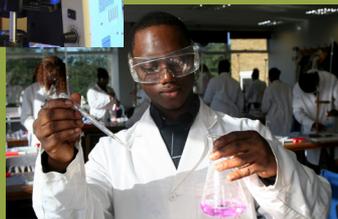


# Illinois Career Clusters, Pathways, and Programs of Study Guide



The Office of Community College Research and Leadership (OCCRL) was established in 1989 at the University of Illinois at Urbana–Champaign. OCCRL is affiliated with the Department of Education Policy, Organization and Leadership in the College of Education. Our mission is to use research and evaluation methods to improve policies, programs, and practices to enhance community college education and transition to and through college for diverse learners. Projects of this office are supported by the Illinois Community College Board (ICCB) and the Illinois State Board of Education (ISBE), along with other state, federal, and private foundation and not-for-profit organizations. The contents of publications do not necessarily represent the positions or policies of our sponsors or the University of Illinois. Comments or inquiries about our publications are welcome and should be directed to OCCRL@illinois.edu. This supplement is part of a series of publications associated with the Pathways to Results initiative that is funded by a grant from the Illinois Community College Board (ICCB Grant Agreement Number 2013–00467).

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This publication is a revised edition of *Illinois' Career Cluster Model* that was authored originally by Natasha Jankowski, Catherine Kirby, Debra Bragg, Jason Taylor, Kathleen Oertle, and Kathy Nicholson–Tosh. The authors thank these individuals for providing their visionary insights into this early work on career clusters, pathways and programs of study in Illinois. This work provided a solid foundation for the creation of this newest edition of the guide.

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## **Introduction**

The *Illinois Career Clusters, Pathways, and Programs of Study Guide* booklet provides information to multiple stakeholders on the implementation of career clusters, pathways and programs of study in Illinois. This booklet provides an update of the previous edition titled *Illinois Career Cluster Model* (2009), and provides a resource to understand Illinois' adaption of the National Career Cluster Framework. It is intended for individuals just beginning to learn about the process and those with more familiarity. We encourage readers to share this resource with all partners for implementation of the framework. This booklet is divided into seven sections:

- **Background on the *Illinois Pathways Initiative*** and information on federal, state and local initiatives associated with the Initiative
- **Science, Technology, Engineering, Mathematics (STEM) Education**, including information about growing opportunities for STEM employment in Illinois and the United States and the importance of STEM education.
- **The National Career Cluster Initiative**, including a graphic representation of essential knowledge and skills. This section also presents Illinois' six guiding principles and partner roles in implementation of *Illinois Framework for Program of Study Implementation and Evaluation*.
- **Illinois Pathways Initiative**, including the nine cluster areas designated to be part of Illinois Pathways Initiative and the private–public partnerships that form the foundation for STEM Learning Exchanges.
- **Pathways to Results**, including the multi–phase continuous improvement, equity–focused process that is applied to pathways and programs of study to program improvement and evaluation, and to review and reflection, which feeds the next cycle of pathways and program of study improvement.
- **Acronyms and Terminology** – A list of acronyms and definitions for reference and ease of communication.
- **Resources** – Links to tools, resources, research, and national organizations related to career clusters, pathways and programs of study, including STEM education.

# Background

Illinois seeks to extend its commitment to implementation of career clusters, pathways, and programs of study and improve P–20 education through the *Illinois Pathways Initiative*. Funded by the Race to the Top Phase III grant and other federal, state, and local funding sources, Illinois has adopted a statewide approach to improving college- and career-oriented pathway programs that lead students through P–12 and adult education to higher education and employment. In particular, Illinois' Race to the Top grant seeks to widen the scope and impact of academic and career pathways and college and career readiness (CCR). Multiple strategies are being employed to accomplish this goal, including enhanced alignment across secondary and postsecondary education; improved integration of academic, career-technical education (CTE), and STEM education; and strengthened education and employer partnerships.

With support from Illinois P–20 Council and the Illinois Pathways Interagency Committee (IPIIC), the *Illinois Pathways Initiative* is poised to play a central role in future implementation of pathways and programs of study. The remainder of this Guide explains key elements of the Initiative. The *Illinois Pathways Initiative* Website provides a valuable resource for understanding Illinois' commitment to the pathways approach: [http://www.illinoisworknet.com/vos\\_portal/STEM/en/Home/](http://www.illinoisworknet.com/vos_portal/STEM/en/Home/).

## Leadership Matters

Leaders throughout the state of Illinois strive to implement educational opportunities and experiences that will benefit students. The responsibility of local educational agency (LEA) leaders is to utilize local expertise to support the success of all students. State education agency (SEA) leaders contribute to the process by coordinating and supporting education improvement activities, such as those endorsed by Race to the Top and other federal legislation for P–20 education. Employers and leaders representing businesses, government, community-based organizations, and others play an important role in envisioning and supporting educational opportunities. Collaboration by leaders across all of these entities, including collaborations among secondary, postsecondary, and others, is critically important, due to challenging economic times that the state is facing.

Announcing the state's commitment of Race to the Top dollars to the *Illinois Pathways Initiative* in February 2012, Governor Pat Quinn referenced the state's goal of having at least 60% of Illinois' adults earn a college degree or career certificate by 2025 as "equivalent to landing a man on the moon" (Coulter, 2012). Also referencing the state's 60% goal, Lt. Gov. Sheila Simon observed, "While we've got a head start on a lot of other states, we've got a long way to go" (Rueff, 2012). The importance of Illinois' executive leadership branch publically committing to college and career goals cannot be overstated. It demonstrates recognition that the *Illinois Pathways Initiative* is a lynchpin of the state's overall P–20 education approach.

## Illinois' Commitment to Pathways

The *Illinois Pathway Initiative* reflects the state's commitment to building pathways that allow P-12 and adult education students to transition to college and careers successfully. Numerous policies and programs have been implemented over the past few years, with current efforts led by the state P-20 Council. The Council identifies the following commitment:

We [the Illinois P-20 Council] need[s] to develop a seamless and sustainable statewide system of quality education and support, from birth to adulthood, to maximize students' educational attainment, opportunities for success in the workforce, and contributions to their local communities. (Illinois P-20 Council, 2013).

