

Strengthening Career and Technical Education and 21st Century Skills in Philadelphia

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I. Overview

In Spring 2007, the John S. and James L. Knight Foundation awarded funds to the Philadelphia Youth Network (PYN) to undertake an analysis of Career and Technical Education (CTE) in Philadelphia, and to make recommendations on how CTE and other forms of career-connected education could better align with Philadelphia standards for college and career success. This analysis was performed with guidance from the Philadelphia Youth Council's¹ Workforce Preparation subcommittee, and with the support of the School Reform Commission and the School District of Philadelphia. PYN worked with the Philadelphia Workforce Investment Board (PWIB) to perform extensive analyses of local, regional and state-level labor market data and how they were reflected in CTE offerings; scanned the literature to learn about effective practices in CTE and other forms of career-connected education; and convened employers, school representatives and government officials from the City and the Commonwealth of

Pennsylvania to review the data, draw conclusions and formulate recommendations. This report provides an overview of that process, reviews relevant research, and presents a series of findings, analyses and recommendations designed to improve CTE and career-connected education in the School District of Philadelphia.

The scope of this report relates predominately to the city's eight CTE High Schools. Some additional analysis is presented as it relates to the career-connected offerings outside of the eight CTE schools. However, a complete analysis and comprehensive recommendations related to the entire system of career connected educational offerings is beyond the scope of this paper.

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¹ The Youth Council is a statutorily-mandated subgroup of the Philadelphia Workforce Investment Board, which is charged with recommending policies, funding and best practices that promote youth workforce development. As of December 2008, the Youth Council is now known as the Philadelphia Council for College and Career Success.

II. Why Do We Need to Address these Issues?

Historically, Vocational and Technical Education programs were seen as an alternative to academic track programs and too often became the dumping ground for the unmotivated or non-college bound student. Today's CTE offers more than the "Voc Ed" of past generations (Association for Career and Technical Education). With the passage of the 2006 Perkins Act, postsecondary education connections became a new priority for CTE practitioners prompting significant national interest in CTE's relationship with, and transition to, postsecondary education. The new Act provides an increased focus on the academic achievement of career and technical education students, strengthens the connections between secondary and postsecondary education, and improves state and local level accountability. Under the Perkins Act, federal funds are made available to help provide career and technical education programs and services to youth and adults (www.ed.gov). The majority of Perkins funds for the state of Pennsylvania are awarded as grants directly to the Commonwealth's Department of Education.

Recently, the Commonwealth of Pennsylvania also began to study CTE's role in meeting state-wide labor and industry needs. The Perkins Reauthorization coupled with the Commonwealth's push toward alignment with labor market needs has required all Pennsylvania's CTE schools to move from merely technical skills training schools with little emphasis on college to academically integrated technical centers that simultaneously prepare its students for both postsecondary education and the workplace.

Research suggests that CTE and other forms of career-connected education, if well-designed and delivered, have the potential to address a number of related problems that challenge Philadelphia's regional economy. For example:

- Greater Philadelphia employers continue to stress the need for skilled individuals to occupy the high-wage/high-demand positions essential to continued economic well-being. But data indicate that Philadelphians' skill levels and labor market participation rates are well below those of other major cities. Educational programming that is fully aligned with regional employment needs can help to address these critical economic development issues.
- Employers also report that, while solid occupational knowledge and academics are essential, there are other applied skills – like professionalism and work ethic, creativity and innovation, leadership and self-direction – that are equally important for success in 21st century workplaces. With their contextual pedagogies and connections to real-world environments, CTE and career-connected education can help students practice and develop these skills.
- Philadelphia is plagued by an unacceptably high dropout rate, with no more than 60% of students on average graduating within six years of ninth grade entry (Balfanz and Neild, 2006). The National Dropout Prevention Center reports that a mix of CTE and academic coursework helps to lower dropout rates by illuminating pathways to success.

Furthermore, career-connected education, particularly as practiced by high school academies and other career-themed small learning communities, has the demonstrated potential to improve high school graduation rates and significantly increase longer-term earnings and employment for at-risk students.

- Lower-income youth in Philadelphia and other cities have much less access than their suburban peers to jobs and work experience that can promote educational attainment, higher employment rates and increases in future earnings. CTE and career-connected education help to overcome these experience gaps, and offer students opportunities to build work experience and professional networks.

Thus, CTE and career-connected education have the clear potential to boost regional economic growth by significantly improving the preparation and readiness of Philadelphia public school students for high school graduation, postsecondary education and training and career success. The challenge is to ensure that these offerings are, in fact, rigorous and relevant to regional employment needs and accessible to as many youth as possible. The goals of the recommendations addressed in this report seek to meet this challenge while providing an academically sound option for students that facilitates and supports their movement toward successful graduation, postsecondary readiness and gainful employment.

III. A Brief Review of Relevant Research

A. 21st Century Skills

There have been several employer-informed prescriptions of the skills needed to prepare all youth for workplace success -- what we now know as “21st Century Skills” – dating back to the Secretary’s Commission on Achieving Necessary Skills (SCANS) in the early 1990’s. SCANS posited five essential competencies that workers need for job success: (1) Resources – i.e. allocating time, money and materials; (2) Interpersonal Skills; (3) Information; (4) Systems; and (5) Technology; along with a three-part foundation of (a) Basic Skills, (b) Thinking Skills and (c) Personal Qualities like responsibility, self-management and integrity (U.S. Department of Labor, 1991). Another influential early argument for 21st Century Skills advocated a mix of hard skills (math and reading); soft skills (communication and working in groups); and the ability to use personal computers (Murnane and Levy, 1997). Perhaps the most complete recent discussion of the topic can be found in the work of the Partnership for 21st Century Skills, which, based on employer survey responses, identified the most valuable traits for workplace success as: Professionalism/ Work Ethic; Oral and Written Communications; Teamwork/ Collaboration and Critical Thinking/Problem Solving. While basic academic knowledge is considered fundamental, employers indicate that applied skills are also “very important” to employment success. (Partnership for 21st Century Skills, et al., 2006)

B. Career and Technical Education

There is a strong consensus in current analyses about the importance of ensuring that CTE programs have a rigorous academic core that prepares students for careers and post-secondary education (Brand, 2003; Kazis, 2005, Bottoms, 2006). The National Assessment of Vocational Education (NAVE) reports that “CTE students have increased their academic course-taking relative to non-CTE peers,” but CTE concentrators are far less likely to be proficient in reading and math than other students and “much more needs to be done to close achievement gaps.” This is especially true in light of the NAVE finding that “CTE courses and programs do not, in and of themselves, improve academic achievement.” (Silverberg, et.al, 2004)

CTE appears to have efficacy in reducing dropout rates. For example, increases in CTE student enrollment are related to higher high school graduation rates and to the percentage of 15- to 19-year-olds enrolled in school (Bishop and Mane, 2004). Furthermore, students who entered high school had a decreased risk of dropping out as they added CTE courses to their curriculum (Plank, DeLuca and Estacion, 2005). Based on these and other related findings, the National Dropout Prevention Center/Network has identified CTE as one of 15 strategies that have a positive impact on the dropout rate.

