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Career Pathway and Cluster Skill Development: Promising Models from the United States

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BACKGROUND AND CONTEXT

Introduction

This paper looks at states and localities in the United States that are focusing their workforce and education programmes on career pathways and clusters. It describes how these approaches align with economic development strategies and can benefit employers and individuals in the labour market. It points to some of the successes and challenges being experienced by Workforce Investment Boards, Community Colleges and the K-12 education system. It also highlights several regions where sufficient commitment and investment in career pathway and career cluster models has caused real system change in filling the skill needs of employers. Often, this system change requires investment, leadership, best practice models, and partnerships.

In the United States, local and regional government agencies have increasingly adopted industry cluster approaches to economic development. This framework allows economic development agencies to study and understand groups of companies, along with other regional assets such as universities, which have evolved into an ecosystem of interdependence in a region. An industry cluster framework enables the development of approaches targeted to retaining and growing high value employment, increasing the tax base, and attracting new jobs to the region. Stepping back from specific companies and industries, and examining the entire ecosystem of industries that support each other allows scarce economic development resources to be deployed more effectively.

A similar move towards industry cluster approaches is surfacing in the employment and workforce development field. Education and workforce agencies are critical partners in mapping and building skill pipelines for key industries. Local partnerships within key industry sectors are yielding strategies to provide workers with the skills necessary to increase productivity and job creation in regions. This allows economic development agencies to market the talent of the region, and to develop aligned retention and attraction strategies. In addition to cluster approaches, employment and workforce development actors are also using pathway models, which provide a clear progression of courses for learners towards achieving a designated credential in a particular occupation within a cluster. Often, these pathway approaches are implemented through a partnership between secondary and post secondary education stakeholders as well as employers.

Cluster and pathway approaches are important in an increasingly complex and fragmented labour market where employees no longer move in a straight line within one company, but rather move vertically and horizontally around a set of jobs. Maps of industry clusters and pathways, which outline associated skill requirements, are incredibly useful tools for those in the labour market and those entering the labour market. Cluster and pathways models are also a way for the public education and workforce system to categorise and organise their work. For high schools and community colleges, participating in career cluster and pathway models helps to connect them to the local economy and produce workers with the appropriate skills for jobs in the region.

The Current Environment

In order to better understand the potential for transferable examples to other OECD countries, it is important to provide some background and policy context. Designing programmes to respond to the dynamic nature of the economy in the United States with its shifting needs is a constant challenge. Not since the Great Depression have unemployment rates been as high and persistent as they are presently - the unemployment rate for June 2012 was 8.2 per cent (Bureau of Labour Statistics, 2012). According to Sum (2011), there has been a downward trend in youth unemployment, which is particularly worrying as work experience for youth often leads to greater labour force attachment. Statistics for youth unemployment highlight the magnitude of the problem. Aggregate teen employment continued to fall for the fourth consecutive year and helped drive up the youth unemployment rate to just under 26 per cent - the highest it has been in the past 62 years for which data on unemployment rates are available (Bureau of Labour Statistics, 2012).

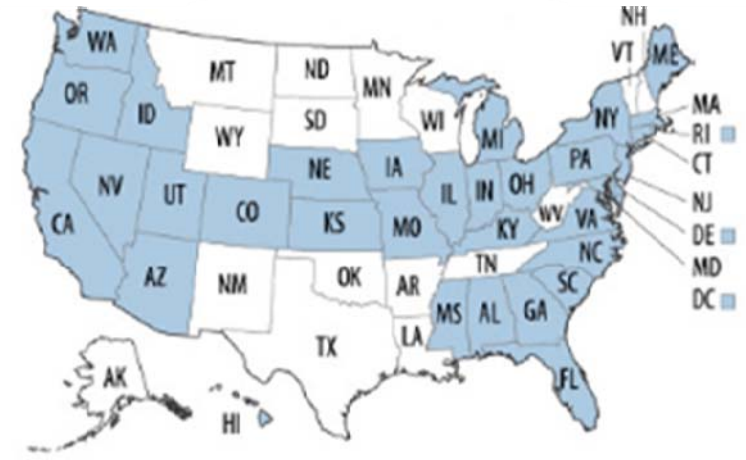
In spite of the current high rates of unemployment, employers in the United States report a growing skills gap. This would indicate that the education and training system may not be responding to employer demand. According to a recent survey conducted by Bridgeland *et al* (2011), more than half (53 per cent) of business leaders say their companies face a very or fairly major challenge in recruiting non-managerial employees with the skills, training, and education their company needs, despite millions of Americans seeking jobs at the time of the survey. Those at smaller and medium sized companies who were responsible for over 50 per cent of new jobs created in 2007 felt this most acutely: 67 per cent say it is difficult while only 33 per cent find it easy.

The current political and fiscal environment is also creating some real obstacles in building new flexible approaches to skill development. The budget deficit at the federal level combined with the Tea Party's conservative anti-government influence in Congress, have shifted the focus of many government programmes away from innovation towards fighting for survival. The House of Representatives in February 2011 voted to remove all funding for the *Workforce Investment Act*, to substantially cut federal investment in PELL grants (financial aid for students), as well as make deep cuts in other education and workforce funding. Following the House of Representatives vote, the Senate voted to retain but cut all of these programmes.

At the State level, Governors and State Legislators are under tremendous pressure to consider huge cuts to education and social programmes as some of the only ways to defray state deficits. As the Centre on Budget and Policy Priorities maps below indicate (see Figures 1-3), almost all of the U.S. state governments are making sweeping cuts in education and workforce programmes (states that are shaded grey have made budget cuts related to K-12 education, higher education, and state workforce development.) As budgets keep shrinking, funding for innovation and the intermediary work required to design and implement cross-system collaboration is more difficult to defend.

A Difficult Fiscal Environment

Figure 1. K-12 Education (34 states plus DC)



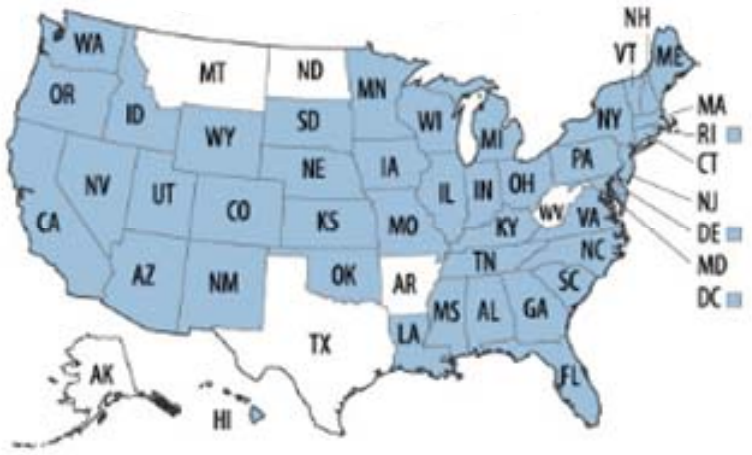
Source: Centre on Budget and Policy Priorities, www.CBPP.org

Figure 2. Higher Education (43 states)



Source: Centre on Budget and Policy Priorities, www.CBPP.org

Figure 3. State Workforce (44 states plus DC)



Source: Centre on Budget and Policy Priorities, www.CBPP.org

Another critical issue is the fragmented nature of federal agencies and their funding. According to the United States Government Accountability Office (2011), for fiscal year 2009, there were 47 federally funded employment and training programmes administered across 9 agencies. Rules and regulations about the use of funds, decision making in narrowly focused Congressional committees and a tradition of funding silos makes progress on a national approach to career pathways and clusters difficult. Innovation and best practices in the United States tend to happen in state and local communities, and once there is enough evidence of success, those approaches are integrated into federal policies and programmes.

