

Industry Clusters, Hot Jobs, Career Pathways, and Skill Acquisition

Hendrick Best Practices for Adult Learners
Conference

May 12, 2015



Interesting Year

- Since the passage of the Workforce Innovation and Opportunities Act (WIOA) in 2014, I have been in a position to think about its implications from a number of different points of view...
 - Chair of the PA Workforce Development Association
 - Board Member of the National Association of Workforce Development Professionals
 - Member of the Transition Team for the PA Department of Labor and Industry
 - An Executive Director of a local workforce investment board (and as a retired one)
 - A certified workforce development professional (CWDP)

Today

- Here to talk about...
 - How as an education leader in PA, Penn State should look at the relationship between industry clusters, high-priority occupations, career pathways, and skill acquisition as the school tries to make sense of how best to serve adult learners;
 - How Penn State as a leading training provider in the Commonwealth and in local communities can support career pathway strategies that engage both business and the adult learner; and
 - How Penn State can engage the partners in the formal workforce system as that system goes through a major overhaul and time of redefinition.

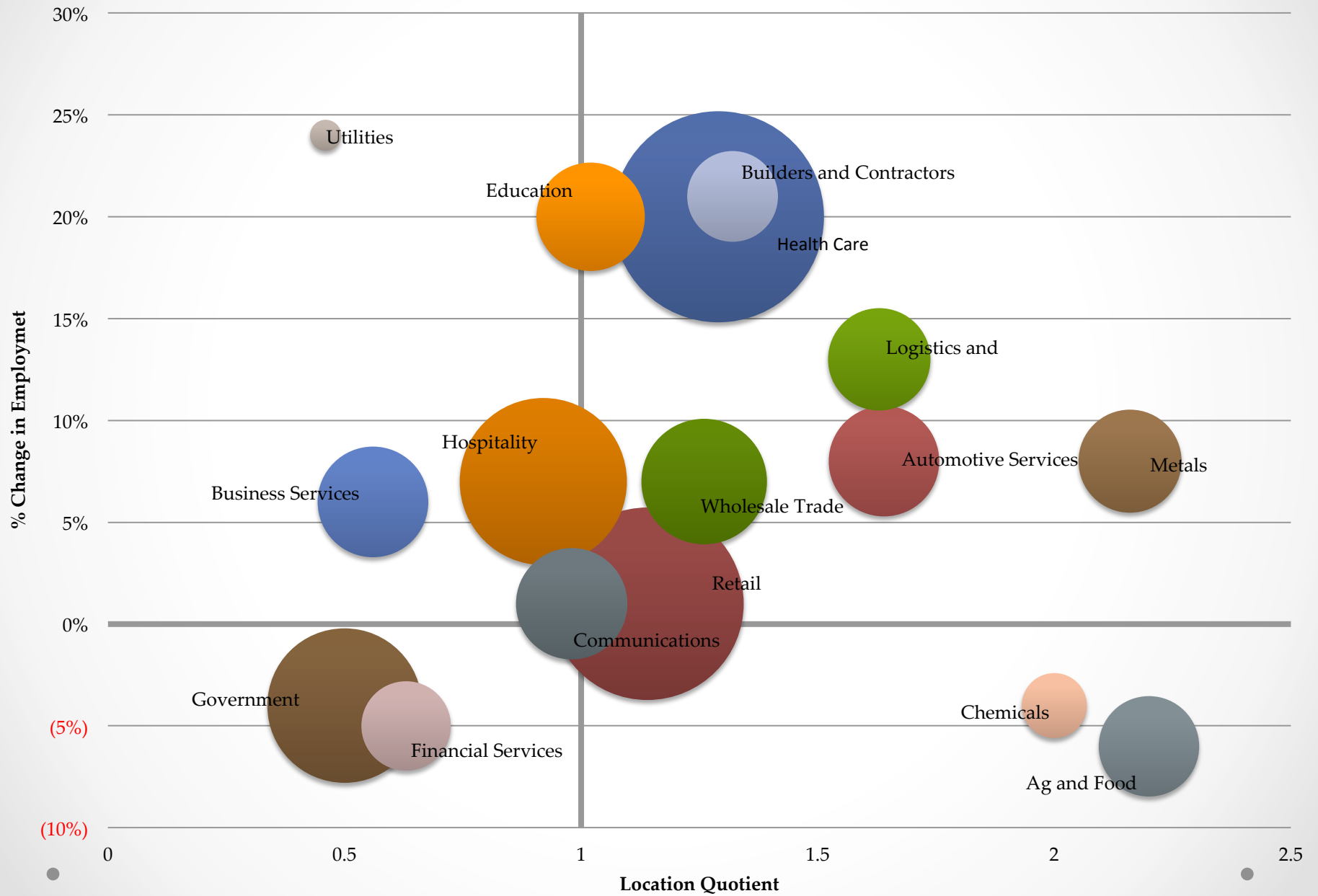


Industry Clusters

- Understanding the drivers of economic activity in our local economies is foundation to everything that we do.
- Defining the industry cluster is typically the first activity in the process. I use a broad definition of clusters that is inspired by the work of Michael Porter to include supply chains, the core industry, and distribution chains.
- Growth, competitiveness, and the growth of good jobs with average wages above the family-sustaining wage levels have been our criteria for picking the industries in which the public workforce system in Lancaster County has invested.
- We also have been interested in traded clusters in contrast to infrastructure clusters.



Industry Clusters in Lancaster County 2014-2024



Industry Clusters

- One of the important legacies of the Workforce Investment Act (WIA) is its emphasis on the formal workforce investment system seeing itself as a part of the economic development system of a local economy.
- We have a dual mission of assuring that the employers in our area have an ample and well-trained workforce to stay competitive in the global economy as well as assuring that people who live in our areas have access to career pathways that lead to family-sustaining jobs.
- This idea is implied in the conversations regarding the implementation of the Workforce Innovation and Opportunities Act but the emphasis on economic development has swung back to more traditional economic development entities.



Opportunities