NAVE reaches strong, positive conclusions about CTE and its effects on earnings, stating that “CTE has positive impacts on short- and medium-term earnings” (\$450/year per CTE course) and CTE students who also take an academic curriculum earn more than similar students who complete either the academic or the CTE curriculum alone. These benefits extend to a broad range of students, e.g. those who are disabled, educationally or economically disadvantaged, and to both men and women.

In *Rigor and Relevance* (2003), Betsy Brand, Director of the American Youth Policy Forum, a DC-based youth advocacy organization that has emphasized the importance of high-quality Career and Technical Education, recommends specific steps for local areas to build high-quality CTE programs:

- Rigorous, integrated, and sequenced CTE curriculum aligned with state academic standards;
- Professional development based on the needs of the teachers to provide high quality, academically rigorous, integrated curricula and contextualized teaching and learning;
- Presence of qualified teachers in both academic and technical fields;
- Creation of various career-themed programs of study, small schools, or early or middle college high school, integrating local needs with national pathway models and state frameworks;
- Career guidance and counseling by school officials and/or supplemented by employer/community partnerships ... to ensure the attainment of a certificate or degree at the postsecondary level;

- Partnerships with employers and community organizations to allow access to work-based learning, service learning ... and to ensure relevancy and validity of the program of study to the labor market and labor market needs;
- Pathways that help students transition and move from high school to postsecondary education; and
- Data collection, disaggregated by race and income, and program evaluation based on solid accountability measures.

C. CTE and Postsecondary Education

According to NAVE, “CTE courses appear to be neutral” with regard to students’ chances of participating in postsecondary education. While increasing percentages of CTE concentrators are enrolling in postsecondary education and training, these effects are not necessarily attributable to CTE programs, and the overall postsecondary rates of CTE students remain less than for other students. Furthermore, among all students who enroll in postsecondary education, CTE students are less likely to complete a bachelor’s degree and more likely to complete an associate’s degree.

Several studies document the relationship between postsecondary education and long-term earnings, and underscore that a postsecondary credential is critical to economic self-sufficiency (Center for Labor Market Studies, 2008; Philadelphia Workforce Investment Board, 2008). In fact, the WIB notes that “more than two-thirds of the students completing career and technical education programs will need a post-secondary certificate or an academic degree to pursue fulltime work.” Dual enrollment is one example of a practice that appears to help students, including those participating in CTE, to earn postsecondary credentials. For example, dual enrollment participants at the City University of New York and in the State of Florida, including the full sample as well as CTE students, “had more positive outcomes on a range of short- and long-term measures than similar non-participants.” Furthermore, students from groups typically underrepresented in higher education “appeared to benefit from dual enrollment participation to a greater degree than other participants” (Community College Research Center, Columbia Teachers College, 2008).

D. Other Forms of Career-Connected Education

- Career Academies. MDRC (formerly the Manpower Demonstration Research Corporation) is conducting an ongoing longitudinal analysis of student performance in career academies using a random assignment research design in a diverse group of nine high schools. Findings suggest that at-risk students who participate in academies are more likely to stay through the 12th grade and show improved attendance and increased credit accumulation toward graduation. Furthermore, career academies produced sustained earnings gains that averaged 11% (or \$2,088) more per year for

Academy group members than for individuals in the non-Academy group — a \$16,704 boost in total earnings over the eight years of follow-up. These impacts were particularly strong for young men, whose real earnings increased by \$3,731 (17%) per year — or nearly \$30,000 over eight years (Kemple et. al. 2008)

- Work-Based Learning. Students participating in paid after-school internships in some of Chicago’s most economically disadvantaged schools missed fewer days of school, failed fewer core academic courses and had higher graduation and lower dropout rates than similar students who did not participate (Goerge, 2006). Further, contextual learning strategies like work-based learning may be effective in improving students’ grades, attendance and graduation rates, and holds promise for increasing student engagement and promoting access to postsecondary education. (Husbands and Breese, 2004).

Evidence also suggests that work-based learning improves self-confidence and self-concept, and expands students’ ideas about their possible futures (Bailey and Hughes, 2004). School-linked internships are particularly powerful for at-risk youth, providing a context that gives meaning to academics, promotes confidence in abilities and provides access to networks and informal channels for employment (Lerman, 1996).

For at- risk youth, there is a strong link between working while in high school and obtaining a job after graduation, and a positive correlation between work during high school and earnings 8-11 years later (Chapin and Hathaway, 1996). At the same time, teens in low-income households have the least access to employment opportunities (Lerman, 2000), and young African Americans begin to fall behind young whites in the accumulation of work experience at very early ages, which contributes to slower wage growth over time. (Holzer, 2000).

The research and components listed above are considered in findings and recommendations throughout this paper.

IV. Report Methodology

Interested in helping Greater Philadelphia leaders more fully understand and improve the relationships between CTE programming and regional employer needs, in Spring 2007 the John S. and James L. Knight Foundation awarded funding to the Philadelphia Youth Network to lead a collaborative process to analyze data, survey research and generate recommendations towards that end. To ensure that this process was linked to related work in the City, PYN, which also staffs the Philadelphia Youth Council (currently named the Philadelphia Council for College and Career Success), recommended that this work be undertaken under the auspices of the Council’s Workforce Preparation subcommittee. As a result, the Council charged the subcommittee with facilitating the process to better understand and make recommendations to improve Career and Technical Education and career-connected education in the School District of Philadelphia. The School Reform Commission and the School District of Philadelphia were also enlisted as partners in the effort.

The subcommittee, which is comprised of representatives from the School District, business, the workforce system, the city and state, teachers, parents, and Philadelphia CTE students, met on a monthly basis as a collaborative work team to inform and direct the planning grant, with PYN serving as managing partner of the work. The subcommittee reviewed all available research regarding effective practices in CTE and career-connected education; arranged interviews and focus groups with a wide range of stakeholders; and collected and analyzed state, regional and local data to illuminate the relationships among CTE programs and regional economic needs.