The challenge for state and local governments, as well as those organisations focused on economic development is daunting. Even though it appears that there are certain sectors of the economy that are starting to see profits, this "jobless recovery" has not created anywhere near enough jobs to employ the 13.9 million individuals in the United States that are still out of work (Bureau of Labour Statistics, 2012). The challenge for those who work with the unemployed, the disadvantaged, low skilled workers, and youth is even greater. Understanding the labour market and which jobs require which skills is more important than ever. Pathways and cluster approaches that allow the most flexibility for current and potential workers in moving from job to job as the economy changes seem to provide the most promise.

CAREER PATHWAYS AND CLUSTER APPROACHES

The concept of integrating education and training to focus on key industry sectors has been introduced in most states and regions in the United States. A number of states have introduced regional sector strategies to support their *Workforce Investment Act* programmes, community colleges and high schools. For example, Michigan has established Regional Skills Alliances, Washington has seeded funding for Regional Skills Panels, Pennsylvania has developed Industry Partnerships and California has established a state level Green Collar Jobs and Health Care Council as well as invested in "industry clusters of opportunity." Many other states have also established similar approaches in which employers from industry sectors meet with public sector stakeholders to define and drive programmes and initiatives to meet their workforce needs.

One of the key reasons that the move towards sector-based strategies has progressed is the influence of increased collaboration between the workforce and economic development systems. Over the past ten years, the United States Department of Labour has increasingly focused on funding regional economic strategies connected to workforce solutions and industry-based sector approaches. Using its authority and funding under the *Workforce Investment Act*, the Department has encouraged and created incentives to move local practice towards these strategies. In 2009, with the passage of the *American Recovery and Reinvestment Act*, the United States Congress allocated an amount that doubled the funding for *Workforce Investment Act* programmes. This enabled the United States Department of Labour to issue a substantial amount of grant funding to states and local Workforce Investment Boards as well as community colleges to design and implement career pathways and cluster approaches.

This work continues to be promoted through a bottom up/top down strategy. Local communities are experimenting while states are taking a leadership role by encouraging local innovation. Economic development practitioners have been focused on industry clusters for many years, developing strategies ranging from a sophisticated understanding of the cluster, its drivers, and the supply chain to support it to more straightforward business attraction approaches. Workforce development agencies have only recently transitioned from a more scattershot job development approach to the establishment of career pathways and clusters within an industry. Previously economic development and workforce development systems have worked in silos and there had not been much collaboration across their work.

What is a Career Pathway?

Although similar in intent, pathway models are all slightly different, with different designs and sometimes different goals. Bragg *et al* (2007) define a career pathway as an attempt to*"…integrate adult literacy, adult basic education (ABE), General Equivalency Diploma (GED) instruction, English language literacy (ELL), and pre-collegiate developmental education with postsecondary career and technical education (CTE) certificate and associate degree programmes, and potentially with the baccalaureate degree."* This definition of career pathways is contrasted by the Baran *et al* (2011), who focus less on articulation of education programmes and more on a progression into employment. Accordingly, career pathway programmes are defined as *"longer-term advancement solutions to employment and skills shortages. They map occupational pathways within specific industry groupings to describe the skills needed to advance up occupational ladders. They also describe how workers can progress through postsecondary education or training that prepares them for these positions. Frequently, they include bridge programmes to provide entry points for the lowest-skilled workers."*

Generally, pathways approaches are an articulation of knowledge, skills, and competencies, which connect education with work in an occupation. Many career pathway programmes and initiatives have a specific emphasis on low skilled, unemployed or target populations. National organisations such as Jobs for the Future, Public/Private Ventures and the Aspen Institute have played a critical role in developing descriptive materials, evaluating programmes, and developing the capacity of states and localities in designing and implementing best practices.

At the local level, community colleges, local Workforce Investment Boards, community based organisations and labour unions have separately and collaboratively designed and implemented career pathway programmes. There are several categories of career pathway programmes, described here in order to make distinctions.

Box 1. Career Pathway Programmes

Bridge Programmes: Often referred to as a bridge or on-ramp programmes, designed to help people at the very front end and provide remedial education and training that help students meet pre-requisite requirements for College and Technical Education programmes.

Education to Job Strategies: Programmes designed to help move students all the way along an educational pathway, while keeping focus on the student completing education and getting a job.

Advancement Strategies: Programmes focused on the career progression of students, in and out of work, but with the goal of career advancement along the way.

What is a Career Cluster?

Career cluster approaches include broad groupings of occupations and industries based on commonalities. Within each career cluster, there can be anywhere between two and seven career pathways from secondary school to college, graduate schools, and the workplace. They enable low-skilled low-income workers to make connections to future goals, providing motivation for working harder and enrolling in a series of related courses.

There is national framework for career clusters within the education sector in the United States, which had its start in the mid 1990s with the passage of the *School to Work Opportunities Act*. Key policy makers at the United States Department of Education understood the connection between education and the economy, and the importance of linking educational strategies with work. Using *Carl Perkins Vocational and Technical Education Act* (Perkins Act) funding, the Department set out to transform high schools by connecting learning to preparation for work. The new Perkins Act placed a stronger emphasis on integrating vocational education and academic preparation so that students could be prepared both for post secondary education and work. This was an important distinction because prior to this, these programmes were perceived as only for students not going on to college, and as such, not academically rigorous. In addition, Perkins Act funding included standards which helped to bring increased attention to curriculum development and achievement.

One of the difficulties in integrating vocational education and preparatory programmes is that although academic standards and vocational education "programmes of study" were being developed at the same time, there was very little conversation across the two systems. Education standards were developed without an employment lens or business involvement, and therefore stood separately from vocational education programmes. From a governance perspective, vocational education and academic programmes were also separate. In many states, authority for vocational education is dispersed among

more than one state agency. On the vocational education side, the federal emphasis on career clusters within Perkins funding became the "bully pulpit" for looking at broader skills acquisition within an employment context.

The Department of Education organized the national career cluster framework using an industrial and occupational approach. It outlined clusters using a rationale that provided flexibility for student's and described the full range of industries (a few were grouped by occupation) (see Box 2). Within each cluster, the Department identifies the knowledge and skills needed for an occupation, as well as possible pathways.

Box 2. Department of Education Industry Clusters

- Agriculture and Natural Resources
- Architecture and Construction
- Arts/Audio Video Technology and Communications
- Business and Administration
- Education and Training
- Finance
- Government and Public Administration
- Health Sciences
- Hospitality and Tourism
- Human Services
- Information Technology
- Law and Public Safety
- Manufacturing
- Retail/Wholesale and Services
- Scientific Research and Engineering
- Transportation/Distribution and Logistics

Source: United States Department of Education (2000), Career Clusters--Cooperative Agreements; Notice Inviting Applications for New Awards for Fiscal Year (FY) 2001, United States Federal Register.

Funding for the development of vocational education standards and the implementation of career clusters was discontinued under the Bush Administration. However, several states continued to move forward despite the lack of funding and have now adopted 16 clusters as their framework. According to Greene (2012), career cluster models have been implemented around the country because state directors stepped up and took a leadership role when funding was discontinued and there was commitment to make implementation successful.