- Clusters are the basis for the industry partnership network that developed high-quality training for the incumbent workforce and, then, withered over the last five years or so. I think that industry partnership network will be revived as the Commonwealth figures out its fiscal situation.
- Industry cluster analysis lends itself to thinking regionally, an idea that is mentioned in the new WIOA legislation.
- Some investment of time in real supply and distribution chain analysis can lead to a new, more pro-active kind of economic development.

•

•

Top 100 Hot Jobs

- Traditional in-demand jobs lists did not work for us after adopting a sector model.
- We also needed to account for replacement jobs for retiring workers as well as new jobs because of growth.
- In the early days, we used our proprietary database to run staffing patterns by industry cluster.
- However, we began to see that many occupations are a part of the staffing patterns of multiple industries.



Finding Top Occupations

- Our model uses a proprietary database (EMSI) to project job openings (new and replacement jobs) over a ten-year period.
 - We initially filter out any jobs that fall below the family-sustaining wage for our regional economy.
 - Next, we resort the database by openings to see where the jobs with the highest demand fall.
- This provides us with what we call the Top 100 Hot Jobs in Lancaster County.
- These are the middle-skills, middle-wage jobs with strong STEM components which are often leading the job growth in many areas;
- We eventually used this concentrated list to build career pathways.

•

•

Opportunities

- I'll talk more about Hot Jobs in relation to career pathways in just a minute but I think that it is important for the University and all of you to understand middle skill, middle wage jobs and the skills that go with them.
- The University can have a direct role in skill acquisition for these jobs, particularly in those that have STEM requirements but this training may look different than the typical way that does education.
- Beyond that, these folks will eventually have the need for more education and training as their careers progress. We need to understand the skills and experience that they bring and recognize it as they engage the formal education system.



Career Pathways

- Career pathways have become increasingly popular frameworks for talking about the variety of career options that are available to people who are preparing to enter the jobs market or looking for work after an employment dislocation.
- They use occupations as a kind of roadmap for jobseekers and many have been organized in “ladders” or “lattices” showing occupational progression.
- Many people doing career pathway development, especially educators, begin with training that they want to do and build an occupational pathway that fits it.
- We propose that building pathways must begin in the context of the needs of the employers in a regional economy and be based on occupational projections for the jobs for which the employers are hiring.