The P-20 Council's overarching goal reinforces college and career readiness for Illinois citizens, as follows:

Our goal is to increase the proportion of Illinoisans with high-quality degrees and credentials to 60 percent by the year 2025. Today, only about 41 percent of the state's nearly 7 million working-age adults (25-64 years old) hold at least a two-year degree. (Illinois P-20 Council, 2013).

## Federal and State Support

The American Recovery and Reinvestment Act (ARRA) of 2009, including Race to the Top (RttT), is focused on improving the quality and impact of education for all students, including creating opportunities for students to transition to college and careers. In December 2011, Illinois was awarded \$42.8 million in RttT funds from the U.S. government. As part of ARRA, the RttT grant funding bolstered Illinois' ongoing work to establish enhance STEM programs of study in P-20 education.

Another policy that guides students' college and career readiness (and decision-making about college and careers) is the federal Carl D. Perkins Career and Technical Education (CTE) Improvement Act of 2006 (Perkins IV), which for several decades has emphasized student transition from secondary to postsecondary education. The Perkins IV law provides funds to states that, in turn, fund secondary schools and community colleges to partner with employers and other organizations to create college-and-career pathways and programs of study. These pathways and programs of study are intended to provide students with the academic and technical skills they need to succeed in the state's evolving knowledge- and skills-based economy. Pathways and programs of study are important to the state and a particularly important focal point of Illinois' RttT initiative.

Other initiatives are contributing to the change as well, including the Illinois College and Career Readiness (CCR) Pilot Act and the current RttT STEM CCR projects. Illinois' involvement in the Common Core State Standards movement, as well as its engagement in the development of new universal assessments is important to the state. Other important contributors to pathways include the state's Curriculum Revitalization project and a suite of reforms that are being implemented for adult learners, including Accelerating Opportunities, Shifting Gears, and the Trade Adjustment Act Community College and Career Training (TAACCCT) Act.

## Partnerships

Secondary and postsecondary education partnerships bring together business and industry employers, labor organizations, community-based organizations, faith-based organizations, parent groups, and others to educate students and address the state's workforce and economic development. These groups focus on the following:

- secondary and postsecondary alignment,
- seamless transition,
- reduced remediation,
- non-duplicated courses,
- integrated academic and career-technical education (CTE) curricula,
- dual-credit opportunities,
- standards-based curricula aligned with industry credentials and/or certification,
- career development,
- professional development,
- articulation agreements,
- data-sharing agreements,
- partnerships and collaboration,
- accountability, and
- continuous improvement.

Critical to this approach is the fact that education and employer partners need to develop and implement pathway curricula that lead to employment, including pathways in existing and emerging STEM.

## STEM Employment

The U.S. Department of Labor (DOL) predicts that jobs requiring science, engineering, and technical training will increase 34% between 2008 and 2018 (National Science Foundation, 2010). By 2018, the DOL projects that Illinois jobs requiring postsecondary education and training will grow by 418,000, as compared to 148,000 jobs for high school graduates and dropouts. Two million job vacancies will be created from both retirements and new jobs with over half of these requiring postsecondary credentials (Carnevale, A.P., & Smith, N., 2011). By 2018, 64% of all jobs in Illinois will require some postsecondary education and training. Of the jobs needing to be filled, an estimated 348,000 will be STEM-related, requiring extensive skill sets in science, technology, mathematics and/or engineering (My College Options & STEM Connectors, 2012).

A call for STEM education resonates as advances in technology continue to evolve. Focusing on STEM competencies and skill sets is deemed a major strategy for Illinois as well as the United States to support global competitiveness and reach the goal of increasing the proportion of Illinoisans with high-quality degrees and credentials from 44% to 60% by the year 2025 (Illinois Pathways Initiative, 2013).

## STEM Education

STEM education refers to Science, Technology, Engineering and Mathematics education that is offered independently or in an integrated fashion. Typically, STEM applies to instruction across all educational levels—elementary, middle school, high school, adult and postsecondary education—and it is foundational to many college majors and career opportunities. STEM education can be provided through a variety of instructional formats, including classrooms and laboratories within schools and colleges, but also through out-of-classroom and work-based learning (WBL) activities.

The Common Core State Standards (CCSS) and the related content and pedagogy supporting STEM programs of study have major implications for student success (Common Core Standards Initiative, 2012). Integrated, project-based and contextualized learning (sometimes seen as a definitional part of STEM education) includes integration of subject matter and a collaborative environment to achieve a solution or multiple solutions to a problem or challenge. Networking with professionals through WBL opportunities and/or mentoring can offer students a fresh and exciting perspective on a career field or occupation.



# The National Career Cluster Initiative

## Career Clusters, Career Pathways, and Programs of Study

The Illinois Community College Board (n.d.) provides the following key concepts and definitions:

