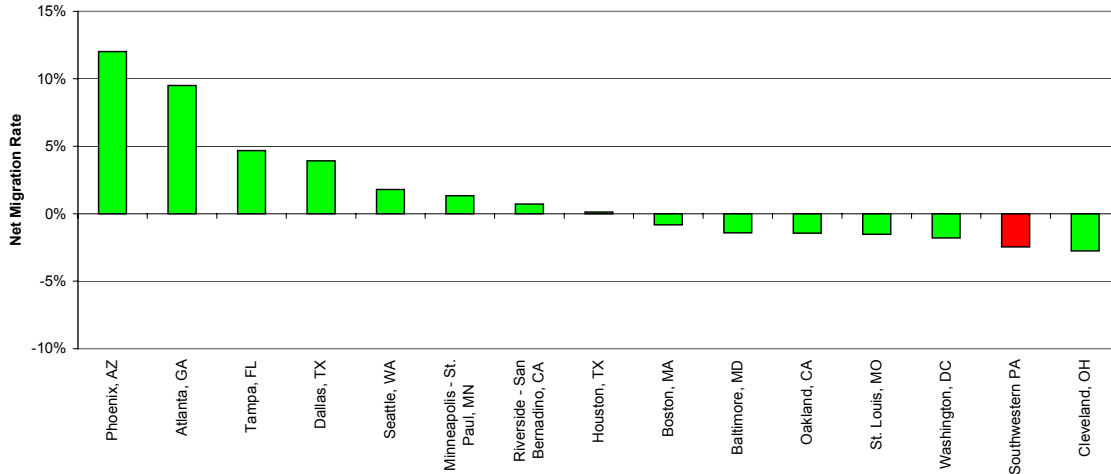
Source: PA Department of Labor and Industry and Team PA Business Resource Network.

If the population doesn't grow, and we are not able to make better use of the existing workforce, then we will have to attract workers from elsewhere. Unfortunately, without a

¹ Supply calculations were based on population projections from the Team Pennsylvania Business Resource Network (http://www.teampa.com/new/scripts/workforce_stats.asp?key=2&sec=3). The projected labor force assumes a constant rate of participation of 49%. This is an optimistic estimate of supply given the aging of the region's population. The demand estimate is aggregated from industry projections by the Center for Workforce Information and Analysis, Pennsylvania Department of Labor and Industry. <http://www.lmi.state.pa.us/clep/ltip/intro.asp>. The 1% rate of employment growth is comparable to the region's growth rate during the 1990s.

growing employment base, it is difficult to attract and retain the labor force. Even during a period of growth in the regional economy, Pittsburgh had a negative rate of net migration (Figure 7).

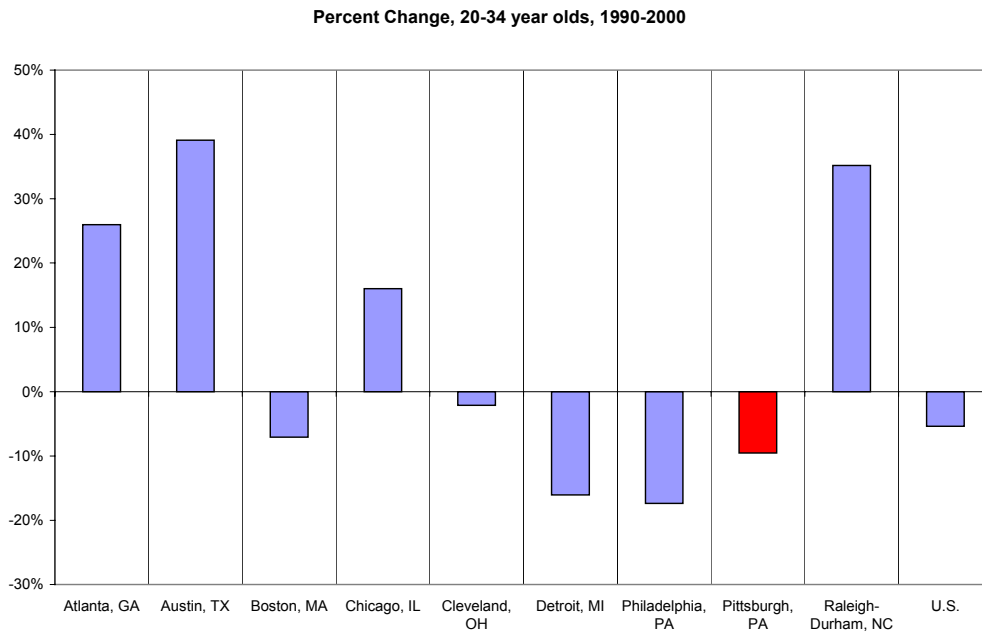
Figure 7: Net Domestic Migration in Select MSAs, 1994-1998



Source: U.S. Census Bureau.