White Paper

- For a downloadable copy of our White Paper on Career Pathways which includes a brief literature review and a broader discussion of why data-driven career pathways are better, go to http://www.economicmodeling.com/wp-content/uploads/CareerPathways_Sheely_3-2014-1a.pdf

WIOA Overview from US DOL (July 22, 2014)

Provides Access to High Quality training: WIOA helps job seekers acquire industry-recognized credentials for in-demand jobs.

- Training that leads to industry recognized post-secondary credentials is emphasized.
- States and local areas will use **career pathways** to provide education and employment and training assistance to accelerate job seekers' educational and career advancement.
- Local areas have additional procurement vehicles for training to increase customer choice and quality, including individual training accounts, pay for performance contracts, and direct contracts with higher education.

Reinforces Connections with Registered Apprenticeship (RA): WIOA promotes the use of RA, a proven model that provides workers with **career pathways** and opportunities to earn while they learn.



Developing and Testing Career Pathway Concepts

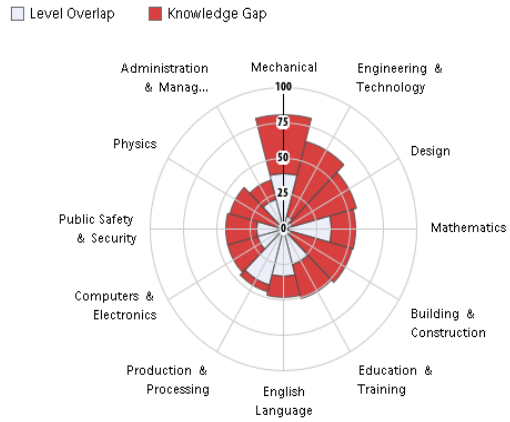
- To begin, we use the Top 100 list to find occupations that have some commonalities of function and skill.
- Our next step is a bit more subjective and requires some knowledge of occupations and compatible skills.
- We put occupations into tentative categories that will become the basis of our career pathways.
- Checking wage progression is one way to measure the actual pathway. Employers typically pay for skills. The more skills, the more pay.



Validating the Career Pathway

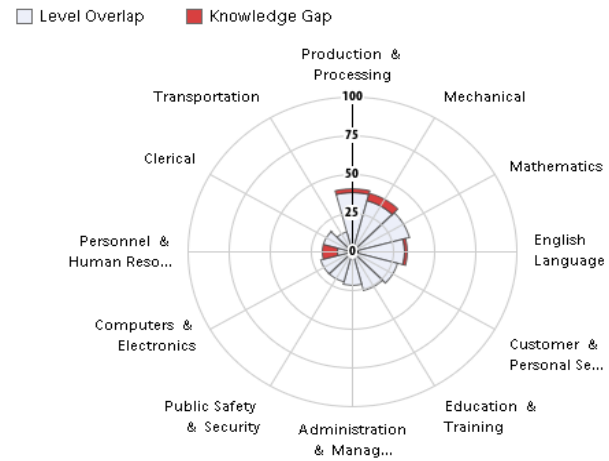
- A further way to validate the pathway is to look at the knowledge and skills themselves.
 - We do this by identifying exemplar occupations.
 - If we are right about the place on the pathway, there should be a knowledge and skill gap from one level to the next.