An advantage of this framework is that it has created a common language and starting point for conversations between the workforce development and education systems. Adopting a similar language allowed the two systems to talk to each other. In some states, state education agencies and local school districts did not do much more than take their existing curriculum and map it to the career cluster framework. This gave the appearance of cluster adoption, but did not serve to transform the education system. In other states, however, real transformation has taken place. Around the United States, the most rapid adopters have been counsellors in high schools as it has provided a useful way to talk to parents about labour market options for their children.

EXAMPLES OF LOCAL AND STATE LEVEL INITIATIVES

This section of the report outlines examples of pathway and cluster models that have been implemented at the local and state level.

Pathway Models

Local Pathway Model: Fresno California/PG&E's PowerPathway™

PG&E's PowerPathway™ is an industry-led initiative that was introduced in 2008. PG&E, one of California's largest energy and utility companies, knew that the average age of their workforce was reaching retirement age and saw an opportunity to engage the public education and workforce system in creating a new pipeline of utility workers. California has some of the most stringent climate laws in the United States, therefore, PG&E and California's other utility companies actively developed new sets of skill requirements for new kinds of energy workers to meet the requirements of the law.

PG&E reached out to community colleges, Workforce Investment Boards and community organisations to develop a pipeline of skilled workers. They saw the vocational education system as one which could produce entry level workers into an industry that provided good jobs with an entry level wage on average of $76,000 a year.

This led to the development of a new credit based programme at Fresno City College - a 12 week *Bridge to Apprentice/Utility Worker programme* - which prepares workers for a career as a Utility Worker or Line Worker. The course includes technical skills, soft skills, and physical conditioning. There are specific offerings for returning Veterans, which help map military skills to the energy industry.

The Workforce Investment Board in Fresno, a county in the agriculturally based Central Valley of California – decided that participating in the PowerPathway™ programme would provide good jobs for their customers and the residents of Fresno. In an economy with an 18.2 per cent unemployment rate, focusing on the energy and utility sector seemed like a smart strategic investment. The role of the Board was to find suitable candidates for the programme.

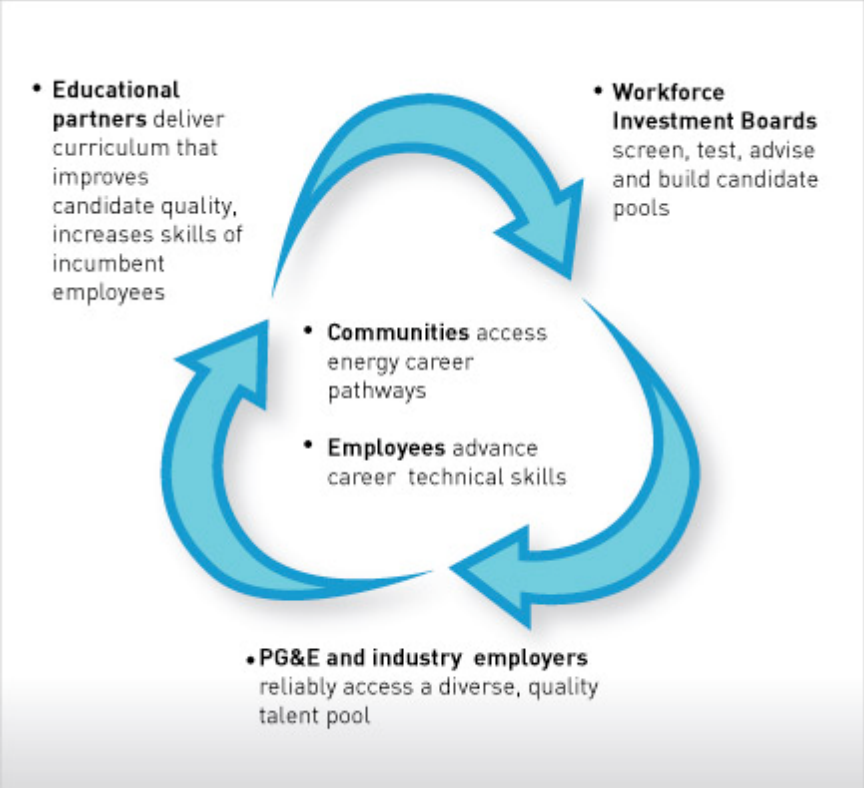
According to Konczal (2012), initiating the work with PG&E required a major commitment to completely reengineer how they did business. As a starting point, the Workforce Investment Boards decided that they would try to understand, commit to, and deliver on all of the employer's requirements. Rather than telling PG&E what the Board could offer them, they looked at what PG&E did internally and replicated PG&E's recruitment processes within the Board. They were also committed to finding the right applicants – whether or not they were enrolled in the Board's *Workforce Investment Act* programmes so some of the screening process, such as drug testing, had to be funded with non-WIA funding.

Konczal (2012) notes that it took a lot of local political influence to get the programme up and running. For example, the vocational education system in the United States (ie. community colleges) has a much easier time developing what are called "contract education" programmes tailored to business needs outside of the mainstream programmes. This is because there are not laws, regulations and processes regulating the development of curriculum. The downside of the quicker more flexible "contracted"

programme is that the students will generally not be given credit. So although a student may have a credential or certificate, the skills acquired cannot be used to contribute to a degree.

In order to find the first cohort of 30 students to go through the programme, they screened several thousand people. Applicants needed to be physically fit, drug free, and go through an assessment that measured basic skills, interest and aptitude.

Figure 4. Fresno California /PG&E's PowerPathway Model



Source: PG&E (2012), "About PowerPathway," available at http://www.pge.com/about/careers/powerpathway/about/

Van Ton-Quilivan (2012) argues that one of the real successes in Fresno was their use of WorkKeys® assessment tools and vigilant attention to the suitability of candidates in both their qualifications but also their understanding of the industry and what it takes to be a utility or energy worker. In large part as a result of good screening, every one of the 30 students who went through the 12 week programme was accepted into PG&E as an employee. The programme is now working with its fifth cohort of students.

Local Pathway Model: Pennsylvania Mechatronics Partnerships

Pages (2012) has identified a local pathway model in Pennsylvania, which is focused on training industrial maintenance technicians. The Industrial Maintenance and Mechatronics Industry Partnership of Pennsylvania (also known as "The Mechatronics Partnership") was developed via a collaboration of the Workforce Investment Boards within Berks and Lancaster counties.

This pathway model was developed in response to significant hurdles that were faced by companies operating in the area to recruit and hire industrial maintenance technicians, particularly those with the skills and competencies to maintain and repair packaging machinery.

Industrial maintenance technicians typically require a mix of skills, including knowledge of mechanics, electricity, and programmable logic control (PLC) technologies. These multidisciplinary skills were not typically taught in training programmes focused on vertical competencies such as mechanical engineering or electrical engineering. Because of these unique features, few firms obtained maintenance technicians through a typical training or education programme. Instead, technicians learned on the job through a lengthy apprenticeship where they learned by doing.

The programme enrolled its first students in 2006 and a formal Associate of Applied Science (AAS) Degree in Mechatronics Engineering Technology was introduced in 2007. Initial training efforts targeted existing workers, but new modules and training tools were added over time. Today, existing workers still serve as a core customer, but displaced workers and area youth are also enrolled in a variety of Mechatronics-related training programmes. The Mechatronics Partnership's curricula and training tools have followed a steady evolutionary pathway. When initial planning was underway in 2004 and 2005, the programme designers knew that any and all training materials had to have relevance and standing within the manufacturing community, therefore the team quickly focused on collaborating with Amatrol, the industry's market leader. The firm's in-house training programmes soon became the industry standard leading to the spin-out of Amatrol as a stand-alone training and curriculum provider. Ultimately, these tools were further developed by researchers at Illinois State University, which led to the first Advanced Manufacturing/Integrated System Technology (AM/IST) Certificate programme in the United States.