Key partners and highlights of their roles and contributions include:

- *PA Department of Education's Bureau of Career and Technical Education* - provided data and helped to identify policy barriers.
- *The Philadelphia Federation of Teachers* - organized teacher focus groups and helped to create a plan for a CTE Teacher Professional Development Center.
- *The School District of Philadelphia* - provided data and helped to develop and support principal professional development opportunities.
- *Philadelphia Academies, Inc.* - provided data and tapped the knowledge and experience of its Industry Advisory Groups, which offered invaluable support for the planning process and recommendations.
- *Area employers and business leaders* - participated in focus groups and a series of lectures and workshops on CTE.
- *Students and parents* - participated in focus groups that provided an important community perspective, including discussion and surveys around perceptions of CTE, youth workforce preparedness, workforce development strategies, social and educational barriers, and data collection.
- *The Philadelphia Workforce Investment Board* - provided regional workforce data and undertook an in-depth analysis of the School District's programs of study and their alignment with regional high-priority occupations.

Based on its extensive analyses and discussions, the subcommittee identified the following key principles that should guide a high-quality CTE system:

1. CTE Programs of Study are an important part of high school reform.
2. CTE Programs of Study prepare students for post-secondary success and career control.
3. CTE Programs of Study are connected to regional economic and workforce development.
4. CTE programs of study are based in academic rigor and have curricula, facilities, and equipment that are state-of-the-art and meet or exceed industry standards.

5. CTE programs of study lead to students earning industry-recognized certifications and have post-secondary connections.
6. CTE instructors are field-recognized experts and skilled teachers.
7. CTE maintains high levels of excellence supported through the measurement of performance (accountability).
8. CTE sets high expectations for students' academic and social success.
9. CTE state-of-the-art facilities provide multiple uses for industry and the community at large including incumbent worker training and adult continuing education opportunities.

Findings and recommendations found later in the report are organized with these core principles in mind.

V. Findings, Analysis and Discussion

A. CTE Schools and Programs

Career and Technical Education is organized and offered by the School District of Philadelphia via three approaches: (1) Programs of Study, (2) Programs of Concentration and (3) individual CTE courses. The following description of these approaches includes an analogy to postsecondary nomenclature to help further understanding of this organization:

- Programs of Study are course sequences that meet state content and hour requirements (at least 720 hours of CTE instruction for one- and two-year programs; 1,080 hours for a three-year program and 1,320 for a four-year program) and are eligible for state and federal funding. Programs of Study are similar to a college “major,” with the typical Philadelphia CTE student taking two occupation-focused courses each year in grades 10-12.

Philadelphia's CTE offerings:

- (1) Programs of Study
- (2) Programs of Concentration
- (3) Individual courses

In January 2008, there was a total enrollment in all CTE schools of 7,418 students. Of that total number, 4,351 students in grades 10 to 12 were enrolled in 34 Programs of Study in Philadelphia's CTE high schools offering training for 128 related occupations with successful completers having access to 45 certification opportunities, 34 of which are identified by the Commonwealth as industry-recognized.

Programs of Study, representing 10 Philadelphia local industry groupings or “clusters” (identified by the Pennsylvania Department of Labor and Industry), are typically offered in four, five or six different CTE high schools. Most schools offer programs that relate

to more than one (and in some cases up to eight clusters. In only one instance, Saul, does a CTE high school focus on a single cluster.

While there are five Programs of Study still offered in five neighborhood high schools, with 629 students enrolled, the overwhelming majority of Programs of Study are provided in the School District's eight full-time CTE schools.

Unlike much of the Commonwealth, where students learn occupational skills at part-time area CTE schools and take academic coursework at their home high schools, Philadelphia's CTE schools offer both CTE programming and all required academic courses needed for graduation in one facility. In the ninth grade, all students in these schools participate in a "career exploration" course and cycle through each of the programs on site prior to committing to a particular program.

Seats in Philadelphia's eight CTE high schools are highly sought after, with demand approaching that for academically elite public high schools in the city such as Central, Masterman, and Girls High. In fact, almost half (46%) of all 8th graders in the city apply to at least one CTE school. In 2006, a total of 6,797 rising 9th graders applied to one or more of the eight CTE high schools, but only one in four (27%) was admitted.

Philadelphia's CTE high schools:

1. Edward Bok High School
2. Communications Technology High School
3. Murrell Dobbins High School
4. Thomas A. Edison High School
5. Jules E. Mastbaum High School
6. A. Phillip Randolph Career Academy
7. Walter B. Saul High School
8. Swenson Arts and Technology High School

With the exception of Edison High School, admission into CTE high schools is based on a city-wide competitive process, with all prospective students required to apply for admission. Criteria for acceptance include:

- marks of A, B or C;
- no more than ten absences;
- no more than five instances of lateness; and
- no negative disciplinary reports.

Students who meet three of four criteria are considered for admission. They must also attend an interview at the school of their choice, and then are entered into a lottery, from which successful applicants are selected.

According to research currently being conducted by Johns Hopkins University, beginning with the Class of 2004, the CTE schools began to screen out higher percentages of

applicants with weak test scores, grades, attendance, etc., and then conducted a lottery among the remaining youth. The chart below shows the percentage of youth, in five of the schools*, who applied but were not entered into the lottery.

**Percentage of Applicants Not Entered into the Lottery,
By School and Cohort**

	Class of 2004	Class of 2005
Bok	37.30%	42.56%
Dobbins	53.80%	54.95%
Mastbaum	43.35%	65.07%
Saul	52.44%	55.49%
Swenson	n/a	60.15%

In real numbers, in 2004, over 5,321 students applied to one of the four CTE schools listed above and did not meet criteria sufficient to be entered into the lottery. In 2005, for the five CTE schools listed 7,199 applicants applied but were not entered into the lottery.

It should also be noted that Edison High School remains an outlier throughout this analysis as it is both a neighborhood high school and a CTE school. This hybrid structure has a subset of the student population enrolled in CTE programs of study. Students are not identified as distinct and separate groups within the school and it was therefore difficult to evaluate CTE related data for Edison. The hybrid structure makes Edison High School the largest school in the CTE cohort with a total enrollment of 2,321 in 2007-2008 school year. Mastbaum is the next largest CTE school with half the enrollment (1,149) of Edison. The sheer size of Edison as a CTE school, the CTE programs of study not being clearly defined as separate and distinct from the general education program and the lack of CTE trained leadership intimately familiar with Perkins funding requirements creates both administrative difficulties and impedes the implementation of academically rigorous CTE pedagogical practices throughout the CTE programs.

In the seven other CTE high schools, the selectivity of admissions helps to ensure that students who participate in CTE programs are able to meet strict academic and behavioral standards and therefore should be prepared to make the most of their educational experiences. However, it is also possible that the rigors of the selection process might serve to exclude students who have not been well-served by traditional schooling, and for whom the contextual pedagogies practiced at CTE schools might actually be much more effective than regular classroom instruction.

* Randolph High School and Communications Technology High School came into existence during the 2003-2004 school year. No separate data is available for these schools until 2005. Edison, because of its hybrid structure, does not have a lottery process.