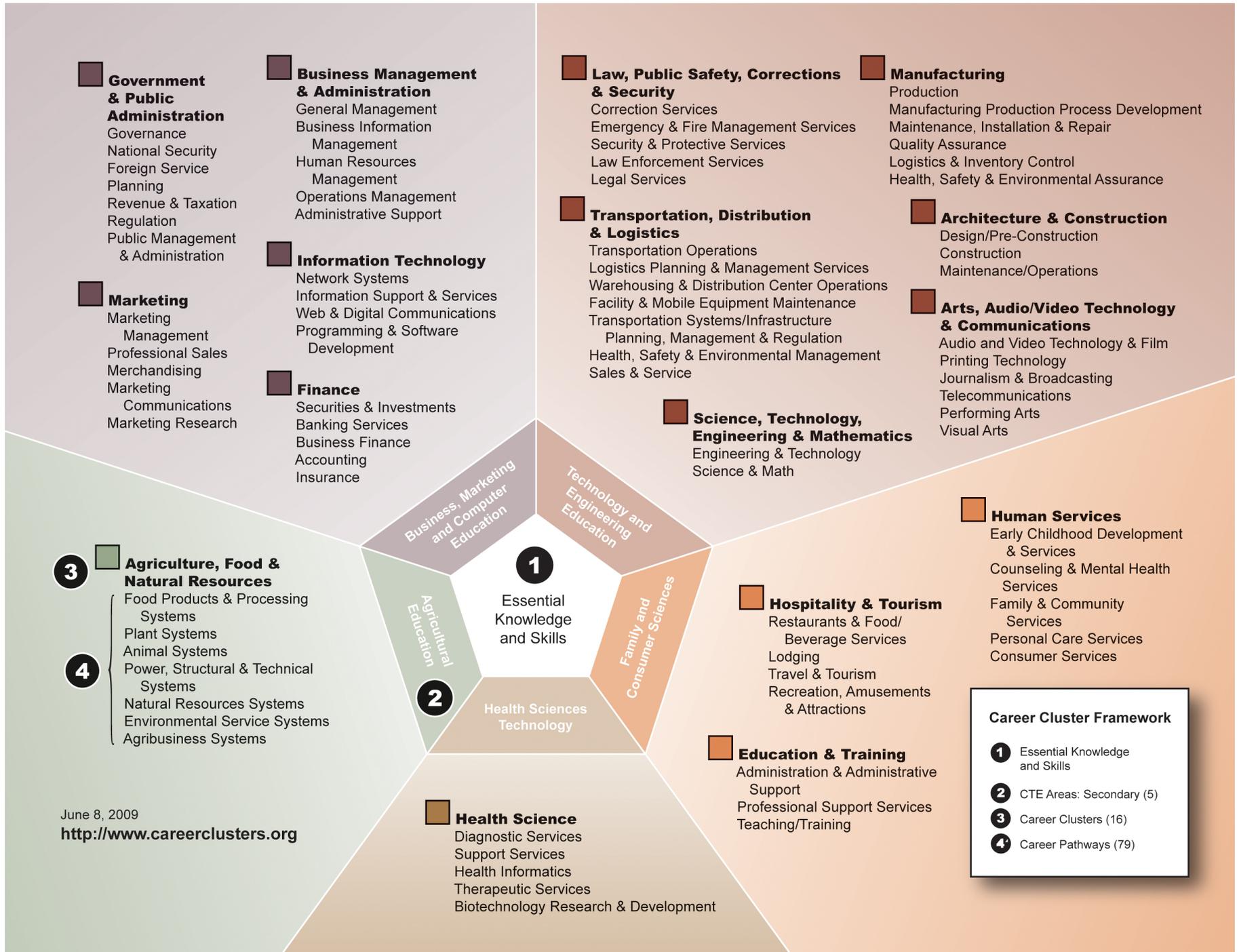
**Career Clusters** are groups of occupations and industries that have a set of foundational knowledge and skills in common. There are 16 nationally recognized clusters within which are multiple career pathways.

**Cluster Level Knowledge and Skills:** The cluster level knowledge and skills set is built on a common core required for career success in the multiple occupations included in the cluster. This shared core consists of the following elements: academic foundations; communication; problem solving and critical thinking; information technology applications; systems; safety, health, and environment; leadership and teamwork; ethics and legal responsibilities; employability and career development; and technical skills.

**Career Pathways** are multi-year programs of academic and technical study that prepare high school students for a full range of postsecondary options within each of the 16 clusters. Currently, there are 79 nationally recognized pathways, each with specific pathway knowledge and skills. These pathways provide a context for exploring career options at all levels of education and a framework for linking learning to the knowledge and skills needed for future education and employment.

**Pathway Level Knowledge and Skills:** The pathway level knowledge and skills set is built on a common core of knowledge and skills required for career success in all programs of study aligned with the pathway. This core is specific to the pathway and consists of elements selected by secondary and postsecondary educators with input from business and industry and other stakeholders.

**Programs of Study (POS)** are sequences of courses that incorporate a non-duplicative progression of secondary and postsecondary elements, which include both academic and career and technical education content. Programs of study should start no later than the ninth grade and continue through at least two years of postsecondary education. Programs of study include opportunities to earn college credit (dual credit) in high school, an industry-recognized credential or certificate at the secondary/postsecondary level, and an associate or baccalaureate degree.



**Government & Public Administration**  
 Governance  
 National Security  
 Foreign Service  
 Planning  
 Revenue & Taxation  
 Regulation  
 Public Management & Administration

**Marketing**  
 Marketing  
 Management  
 Professional Sales  
 Merchandising  
 Marketing  
 Communications  
 Marketing Research

**Business Management & Administration**  
 General Management  
 Business Information Management  
 Human Resources Management  
 Operations Management  
 Administrative Support

**Information Technology**  
 Network Systems  
 Information Support & Services  
 Web & Digital Communications  
 Programming & Software Development

**Finance**  
 Securities & Investments  
 Banking Services  
 Business Finance  
 Accounting  
 Insurance

**Law, Public Safety, Corrections & Security**  
 Correction Services  
 Emergency & Fire Management Services  
 Security & Protective Services  
 Law Enforcement Services  
 Legal Services

**Transportation, Distribution & Logistics**  
 Transportation Operations  
 Logistics Planning & Management Services  
 Warehousing & Distribution Center Operations  
 Facility & Mobile Equipment Maintenance  
 Transportation Systems/Infrastructure  
 Planning, Management & Regulation  
 Health, Safety & Environmental Management  
 Sales & Service

**Science, Technology, Engineering & Mathematics**  
 Engineering & Technology  
 Science & Math

**Manufacturing**  
 Production  
 Manufacturing Production Process Development  
 Maintenance, Installation & Repair  
 Quality Assurance  
 Logistics & Inventory Control  
 Health, Safety & Environmental Assurance

**Architecture & Construction**  
 Design/Pre-Construction  
 Construction  
 Maintenance/Operations

**Arts, Audio/Video Technology & Communications**  
 Audio and Video Technology & Film  
 Printing Technology  
 Journalism & Broadcasting  
 Telecommunications  
 Performing Arts  
 Visual Arts

**3** **Agriculture, Food & Natural Resources**  
 Food Products & Processing Systems  
 Plant Systems  
 Animal Systems  
**4** Power, Structural & Technical Systems  
 Natural Resources Systems  
 Environmental Service Systems  
 Agribusiness Systems