It will not be easy to plug our migration deficit because the most mobile segments of the population are shrinking nationally (Figure 8). Nationwide in 2000 there were five percent fewer persons aged 20-34 than there were in 1990. Pittsburgh and a number of other areas have been losing the competition for this increasingly scarce pool of youth, while a few places in the South and West have been the biggest winners.

Figure 8: Disappearing youth

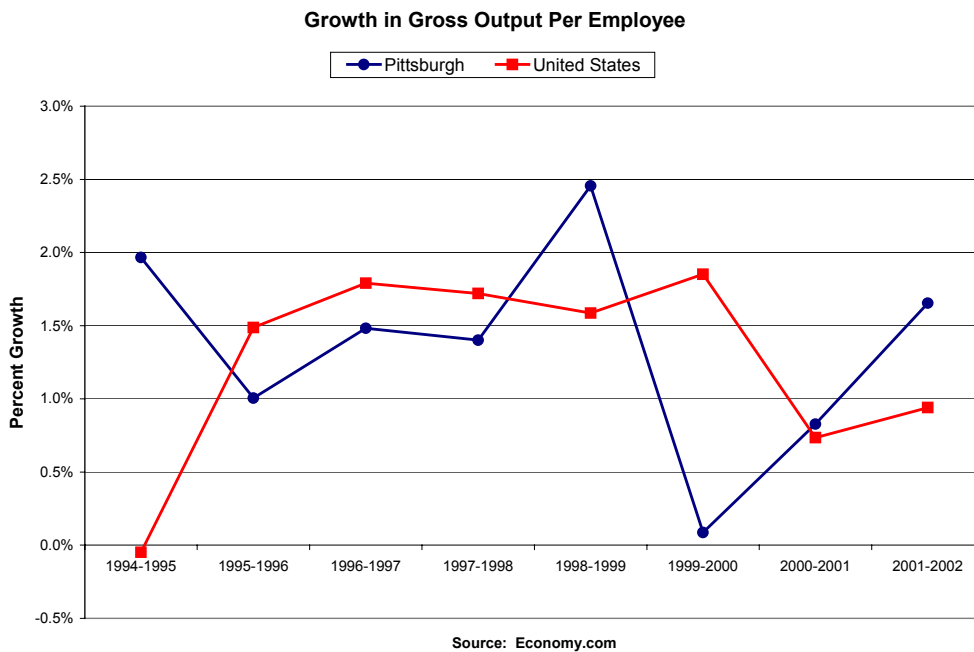


Source: U.S. Census Bureau.

A skilled workforce maintains productivity growth

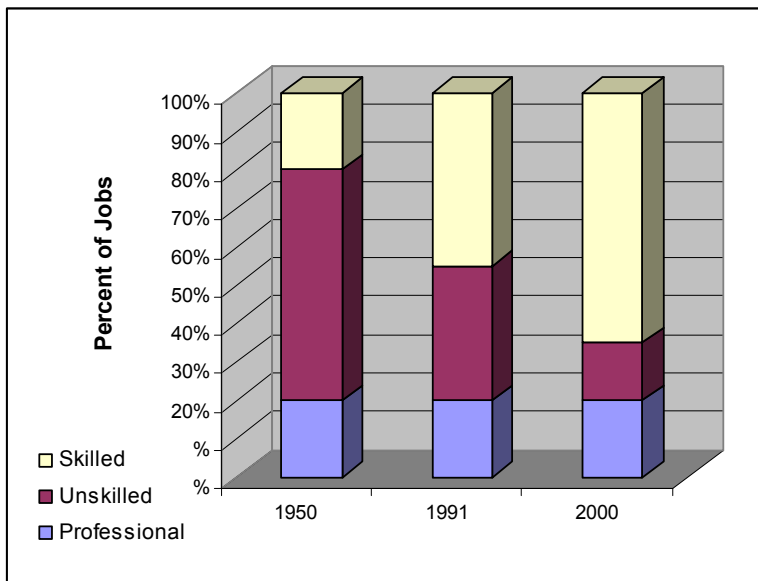
The region also needs a skilled workforce to maintain productivity growth. Pittsburgh has mostly held its own compared with the United States in terms of gross regional output per employee, one crude measure of productivity (Figure 9). Per employee output in the late 1990s has been volatile but it has remained positive.