- Programs of Concentration are emerging course groupings that provide less intensive CTE instruction (e.g. 540 hours) than Programs of Study and are not necessarily organized into a coherent curricular sequence. If effectively developed, Programs of Concentration may offer an opportunity to explore CTE coursework within a career pathway. This career exploration option has become increasingly important as career programs in non-CTE schools have been eliminated in order to meet stricter state requirements for Programs of Study. If properly developed, Programs of Concentration could be considered a career “minor” available in the traditional neighborhood high schools for non-CTE students. Seventeen Programs of Concentration have been identified at 19 high schools that consist of CTE course sequences that enable students to explore careers based on their interests. However, these sequences are not yet considered sufficiently intensive to make them eligible for state or federal CTE funding support and are not yet fully developed.
- Depending on their interests and course requirements, students in neighborhood high schools may enroll in individual CTE courses within elective programs that enable students to experience hands-on, contextual learning within an area of career interest. While some of these programs will be developed into the emerging Programs of Concentration they are not necessarily part of a broader career-focused sequence.

Most Programs of Study and the newly developing Programs of Concentration are offered at multiple locations in CTE and non-CTE schools across the School District. Resources, facilities, equipment, partnerships and other supports for these CTE offerings, particularly Programs of Study, vary considerably from school-to-school. This creates competition for more desirable Programs of Study as qualified students vie for admission, with more than 40% of students denied their first choice. As a result, some students have greater access than others to the best equipment, facilities and faculty, and to Programs of Study that are more likely to provide pathways to the region’s high wage/high demand careers.

Interestingly, while there are some obvious advantages for students to attend school in or near their neighborhoods, only 27% of CTE students who participated in a focus group for this study identified geographic proximity as a reason for choosing their schools. Furthermore, 69% of students in the focus group indicated that they would travel in order to get their first choice of school and Program of Study, and CTE parents who participated in a different focus group indicated that they would allow their children to travel to a CTE school if they were guaranteed their first choice. However, parents were very concerned about the “double negative” – i.e. their children having to travel and still not receiving their first choice.

The District receives a total Perkins allocation of \$6,326,473 directly from the Commonwealth’s Department of Education which is applied towards the CTE system total cost. This Perkins allocation is then divided into two categories by the District’s CTE office: \$1,911,962 moves directly to the CTE schools; the remaining \$4,414,511 goes to the CTE office in the District. The CTE Office then redistributes the remaining \$4.4 million Perkins allocation: \$1,674,769 is allocated by the CTE office to both CTE and non-CTE schools to help offset the costs of equipment, personnel and additional student services that the schools could not otherwise afford. The \$2,739,742 remaining in central office is used to cover the costs of

non-school based personnel, professional development, contracts with partners and business services. In total, students in the CTE high schools receive an additional \$933 per student comprised of Operating funds, Special Education Voc Ed/other Vocational Ed funds. The total amount of vocational related supplemental funds the CTE schools receive total just over \$7 million. Overall, the CTE schools receive approximately 11% more operating funds than the comprehensive high schools in Philadelphia.

Summary

- Most of Philadelphia’s state-approved CTE course sequences – known as Programs of Study –are offered at eight full-time CTE high schools.
- There are over 4,300 students, grades 10 through 12, in Program of Study across the city.
- CTE high schools are highly competitive and admit less than one-quarter of applicants.
- Many Programs of Study and their related occupations are offered at several different CTE high schools across the City.
- Other less-intensive forms of CTE also exist throughout the School District, including Programs of Concentration and individual courses taken as electives.
- The hybrid structure at Edison High School requires both short-term and long-term remedies.
- Quality and resources across Programs of Study vary from school to school.

B. Other Forms of Career-Connected Education and their Benefits

Other types of career-connected educational programs are offered in the School District of Philadelphia, providing the benefits of contextual learning but not necessarily including formal CTE coursework.

- High School Academies. Philadelphia’s career academies operate in 16 high schools, including both CTE and neighborhood schools. These “schools-within-schools” feature active learning through internships and direct exposure to the business community. Typically serving between 150 and 200 students from grades 10 through grade 12, career academies combine academic and technical curricula organized around a career theme, and establish partnerships with local employers to provide work-based learning opportunities that prepare students for employment and postsecondary education.

Philadelphia Academies, Inc. (PAI) supports a majority of the career academies in the School District. In 2008, PAI served approximately 6,000 students in educational

programs organized around nine industry themes used to facilitate career exposure and integrate academic and career-related instruction. Communities in Schools of Philadelphia, associated with the National Academy Foundation, also offers an academy focused on finance and provides support to all of the Culinary programs in the District.

Additionally, PAI provides supplemental support to Programs of Study and Programs of Concentration. PAI also offers technical assistance to several neighborhood high schools to bolster the effectiveness of their CTE course work through professional development, curriculum alignment with relevant career pathways and access to workplace internships.

- Industry Pipeline Programs. There are a number of well-established and articulated pathways from Philadelphia public high schools to careers and/or postsecondary education. While relatively small in scale, these “pipeline programs” are showing promise as vehicles for preparing students for careers in high-demand occupations in the regional economy. In general, pipeline programs are characterized by:
 - Employer involvement in and feedback on curriculum elements;
 - Career exploration and discussion directly with employer representatives;
 - Opportunities for work after graduation;
 - Sustained student involvement, preferably including summers and spanning more than one school year;
 - Opportunities for financial support for post-secondary education; and
 - A tight focus on academic standards and occupational competencies.

Examples of current Philadelphia industry pipeline programs include:

- Sunoco and the Process Control Pipeline Program. The Philadelphia Academies, Inc. created a process control program working directly with Sunoco at the Philadelphia-based oil refinery. Sunoco partners with the process control technology academy at Bok High School, helping to develop curriculum and providing up to 20 job opportunities each year for students. Young people who successfully complete the program but choose to go on to college are eligible to compete for one of two four-year scholarships if they major in engineering, science or technology related program.
- Philadelphia City Water Department. The water department draws potential employees from students in the electrical, environmental, and process control academies which are supported by Philadelphia Academies, Inc. In the second half of their senior year, students can choose an internship with the water department, arranged to combine school attendance and 20 hours of work each

week. Mentors help young workers adjust to the expectations of the workplace and provide on-the-job training. After graduation, students can move into full-time employment if they pass the civil service exam. The water department also pays 100% of the costs for students to attend Community College of Philadelphia to meet specific goals in math, reading and comprehension over the summer to prepare for the civil service exam.

- Lockheed Martin Integrated Systems and Solutions Registered IT Apprenticeship. The 3 year-long IT apprentice program begins in 11th grade and works with cohorts of 22 students drawn from both neighborhood and CTE high schools. PYN helped to establish and sustain this apprenticeship program which provides mentoring, job shadowing, projects, and hands-on training. During their senior year, the apprentices work as interns two days per week on-site at Lockheed, with the final year comprised of full-time training on-site after high school graduation. At completion of the three years of training, students are awarded Pennsylvania Department of Labor and Industry certification as an information technology technician. Graduates of the three year program may opt to remain as full-time Lockheed employees or search for other employment. Since 2002, four student cohorts have participated in the Registered IT Apprenticeship, with the next group of students expected to be brought into the program in Fall 2009.