Business, Marketing and Computer Education

Technology and Engineering Education

Agricultural Education

Family and Consumer Sciences

**1** Essential Knowledge and Skills

**2** Health Sciences Technology

**Hospitality & Tourism**  
 Restaurants & Food/Beverage Services  
 Lodging  
 Travel & Tourism  
 Recreation, Amusements & Attractions

**Education & Training**  
 Administration & Administrative Support  
 Professional Support Services  
 Teaching/Training

**Human Services**  
 Early Childhood Development & Services  
 Counseling & Mental Health Services  
 Family & Community Services  
 Personal Care Services  
 Consumer Services

**Health Science**  
 Diagnostic Services  
 Support Services  
 Health Informatics  
 Therapeutic Services  
 Biotechnology Research & Development

**Career Cluster Framework**

- 1** Essential Knowledge and Skills
- 2** CTE Areas: Secondary (5)
- 3** Career Clusters (16)
- 4** Career Pathways (79)

June 8, 2009  
<http://www.careerclusters.org>

## Why a Career Clusters Framework?

The framework of career pathways, career clusters, and programs of study organizes educational preparation and occupational choices into a unified concept. Career clusters provide a focus and path for students to pursue learning experiences that begin in P–12 education and extend through college to careers. Career clusters:

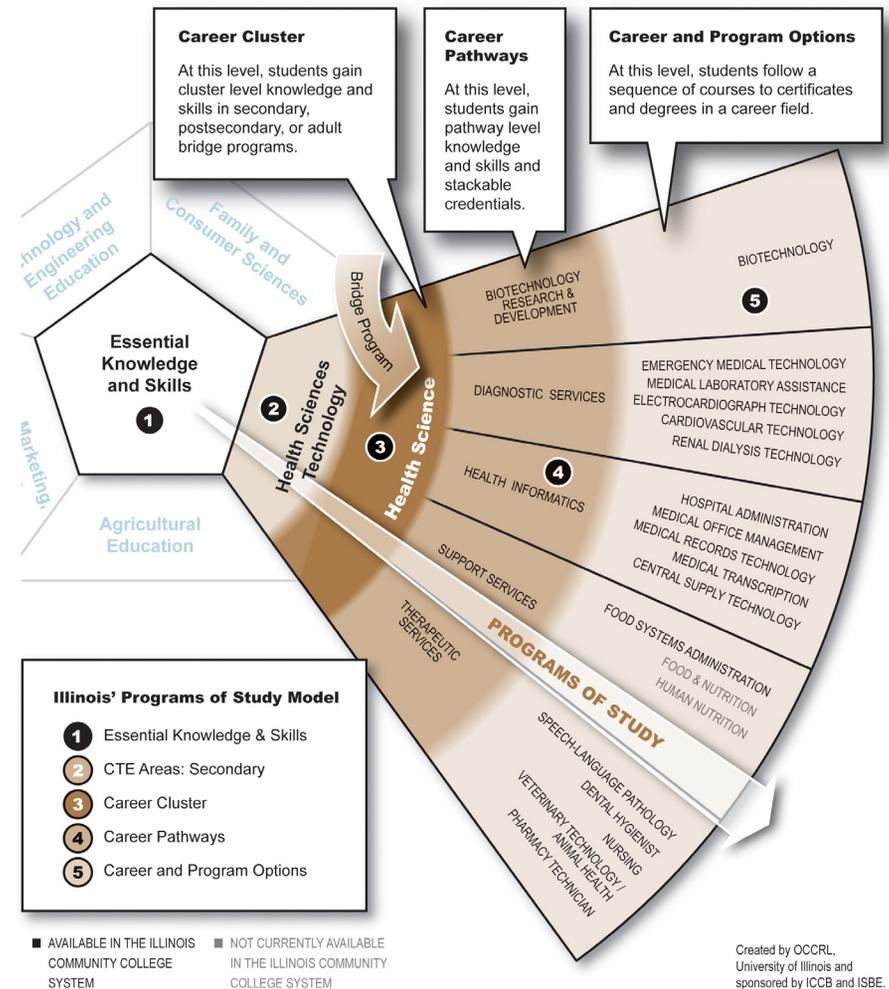
- are for all students;
- create distinct educational plans of study that students can follow from secondary to postsecondary education to the workplace;
- help create smooth transitions in the educational pipeline and reduce duplication;
- empower students through information and experiences they need to make informed educational choices;
- help counselors, teachers, parents, and students design individual plans of study; and
- comprise a key element in enhancing economic development by connecting schools with business and industry.

## Who Benefits?

- **Students** benefit when there are links between education and careers. Career pathways provide career guidance and a framework for students to plan their future. Students are more motivated when they can see the relevance of their education and are provided with smooth transitions to college and careers.
- **Educators** (teachers, counselors, and administrators) benefit when they integrate academic and CTE curricula, partake in professional development, align with other school reform efforts, and receive support. Programs of study also connect educators with local business and industry to ensure that what students learn connects to current and emerging careers.
- **Employers** benefit when they have the opportunity to partner with educators to prepare future employees by determining necessary skills, certifications, and current knowledge to succeed in the workforce.
- **Communities** benefit when business and industry partners with education for local economic development and educational planning. Higher levels of educational attainment contribute to a healthier local economy.

## Career Cluster Example

This example of the Illinois Career Cluster Model shows the relationship between one of Illinois' five secondary CTE areas (Health Sciences Technology), the related career cluster (Health Science), the five pathways within that cluster, and sample programs of study within each pathway. It also illustrates the essential knowledge and skills that are shared by all clusters; the cluster level knowledge and skills shared by all occupations within the pathways in the cluster; the pathway level knowledge and skills specific to each of the five pathways; and the programs of study, which represent courses that are taken at multiple education levels and lead to employment in related pathway occupations. Career exploration and development are infused at all levels of the model. The model also shows an entry point for adults by including bridge programs that infuse cluster level knowledge and skills with adult education and remedial education course content.



## Career Cluster

At the career cluster level, students are exposed to the breadth of essential and cluster level knowledge and skills needed for multiple careers. The career cluster framework provides multiple entry and exit points for students as they progress through a program of study. For example, a P-12 student may participate and acquire cluster-level knowledge and skills and dual credit while in the secondary system, and adults may acquire cluster level knowledge and skills as they progress through an adult bridge program.