Figure 9: Regional and National Productivity



Productivity growth is driven by either capital investment or by a more skilled workforce. There is significant evidence that in the United States, and in Pittsburgh, that the shift toward skilled jobs is driving productivity growth. Nationally, unskilled jobs are giving way to skilled jobs (Figure 10).

Figure 10: Unskilled jobs are disappearing



Maintaining our productivity may be difficult. Against comparable markets, we don't offer as large a pool of highly educated workers. We more people with at least a high school degree, but fewer with at least a bachelor's degree. With 372,000 people with at least a bachelor's degree, the region ranks 15th of the 19 MSAs listed in Table 1. The result is that the

region is at a disadvantage versus comparable MSAs in competing for high-wage “knowledge economy” jobs.

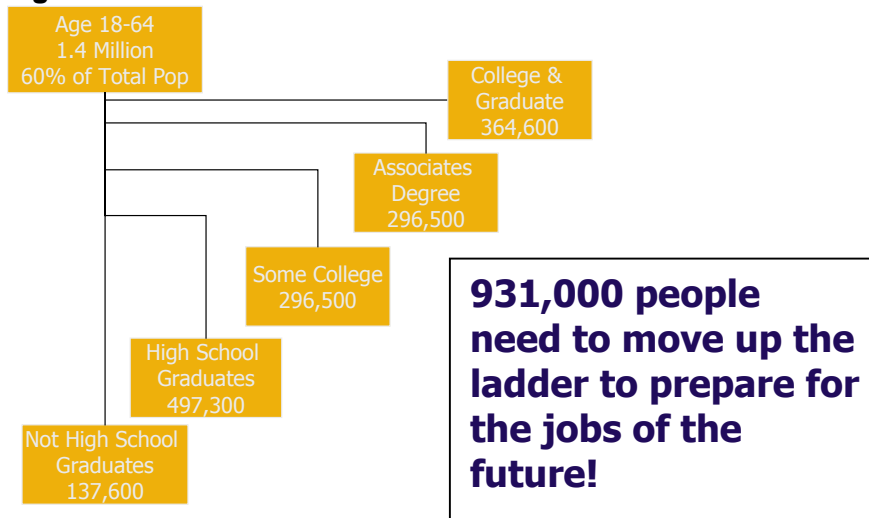
Table 1: Supply of highly educated workers in competitive markets

Metropolitan Area	Population (thousands), 25 and older	Percentage with high school degree	Percentage with bachelors degree or higher
Denver-Boulder-Greeley CO CMSA	1,689	89.3	38.7
Minneapolis-St. Paul, MN-WI MSA	1,772	94.0	38.4
Kansas City, MO-KS MSA	1,204	90.6	34.7
San Diego, CA MSA	1,803	85.3	34
Seattle-Tacoma-Brem., WA CMSA	2,169	93.2	33.8
Atlanta, GA MSA	2,620	89.0	31.4
Sacramento-Yolo, CA CMSA	1,144	90.6	31.4
Portland-Salem, OR-WA CMSA	1,513	90.0	29.4
Cleveland-Akron, OH CMSA	2,020	89.6	28.7
Cincinnati-Hamil., OH-KY-IN CMSA	1,207	86.4	27.7
Milwaukee-Racine, WI CMSA	1,251	87.3	26.9
St. Louis, MO-IL MSA	1,683	85.5	24.5
Pittsburgh, PA MSA	1,537	87.5	24.2
Tampa-St. Petersburg-Clrwrtr, FL MSA	1,642	83.2	18.6

Source: US Census Bureau.²

There are no precise estimates on the number of jobs being creating for each education level, but higher skills are required to compete; therefore more people have to move up the education ladder. This does not suggest that everyone needs a college degree, but most need to climb a rung or two. The nearly 140,000 working-age persons should complete at least a high-school education for many of the jobs available in manufacturing and IT. Meanwhile, the 300,000 individuals with some college education have the earning power of high school and might have been better served in pursuit of an associate’s degree.