Urban Education Academy. In 2003, Philadelphia Academies, Inc. created the Urban Education Academy as a vehicle to meet the need for more qualified teachers in Philadelphia. The Academy is designed to serve as an introduction to the teaching profession and other educational careers for students in the Philadelphia School District. Seven hundred and thirty nine (739) students from the participating schools have the opportunity to take courses in career specific areas, participate in an instructional internship and in programs designed to enhance leadership skills, attend summer skill enhancement programs and gain dual enrollment credit for college while still in high school. The Academy's Industry Advisory Board and other partners support the program by providing practice interviews, speakers, tours and internships for students and by working with Academies staff to develop curriculum and train teachers. On September 22, 2008, the Philadelphia Academies Inc., the School District of Philadelphia and the Philadelphia Federation of Teachers announced an historic agreement guaranteeing a teaching job to every graduate of the Urban Education Academy at Parkway West, Overbrook and Furness High Schools when they complete college and receive Pennsylvania certification.

- Pipeline programs managed by organized labor. Organized labor also works with the Philadelphia School District to provide pipeline programs. For example:
 - SEIU 1201 provides a summer internship in maintenance trades for twenty students completing their 11th grade year. After successful completion of the

program and graduation, students are eligible for the Building Engineer Trainee Program or the Trades Apprenticeship Program.

- District I 199C Training & Upgrading Fund works with the Philadelphia Academies, Inc. and the Philadelphia School District to train students as nurse aides.
 - The International Union of Painters and Allied Trades District Council 21 offers a summer co-op program in which students attend training one day a week while also attending regular high school classes. After graduation, students may apply to the union with credit towards completion of an apprenticeship.
 - The Philadelphia Building Trades Council and the School District of Philadelphia entered into a four-year agreement beginning in 2006 with the intention of providing a minimum number of apprenticeship opportunities to School District graduates over the life of the agreement. The agreement calls for the Building Trades Council to work closely with the School District to create a curriculum that will prepare public school students for apprenticeships with the electricians, carpenters, plumbers and other skilled trade unions.
- WorkReady Philadelphia – The WorkReady Philadelphia system of year-round and summer-only programs offers another opportunity for District students to gain career exposure, develop work readiness skills and receive on-the-job training. These programs have varying levels of connection to schools, ranging from year-round pipeline programs partnered with specific schools (e.g. St. Christopher’s Hospital for Children with Bok, Furness, Robeson, and School of the Future and Children’s Hospital of Philadelphia with Olney) to summer-only internships that provide opportunities for youth to earn school credit based on evaluations of projects and portfolios by certified teachers. Also part of WorkReady is Shadowing Day, which provides career-exposure and worksite visits to more than 1,000 ninth graders each year.

The Philadelphia Youth Network manages the WorkReady system, contracting with several dozen community-based organizations to operate these programs on behalf of the PWIB/Philadelphia Council for College and Career Success. More than 8,000 youth receive work-based learning opportunities through this system of programs each year. There are 3,000 more youth who seek to participate in these programs each year but cannot be placed due to insufficient funding.

- Accessibility of Career-Connected Education. CTE high schools and career academies combined serve more than 10,000 students each year. If you consider students who take any type of CTE course, the total student participant count jumps to over 14,200 students including several hundred participants in pipeline programs. Therefore, almost

28% of Philadelphia high school students have access to some type of career and technical offerings.

While it is outside the scope of this paper, consideration should be given to the core career-related activities available to all young people with particular attention on how to scale 21st Century skill building throughout the District.

Summary

- High school academies provide career-connected learning opportunities – in some cases including CTE Programs of Concentration – for approximately 6,000 students.
- With technical assistance provided by Philadelphia Academies, neighborhood high schools are developing Programs of Concentration.
- Although relative small in number and in enrollment, industry pipeline programs are well-established in Philadelphia and provide “evidence proofs” for an important new model for career preparation.
- Thousands of additional youth are provided career-connected learning experiences through WorkReady Philadelphia programs, managed by the Philadelphia Youth Network, with several thousand more placed on waiting lists each year.
- While outside the scope of this paper, work-based learning opportunities have a number of benefits for students, particularly those at-risk of high school dropout. More attention needs to be given to the District-wide strategy for 21st Century Skill building and career-connected education.