Most Important Knowledge Levels



Printing Press Operator to Maintenance

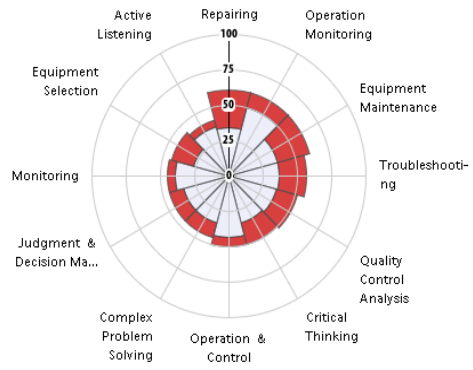
Most Important Knowledge Levels



Driver to Printing Press Operator

Most Important Skill Levels

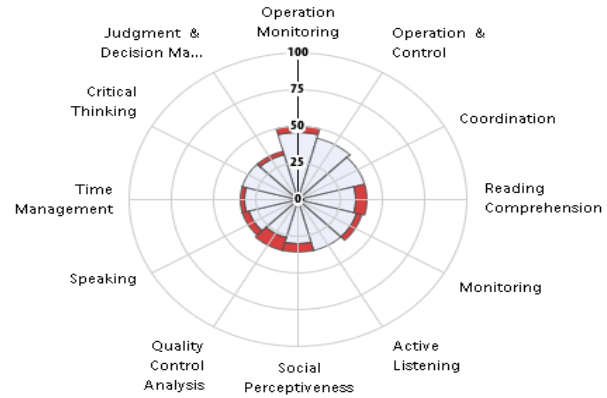
□ Level Overlap ■ Skills Gap



Printing Press Operator to Maintenance

Most Important Skill Levels

□ Level Overlap ■ Skills Gap



Driver to Printing Press Operator

Settling on the Career Pathway

- Pathway concepts may take some tweaking to get to the point where we feel comfortable with them.
 - We recommend reviewing them with employer customers to make sure that the pathway can be validated in the work world;
 - In addition, we run the list of jobs with compatible skills for the entry-level to see if we missed anything;
 - We also go back to the original occupation listing to see if any occupations beyond the top 100 should be added to the pathway lists;
 - Finally, we review the list of all jobs ranked by opening to see if there are jobs under the family-sustaining wage that should be included.



Career Pathway Concepts

- In our research and practice, we have found six groupings that seem to be fairly consistent...
 - Production
 - Sales
 - Administrative Support
 - Health Care
 - Construction and Trades
 - Technical Support



Production

- 58,642 jobs in 2014 to 60,530 in 2024 for a net gain of 1,888 or 3%
- Projected openings for the decade: 17,385
- Average hourly wage in 2013: \$16.74
- Industries
 - General Warehousing and Storage
 - Commercial Printing
 - General Automotive Repair
 - Animal Production
 - Supermarkets and Other Grocery Stores
 - Plumbing, Heating, and Air-Conditioning Contractors
 - Iron Foundries
 - Fabricated Structural Metal
 - Ice Cream Manufacturing
 - Wood Kitchen Manufacturing
 - Machine Shops

Production

- Laborers
- General Maintenance and Repair Workers
- Helpers-Production Workers
- Industrial Truck and Tractor Operators
- Printing Press Operators
- Mechanical Engineers
- Automotive Service Techs
- Structural Metal Fabricators
- Industrial Engineers
- Farmers and Ranchers
- First-Line Supervisors of Production Workers
- Food Batchmakers
- Inspectors, Testers, Sorters
- Industrial Machinery Mechanics
- Machinists
- Welders
- Heavy and Tractor Trailer Truck Drivers
- Machine Feeders and Offbearers



Production

Industrial Machinery Mechanic

- First-Line Supervisors of Production and Operating Workers
- Electricians

Printing Press Operator

- Food Batchmaker
- Truck Drivers
- Maintenance and Repair Workers

Industrial Truck and Tractor Operator

- Laborers and Freight Movers
- Inspectors, Testers, Sorters, and Weighers
- Machine Feeders and Offbearers

Production

Industrial Machinery Mechanic

- AAS in Mechatronics Engineering Technology
- Mechatronics (Advanced Manufacturing/Integrated Systems Technology)
- Certified Apprenticeship

Printing Press Operator

- Production Technician Certificate
- Operators' Certificate
- Hot Lab
- Printing 101

Industrial Truck and Tractor Operator

- Blueprint Reading
- Maintenance Basics
- Forklift/OSHA certification
- ServSafe

Discovery of Other Pathways

Good examples from agriculture...

- Farmers need more STEM skills
- Agriculture Equipment Mechanics need more mechatronics skills like an Industrial Machinery Mechanics
- Too many cooks and chefs but not enough Food Batchmakers and Food Scientists
- Regulations driving a need for Environmental Scientists but there are none around



Applications: Planning

- The ability to look at the high-demand jobs in our local economy allows the Workforce Investment Board to drill deep into career planning and to focus on programming that addresses those careers.
- Using EMSI, we have been able to take the jobs from the career pathways and profile the Top Jobs, particularly looking at the matter of the aging workforce in each career pathway.