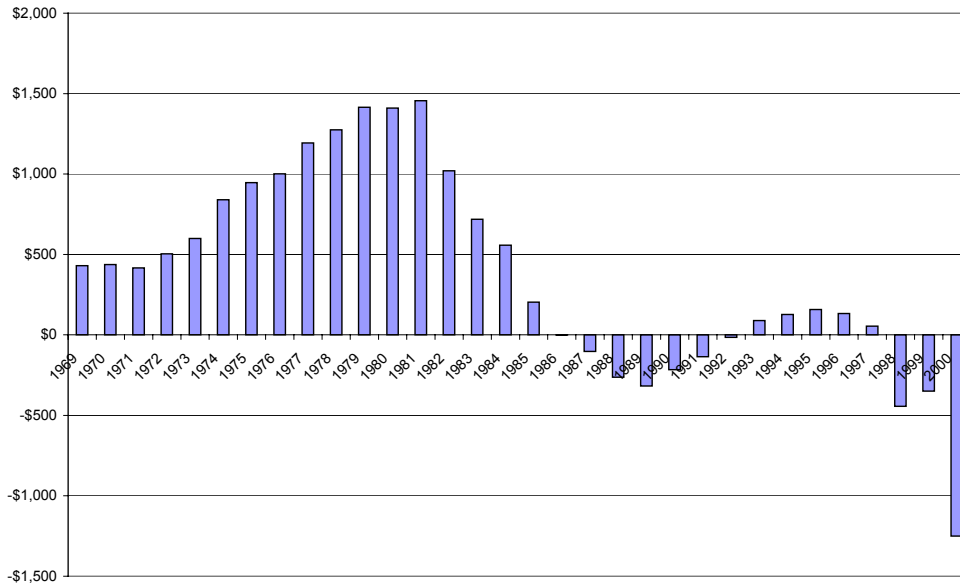
Figure 11: Education of the labor force



² Educational Attainment of the Population 25 Years and Over, By Metropolitan Area, Including Confidence Intervals of Estimates: March 2000, U.S. Census Bureau, <http://www.census.gov/population/socdemo/education/p20-536/tab15.pdf>.

Until the mid-1980s Pittsburgh maintained higher average wages than the nation, but especially with the loss of jobs in manufacturing this advantage eroded (Figure 12). If we don't improve education and skills, the wage gap between Pittsburgh and the rest of the nation will worsen. Analysis by the Center for Economic Development suggests that the educational disparities between Pittsburgh and the nation, particularly in regards to more educated workers, is driving this wage gap.³

Figure 12: Gap in Annual Average Wages, Pittsburgh - U.S.



Source: U.S. Bureau of Economic Analysis.

Skilled jobs are very hard to fill in Southwest Pennsylvania

On the employer side, these pressures are felt in the difficulty in filling positions. Even during the fall of 2002, during a time of national and regional recession, employers in Southwestern Pennsylvania experienced high levels of difficulty in filling skilled production jobs, and professional and managerial jobs (Table 2).

Table 2: Difficulty of Filling a Vacancy by Type of Position, Fall 2002

	Not Difficult	Somewhat or very difficult
Skilled Production Jobs	9%	90%
Unskilled Production Jobs	46%	54%
Professional and Managerial Jobs	37%	63%