C. Enrollment and Academic Achievement in Philadelphia’s CTE Schools

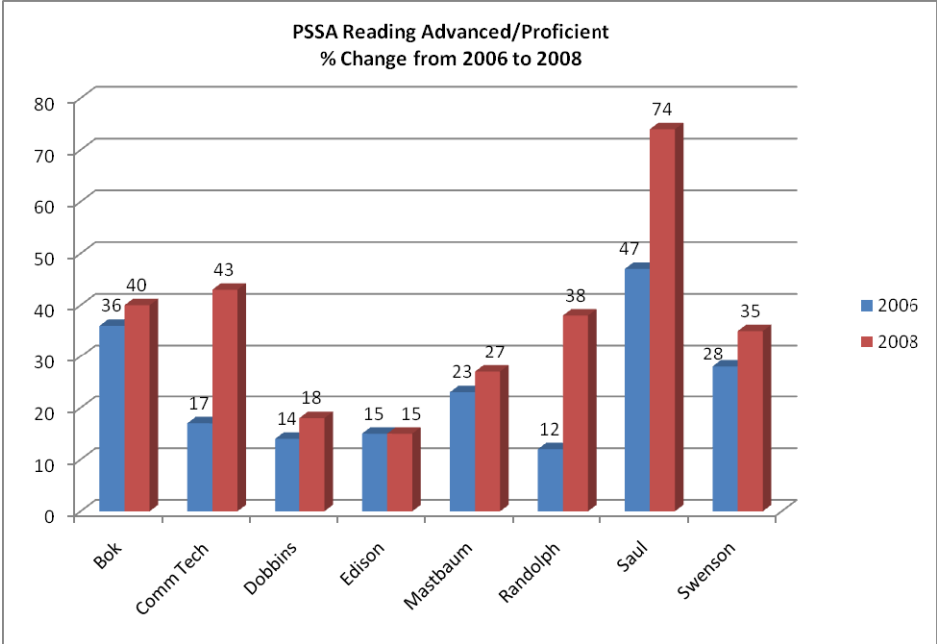
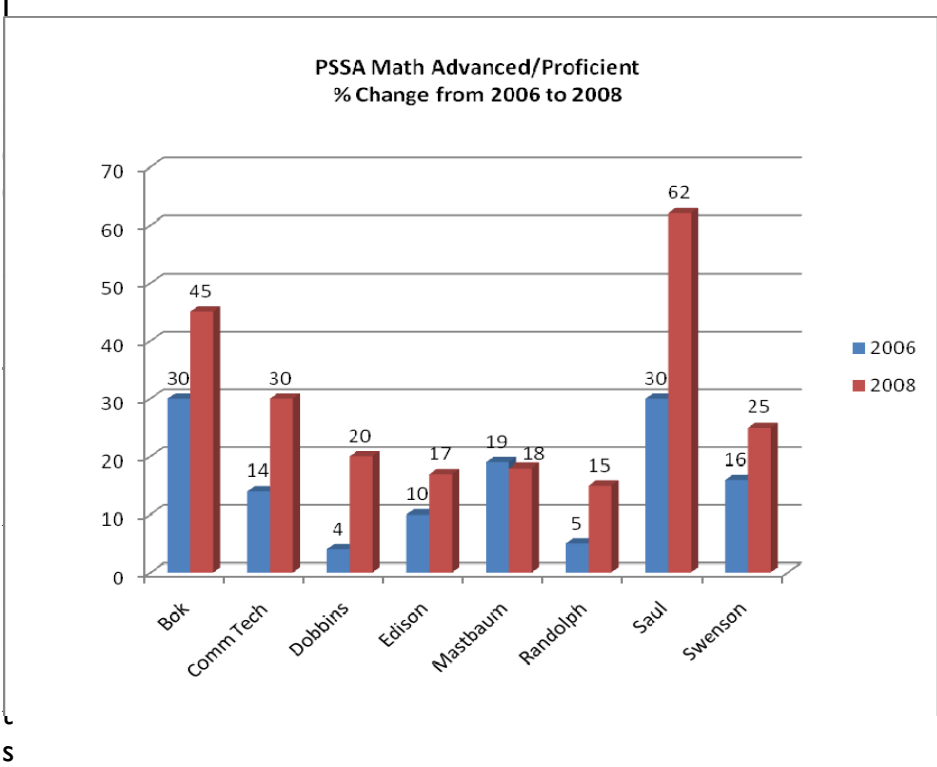
- Enrollment. In January 2008, more than 4,000 students were enrolled in 34 different Programs of Study in Philadelphia’s CTE high schools, covering 10 industry clusters. Training for 128 related occupations is available within these Programs of Study, with successful completers having access to 34 state-recognized industry certifications.
- Promotion and Retention. Ninth grade is a critical year for Philadelphia students. Simply put, those who earn enough credits during their first year of high school to be promoted to 10th grade are likely to graduate; those who do not are likely to drop out. The following table, based on recent work by Hopkins research scientist Ruth Curran Neild, uses two approaches to calculating promotion rates. In either case, it is clear that ninth grade promotion rates have increased over the past few years at CTE schools.

9th to 10th grade promotion rates for CTE Schools

	2001-02	2002-03	2003-04	2004-05
<i>Method 1: Promotion rate among all with grade indicators in subsequent year</i>	79%	88%	90%	95%
<i>Method 2: Minimum on-time promotion rate</i>	76%	79%	81%	88%

These data show two ways of looking at promotion from 9th to 10th grade. Method 1 shows promotion among those for whom any grade indicator can be found in the subsequent school year (i.e. these are students still enrolled in the District). It is a less conservative estimate because it does not take into account students who may have dropped out of the District. In contrast, Method 2 is a very conservative estimate of promotion. It counts all students who do not have grade indicators in the subsequent year as “not promoted.” Method 2 shows the minimum percentage of ninth graders who were promoted.

- Academic Achievement Based on Statewide Assessments. The Pennsylvania System of Statewide Assessment (PSSA) is the Commonwealth’s mandatory standardized test, established by the State Board of Education and used for accountability purposes under the federal No Child Left Behind Act. Between 2005 and 2008, CTE students and schools exhibited the following trends:
 - Each of the CTE schools saw decreases in students scoring below basic in math (ranging from 9.7%-35.3%) and reading (7.7%-60.1%);
 - Seven of the eight CTE school saw increases in the proficient and advanced categories in math (10.5%-40.3%) and in reading (6.7%-32.7%); and
 - sat for, and scored higher on the SAT in verbal and math at rates higher than or comparable to neighborhood high schools with similar demographics.



Despite the fact that CTE students scored higher on state assessments than the average of all students in the School District of Philadelphia, it is evident much work remains to be done when these results are compared to statewide scores. For example, in the 2006-07 school year, Saul High School was the only one of the eight schools to equal statewide average scores on 11th grade reading, and the only school to meet the state’s actual targets for PSSA performance. None of the eight equaled statewide average scores on mathematics assessments. Furthermore, four of the eight schools are in “Corrective Action 2” in 2008, meaning that they have failed for five years to make Adequately Yearly Progress under the federal No Child Left Behind Act. One of the four in Corrective Action 2 met standards to qualify as “making progress” and only two of the eight met Adequate Yearly Progress standards under the Act. Edison High School’s 2008 Pennsylvania State Assessment reading scores shows the lowest number of proficient readers among the CTE cohort schools.

- **Graduation.** Graduation rates at CTE schools exceed the average District graduation rate, ranging from 10 to 25 percentage points higher, depending on the cohort (Balfanz and Neild, *Unfulfilled Promise*).² Furthermore, graduation rates have risen over time. This is evident when comparing the four year graduation rates of the Class of 2005 with the six year rates for the Classes of 2001 and 2003.

	Class of 2001 (six year rate)	Class of 2003 (six year rate)	Class of 2005 (four year rate)
Percent graduated	74%	73%	77%

These findings are consistent with research cited above which indicates that CTE and other forms of career-connected education have important dropout prevention benefits, particularly for low-income students. However, while the graduation rates of all but one of the 6 CTE schools with available data indeed measured higher than other high schools in Philadelphia in 2005, only 3 achieved the Commonwealth’s graduation rate benchmark of 80%. More research is necessary to determine the role that selectivity plays in the overall graduation rates.

- **Additional Graduation Requirements for CTE Students.** The increases in the School District’s high school graduation credit requirements in combination with the coursework needed for CTE Programs of Study have led District officials to determine that, effective in the 2009 school year, CTE students must take more credits than other students to graduate (e.g. 26.5 vs. 23.5). This conclusion was reached based on the belief that CTE students could not meet both requirements within a 23.5 course load. However, evidence suggests that there are effective ways to integrate coursework so that students are able to earn both academic and career-focused credit within a single, well-designed course.

² This comparison does not include data for Edison High School. While Edison enrollment includes both CTE and non-CTE students, the data set used for this analysis does not identify students accordingly. Therefore the entire school was excluded in this particular case by the researchers.