Profile of Maturing Workforce by Career Pathway (2014-2024)

	Jobs 2014	Jobs 2024	Job Growth	Openings	% Replacement	% Above 55
Administrative Support	13,812	14,374	562	3,642	85%	25%
Construction	16,990	18,627	1,637	5,283	69%	19%
Health Care	10,661	12,385	1,724	4,319	60%	24%
Production	32,200	32,896	696	9,909	93%	24%
Sales	10,452	11,012	560	3,267	83%	26%
Technical Support	6,034	6,428	394	1,824	78%	25%

Applications: Career Counseling

- This skills gap information is also good for career counseling that is being done in an education or workforce setting.
- Many people come to use with 80% or more of the skills that they need for their next job already present.
- Career counselors need as much information about skill compatibility as possible.
- Much of that information can be pulled from this process (comparable jobs, knowledge and skill gaps).
- Now what practitioners need are the skills to have these conversations with the customers that we serve.



Applications: Curriculum Planning

- Whether you are a curriculum planner in an education setting or a program planner in a one-stop center, the information on skills gaps between levels on the pathways is invaluable.
- The charts that accompany the diagrams and which show the gaps in knowledge, skills, and abilities point to places where new curriculum needs to be developed or where training services need to be procured.
- We have worked on a Skills Acquisition Map for each pathway.

•

•

Production Career Pathway with Skill Standards, Curriculum, and Credentials					
Occupation	PMMI	Training Content	PA CareerLink	MSSC/NAM Production/Logistics Technician	RACC, HACC, LCCTC
		Ready2Work	-TABE -WIN -Alchemy		
		WorkKeys	-National Career Readiness Credential (<i>Applied Mathematics, Locating Information, Reading for Information</i>)		
Laborers Helpers Packers		Basic Safety (OSHA 10-hour) (SA 101) Math for Manufacturing (MA 101) Introduction to Hand Tools (MF LAP 1-8, MP LAP 7) Basic Communication Skills on the Job (PD 101) Conflict Resolution (PD 102) Locating and Documenting Information Blueprint Reading (BP 101) Manufacturing Fundamentals	Introduction to Manufacturing		Production Technician 1

 **Material Handler**

Operator

Quality Control 

 **Welder**



		WorkKeys	-Workplace Observation -Applied Technology		
Assistant Machine Operators	Introduction to Shop Machinery	Principles of Workholding (PT 201) Torque Wrench (PA LAP 1-2) Band Saw (MP LAP 1) Drill Press (MP LAP 6) Grinding (PE 203) Turning (PE 101) Milling (MP LAP 8-9) Measurement 1, 2 (MA 101, BP 204) Measurement Tools (MT 203) Manufacturing Processes 1,5,6,7	HOT Lab		Production Technician 2
Machine Offbearers	Manufacturing Fundamentals	Principles of Advanced Manufacturing (AM 101) Mechanical Principles Machine Operations Equipment Procedures Production Planning and Workflow Production Control		Manufacturing Processes and Production Certificate	

← CNC Machinist

Maintenance

Assembler →



Maintenance

Machine Operators Food Batchmakers		Mechanical Drives 2 Lubrication AC/DC - Electrical Safety		Maintenance Awareness Certificate Production Technician Certificate	
General Maintenance and Repair Workers	Industrial Mechanics 1 Industrial Electricity 1 Introduction to PLCs	AC/DC Basic Pneumatics Basic Hydraulics Mechanical Drives 1, 2, 3 Electro-Fluid Power Relay Control Welding			MET 120 MET 130 MET 140
		Electrical Piping Hydraulics Mechanical			AMIST 1

Material Handler

Occupation	PMMI	Training Content	PA CareerLink	MSSC/NAM Production/Logistics Technician	RACC, HACC, LCCTC
Industrial Truck and Tractor Operator	Manufacturing Fundamentals	Personal Protective Equipment (SA 102) Hazardous Materials (SA 103) Lockout/Tagout (SA 105) Confined Spaces (SA 104) Working in Groups (PD 103)	Forklift Driving	Safety Certificate Certified Logistics Associate	