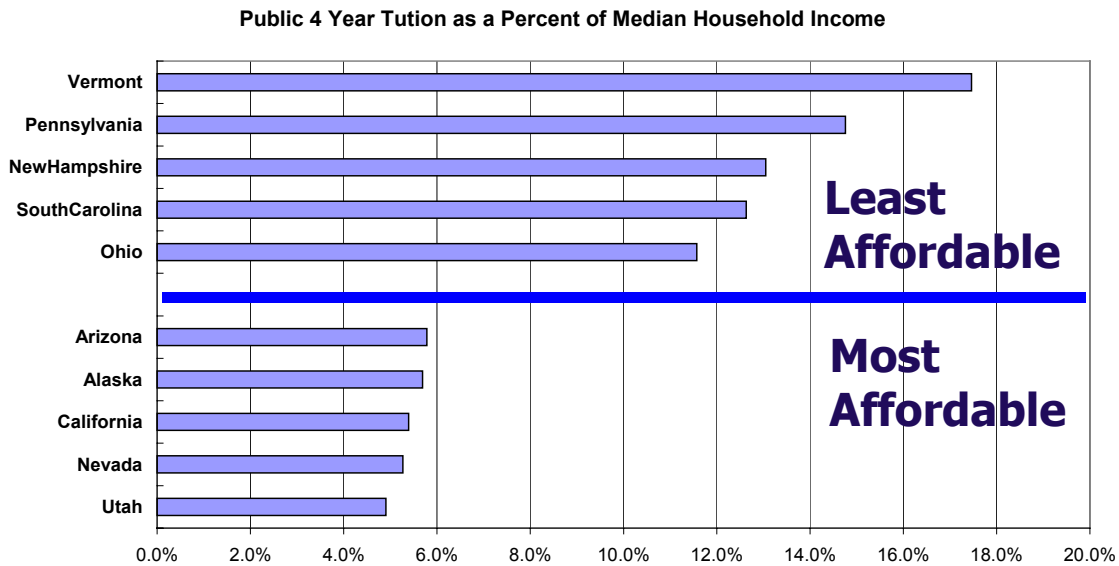
Source: The Center for Competitive Workforce Development, Duquesne University, Job Vacancy Survey Report, February 2003.

³ Falling in the wage gap. Carnegie Mellon University, Center for Economic Development. <http://www.smartpolicy.org/wagegap/wagegap.htm>.

Getting skills is not cheap in PA

The tuition for four-year college and university programs is 169 percent of the national average and for two-year programs it is 168 percent of the national average. Relative to median household income, the state has the second highest tuition costs for four-year programs in the nation, and seventh highest for two-year programs.

Figure 13: A high price



Source: National Center for Education Statistics, Analysis by the CED.

Key sectors of demand

Manufacturing and Information Technology represent two key sectors of demand. Manufacturing, as the traditional base of the economy, still accounts for more than 140,000 jobs. Information technology, while smaller than manufacturing in terms of absolute numbers, has accounted for a substantial portion of the new jobs created in the region in the 1990s. For these reasons, we explore these sectors as representative of demand in the regional economy.

<p>Manufacturing: 4,220 Firms</p> <ul style="list-style-type: none"> ▪ Retirement could create 12,000-24,000 vacancies/year for next 10 years ▪ Average employees = 38.5 ▪ Demand is from many small firms located away from large labor pools 	<p>Information Technology: 1,740 Firms</p> <ul style="list-style-type: none"> ▪ Created nearly 3,000 jobs/year from 1996-2001 ▪ Average employees = 23.5 ▪ Demand is from many small firms creating a few jobs each
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The educational needs of these sectors are diverse in terms of the degree requirements for the positions. Information Technology has more occupations requiring at least a

bachelor’s degree, but there are a significant number of jobs being created in occupations that require technical or occupational training (Table 3).

Table 3: Education by Occupation, IT Firms Only

<i>Occupation</i>	<i>Preferred Degree</i>
Management	Bachelor’s
Mktg. & Sales	Bachelor’s
SW Prog. & Eng.	Bachelor’s
HW Eng.	Bachelor’s
Network & Systems	Bachelor’s
Comm. & Media	Associate-Bachelor’s
Op & Support	Associate
Assembly, Install & Repair	High School - Associate

Source: IT Workforce Survey. SWPA Industry Cluster Analysis.

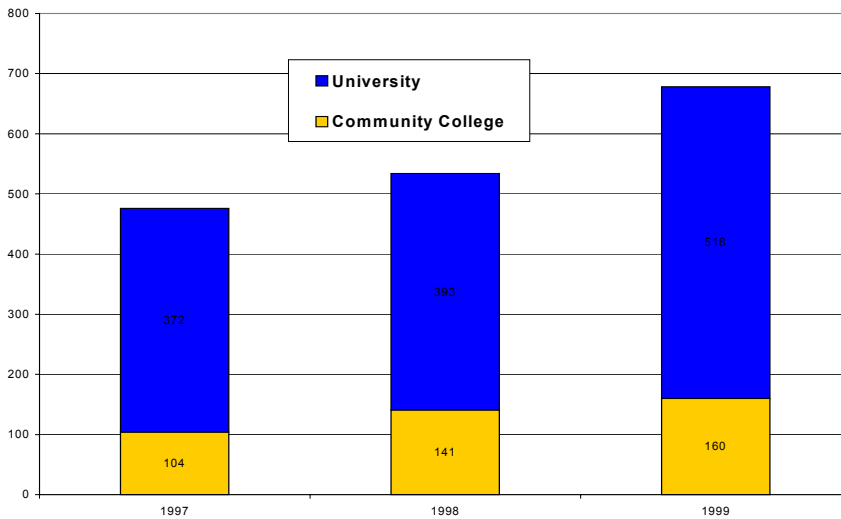
Manufacturing firms also hire for occupations that require a four-year college education, but many of positions require only additional training beyond high school (Table 4).