One of the innovations of the Mechatronics approach was bridging the gulf that often exists between for-credit and non-credit programmes at community colleges. Most community colleges in the United States provide regular courses that lead toward an associate's degree and/or transfer to a four year college or university. At the same time, they also operate workforce training programmes that serve existing companies and individuals looking to learn a new skill or gain new knowledge. In most community colleges, credit and non-credit training are not well integrated, and few workforce training programmes are approved as for-credit offerings (i.e. those that count toward degree completion). Most non-credit students attend the college for a single course or training programme, but do not pursue a terminal degree.

The Mechatronics competency model works via a system that workforce professionals refer to as "stackable" credentials. Stackable credentials are an essential part of any career pathways programme. They provide a sequential education and training programme that offers many "on-ramps" and "off-ramps" for students. In other words, these programmes allow students to enter at multiple points in the system and to receive certificates and other credentials at various parts of the process. The credentials and training are stackable in the sense that they build seamlessly upon each other. They begin with foundational skills that are relevant to all jobs and careers. These include general competencies such as teamwork, professionalism, interpersonal skills, and academic competences such as reading and mathematics. They next progress to industry-related competencies. In Mechatronics, these include competencies such as maintenance, installation and repair or industrial safety. Finally, occupation related skills focus on particular jobs themselves and may be unique to each company or each industry. Examples might include training on a specific piece of equipment or learning the unique attributes of snack food packaging. This approach also recognizes the new reality that there is no "typical" training pathway. Workers and students enter programmes in a variety of ways and at different stages of their career progressions.

State Pathways Model: Oregon Career Pathways

Although there are a number of local pathway models, some states have developed pathway approaches. The State of Oregon's is particularly useful to examine because it is a collaborative and partner-based approach. The Oregon Career Pathways Initiative was designed to achieve the following specific results:

- To increase the number of Oregonians with certificates, credentials, and degrees in demand occupations.

- To articulate and ease student transitions across the education continuum from high school to community college; from pre-college (ABE/GED/ESL) to credit postsecondary; and from community college to university or a job.

This specific goal setting is different than approaches in other places, where the reason for implementing the pathway model was focused on employer-based goals, or addressing skills gaps. The Pathways Statewide Initiative is about innovation and collaboration that is student-centred and demand-driven (Workforce Oregon, 2012). Partners include Oregon's 17 community colleges, the state's high school Career and Technical Education Network, the Department of Education, the Department of Employment, the Department of Human Services, and the Workforce Investment Boards. Each partner has articulated a statewide "Action Plan" about how their organisations contribute to the Pathways Initiative.

According to McGouch and Latimer (2012), Oregon Workforce Investment Boards are using *Workforce Investment Act* funding to help further the pathways approach and are working with their community colleges to develop certificates and credentials in demand occupations, including teacher preparation, manufacturing engineering, pre-engineering, retail management, apprenticeships, and healthcare.

The Portland Workforce Investment Board was one of the primary funders of some of the first pathway work done at Portland Community College in the late 1990s in entry-level health care occupations. Portland also was one of the cities that launched the CEOs for Cities' Talent Dividend initiative. This initiative seeks to raise college completion rates in cities around the United States and makes the case that post secondary graduation rates have a direct relationship with economic prosperity. According to Cortright (2012), "p*er capita income and college attainment rates are closely correlated. Using data from 2006, each additional percentage point improvement in aggregate adult four-year college attainment is associated with a $763 increase in annual per capita income. Raising the national median of the top 51 metro areas from 29.4 per cent to 30.4 per cent would be associated with an increase in income of $124 billion per year for the United States."*

Oregon has developed a comprehensive website with information for students, teachers and parents that explains the pathways approach (see http://www.worksourceoregon.org/index.php/career-pathways). The State has also developed interactive "roadmaps" and recently, a website specifically designed for young people to explore pathways to education and jobs. (see http://www.mypathcareers.org/) The website has:

- 250+ career profiles based on data from the Oregon Career Information System

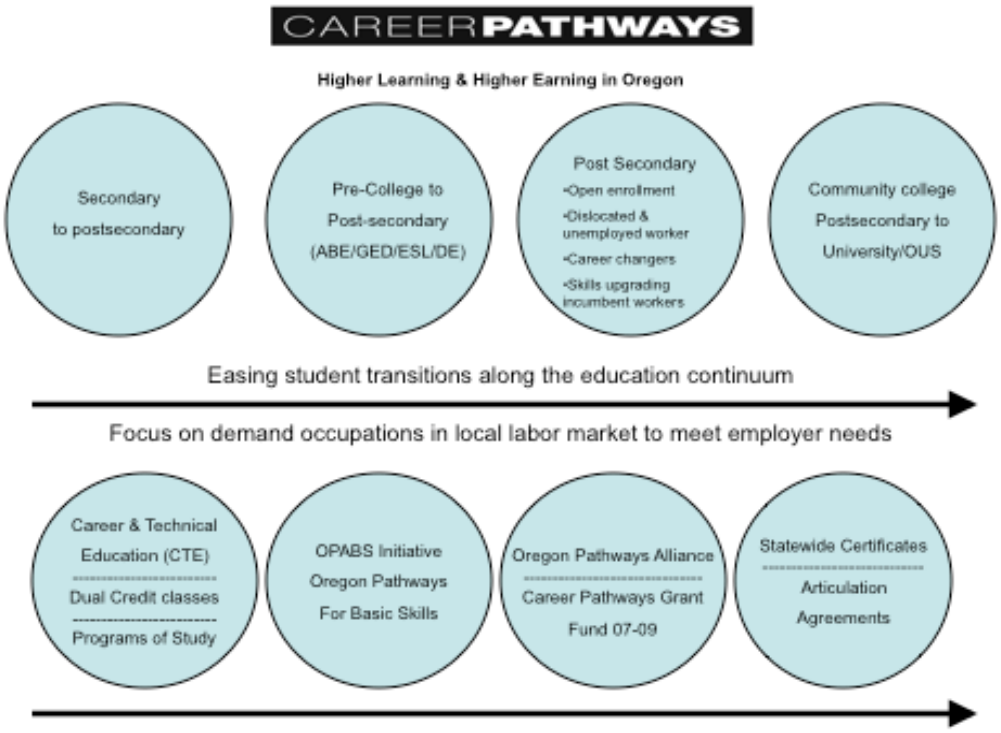
- 450+ videos and photo diaries of real people talking about their work and giving advice

- Career-specific schools and education opportunities

- Links to Career Pathways Roadmaps
- Additional resources for financial aid, mentoring, and internships

The Oregon model is more integrated than in many other states because the community colleges, Workforce Investment Boards, One-Stop Career Centres, as well as other education and supportive service partners, are actively committed to the framework.

Figure 5. Oregon Career Pathways



Source: Workforce Oregon (2012), "Career Pathways," available at http://www.worksourceoregon.org/job-seekers/resources-and-programs/career-education-a-training-resources/122-job-seekers/job-seeker-resources-and-programs/438-careerpathwayshomepage

Cluster Models

As mentioned previously, pathway models are often part of a broader cluster approach. There are some interesting cluster models that have been implemented at the state level.

State Cluster Model: California

Turning to examples of cluster initiatives, the Economic Strategy Panel, established by the State of California Legislature, first identified the diversity of California's economy in 1996. At that time, the panel also adopted a new way of looking at industry sectors and how they function and grow as industry clusters. These new ways of looking at the economy became the basis for the analytical work completed then, and provided the foundation for the Cluster of Opportunity approach.

