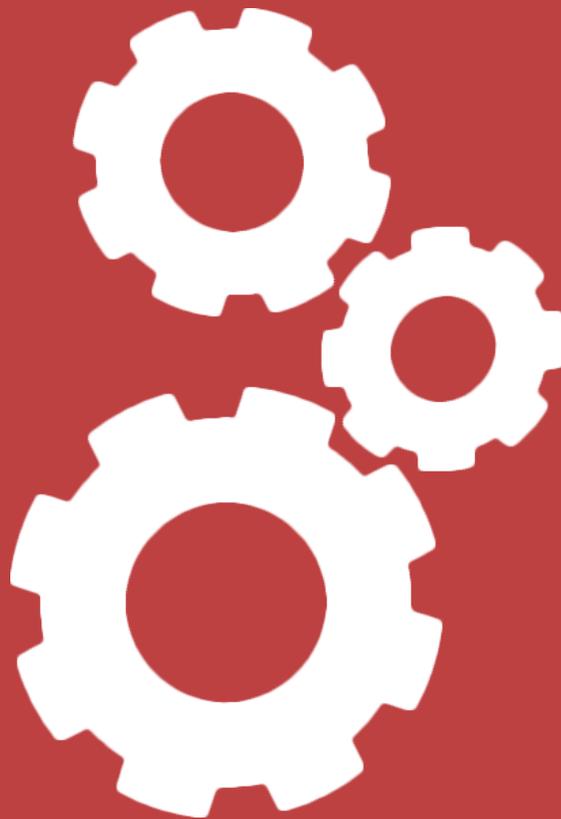


**INDICATOR 7:
CREATE AN EFFECTIVE SYSTEM OF CAREER
AND TECHNICAL EDUCATION AND TRAINING**



In the best systems, Career and Technical Education (CTE) attracts strong students, and, far from being perceived as a dead end alternative for students who are academically weak, it is seen as an attractive option for students who have what it takes to rise to very senior positions in the corporate world and other sectors. More often than not these systems enroll 40 percent or more of their high school class and postsecondary students. Indeed, systems that enroll fewer than 40 percent in CTE appear to be in danger of creating the perception that their CTE system is for students who are academically weak and whose prospects are poor. That perception is often self-fulfilling.

The top-performing countries typically begin offering students vocational education opportunities after they have completed a common program of academic study through age 15. These CTE programs are built on the assumption that the students entering them have mastered the core academic subjects at a high level.

What typically attracts students with strong academic backgrounds to CTE is the applied nature of the program, which many students prefer to what they perceive as boring and lacking in opportunities to assume responsibility in an adult world. These students prize the opportunity to combine work and learning in a setting in which the abstractions they master in the classroom can be applied within the hour in an authentic work setting, and they can gain the skills needed to be successful in that setting under the supervision of highly competent adults.

These top-performing systems offer applied learning either in real-work settings, or in simulated work experiences in schools, both with state-of-the-art equipment. In either case, instructors in CTE programs typically have had long tenure in industry and often continue to stay in touch with industry by rotating periodically through state-of-the-art workplaces. Programs of study for CTE students in top-performing systems are driven by industry in partnership with the education system and often labor unions. Whether through industry associations or organized by state government with industry and labor, the development of standards, assessments and certification for CTE programs of study are the responsibility of these groups.

Top performing CTE systems also work hard to insure that qualifications received by CTE students reflect state-of-the-art practice in an industry area and include the broad knowledge and skills, occupation-specific skills and employability skills needed for success in entry-level jobs across any given industry as well as prepare students to enter post-secondary education or training. Vocational qualifications go way beyond the traditional crafts and trades to include demanding technical careers in every major industry.

Top performing CTE systems are also designed to allow young people to move from vocational programs to post-secondary academic or technical programs and vice versa. In other words, these systems allow for mobility between types of education and training after students leave secondary school. They also provide a system with no dead-ends, in which students at any level of the system can go on for more education and training at even higher levels if they so choose. This feature is a particularly important factor in attracting ambitious students with strong academic backgrounds who might otherwise see CTE as limiting their opportunities.

These systems provide strong career advising for students, usually beginning in the early teen years and often extending into adulthood.



Results of strong CTE systems can be seen in youth unemployment rates and other indicators of success in post-secondary education such as low remedial rates and on-time graduation.