Welder

Occupation	PMMI	Training Content	PA CareerLink	MSSC/NAM Production/Logistics Technician	RACC, HACC, LCCTC
Welder			Introduction to Welding		Production Technician 3

Quality Control

Occupation	PMMI	Training Content	PA CareerLink	MSSC/NAM Production/Logistics Technician	RACC, HACC, LCCTC
Inspectors, Testers, Sorters, and Weighers	Manufacturing Fundamentals	Quality Assurance Learning System (94-QC-1, Lap 1-11) -Statistical Process Control -SPC Charts Measurement 1, 2 (MA 101, BP 204) Measurement Tools (MT 203)		Quality Practices and Measurement Certificate	

CNC Machinist

Occupation	PMMI	Training Content	PA CareerLink	MSSC/NAM Production/Logistics Technician	RACC, HACC, LCCTC
CNC Machinist		Introduction to CNC Machining CNC Program Operation CNC Turning Operation CNC Troubleshooting		NIMS Mill Operator 1	CNC Milling

Assembler

Occupation	PMMI	Training Content	PA CareerLink	MSSC/NAM Production/Logistics Technician	RACC, HACC, LCCTC
Team Assemblers		Production Assembly (VX19030) Mechanical Fabrication (WX19004) Electrical Fabrication (WX12204) Tolerances (QS 202)			Production Technician 4

Career Pathways in Summary

- Building career pathways begins in the context of a regional economy and the industries that are a part of it.
- We want to look at all jobs not just the jobs for which we want to provide education and training because there may be other occupations that are higher priority and which offer better opportunities to serve.
- Ultimately, we need to develop workforce and education practitioners that are conversant in the language of skills.

•

•

Opportunities

- As local areas figure out the career pathways that related to the needs of employers in their areas, they will be looking for partners in defining the pathways and filling the skills gaps that exist.
- Most programming from the workforce system will be rather basic, leading to the possibility of hand-offs to the education system at some point.
- Training related to STEM topics will be in great demand as technology continues to reinvent the workplace.
- Work-based learning offers new possibilities for cooperation with the formal workforce system.

•

•

Work-Based Learning

- At first, work-based learning looks like something new but those of us in adult education understand that it has a long history as we look at more informal modes of learning.
- The feds love the idea but really don't have much of an idea of what it is beyond apprenticeship (which they are really pushing hard around the country) and formal on-the-job training as done by the workforce system.
- This is a space that needs filled and offers great opportunities for new thinking.



Some Other Thoughts

- It is wonderful to see these ideas – industry clusters, high-priority occupations, career pathways, and new forms of skill acquisition - develop as foundational for WIOA as it roles out.
- Integration of funding streams and programming seems to be a priority in WIOA, particularly TANF, adult basic education, and vocational rehabilitation. Veterans, ex-offenders, and out-of-school youth continue to be important target groups.
- There is an interest in all of the partners in the system helping to fund the infrastructure.
- Leveraging dollars and sharing resources promise some additional levels of flexibility.

•

•

Some Other Thoughts

- I have some concerns, however.
 - First, there is no more funding for the system and its partners. It is a consistent or lessening pool of resources. To innovate, we will have to find the money in the existing pool or in new sources of revenue.
 - Second, while there is a promise of more flexibility with the roll-out of WIOA, there appear to be many more rules and regulations with an orientation to top-down meddling. The space for innovation appears to be closing.



If I Were You (Penn State), I'd...

- Develop an understanding of the local economies in which you work, including career pathways. Each area is different;
- Try not to be all things to all people. Pick several niches and negotiate points of contact with other systems for referrals;
- Be attentive to the training needs that are identified in local areas, particularly those related to incumbent worker training, and develop programming that fills gaps;



If I Were You (Penn State), I'd...

- Be realistic about the workforce investment system funding your training. Find other ways to get it done;
- Find ways to get involved with apprenticeship but be creative about other forms of work-based learning. It is a new frontier in workforce but one that we thoroughly know (contextual learning) in adult education;
- Embrace STEM for adults and take advantage of the role of the University as a generator of STEM knowledge and skills.



Questions



Contact

Scott Sheely, CWDP

Economic and Workforce Development
Consulting

717-824-0466

sjsheely@comcast.net