Cluster of Opportunity grants seek to bolster regional economic competitiveness by building the capacity of regional collaborations to identify growing industries, undertake strategic planning and leverage public/private resources. Funding supports the utilization of an Industry Cluster of Opportunity Methodology (see Box 3) to develop data-driven analysis for the formation of relevant regional sector initiatives. The results of this analysis serve as the foundation for developing and implementing regional clusters of opportunity strategies and for involving partners in advancing the competitive position of targeted clusters resulting in economic prosperity.

Box 3. Clusters of Opportunity Methodology

1. *Clusters of Opportunity Diagnosis*: Research and analyses of one or more regional cluster of opportunity. This activity should include quantitative cluster research, qualitative value chain analysis, analysis of cluster occupational categories and skill-set requirements and related tasks to develop a firm understanding of a region's transforming economy.

2. *Collaborative Priority-Setting*: Design and implement a collaborative cluster engagement process based on the results of the research and analyses described above. This activity should engage cluster employers and community stakeholders to identify shared priorities for an overall cluster of opportunity strategy.

3. *Cluster of Opportunity Investment Strategy*: Identify and connect specific investments and other commitments among local, state, and federal government partners, as well as private firms and industry associations, and non-profit and private foundation partners, and others to advance the competitive position of regionally targeted clusters of opportunity through workforce and economic development partnerships. This activity should produce an overall strategy with specific organisational commitments and champions organized around shared cluster priorities.

4. *Sustainable Implementation*: Support the long-term sustainability and growth of regional clusters of opportunity. This activity should produce a set of broader organisational and policy changes to sustain and expand regional cluster of opportunity strategies, as well as a lasting mechanism to support ongoing collaboration among all the partners.

Source: California Workforce Investment Board (2012), Fact Sheet: Regional Clusters of Opportunity Grant

The Clusters of Opportunity methodology has been used by a number of Boards in the last few years, and the method's hallmark is the engagement of a broad range of partners, with Boards, economic development agencies, and community colleges at the core. They have been incredibly successful in shaping new partnerships among these systems, uncovering new levels of information about regional labour markets that can be used by the public sector to rethink and redesign skills training and education programmes.

The Humboldt County Workforce Investment Board has been a pioneer in the use of the Industry Clusters of Opportunity approach. Serving a rural county almost to the Oregon border in Northern California, the Board used their analysis to demonstrate that contrary to the general perception that there were no jobs in the northern part of the State, in fact there were over 500 niche manufacturing jobs in a five county region. The Board further used the data to convene employers in a set of industries including manufacturing, artisanal cheese, micro-breweries, wineries and flower production to better understand their skill needs. They discovered a baseline set of common skills and mapped these to the occupations in the industries.

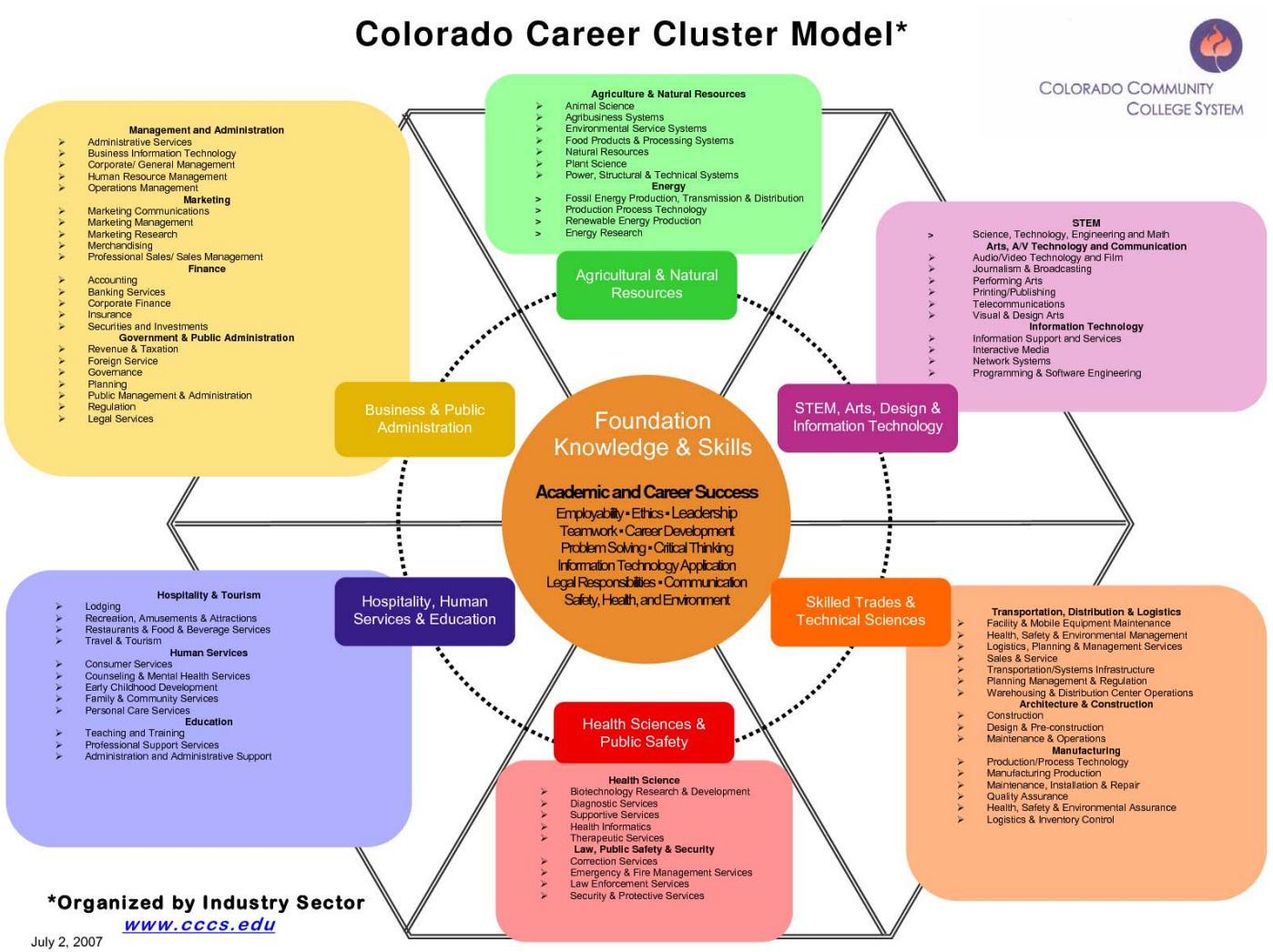
The chancellor of the local community college was convinced that it was these skills that needed to be taught, and asked for a review of all of the college's courses to determine how they were relevant to the regional economy. This kind of connection between education programmes and the economy is a benefit of

this approach, but not easily adopted by educational institutions, that have established programmes and faculty.

State Cluster Model: Colorado

Colorado has implemented career clusters in their secondary education and community college system using a framework similar to the national level (see diagram on next page). Their K-12 system has developed a Plan of Study Template for each of the 16 Career Cluster Areas and is building example plans of study for each of their 81 Career Pathways. They are developing tools and approaches to make it easy for parents and teachers to understand the cluster approach so that it becomes more user-friendly rather than just an internal method for classifying classes.