Whether the majority of expense is borne by employers or by the public, top performing CTE systems are expensive. The countries that choose to bear that expense usually do so because there is a strong consensus among the public that they want an economy that is based on broadly shared prosperity and do not wish to compete with other countries on the basis of low wages but instead on the basis of high skills. Countries in which there is no such consensus have a hard time raising the money needed to produce a workforce with strong technical skills at all levels of employment.

In the section that follows, we have benchmarked two of the world's strongest CTE systems, those of Switzerland and Singapore. The Swiss system is largely employer-based, with much of the instruction taking place at the employers' worksites. Singapore's system is largely school-based. Approximately 70 percent of Swiss students are in their CTE system. In Singapore, a similarly large fraction of students attend their Institutes of Technical Education and their polytechnics.

In addition to Singapore and Switzerland, two of the world's strongest CTE systems, we have also benchmarked the CTE systems in Finland and Ontario, as well as Massachusetts, New Jersey and New Hampshire, the jurisdictions to which we have compared Kentucky on the other building blocks. We chose to omit China in this indicator as the system does not yet meet many of the criteria for high performing CTE systems as we will describe them.

Global Top Performers:

Each of the jurisdictions is summarized below, with details provided on the extent to which:

- Training is available in a wide range of attractive careers
- Students are given authentic work-based learning and there are enough apprenticeship slots available to meet student demand
- Teachers are kept up-to-date on industry best practices
- Students receive career guidance and counseling
- Programs lead to industry-recognized qualifications
- Qualifications meet global standards and are reviewed and updated regularly
- Career and Technical Education is seen as a high quality pathway post-secondary pathway choices for CTE graduates

A chart of CTE programs of study for jurisdictions can be found at the end of this analysis.

Switzerland

Switzerland's CTE system is designed as a "dual" vocational education and training system where students combine learning in school with learning in the workplace. Most students choose the CTE pathway in upper secondary school, after completing a common program of study in the core academic subjects. CTE programs focus on building skills in broad career areas. Employer organizations and associations are highly involved in supporting and driving the system to ensure that the next generation of workers has the skills necessary to meet rigorous industry standards across numerous industries, from banking to healthcare to high-tech manufacturing. The system has a very strong reputation within Switzerland and attracts not only a majority of high school students, but students with very strong academic skills. Students are paid during their apprenticeships and with certifications in hand, have very strong career

prospects. Students in CTE programs in Switzerland are supported early in their education careers through a system of Career Centers run by industry associations and supported by state and municipal governments. Some industry associations, in partnership with education, labor and government also provide students with classes in broad industry knowledge and skills and core academics in Skills Centers that they run where students go when they are not in the workplace. Workplace learning is supervised by highly trained instructors who are company employees trained to work with young people and assess their progress.

Training Available in a Wide Range of Attractive Careers

The Switzerland CTE program prepares students for a wide range of white- and blue-collar occupations—high-tech, human service, health, as well as traditional trades and crafts.¹ The most popular choice is the commercial sector, which includes 21 areas of specialization including banking, retail, public administration, and some areas of IT.²

Authentic Work-Based Learning Experiences

Switzerland's CTE program offers the most extensive work-based learning experience for its students, with students spending three to four years in an apprenticeship. Well-respected global employers, such as Credit Suisse, ABB and Swisscom, provide paid apprenticeships to students, with students doing real entry-level work under the guidance of credentialed trainers within the company.³ Employers ensure there are enough apprenticeship slots for all students who want them. Employers pay a below-market wage rate, with students earning an average monthly wage of \$600 to \$700, rising to around \$1,100 to \$1,200 by the time they are in their third year.⁴

Teachers Kept Up-to-Date with Industry Best Practices

The Swiss Federal Institute for Vocational Education and Training offers training courses leading to a federal certificate for people who work in industry and wish to teach part-time in a CTE school at upper secondary level. Entry requirements for the training course include a higher education degree in the relevant field and at least six months of work experience in the field. Firms need to meet quality standards to be licensed to take apprentices. To acquire a license, companies must meet technical and staff criteria and demonstrate that the content of the training meets the needs of the occupation.⁵

Students Receive Career Guidance and Counseling

In Switzerland, students in vocational programs are responsible for finding their own apprenticeship that includes signing a three-to-four year apprenticeship contract. Local career guidance centers (not school-based) help students prepare to make that decision and to learn about the labor market during their search. These community-based career centers are specially organized and staffed to help young people interested in pursuing vocational pathways transition from grade 9 (the end of compulsory schooling at around age 16) into a Federal VET Diploma Program, directly into a two-year apprenticeship, or into a 10th grade transition year for those who are not ready. Students can access interest inventories, get help with resume writing and portfolio development, and sample prospective apprenticeship sites.⁶