## Career Pathway

At the career pathway level, students make choices about occupations in terms of their career interests and start to acquire pathway-level knowledge and skills at either the secondary or postsecondary levels of the educational system. Pathway-level knowledge and skills are more specialized than those at the cluster level, preparing students to enter occupations that they have identified in their individualized plan of study. This means students become more specialized in their pursuit of occupational and career areas.

## Program of Study

Through the program of study, students are provided with the opportunity to receive stackable credentials; secure credentials aligned with segments of the curriculum, and acquire certificates and degrees at multiple completion points from secondary school through the baccalaureate degree. Career clusters and career pathways offer the knowledge and skills required to complete a program of study that leads to the community college and/or university level and provide students with opportunities for certification and degree attainment.

## Six Guiding Principles for Implementation and Evaluation of Programs of Study

In 2008–09, the State of Illinois adopted six guiding principles and associated design elements to aid local districts, community colleges and their partners in the implementation and evaluation of programs of study. For additional information on the six guiding principles see: <http://occl.illinois.edu/projects/perkins/principles/>.

### Principles and Principle Statements

*Leadership, organization and support* – Programs of study are developed, supported and led with guidance from collaborative partners.

*Access, equity and opportunity* – Each and every student has access to educational opportunities and services that enable their success.

*Alignment and transition* – Education and training providers, with input from business and industry, enhance alignment that facilitates student preparation and transition through the educational pipeline.

*Enhanced curriculum and instruction* – Curriculum and pedagogy involve rigorous and relevant instruction that enhances learning and enables students to attain academic and technical standards and credentials.

*Professional preparation and development* – Comprehensive and continuous professional development that impacts teaching and learning is delivered to enhance the recruitment, preparation, and retention of qualified instructional and administrative staff.

*Program improvement and accountability* – Data are collected, shared, and utilized to improve outcomes and demonstrate accountability.

# Illinois Pathways Initiative

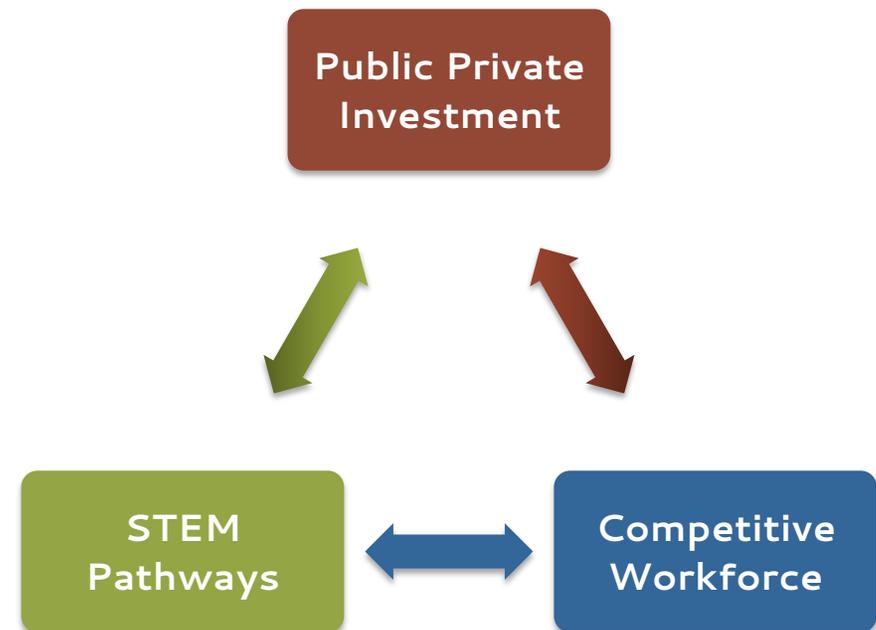
The Illinois Pathways Initiative, funded through RttT, is a new State of Illinois-led STEM education initiative designed to support college and career readiness for all students. Through partnership between the State of Illinois' education and economic development agencies, Illinois Pathways supports local programs that empower students to explore their academic and career interests. It also is creating new statewide, public-private partnerships known as Learning Exchanges that better coordinate investments, resources, and planning for those programs.

## Illinois Pathways proposes to increase credential attainment by supporting two strategies:

- local schools and postsecondary institutions will work collaboratively to enable learners to explore their academic and career interests in STEM fields; and
- coordinated public and private investments, including business and industry, to support the develop a competitive workforce for tomorrow's economy.

## Why Illinois Pathways?

As Illinois' economy continues to recover, it is critically important to understand how the economy is both growing and changing. More importantly, it is necessary to ensure the education system is supporting students in developing skills and knowledge that will make them competitive in a 21st century economy. Because the majority of future jobs will require some level of college education or postsecondary training, Illinois P-20 Council has established a goal to increase the proportion of Illinoisans with high-quality degrees and credentials from 44% to 60% by the year 2025. (Tyszko, J., 2012). This goal is consistent with the strategic goal that organizations such as Complete College America and Lumina Foundation have promoted nationwide (Lumina Foundation, 2013).



## Alignment of the Illinois Pathway Initiative with the National Career Cluster Initiative

The Illinois Career Clusters Framework identifies 16 career clusters, which are patterned after the National Career Clusters Framework (Illinois Community College Board, n.d.). Illinois has adopted this framework for implementation of Perkins IV programs of study; however, a few changes were made to customize the Framework to Illinois' economy and the Illinois Pathways Initiative. Whereas all 16 clusters are viable, Illinois has chosen to focus on 9 clusters of particular importance to its economic growth and development. These clusters include the following:

- Agriculture Food and Natural Resources,
- Architecture and Construction,
- Energy (this cluster is not differentiated in the Illinois Career Cluster Framework),
- Finance,
- Health Science,
- Information Technology,
- Manufacturing,
- Research and Development (called STEM in the Illinois Career Cluster Framework), and
- Transportation, Distribution and Logistics

As noted above, two clusters, Energy and Research and Development, emerged in Illinois based on employer input. The pathways and occupations that relate to each of these career clusters can be seen on the Illinois Pathways Initiative website at [www.ilpathway.com](http://www.ilpathway.com).