Figure 6. Colorado Career Cluster Model



Source: Colorado Community College System (2012), "Colorado Career Cluster Model" available at http://www.coloradostateplan.com/clusters/careerclustermodel.pdf

For example, Colorado published a 2009-2010 Career Clusters Course Description booklet. The courses are colour-coded according to the Cluster making the booklet easy for students, parents, and advisors to navigate. They have also developed a set of *Academic and Career Success* foundational skills for all students which include: Employability, Ethics, Leadership, Teamwork, Career Development, Problem Solving, Critical Thinking, Information Technology Application, Legal Responsibilities, Communication, Safety, Health, and Environment.

Table 1. Excerpt from the 2009-2010 Career Clusters Course Description Booklet

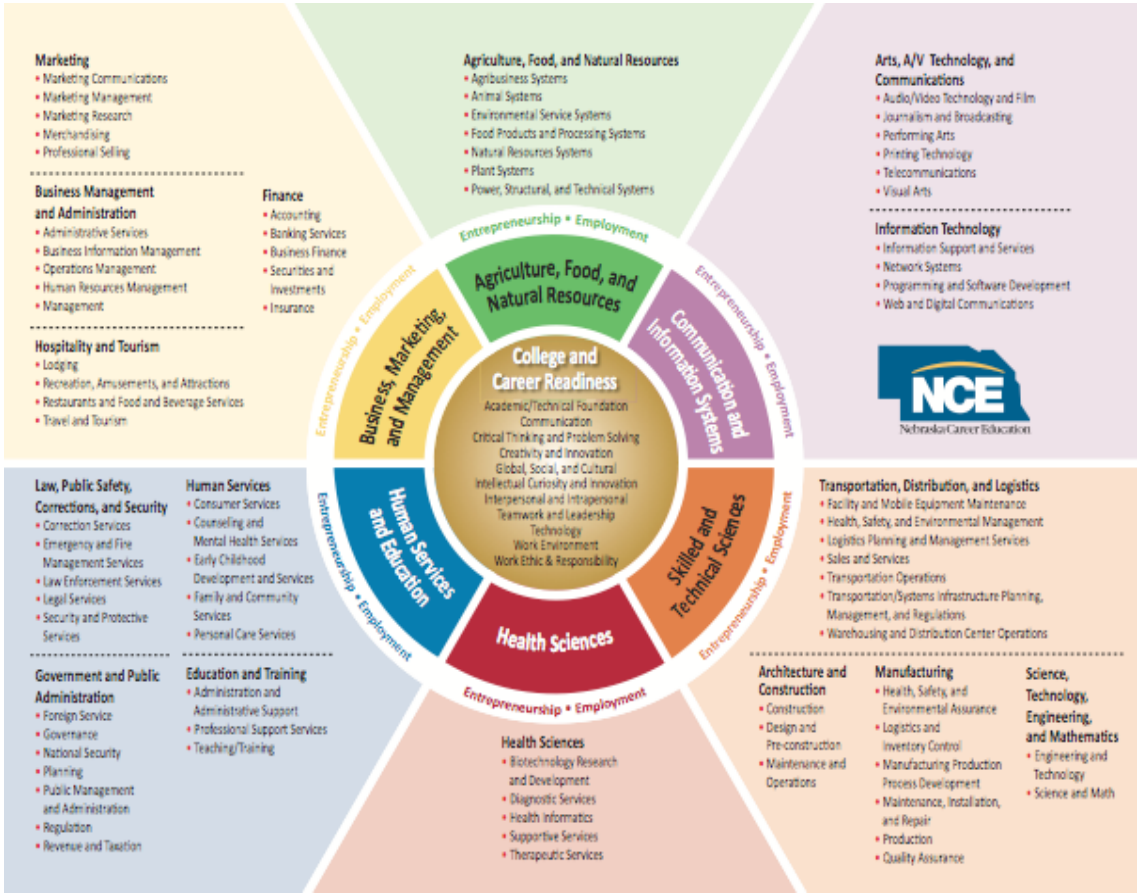
Colour	Meaning	
	Foundation on Knowledge and skills	These courses are required core courses. Any courses marked with this colour will be considered foundational knowledge for any pathway.
Courses marked with the following colours are recommended courses for the listed career pathways		
	Science, Technology, Engineering, Math, Arts, Design, and Informational Technology	
	Agricultural and Natural Resources	
	Business and Public Administration	
	Hospitality, Human Services and Education	
	Health Sciences and Public Safety	
	Skilled Trades and Technical Sciences	

State Cluster Model: Nebraska

Nebraska started their cluster programme in 2001 as a new framework for vocational education and has developed common language on career clusters. The programme is governed by both the Department of Labour and the Department of Education. According to Katt (2012), Nebraska is using the federal model of 16 career clusters, but has condensed them to six career fields with common skill sets. This makes it easier to explain the cluster approach and for the first time career counsellors and one-stop staff are using the same language.

Funding comes from the Perkins Act as well as the local level where additional funds from other sources may be contributed. They are developing curricula for the elementary school level so students better understand the world of work at an early age. At the same time, they are getting teachers to understand the economic development and workforce development trends and information of the state. Prior to this effort, there was no connection between the systems. Katt (2012) argues that the programme has been an unqualified success as there is now a common voice between vocational education and workforce development stakeholders.

Figure 7. Nebraska Cluster Model



Source: Nebraska Career Education (2012), "Nebraska Career Education Model," available at http://www.nebraskacareerconnections.org/careerClusters.htm

State Cluster Model: Illinois

The State of Illinois is taking a new experimental approach to clusters in Science, Technology, Engineering, and Mathematics based on the idea that innovation is at the core of the United States's business advantage and that the education system needs to focus on the development of skills required for cross-functional and interdisciplinary teams. According to Sheets (2012), Illinois needed to create a new infrastructure both for governance and for information. Illinois has developed a new model of Learning Exchanges, which are outside of government, collaborative, and based on a broad range of partner organisations. Partners include business and industry, the state government, secondary education, postsecondary education, industry and education experts, research centres, museums and other public and private partners.

The role and functions of the Learning Exchanges include the following:

- E-learning curriculum resources including on-line courses, assessment and feedback systems, reference materials, databases, and software tools (e.g., engineering design software)

- Internships and other work-based learning opportunities that connect students with adult mentors

- Career development and outreach resources to expand awareness of Science, Technology, Engineering, and Mathematics (STEM) related programmes and careers to K-12 students

- Sponsored challenges and project management resources for students to work in collaborative teams addressing real-world interdisciplinary problems

- Professional development resources for teachers and school administrators, including support for web-based networks

- Review performance of STEM related programmes of study and work with school partners to continuously improve performance

State Cluster Model: Maryland

Maryland started working on career clusters in 1995 under the *School to Work Opportunities Act*. They spent a great amount of time looking at standardized language and how they could organize their 10 clusters around that language. Gilli (2012) argues that state policy makers sensed a need to focus less on procedural skills and more on problem solving and skills training therefore, they looked at cross cutting functions. They looked at large clusters, mapped out what knowledge and skills were required and developed programmes around these skills.

The original project was funded with $25 million of School to Work funds, and the approach was very bottom-up. There is now a Programme Advisory Board for each cluster, and a Career Connection Leadership Team, with partners from all relevant state agencies. When a school system wants to develop their own programme outside of the cluster framework, they must present it to a Programme Advisory Board with representatives from each state agency.

Within each county, there is both a Cluster Advisory Board (CAB), and an affiliate for each industry cluster. In Montgomery County, for example, where there is the third largest biotechnology cluster in the United States, they have a CAB that is focused on the Biosciences, Health Science and Medicine cluster. This allows partnerships and relationship building across clusters and employers, to ensure that foundational classes are relevant to multiple programmes.