Programs Lead to Industry Qualifications

In Switzerland, each industry sector, in partnership with the State Secretariat for Education, Research, and Innovation (SERI), develops qualifications and assessments for the industry, establishes curriculum, and provides, through their affiliated training companies, varying amounts of course work during the three- or four-year upper secondary vocational education program. Each occupational area has a qualification that

is attained through a final assessment, and is standardized across the country. Students who complete the CTE program earn a nationally recognized qualification that is portable, and the opportunity to move directly into full-time employment or to continue on to additional education or training.⁷

Qualifications Meet Global Standards and Are Reviewed on a Regular Basis

In Switzerland, employers take the lead in determining when new occupational programs need to be developed in response to changes in the economy. Similarly, they determine when existing programs need to be revised and/or discontinued. The level of support from businesses is impressive. The employer community—the association and the member companies that employ apprentices—contribute about 60 percent of the total cost of the CTE system.⁸

CTE Seen as a High-Quality Pathway with Post-Secondary Pathway Choices for CTE Graduates

CTE is the mainstream upper secondary program, serving 70 percent of Swiss students.⁹ The Federal Vocational Baccalaureate (FVB) allows a student to enroll in a Swiss university of applied sciences (UAS) without taking an entrance examination. In 2013, 14 percent of VET graduates also obtained an FVB, giving some indication of how many CTE graduates might enroll in university.¹⁰ An OECD report notes that vocational school graduates have a lower unemployment rate (3.1 percent) than those with a general education (5.1 percent).¹¹

Singapore

Singapore is notable for its success in “rebranding” vocational education from a low status pathway to a valued and respected option for students. After compulsory education ends at around age 15, approximately 40 percent of students enroll in one of the five polytechnics and another 25 percent enroll at the Institute of Technical Education (ITE). Because learning takes place on the campus (rather than in an actual worksite), the government ensures that the institutions have the most up-to-date equipment, highly trained faculty, and strong connections to the business community. The practical, hands-on training and the involvement of Singapore employers working in partnership with educators to design programs of study and evaluate students, ensures that students are ready to meet industry standards in a wide variety of industries including Singapore’s growing IT sector, business consulting, finance and distribution industries. Despite the strength of its system, Singapore has recently created the SkillsFuture Council, a new national task force of government officials and business leaders, to develop plans to create work-based learning opportunities in companies (apprenticeships) for polytechnic and ITE students and expand participation in vocational training for the current workforce. This is based on the recommendations of the ASPIRE (Applied Study in Polytechnics and ITE Review) Committee released in 2014.

Training Available in a Wide Range of Attractive Careers

Singapore’s CTE system is a key part of the country’s economic development strategy. Seats in each program at the Institute of Technical Education (ITE) are based on projections of the country’s job openings by occupation and the identification of sectors in which Singapore wants to have a strong industrial presence. As of January 2013, there were 102 programs in the ITE, divided into 11 sectors.¹²

Authentic Work-Based Learning Experiences

While Singapore’s system is school-based, government works in concert with industry to insure that school-based experiences simulate the work environment as closely as possible and employers participate in the development of standards, curriculum and assessments in partnership with the vocational





institutions. The Institute of Technical Education (ITE) partners closely with large global companies, including Cisco, Hewlett Packard, Rolls Royce, Siemens, etc. Employers provide state-of-the-art equipment for instruction so students train in a supportive environment while still being presented with real-world challenges. Every student in the polytechnics is required to do an internship of two to six months and complete a project with a deliverable for the employer. Students receive a small allowance during this work period.¹³ The government is working to implement the ASPIRE Committee's recommendation of introducing place-and-train (apprenticeship) programs to allow polytechnic and ITE graduates to work and deepen their skills at the same time. Students will be matched to progressive employers committed to supporting on-the-job learning and further upgrading. The government intends to offer monetary incentives to encourage employer participation. The curricula will be designed in consultation with industry to ensure relevance. The ASPIRE Committee recommends that graduates be employed by the companies and paid monthly salaries as employees. Structured on-the-job training at the workplace will be paired with classes at the polytechnics or ITE.¹⁴