Table 4: Education by Occupation, Manufacturing

<i>Occupation</i>	<i>Degree</i>
Engineer	Bachelor’s
Other Professional	Bachelor’s
Sales	High School – Associate
Skilled Production	High School +
Non-Skilled Production	High School

Source: Manufacturing Workforce Survey. SWPA Industry Cluster Analysis.

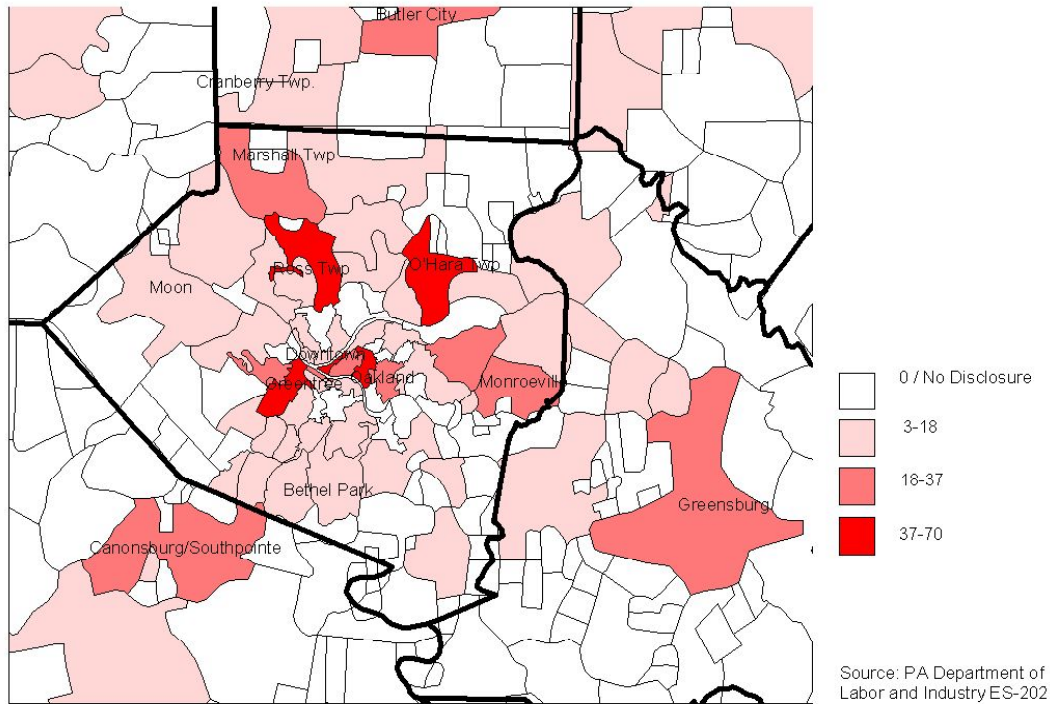
Figure 14: IT Degrees Awarded in the Pittsburgh Region



The region has been creating nearly 3,000 jobs annually in IT, but it has been unable to absorb all of these graduates. Part of the problem is a preference for more experienced workers and the need for more business and entrepreneurial expertise.

Not only is the demand for IT workers dispersed among many companies making a small number of hires, it is also dispersed among a number of geographic centers. There are several clusters of IT establishments in and around the City of Pittsburgh, but concentrations also exist around the compass in Greensburg, Southpointe, O’Hara, Ross, Marshall and Butler.