Employer involvement was key in Maryland's cluster initiatives. According to MacDonald (2012) employers who were involved were not vice presidents or CEOs but mid-managers and front line people who know the jobs and the skills required. Working with these employers was particularly important to understand what happens in their workplaces and how they hire. Students were graduating, but many were not finding jobs out of high school as many companies in this industry would not take interns under 18 years old. According to McDonald (2012), most bioscience companies need more education than high school so helping to develop articulation to higher education is critical. Middle school is important in establishing a student's interest in science therefore, the State has just launched a new 7th grade life science curriculum to help engage students at a younger age.

The career cluster framework in Maryland is now embedded with flexible pathways. Administrators, counsellors, and faculty members are using the career cluster system to develop programmes that extend from high school to two-and four-year colleges/universities, graduate schools, apprenticeship programmes and the workplace. Although the cluster framework was originally developed for high schools and young people, it is now being adopted by Workforce Investment Boards and other programmes serving adults.

Table 2. Features and Benefits of Maryland Career Clusters

Features	Benefits
Aligns teaching and learning with students' interests	When students are interest in what they are leavening, they stay involved and perform better
Helps students become more self-directed and focused on their future	Students who set goals achieve greater success in high school, community college and beyond
Relates class work to students' goals and interests	Students are motivated to work harder, enrol in more challenging courses, and make better career choices
Provides a framework for organising high schools into smaller learning communities	Students receive more personalised instruction, advice, and support
Aligns high school programmes of study to college and workplace requirements	Programmes of study ready students for college and eliminate the need for remediation
Organises career opportunities in 10 Career Clusters	Students, parents, and advisors understand future career possibilities, thus facilitating career decision-making
Anticipates and responds to change in the economy	Business and community leaders continue to keep educators informed on the changing requirements of the workplace
Guides the continuous improvement of career and technology education programmes	Students can learn industry credentials and/or gain advanced standing in college and careers
Aligns course content to state standards	Student achievement increases and dropout rate decrease

Source: Maryland State Department of Education (2007), "Maryland Career Clusters: Restructuring Learning for Student Achievement in a Technologically, Advanced, Global Society" State Department of Education.

State Cluster Model: New Jersey

Cleary and Stoller (2012) identified a state cluster model in New Jersey, where sector based strategies have been launched to address the current and future skill needs of local employers. The New Jersey State Department of Labour and Workforce Development issued grants to establish six state-wide Talent Networks in the following sectors: 1) Transportation, Logistics & Distribution; 2) Life Sciences; 3) Advanced Manufacturing; 4) Financial Services; 5) Health Care; and 6) Technology/Entrepreneurship.

All of the Talent Networks share the common goals of 1) enhancing the capacity of the public workforce and education systems to understand and address the skill needs of employers in the state's key industries; 2) acting as a primary point of contact for employers seeking qualified jobseekers and workforce services; and 3) creating networking opportunities for employers, jobseekers, educational institutions, and workforce agencies. As each network expands and matures, documented best practices and resources will be available for other local areas and regions addressing similar skills-based issues.

Talent Networks were established based on earlier efforts to develop local skills strategies in key sectors within various regions of the state. In addition, the State began an internal shift toward developing more industry focused labour market intelligence. These efforts support the workforce system to build richer, more productive relationships with employers from key sectors to address critical skills gaps and shortages. The labour market statistics team develops data and reports on key industry workforce topics for the Talent Networks and the One Stop Careers Centres and Workforce Investment Boards. It also handles custom data requests from the Talent Networks to uncover key industry trends. In turn, the Talent networks provide real-time, qualitative information on the skill needs of industry employers to State policymakers and local workforce development staff to improve their interpretations of the quantitative data and to alert them to potential new developments.

As an example, the Transportation, Logistics & Distribution Talent Network is working with stakeholders from the Mayor's office of economic development, the local Workforce Investment Board and a state-wide industry association, as well as several education institutions to implement an entry-level curriculum for workers qualified to work in entry-level port jobs in warehouses. The training is designed to give workers an overview of the global trade process and careers in Transportation, Logistics & Distribution, as well as teach basic foundational skills. Local partners work with each other to build in leadership modules and other stackable elements, as well as advocate for providing college credit.

Another example includes the Life Sciences Talent Network, which provides resources for job searches and career transition strategies. It uses social media and other tools to engage potential workers in personal and professional links to more than 3,000 New Jersey contacts and up to 40 additional professional organisations and networks through which this Talent Network communicates. The Talent Network conducts workshops and training in entrepreneurship. There is also a biweekly distribution of industry job leads – many of which have not been formally advertised, and networking events where industry job seekers can interact in person with other professionals, in addition to meeting employers and recruiters in a soft-networking environment.

LESSONS LEARNED AND POLICY IMPLICATIONS

Based on pathway and cluster models introduced in the United States, there are some critical lessons that can be drawn for policy makers. It is important to highlight that there has not been a comprehensive evaluation on the effectiveness of career pathway and cluster models in the United States. Public/Private Ventures (2010) has done some of the only research on the effectiveness of sector approaches to workforce development. Their research showed significant increases in employment, retention and wages between test and control groups. Even though information on the effectiveness of pathway and cluster models is just starting to emerge, there are some indications of the key factors within these models that have been successful.

Employer engagement

Changes are happening fast which means that education and training programmes must keep up with industry demand. It is exceedingly difficult for workforce and education programmes to consistently engage the business community – particularly those representing small and medium sized enterprises, where the majority of new jobs are being created. Often employers are reluctant to talk about what is really going on in their businesses, for fear of "tipping off" competitors. Employers also express frustration with the speed of government agencies and educational institutions to respond to their immediate needs.

An essential feature in all of these pathways and cluster approaches is employer involvement. Some states have established regional groups of employers within an industry, who meet on a regular basis and advise workforce and education agencies. The purpose of these advisory groups is to understand the needs of the industry and marshal resources to meet those needs whether they relate to training or to another aspect of that industry's health. For the purposes of developing a pathway and cluster approach, the expressed needs of employers also need to be balanced with a deep understanding of the whole sector, and the common skills and competencies across different industries and occupations. One employer or a set of employers in a sector may articulate a specific set of skills that they require but it is only by stepping back and looking at related industries that practitioners see patterns and relationships that can be built into curriculum.

In California, the Industry Clusters of Opportunity initiative convened focus groups, and used Workforce Investment Board members directly in the examination and evaluation of industry data. The initiative effectively engaged private sector Board members and used employers to gain more "real world" intelligence than could not be discerned through labour market information, which is sometimes retrospective rather than prospective. In New Jersey, policymakers realized that more focus on understanding and addressing the needs of employers in key industries was necessary to improve employer engagement with workforce and education programmes, as well as directly with jobseekers. Employers also need a point of contact with these systems who has a baseline understanding of the industry, important trends, job structure, and skill requirements and who can help make important connections to workforce and education institutions.

The role of employers should be more than just articulating skills needs to government and training organisations. In many cases, the workplace needs to be organised to accommodate pathways and cluster programmes, which means employers need to play a strong role in designing programmes. Pathway and cluster programmes rely on employers to change business practices, enabling time for employees to learn,

and creating incentives and rewards for learning and skill attainment. Employers must also be willing to think about their internal organisation and structure the workplace in a way that enables advancement potential within jobs (Fitzgerald, 2006).

Balancing Individual and Employer Needs

Many career pathway and cluster approaches are developed in response to a specific skill shortage or need by an industry or group of employers. However, many of the successful examples highlighted in this report integrate a long-term focus on the development of skills to ensure individuals are equipped for labour force attachment. Employers tend to have a narrower vision of their skill needs, which is more short-term in nature therefore it is necessary to ensure that pathway and cluster approaches balance this priority with the long-term need to equip individuals with a broader set of transferable skills.