## What is a STEM P-20 Program of Study?

STEM P-20 programs of study are organized around a career cluster and feature a series of orientation and advanced pathway courses including early college. These run across P-12 and postsecondary institutions and are accompanied by opportunities for students to enrich their learning through work-based learning and demonstrate their understanding through assessments and industry credentialing opportunities.

The following graphic is a sample of one of nine industry clusters that are explained on the Illinois Pathway Initiative website. If readers are accessing this resource through the website link, the box under each level of instruction is "live" and opens into a complete listing and description of courses, work-based learning experiences, and credentials that can be obtained at that level (Illinois Pathways Initiative, 2013a).

The screenshot shows the Illinois Pathways website interface. At the top, there is a search bar and the logo for "ILLINOIS Pathways" with the tagline "Science, Technology, Engineering & Math". Below the logo is a navigation menu with links for Home, About, Illinois Pathways, STEM Learning Exchanges, Grants, FAQs, What's New, and Resources. A social media bar includes icons for Facebook, Twitter, LinkedIn, and YouTube. A description for the "AGRICULTURE FOOD & NATURAL RESOURCES" cluster is provided: "Development, production, processing, distribution, of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources." Below this is a "Cluster:" dropdown menu set to "Change Cluster" and a "Go" button. A legend identifies icons for Courses, Work-Based Learning, Credentials / Assessments, and Shared Pathways. A text box instructs users to "Select any Pathway to see related programs then click on any course, work-based learning, credentials/assessments, or shared pathway icon to see related lists." The main content area features a table with four columns: Orientation (e.g. Middle & High School), Pathways (e.g. High School), Postsecondary Education and Training (Bridge / Certificates and Associates / Bachelors / Graduate), and Careers. The table lists various pathways such as Agricultural Science, Agricultural Business and Management, and Horticulture, each with associated icons for Courses, Work-Based Learning, and Credentials / Assessments. A "Learning Exchange" section is also visible, featuring a diagram of a person at a computer and a link to "View Agriculture, Food, and Natural Resources Learning Exchange".

Orientation (e.g. Middle & High School)	Pathways (e.g. High School)	Postsecondary Education and Training Bridge / Certificates and Associates / Bachelors / Graduate	Careers
Agriculture, Food and Natural Resources Orientation	Agricultural Science	Agricultural Science	Careers
	Agricultural Business and Management	Agricultural Business and Management	Careers
	Agriculture Mechanics and Technology	Agriculture Mechanics and Technology	Careers
	Horticulture	Horticulture	Careers
	Natural Resources Conservation Management	Natural Resources Conservation Management	Careers

## How are STEM P-20 Programs of Study Supported?

A variety of resources have been identified to assist local school districts in the implementation of STEM P-20 programs of study. The Illinois Pathways Initiative website ([www.ilpathways.com](http://www.ilpathways.com)) provides a wealth of information on the nine clusters, pathways, and programs of study course sequences and experiences. Additional support mechanisms include the Pathways Resource Center ([www.pathways.illinois.edu](http://www.pathways.illinois.edu)) and the Illinois Shared Learning Exchange (ISLE, [http://www.illinoisworknet.com/vos\\_portal/STEM/en/Resources/ISLEPlanning/](http://www.illinoisworknet.com/vos_portal/STEM/en/Resources/ISLEPlanning/)). Finally, state and local partnerships, as later discussed in this Guide, are essential to supporting the initial and long-term implementation and improvement of STEM P-20 programs of study.

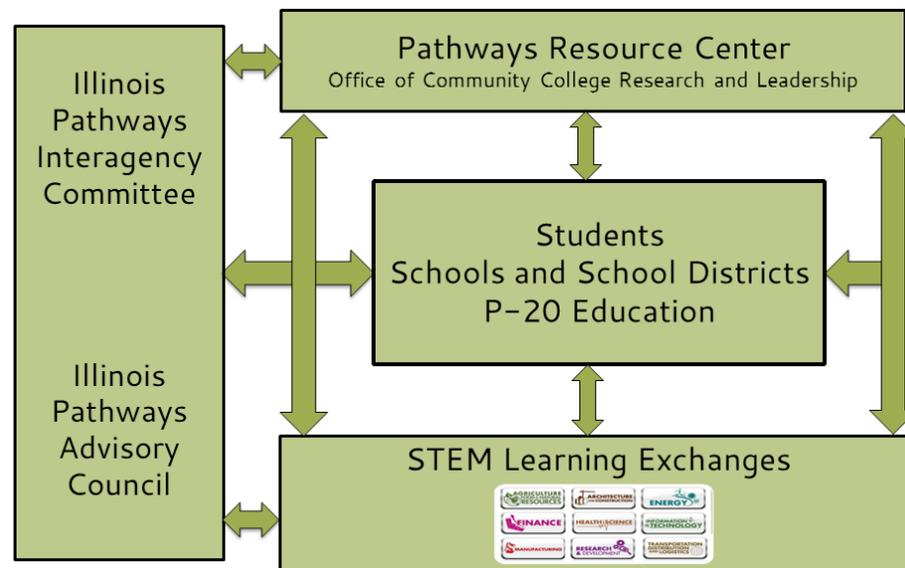
Originally developed and implemented as part of CTE, P-20 STEM programs of study serve as a model for bridging programs across P-20 education to improve students' academic achievement, increase their graduation rates, and improve their transitions to college and careers. Also, P-20 STEM programs of study are designed to improve access and success for underrepresented populations in STEM fields, such as women, minorities, low-income, and disabled students (Tyszko, 2012).

## Pathway Resource Center

The Pathways Resource Center (PRC) is a supportive and coordinating structure within Illinois' implementation of the 2012 Race to the Top III grant. In this capacity, the PRC serves as a centralized resource for local districts, their postsecondary and employer partners, and the Illinois STEM Learning Exchanges as they seek to:

- Create effective partnerships;
- Select and implement student programs of study within the Race to the Top career cluster areas;
- Implement curriculum reforms necessary to support their chosen programs of study and career cluster areas; and
- Create and maintain sustainable and effective pathways for their student populations from P-12 schools to postsecondary education to careers.