Teachers Kept Up-to-Date with Industry Best Practices

Singapore's Institute of Technical Education's human resource policy requires consistent and continual training and development. The ITE colleges require staff to go back to industry for a relevant assignment for a minimum of three months. A new Total System Capability Scheme was instituted in 2007, targeting 85 percent of the faculty to remain up-to-date in their industry by demonstrating ability to "Do or Lead" in consultancy or industry projects. Those who do not do this are not eligible for promotion.¹⁵ As of 2012, 88 percent of ITE staff have met this goal.¹⁶

Students Receive Career Guidance and Counseling

Singapore is currently developing a plan to improve the alignment between ITE offerings and industry needs, including coordinating and improving education and career guidance systems. Each polytechnic and ITE college will have six counselors on staff. For every five secondary school/junior college/centralized institute students, there will be one assigned counselor.¹⁷ Counselors will undergo extensive training to provide them with a realistic understanding of the economy. The training will include information from Singapore's Economic Development Board on job projections. Employers will be involved, making videos and hosting student visits. Students from polytechnics and ITE will receive more systematic career counseling, receiving 40-60 hours across two years for ITE students and three years for polytechnic students starting in 2015. The content will focus on helping students to develop skills to make career choices and transition into the workplace. The curriculum will also include out-of-classroom activities, including industry immersion programs, talks, workshops, and individual and group career guidance sessions.¹⁸ The goal is to provide seamless education and career guidance across an individual's entire life, taking into account his/her strengths, interests, skills, and the available education and career options.

Programs Lead to Industry Qualifications

In Singapore, the employer community is deeply involved in advising the various CTE institutions and programs, in setting occupational standards, and in assessing candidates for diplomas.¹⁹ Members of the business community sit on the Board of the ITEs and Polytechnics and participate in developing programs of study. One of the recommendations of the ASPIRE Committee was to develop sector-specific skills frameworks and career progression pathways in collaboration with industry to support student progression based on industry-relevant skills.

Qualifications Meet Global Standards and Are Reviewed on a Regular Basis

Singapore has the most robust system linking its CTE system to larger economic development goals. Every year the Ministries of Manpower and Education, the economic development agencies, and the post-secondary institutions come together to discuss the manpower needs for the economy in the coming years. The discussion influences the programs and courses to be offered by polytechnics and the Institutes of Technical Education (ITE). Both the polytechnics and the ITEs have a robust curriculum development and review process to ensure that they meet industry standards. Their Academic Advisory Committees include industry leaders and professionals who advise them on trends and developments in the industry sector.²⁰ For example, the ITE training has shifted from a manufacturing focus to a greater emphasis on training for the services sector in the last ten years. This is in line with the government's economic policies and manpower projections. Skill standards developed in 2005 include communications technology, product design and tourism.²¹

CTE Seen as a High-Quality Pathway with Post-Secondary Pathway Choices for CTE Graduates

After compulsory education, students at approximately 16 or 17 years of age can choose to go to junior college (academic) for 2-3 years, a polytechnic for 3 years of industry-oriented education, or the Institute of Technical Education (ITE) for 1-2 years leading to a National ITE Certificate. About 40 percent of students choose to enroll in one of the five polytechnics. Another 25 percent, typically those who do not perform as well, go to the ITE. Therefore, a total of about 65 percent pursue some form of CTE.²² In 2010, an independent survey of Singaporeans found that 69 percent viewed ITE favorably.²³ As of 2014, 87 percent of ITE graduates are hired in their fields within six months of graduation, leading more students to see vocational education as a strong choice for future success. Within ten years of leaving the Institute of Technical Education, about half of graduates will go back to school, most of them to the polytechnics for a diploma. And a significant fraction of polytechnic graduates will go on to university, either right after they get their diploma or later on.²⁴

Finland

Vocational education in Finland begins in upper secondary school after students have succeeded in completing a rigorous, common program of study in the core academic subjects. These programs typically last for three years and are full-time programs of study, requiring six months of on-the-job learning during the three-year period. CTE offerings are defined by national qualification requirements defined by the Finnish National Board of Education in cooperation with employers and unions so as to align with the country's economic and labor market needs.²⁵ Students leave the program with extensive basic skills in their field and a specialization in one particular area. Students then have the option of entering a polytechnic college or moving directly into university.