Figure 15: The Geography of IT in 2000



An economy of small companies

Part of the difficulty in filling these positions is that many of the region’s employers are small firms. Small firms often do not have a Human Resources department or staff. In addition, they typically hire in small numbers and have less capacity for sophisticated promotion of openings, making it harder for candidates to find these opportunities.

Establishments in the Pittsburgh MSA:

- 69% have less than 20 employees
- 84% have less than 500 employees
- Only 16% have more than 500 employees

Source: U.S. Census Bureau, Economic Directorate

"I get a lot of people who are not qualified and on top of that they want to make big money to learn. They want me to teach them, and they want me to pay them, too."

Small machine shop owner in Export, PA, Post-Gazette, Feb 11, 2003.

Furthermore, as the regional economy has diversified in terms of industry, there is more variation in the workforce needs and challenges across firms. This diversity of demand provides fewer and less significant opportunities for aggregating the demand for specific

occupations or skills. From the employee perspective, they have fewer prospects for employment with any given set of skills.

Due to their size and lack of specialized resources, small firms lack the capability to manage training programs. Throughout southwestern Pennsylvania, outside training providers are not widely used by industry (Table 5). Less than one-third of the firms in manufacturing (31%) and information-technology (28%) use external training providers. Most rely on informal, on-the-job training. Surveys and interviews have identified "on-the-job" experience as one of the key skills that workers need, and unfortunately, schools and training providers are not able to offer this real-world experience. Small firms are less able to accommodate employees who require significant on-the-job training. The surveys also identified the need for "relevant experience" as an important gap in the workforce. Unfortunately, the use of internships and apprenticeships, which can provide that relevant experience, is very low.

Table 5: Use of Training in Key Industries

Type of Training	Manufacturing		IT
	Production Workers	Non -Production Workers	
"On the Job"	74%	47%	65%
Formal, Internal	37%	24%	38%
External Provider	31%	25%	28%

Source: *Southwestern PA Industry Cluster Analysis*.

Overall the regional workforce rates well on its technical skills. However, most of this evidence relies on assessments of people in the civilian labor force – those who are either employed or actively seeking a job. Deficiencies in basic skills such as math, reading and communications are likely to be more severe in those not in the active labor force. Therefore, it is difficult to assess the need for remedial training. From the perspective of employers and the active workforce, a high-quality K-12 system is the best way to maintain these basic skills. Comparatively, our schools rate well in terms of SAT scores and other measures of those preparing for post-secondary education.⁴ However we know less about the quality of student going directly to the workforce. Furthermore, high-achieving students are often concentrated in select schools, creating disparities between schools within the region that will impede the preparation of a workforce for the future that is adequate in supply and proficient in skills.⁵

⁴ Education Policy and Issues Center, *2000 Regional Education Index Report*.

⁵ Education Policy and Issues Center, *2000 Regional Education Index Report*, p. 6.

The region must pursue several responses



- Increased retention of young local residents & college students,
- More effective utilization of existing population & workforce
- More flexible, *cafeteria style* training to respond to disaggregated demand, and the lack of use of external training

One of the common characteristics found in many studies of the region is that the demand for entry-level positions is limited.⁶ Recently the region has taken steps to promote internships, which must be expanded throughout the target clusters and the region.

Addressing the training and skill needs of the regional workforce will require a more flexible approach to the development and delivery of training services. Our schools and institutions will have to learn how to deliver more customized and "just-in-time" training, much like businesses have had to do with their products and services. The first steps to bringing about these changes are to involve industry in the training arena – to identify skill demands, develop curriculum, and advise on the delivery of training services. Furthermore, as employers are more involved with training providers, we may be more able to offer more opportunities to inject real-world experience into the training environment.

An effort that integrates demand and supply is required...

- Prospective employers need access to customized training, delivered quickly and cost-effectively
- Uniting a variety of providers can offer a more flexible modular approach
Potential employees need access to training
- Provide services on-site that enable more people to help themselves

Workforce development is like an onion – it has many layers. It is a system that has developed over time in response to various needs and stakeholders, but may not be as well aligned to current conditions as it should be. Unfortunately, this is purely speculation because the system is complex and confusing to navigate (Figure 16: Regional Workforce Development Explained).

⁶ This finding was supported in the cluster surveys and an earlier survey conducted for the *Entrepreneurial Pittsburgh* report prepared for the Pittsburgh Regional Alliance.

Figure 16: Regional Workforce Development Explained