Summary

- Students in CTE high schools have performed better over time on state assessments and graduate at higher rates than students in non-CTE schools. While national data indicates that CTE pedagogy correlates with student performance, research is needed to determine whether the stronger performance in Philadelphia results from CTE schools' selectivity or other factors.
- For the most part, while they outperform their non-CTE (non-magnet school) peers in the City, Philadelphia CTE students and CTE high schools are below statewide averages on assessments of reading and mathematics. In fact, four CTE high schools are in "Corrective Action 2" status.
- Effective in the 2009-10 school year, CTE students will have to accumulate 26.5 credits to graduate, compared to 23.5 for non-CTE students, in order to accommodate academic and CTE course requirements.

D. Alignment of CTE Schools with Regional Workforce and Economic Development Needs.

The apparent ability of CTE schools to produce stronger academic outcomes than non-CTE high schools has important benefits for students. But beyond their academic mission, CTE schools are also intended to equip students with skills needed to enter employment and/postsecondary education and training aligned with the region's economic development needs. To assess and understand the extent of this alignment, the Philadelphia Workforce Investment Board undertook a study to examine:

- The connection between the skill sets offered through CTE programs in the public high schools and available occupations – especially Commonwealth designated high priority occupations
- Possible gaps in the CTE programs for large or growth occupations that require specific skill sets that can be learned in several years and provide opportunities for advancement
- Emerging occupations that might provide specific skill sets that can be learned in several years and provide opportunities for advancement

The Growing Need for a Skilled Workforce. The WIB notes the steady increases in skill levels of occupations found in the Greater Philadelphia labor market. These changes are primarily attributable to two factors: the job content – i.e. the skill requirements of individual

occupations – has changed to favor greater educational attainment; and the staffing structures of employers – i.e. the mix of employment within firms, has also changed to reflect the need for increasing numbers of skilled employees.

As an important pipeline of talent for regional employers, CTE schools must understand and address these trends. The WIB report notes, “skills, knowledge, and abilities for jobs today require strong core competencies in math, reading, comprehension, writing, critical thinking, problem-solving, and communication.” As the labor market in Philadelphia shifts to occupations requiring higher levels of knowledge and skills than in the past, even for entry-level opportunities, the WIB states that “more than two-thirds of the students completing career and technical education programs will need a post-secondary certificate or an academic degree to pursue fulltime work.”

CTE Alignment with Regional Economic Needs. Several of Philadelphia’s CTE Clusters and Programs of Study align with in-demand occupations that pay well and involve advanced levels of education and skills development as prerequisites to career success. For example, Programs of Study and related occupations in four of Philadelphia’s nine CTE clusters – Communications, Health, Information Technology and Transportation – are in great demand in the regional economy. In most cases, students in these programs will need to continue their education well beyond high school in order to gain and keep high-wage/high-demand positions.

In other instances, Programs of Study and related occupations in several CTE clusters – e.g. Hospitality and Cosmetology & Fashion Design – offer training for job entry immediately after high school, without the need for additional post-high school education. But while job opportunities are numerous for students in these programs after high school graduation, wages and opportunities for advancement are often poor. Particularly in these instances, the WIB notes “there is a clear need to articulate secondary coursework and Programs of Study with post secondary credentials in order to equip students with skills needed to earn family sustaining wages and move beyond entry-level jobs to careers with potential for growth and advancement.”

Specific Connections to Commonwealth-Established High Priority Occupations. Each year, the Commonwealth’s Department of Labor & Industry determines High Priority Occupations (HPO) for the Commonwealth and approves additional occupational titles for local workforce areas and regions. High Priority Occupations are defined as job categories that are in demand by employers, have higher skill needs, and are most likely to provide family sustaining wages. Therefore, the High Priority Occupations list should be an important factor in developing Programs of Study at the school level. Once included on the HPO list, the state and school can provide additional resources for the development of programs of study related to an emerging regional workforce need. Early identification of these developing occupations can help schools keep pace with industry needs while allowing the region to better prepare for the workforce needs on the horizon.

Any new program for which Commonwealth workforce-related funding is sought must be consistent with the HPO list. Philadelphia’s regional list includes occupations generated by the Commonwealth as well as those occupations successfully petitioned for HPO inclusion within

the SE region of Bucks, Chester, Delaware, Montgomery, and Philadelphia counties. With the exception of Hospitality, at least one HPO is included within each CTE cluster, but only one quarter of CTE programs are directly aligned with HPOs. As noted above, Health, Communications, Information Technology and Transportation occupations are well-aligned with HPOs, while Agriculture Science, Cosmetology & Fashion, and Hospitality Clusters are the least aligned.

The process for impacting the HPO list involves completing an application through the local Workforce Investment Board that ultimately gets submitted to the Economic Development Cabinet through the Department of Labor and Industry. This application requires significant levels of data.

To date, this process has occurred on an “as-needed” basis and has met with limited success on applications submitted by the local education agency through the WIB.

Because schools are not typically partners in high-level discussions of regional workforce projections, they are dependent on their industry or community partners if they wish to impact the HPO list. The HPO is one of a several criterion that must be considered when determining alignment that includes the local job market and industry partner involvement.

There is currently no systemic mechanism for planning and incubating programs in emerging industry areas such as “green jobs.” Developing systemic processes and supports for such efforts would also help schools in their efforts to keep up with industry trends and prepare for future HPO’s.

Summarizing the Labor Market Data. In the table on the following two pages, the WIB lists Philadelphia’s CTE clusters, Programs of Study and students enrolled, and characterizes them in relation to employment opportunities after high school, the need for postsecondary education and competencies essential to workplace success.

Cluster	No. of Students Enrolled	No. of POS	Program of Study Listing	Associated w/ High Priority Occupation	No. of Industry Certs. Offered	No. of Schools offering POS	Strong employment opportunities w/ a diploma	Requires post-secondary education to be successful	Competencies that must be present for success
Agricultural Science	342	4	Agr. Bus & Prod	No	2	1	Low wages in food processing; poor articulation with opportunities for veterinary technicians	Natural resource occupations; farm management	Stronger science and math
			Agr. Prod Workers & Managers	No					
			Agr. and Food Processing	Yes					
			Agr. Production Operations	No					
Business/Finance	441	2	Business Technology	Yes	8	4	Good wages and many opportunities	Not necessary for many entry-level positions	Strong budget and writing skills
			Business/Accounting, Finance	Yes					
Communications/ Graphic Arts	629	4	Graphic Communication	No	2	4	No	In most cases a Bachelor's degree	Logic and creative visual skills
			Graphic Design	No					
			Commercial Photography	No					
			Cinematography/Television & Radio	Yes					
Construction	723	9	Carpentry	Yes	5	6	Yes- barriers for entry exist because of union apprenticeship programs	Necessary for engineering and electromechanical occupations	Strong measurement skills, ability to read schematics
			Construction	Yes					
			Appliance Installation Repair/ Heating & Ventilation	Yes					
			Electrical Construction and Maintenance	Yes					
			Electromechanical Technology	Yes					
			Engineering Related Technology	Yes					
			Plumbing Technology	Yes					
			Welding Technology	Yes					