Training Available in a Wide Range of Attractive Careers

In Finland, the vocational curricula are defined by national qualification requirements developed by the Finnish National Board of Education. They are created in partnership with employer organizations and trade unions. CTE is organized into eight different fields: humanities and education; culture; social science, business and administration; natural sciences; technology, communication and transport; natural resources and the environment; social services, health and sport; and tourism, catering and domestic services. There are specializations leading to about 120 study programs in total.²⁶



Authentic Work-Based Learning Experiences

In Finland, vocational upper secondary education is a three-year program that includes at least half a year of on-the-job learning in the workplace. Students do not get paid. The objective is to give students the opportunity to apply learning in practice.²⁷ It is unclear if there are enough apprenticeship slots for all students who want them. Finland does have a comprehensive Youth Guarantee Scheme. A Eurofund evaluation found that, in 2011, 83.5 percent of young job seekers received a successful offer within 3 months of registering as unemployed.²⁸ The Finnish scheme has led to personalized plans for young people being drawn up more quickly, ultimately lowering unemployment.

Teachers Kept Up-to-Date with Industry Best Practices

Finland is known for its high quality teaching pool. Teachers of vocational subjects are required to have an appropriate Master's degree or a polytechnic degree (or the highest possible qualification in their occupational field) plus three years of work experience in the field. Vocational teachers are trained in pedagogy and teaching practice at five vocational teacher education colleges and one Swedish-speaking university. This training is provided free of charge for students. Vocational teachers are also required to participate in continuing training each year (usually up to 5 hours per school year) to keep their classroom competencies up-to-date. In addition, many teachers take part in on-the-job learning periods.²⁹ Alongside teachers, there are workplace instructors who supervise students during on-the-job learning periods. These are generally experienced foremen and skilled workers who guide students and assess their vocational skills.³⁰

Students Receive Career Guidance and Counseling

Career guidance in Finland begins during the first two weeks of high school. Students spend these two weeks developing their academic and career goals and planning accordingly. When students enter the vocational track in upper secondary school, they take at least 1.5 credits of guidance counseling to help students navigate education and training options, occupations, and the world of work.³¹ Each student develops an individual study plan that documents progress in their studies, along with an assessment of learning, identification and recognition of student competencies, on-the-job learning experiences, and vocational skills demonstrations.

Programs Lead to Industry Qualifications

The Finnish CTE system is based on a vocational qualifications framework developed in cooperation with employers. Assessments are built into the vocational education experience to ensure that by the end of the three-year program students who are successful earn industry-recognized credentials.³²

Qualifications Meet Global Standards and Are Reviewed on a Regular Basis The Finnish National Board of Education developed the qualification requirements for vocational qualifications in partnership with employers in 2008–2010. The Qualification Requirements for different qualifications are reformed on the average every 5 to 10 years, but they can be renewed when necessary, either partially or completely. The cycle of revision and updating is influenced by changes to the qualifications structure and legislation, changes in the relevant occupations and changing needs in the world of work.³³

CTE Seen as a High-Quality Pathway with Post-Secondary Pathway Choices for CTE Graduates

Finnish students are drawn to CTE pathways because they offer both theoretical and applied learning along with the opportunity to continue higher education after receiving a professional qualification. After compulsory education ends at approximately age 16, 42 percent of Finland's high school students

transition to vocational upper-secondary programs compared to 50 percent who transition to general upper-secondary education.³⁴ The majority of VET providers offer both upper secondary VET and further vocational training.³⁵ In 2013, 68 percent of students who received an upper secondary vocational qualification were employed one year after graduation.³⁶

Ontario

In Canada, vocational education is offered at both the secondary and post-secondary levels. At the secondary level, courses are offered starting as early as grade 11 either alongside academic courses in a comprehensive high school or, occasionally, in separate vocational schools, depending on the province. Students in Ontario's secondary schools can participate in "Specialist High Skills Majors" (SHSM), which are programs of eight to ten classes available in 18 industry or trade fields, including aviation, energy, transportation, hospitality and tourism, and health and wellness. Students completing these CTE courses in a high skills major graduate from high school with both a high school diploma and industry certification and can then enter the workforce, a post-secondary program to expand and enhance their skills, or an apprenticeship in their occupational area or trade. These programs have been very popular; the Ontario Ministry of Education credits them with raising the high school graduation rate from 68 percent in 2003-2004 to 82 percent in 2012-2013.³⁷