As part of the Illinois Pathways Initiative, the PRC has a number of associated partners, all working together to support schools and school districts as they work to ensure college and career success for their students. The relationship between these partnerships can be expressed using the graphic below (Pathways Resource Center, 2013):



More information about PRC and its role in the Illinois Pathways Initiative is available at [www.pathways.illinois.edu](http://www.pathways.illinois.edu).

## STEM Learning Exchanges

STEM Learning Exchanges are new, innovative public–private education partnerships that are organized to support local implementation of P–20 STEM programs of study by coordinating and reducing the transaction costs among statewide networks of education partners, businesses, industry associations, labor, and other organizations. Learning Exchanges are organized by the STEM career cluster areas to coordinate planning, aggregate resources, and review talent supply–chain performance (Illinois Pathways Initiative, 2013b).

Learning Exchanges provide a new voluntary infrastructure dedicated to helping coordinate statewide investments to connect and serve local programs while also tracking local and statewide performance. Each Learning Exchange is governed by a consortium of education, business/industry, and community partners with one entity serving as a fiscal agent to receive public funds to support this work. Learning Exchanges are required to have a state–approved strategic plan and have a state designation, but they operate as independent, voluntary public–private networks using the *Illinois Pathways Initiative Governance Model* (Illinois Pathways Initiative, 2013b). More information on the STEM Learning Exchanges and their role in the Illinois Pathways Initiative is available at [http://www.illinoisworknet.com/vos\\_portal/STEM/en/Home/](http://www.illinoisworknet.com/vos_portal/STEM/en/Home/).

## Functions of STEM Learning Exchanges

The Illinois Pathways Initiative (2013c) describes the functions of the STEM Learning Exchanges as follows:

1. Provide e–learning curriculum resources, including on–line courses, assessments and feedback systems, reference materials, databases, and software tools.
2. Expand access to classroom and laboratory space, equipment, and related educational resources necessary to support programs of study through regional partnerships and other strategies.
3. Support student organizations and their major activities, including conferences, internships and professional networking experiences, competitions, and community projects that build leadership, communication and interpersonal skills and provide professional and peer support networks.
4. Provide internships and other work–based learning opportunities that connect students with adult mentors.
5. Sponsor challenges and project management resources for students to work in collaborative teams addressing real–world interdisciplinary problems.
6. Provide professional development resources for teachers and school administrators integrated and aligned across middle school, high school, and community college instruction, including STEM externships, support for web–based networks, and integrated professional development for academic and CTE instructors.
7. Provide career development and outreach resources to expand awareness of STEM–related programs and careers to P–12 students.
8. Provide tools and resources to assist students and schools with implementing personalized education plans and transitions to post–secondary academic and training programs, including establishing course articulation and dual credit opportunities.
9. Review performance of STEM programs of study through assessments and work with school partners to continuously improve performance.

## Collaborative Partnerships

Without collaborative partnerships among secondary education, community colleges, universities, business and industry, adult education, and community-based organizations, it is difficult to align curriculum and meet the needs of all learners. Partners need to work together to develop relevant, challenging courses, align curricula, enhance college readiness, reduce college remediation, and foster seamless transitions for students to improve their college and career outcomes.

Partners engage in deliberate planning and communication, with six key practices or steps associated with operating an effective partnership at the local, regional or state level. These steps are as follows:

1. **Set the Partnership Mission and Goals:** Every partnership should have a clear mission and goals that are frequently and widely communicated. These mission and goals guide the identification of new partners.
2. **Identify Partners:** Identify and invite organizations and representatives within those organizations to be associated with the partnership. Communication by organizational leaders can help solicit new partner organizations and representatives to participate.
3. **Define Governance:** Determine the structure of the partnership and the various roles and responsibilities each organization plays. Fiscal and logistical roles and responsibilities should be given thoughtful consideration.
4. **Determine Optimal Operating Mechanism:** Identify meeting times, lengths, locations, and frequencies. Characteristics of effective meetings include: 1) held at times and locations that are accommodating to the partners; 2) begin and end on time; 3) have a clear purpose and stay on task; and 4) allow for full and open discussion of issues, including controversial ones. Communication among the partners is punctual and comprehensive.
5. **Evaluate Effectiveness:** A clear mission and goals provide the basis for determining the effectiveness of the partnership. These goals lead to the determination of measures of success for use in data collection and analysis and the identification of improvement strategies. Pathways to Results (PTR), as described in the next section of this guidebook, involves partners in providing a comprehensive approach to evaluation and continuous improvement of programs of study
6. **Identify Factors that Sustain the Partnership:** Partnerships may be more likely to be sustained when a memorandum of understanding (MOU) or by-laws are executed among the partners. If partnerships are to be sustained, the partners need to agree on the critical elements of the partnership, increasing partner commitment and accountability.

## Key Partners

Early identification of the different knowledge and expertise that representatives can bring to the partnership is critical. Kirby and Tosh (2012) summarize the expertise needed as follows:

### Business and Industry

- Review and validate career cluster and pathway-level knowledge and skills
- Support student opportunities to explore careers
- Provide feedback to partnerships on critical skill shortages
- Provide work-based learning opportunities, including internships
- Support data collection and analysis efforts
- Dedicate resources in the form of leadership, expertise, curriculum, facilities, etc.