In Oregon, the state pathways model emphasises the importance of equipping individuals with a certificate, credential, and/or degree in demand occupations. The focus is on individuals as opposed to responding directly to employer-based goals. This approach ensures that individuals are equipped with a broad set of foundational skills, which will make them more resilient to potential changes in the local labour market. Pathway and cluster approaches, which are specifically focused on employer needs without balancing it with the long-term needs of the labour market will produce workers that are reliant on employment in a limited number of occupations.

Wrap around Services

Virtually all of the models of successful career pathway and cluster models highlight the importance of supportive services to assist low-income adults in completing education and/or attaining employment. These services have proven particularly effective in helping students stay in community college programmes where there are consequences for the individual, who will not acquire the skills he or she needs to enter the labour market, and the school, which loses a seat in the classroom that another student could have used.

Supportive services range from childcare, transportation, housing assistance, coaching, counseling and subsidies for books and equipment. In many states, the ratio of counsellor to student is 1 to 800 or 1000, so counselors' have a role to play in providing career coaching and help in determining the suitability and capacity of students to enter into a programme of study. Career counseling and assessment prior to entering a programme have become key aspects of successful pathway programmes and cluster approaches.

Flexibility in Programme Design

Another critical aspect from the pathway and cluster models examined is the importance of designing programmes in a business-friendly and flexible manner. Many training providers fail to structure their operations this way - they reach out to firms for input yet design programmes ill-suited for business needs. For example, community colleges typically create a new curriculum along with relevant classes, which require a cohort of students who take the course over an extended period of time (typically 10-15 weeks). Traditional models work poorly for employed individuals who lack the flexibility to attend courses on a regular basis. They also often fail students who need more time and attention to comprehend materials, who are sometimes "left behind" in traditional class work.

Training should be flexible and adaptable to individual and employer needs. The Mechatronics model described in this report jettisoned traditional models and instead embraced an ethos of "any time, any place, any pace" (Pages, 2012). In other words, stakeholders agreed to customize training to the needs of both workers and firms. They provided training according to any schedule and customized it to the needs

of each individual or firm. This new approach stressing flexible self-paced learning creates a more user-friendly system for all parties.

Cohort Training

Another critical feature of the pathway and cluster approaches examined relates to cohort training, which seems to improve outcomes and retention in these types of programmes. Students who go through a set of classes together become a support system in their own right and many models now being implemented have cohort training as a key component. For example, California has established pipelines to careers and additional higher education opportunities for underprepared, underemployed young adults and enrols students in cohorts as a specific strategy for increasing student success. The PG&E's PowerPathway Initiative in Fresno, California also uses a cohort approach to building talent pools in the region. The programme is now in its fifth cohort of students. Previous programmes have been very successful with most students going on to become PG&E employees.

Collaboration

The importance of collaboration was highlighted in the experiences of the New Jersey Talent Network initiative. Close collaboration between Talent Network Coordinators has been seen by the state government as an early sign of programme success. These coordinators operate as a “travelling think tank” meeting regularly and sharing their experiences and ideas as a way to support every participating sector. Most importantly, this cooperation has served a powerful model that is creating trust among businesses, educators, and other talent network partners who may be working together for the first time.

Intermediaries or brokers such as labour unions, community-based organisations, faith-based organisations and civic groups can be particularly effective at establishing connections between employers, job seekers, education, and other service providers (Fitzgerald, 2006). As the development of pathway and cluster approaches in green jobs emerges, for example, local Workforce Investment Boards are collaborating with environmental groups such as the Sierra Club, to help integrate curriculum about sustainability into training programmes.

The fragmentation and lack of communication among federal agencies can inhibit collaboration and the development of a national policy on career pathways and clusters. It is important to increase the awareness of these approaches at the state and national level. In the course of researching this paper, it became clear that some state officials were not aware of key pathway and cluster initiatives in their own states. One of the reasons collaboration is so important is that the education and workforce systems are scattered across hundreds of federal, state and local agencies. In some states, adult education funding is divided between the community colleges and the Department of Education. Collaboration among government agencies, each with part of the total solution, is essential for new pathways and cluster models to work.

Governance

The decentralised nature of the federal system in the United States creates many challenges for pathway and cluster models. Because public funding opportunities are limited, many service providers have often opted to build large partnerships that engage multiple partners (i.e. business, education, and economic development) and that serve multiple customers and constituencies (i.e. high school students, college students, existing workers, and displaced workers).

This governance structure is messy and complex creating a myriad of organisations challenges. Yet, at the same time, it is well suited for the policy system in the United States. First, its flexibility creates

opportunities for “policy entrepreneurs” to test new ideas and concepts. Because of limited public resources, industry partnerships cannot survive with support from one programme or one small base of customers. They must attract funding from multiple sources. This system also provides an opportunity for the private sector to assume a leadership role in programme design and implementation. Businesses do not simply pay for a service or a training programme; they have the opportunity to design both the content and the delivery mechanisms for training. They also have the ability to revise the programme to keep up with the latest industry trends.

One of the key issues in creating career pathway and cluster models is that there is no perceived national obligation to match skills supply and demand in the economy. Furthermore, most individuals in the United States see education and skills as a state responsibility; therefore establishing national frameworks is difficult. Even employer-based national skills standards have been largely unsuccessful. To move forwards on ladder and cluster approaches, the employment and training system should make it an explicit system objective to promote such programmes. While states have been made great progress in developing pathway and cluster approaches, more could be done to integrate these programmes into a national strategy.

CONCLUSION

One of the key issues in developing career pathway and cluster models is the tension between trying to respond to the needs of individual employers and understanding larger foundational skills for individuals that are needed across occupations and industries. Any approach will need to balance legitimate skill needs of particular employers with a more broad integration of foundational skills into the training curriculum. In either case, partnerships with employers are important.

Another issue is the changes needed in the private sector itself. Training to increase skills in a career pathway or cluster may only be effective if employers reward the acquisition of skills through wage increases or other benefits. The investment in training (and when people are unemployed, the lost opportunity cost while they attend training) needs to pay off for workers in the long run. Although some industries are more organised and structured, there are often large gaps between training and the related pay and benefits. The public sector's role needs to include working with employers within an industry or cluster to help redesign pathways within the workplace and to build in rewards for certificates, credentials and degrees.

Another key issue is the need for investment in capacity building and the intermediary function that is required to develop pathways, work with employers, design new approaches, build networks of providers, and align systems. Most public funding is targeted to service delivery, and as funding is cut, resources for system building and community leadership is often the first to go. Although foundations have stepped up in the last five years to fund these approaches, funding from these sources is often short term and focused on getting programmes off the ground, rather than to sustain these kinds of efforts over the long term.

Work related to pathways and clusters should include a stronger national role, and requirements that systems leverage resources and align their work more closely. Aligning resources within states and regions cannot be left solely to individual leadership – there should be national policies that drive system change. Very little of the career pathway and cluster models has really been adopted across states and training systems because this requires commitment from the top. At the same time, however, regions and local communities must have the flexibility to develop their own partnerships, design their own pathway and cluster strategies, and respond to local conditions.

Lastly, there is very little empirical research on these models. Although there have been several studies that point to the effectiveness of sector approaches, there are still very little data that point to effective programme design, theories of change models and their key elements, and the best ways to bridge silos of funding and programme requirements. Investment in evaluating programmes and approaches, and then spreading best practices and models will be a critical part of a large scale effort throughout the OECD countries.

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