Cluster	No. of Students Enrolled	No. of POS	Program of Study Listing	Associated w/ High Priority Occupation	No. of Industry Certs. Offered	No. of Schools offering POS	Strong employment opportunities w/ a diploma	Requires post-secondary education to be successful	Competencies that must be present for success
Cosmetology/ Fashion Design	304	3	Cosmetology	No	2	2	With certification, but wages low	No	Budget and accounting
			Barbering	Yes					
			Fashion Design	No					
Health	537	3	Child Care	Yes	11	5	Jobs available with a diploma pay very poorly and do not offer advancement	Yes, a vocational or associates degree is necessary	Academic skills to succeed in post secondary education – lab techniques
			Health Information Management	Yes					
			Health Related Technology/Cert Nursing Asst	Yes					
Hospitality	707	2	Baking	Yes	1	6	Yes, but low wages	Some specialized training may improve career opportunities	Timeliness, good communication
			Culinary Arts	Yes					
Information Technology	259	2	Web/Multimedia Design	Yes	6	4	No	Yes, most occupations require a Bachelor's degree for career growth	Logic and math, good communication
			Computer Systems	Yes					
Law and Public Safety (new)	39	1	Criminal Justice	No	0	1	Yes- requires on-the-job training	No	Good communication skills; writing
Transportation	370	3	Automotive Collision Repair	No	8	4	Yes- requires on-the-job training	No	Measurement; math and organizational skills for logistics and warehousing

POS – Program of Study

Chart adapted from the Philadelphia Workforce Investment Board's "Research Brief: Career and Technical Education Programs in the Philadelphia School System"

Training for the Jobs of the Future. The WIB's report on CTE alignment notes the challenges of forecasting future growth in existing occupations, let alone for those that are just beginning to emerge or do not yet exist: The report states: "while formal data sources inform on trends of growth and decline in occupational opportunities, these data cannot predict emerging opportunities or sudden growth in established occupations." As a result, CTE, like most workforce development strategies, designs and constructs its program offerings based on the perceived realities of the recent past – on projections of what has been rather than what might be. Yet, accelerating technological innovation will surely create demands for an ever-expanding pool of skilled individuals who can step into these new positions – or for a pipeline that can deliver them in a timely manner. As a result, a focus on 21st century skills across the board is essential. These programs cannot possibly provide technical training for all the opportunities that might be available to students in the future, but they can focus on problem-solving, global awareness, literacy comprehension, interpersonal skills, etc. – skills that are transferrable across industries and that best position students for the unknown economy.

Based on its access to a wide variety of labor market trends and economic data, the Philadelphia WIB is well positioned to provide such information on emerging industries and rapid shifts in the demand for occupations because of new requirements for credentials, changes in the realm of workplace knowledge, or unexpected investment by government or private sector groups.

Ensuring Alignment Through Assessment. In order to further align programs with postsecondary employment opportunities, the School District of Philadelphia offers two assessment types for students engaged in CTE coursework: industry-related certification and end of course assessments. There are 45 CTE industry-related certifications (34 of which are state recognized) available to students across the School District.

In the 2007-08 school year, 5,313 students across the School District of Philadelphia were eligible to take any of these industry certification exams. Of those, 14% received certification. Of the 5,313 students, 1,850 were eligible in the 8 CTE schools where greater emphasis is placed on work preparation. Of those CTE school students, 29% received industry certification.

These certifications are not directly aligned to any specific program or curriculum, and are only considered to be "associated with" an industry cluster. They also vary in depth of knowledge and skill necessary to pass. As a result, the level of value added to a student's marketability is uncertain for each of the available certifications.

A second, more inclusive mode of assessment is the end of program assessments that measure a range of occupational competencies necessary to a particular occupation. The Bureau of Career and Technical Education in Pennsylvania requires the use of state approved tests, which, in Philadelphia's case, leaves the National Occupational Competency Testing Institute (NOCTI) the only option for nearly all available programs.

The 2007-2008 school year was the first in which the School District of Philadelphia mandated the use of the NOCTI for its graduating seniors in CTE Programs of Study. Of 48 programs tested citywide, only three had average student scores above state and national averages for the written portion, and 11 for performance. Reasons for this include late notice for teachers and students that resulted in a lack of alignment in local curricula and therefore student preparation was minimal.

Plans to improve upon this are being implemented this year including the scheduling of a “NOCTI Week” (April 20-24, 2009) in the CTE high schools where the schools will schedule time during the school day for students to take end of program assessments that are connected to their Program of Study. Questions remain as to how aligned the NOCTI is with occupational needs and standards, although it remains the only state approved assessment tool for nearly all of the programs in Philadelphia. Unfortunately, NOCTI is not an assessment that is recognized by regional employers, a fact that was revealed through employer focus groups conducted during this study. Further research should be conducted to determine the most industry relevant assessment tools available, including an in depth analysis of NOCTI, to ensure alignment with industry standards.

Summary

- CTE offerings that provide employment opportunities immediately after high school are typically characterized by low wages and little chance for career advancement.
- CTE offerings that align well with high-wage/high-demand occupations typically require significant education or training beyond the secondary level.
- Only one-quarter of CTE programs are directly aligned with state-identified High Priority Occupations.
- According to the Philadelphia Workforce Investment Board, two-thirds of CTE students will need postsecondary credentials for career success. These and other credentials that are integral to career success, such as industry certification, can potentially be obtained while still in high school.
- The WIB is positioned to make annual labor market projections that can help to guide and shape CTE occupation training programs.
- High quality assessment tools can be effective in the process of aligning programs and curricula to high-wage/high-demand occupations. More research must be conducted to determine the most effective assessment tools.

E. Connections Between Industry and CTE Programs of Study

The current structure for providing guidance, governance and industry support to CTE schools and programs in Philadelphia consists of Industry Advisory Boards and Occupational Advisory Committees. Both are overseen by the School District’s Office of High School Reform: College, Career and Technical Education Division.

The State Board of Education published final revisions to Chapter 4 in February, 2008. The Vocational-Technical Education section on advisory committees for area vocational technical schools (§33) requires the following three CTE committees for the District as a whole:

Local Advisory Committee: committee of business and industry representatives, public sector employees, agriculture, labor organizations, community organizations, postsecondary institutions and the general public that give advice to the board and the administration on the program of the school.

Administrative Committee: composed of chief school administrators.