### P-12 Education, Community College and University Partners

- Align curriculum with knowledge and skill statements
- Encourage, support, and participate in discussions across educational sectors
- Create and maintain articulation agreements to support aligned course sequences
- Identify and facilitate dual credit opportunities
- Develop programs of study with multiple entry and exit points
- Collaborate to provide universally designed instruction and support services
- Develop data-sharing agreements to track student progress

## Adult Education Providers

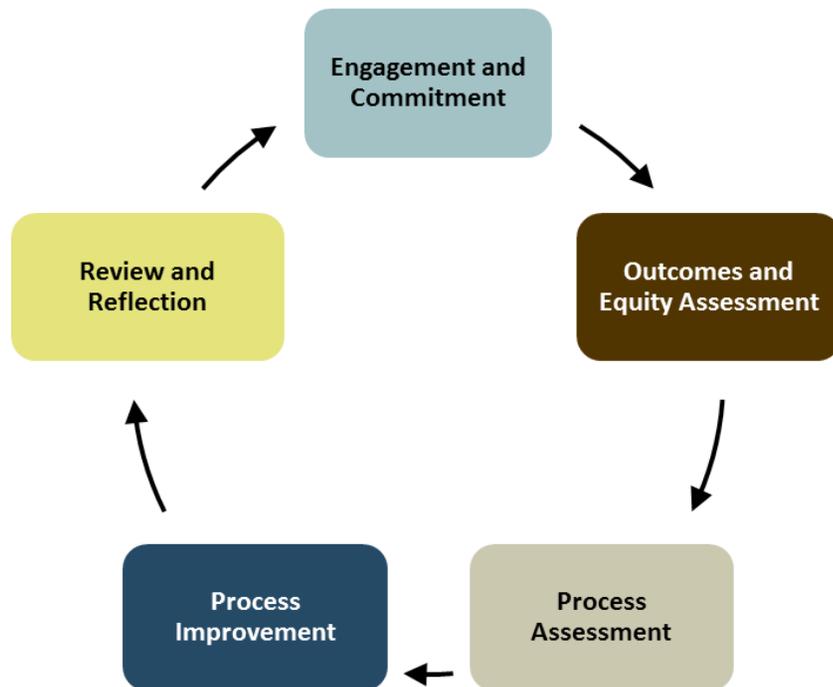
- Include cluster level knowledge and skills in bridge programs
- Align bridge programs with the postsecondary component of programs of study
- Encourage and participate in discussions across educational sectors
- Develop career pathways with multiple entry and exit points

## Community-based Organizations

- Encourage, support, and participate in discussions with other partners, including employers
- Facilitate programs of study that provide access for diverse learners
- Encourage connections with students' parents and communities
- Contribute resources to support students' learning experiences

# Pathways to Results

Pathways to Results (PTR) is an outcomes-focused, equity-guided process to improve student transition to and through education and employment. Applied to programs of study, PTR focuses on addressing equity and outcomes gaps between diverse learner groups and continuously improving processes critical to programs of study that extend from secondary or adult education to the postsecondary level. PTR is led by partnerships and teams comprised of education, employer, and community partners whose shared goal is success for all students.



PTR uses a multi-phased approach (Bragg, D., & Bennett, S., 2012):

- **Engagement and Commitment** supports partners and team members to collaborate to focus on critical problems that need to be addressed to improve student outcomes and enhance program quality. Analysis of existing data on student outcomes and programs of study feed into initial decisions about the PTR project's focus.
- **Outcomes and Equity Assessment** involves teams in using student-level data to examine outcomes and identify gaps in results between racial, ethnic, low income, and other groups and special populations. Using these data, teams identify areas where outcomes are especially successful and areas where short- and long-term improvements are needed.
- **Process Assessment** encourages teams to analyze core processes (e.g., advising, teaching, learning assessment) that relate to the problem the team has decided to address. Teams probe existing processes to understand why desired results are not being produced.
- **Process Improvement and Evaluation** involves teams in reaching consensus on solutions and developing implementation and evaluation plans to assess student outcomes and improve programs of study.
- **Review and Reflection** guides team members, individually and collectively, in reviewing and reflecting on lessons learned from engaging in the PTR process. The team develops a plan to ensure that solutions are sustained and determines the feasibility of scaling up the PTR process to other programs of study.

More information about PTR process is available on OCCRL's Pathways to Result webpage at <http://occril.illinois.edu/projects/pathways/>.

# Acronyms and Terminology

A list of abbreviations and acronyms are provided for reference and ease of communication between multiple partners on programs, initiatives, and organizations.

ACC	Area Career Center	IPAC	Illinois Pathways Advisory Council
ACTE	Association of Career and Technical Education	IPIC	Illinois Pathways Interagency Committee
ADP	American Diploma Project	ISBE	Illinois State Board of Education
AEFLA	Adult Education and Family Literacy Act	ISIS	Illinois Student Information System
CCRI	College and Career Readiness Initiative	ISLE	Illinois Shared Learning Environment
CCTI	College and Career Transitions Initiative	IWIB	Illinois Workforce Investment Board
CRP	Curriculum Revitalization Project	LEA	Local Educational Agency
CSSI	Critical Skills Shortages Initiative	LWIB	Local Workforce Investment Board
CTE	Career and Technical Education	NAEP	National Assessment of Educational Progress
DCEO	Department of Commerce and Economic Opportunity	NAPE	National Alliance for Partnerships in Equity
EFE	Education for Employment	NASDCTEc	National Association of State Directors of Career and Technical Education Consortium
ESEA	Elementary and Secondary Education Act of 1965	NCLB	No Child Left Behind
ELL	English Language Learners	NSF	National Science Foundation
HEA	Higher Education Act	NTO	Non-traditional Occupations
HSTW	High Schools That Work	OCCRL	Office of Community College Research and Leadership
IAI	Illinois Articulation Initiative	OVAE	Office of Vocational and Adult Education
IACTE	Illinois Association for Career and Technical Education	PCCS	Partnerships for College and Career Success
IBHE	Illinois Board of Higher Education	Perkins IV	Carl D. Perkins Career and Technical Education Improvement Act of 2006
ICCA	Illinois Career Coordinators Association	POS	Programs of Study
ICCB	Illinois Community College Board	PLTW	Project Lead the Way
ICSPS	Illinois Center for Specialized Professional Support	PRC	Pathways Resource Center
ICTA	Illinois Career and Technical Administrators	PTR	Pathway to Results
IDEA	Individuals with Disabilities Education Act	RTI	Response to Intervention
ILAVESNP	Illinois Association of Vocational Education Special Needs Personnel	RttT	Race to the Top
ILS	Illinois Learning Standards	SREB	Southern Regional Education Board
IOES	Illinois Office of Educational Services	STEM	Science, Technology, Engineering and Mathematics
		USDOE	United States Department of Education
		USDOL	United States Department of Labor
		WIA	Workforce Investment Act
		WIB	Workforce Investment Board

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