Training Available in a Wide Range of Attractive Careers

While employers are engaged as partners, they are not driving the system the same way as in Switzerland, Singapore and Finland. In Ontario, the 19 selected career areas are the industries deemed to be in demand by the Ministry of Education.³⁸ The career certifications and curricula were developed in consultation with employer, industry, and union representatives from each sector.³⁹ The SHSM frameworks are designed to ensure that students have opportunities to pursue work, apprenticeship, college and university. Post-secondary institutions and business leaders provide input into the content of the frameworks.⁴⁰

Authentic Work-Based Learning Experiences

Ontario's SHSM program requires that students complete a minimum of two credits (total of 220 hours) in cooperative education in a work-based setting. Placements vary in length, but tend to be short-term experiences.⁴¹ It appears that cooperative learning slots are often limited and depend on a school's ability to find employer partners.

Teachers Kept Up-to-Date with Industry Best Practices

Typically SHSM major credit teachers are already teaching in the school and have a special interest or expertise in delivering CTE instruction. There is no minimum requirement specified but teacher expertise is a factor taken into account by the Ministry of Education when approving SHSM programs. However, in a number of the sectors that have the major credits aligned with Technological Education, teachers are required to have industry experience. In the SHSM funding formula, there is funding specifically aimed at providing resources for professional development, allowing teaching to stay current with industry requirements.⁴²

Students Receive Career Guidance and Counseling

In Ontario, the SHSM program incorporates career exploration activities, allowing students to explore career options through worksite tours, career conferences or competitions, simulation activities, and contact with a career mentor. Students are also required to have "Reach Ahead Experiences" to help them



make informed choices about future careers. This can include interviewing an employee in the field of work they are considering, visiting an approved apprenticeship delivery site, or attending a college or university class in their area of interest.⁴³

Programs Lead to Industry Qualifications

In Ontario, students graduating from the SHSM program receive both a high school diploma and industry certification. However, industry certifications are rather limited, often covering only first aid, CPR and other safety qualifications that can give students an advantage when entering the workplace. They do not fully qualify students to begin work in a technical field, but rather give an indication that a student has been exposed to a particular career area. Students receive a Red Seal on their Ontario Secondary School Diploma when they complete a specific set of 8 to 10 courses in their selected field of vocational study.⁴⁴

Qualifications Meet Global Standards and Are Reviewed on a Regular Basis

The Ontario College of Trades has the mandate and powers to regulate all approved trades in Ontario, including setting standards for training and certification and identifying the competencies that must be demonstrated. In August 2014, the Ontario Ministry of Training, Colleges and Universities announced that all 45 publicly assisted colleges and universities signed agreements to ensure that their programs are linked to the economic needs of local and global employers and that the programs are coordinated across the province. Ontario will periodically survey programs to ensure that the range of economic needs in the province are met.⁴⁵

CTE Seen as a High-Quality Pathway with Post-Secondary Pathway Choices for CTE Graduates

The SHSM program has grown rapidly since its introduction in the 2006-07 school year. In the 2014-15 school year, there are 1,608 SHSM programs with 42,000 students enrolled in programs in over 660 schools (more than 75 percent of all secondary schools in the province.) This represents approximately 12 percent of all grade 11 and 12 students, although in some school board districts, the percentage is as high as 40 percent.⁴⁶ A 2011 survey showed that within six months of graduating from high school 64 percent of SHSM students were pursuing a postsecondary program: 31 percent in university, 27 percent in college, and 6 percent in an apprenticeship/pre-apprenticeship.⁴⁷

Top Performing States:

In the United States, at the high school level, CTE typically is seen as a path for those students who are not going on to college and who struggle with academic work. In U.S. states, CTE is often separate from academic learning where students in that track attend regional vocational high schools, some having more interaction with industry than others. Vocational courses can begin as early as the first year in high school. Students entering these courses can come into vocational programs having taken not only different core academic courses, but different levels of challenge within the core academic sequence. Limited career guidance is available, with many states reporting the ratio of counselors to students as high as 1:600. Many CTE high school programs are focused on the traditional crafts and trades such as auto mechanics and hairdressing. However, pockets of excellence can be found across the United States. The movement in high schools, driven at the federal level, to identify 16 career clusters that cover the U.S. economy, and the introduction of the Common Core State Standards, has led a number of states to revamp their CTE systems at the high school level, often focusing on certain fields that the state believes are important engines of the regional economy. Other states have built career academies that combine



academic and occupational studies and some work-based learning. On the whole, students in U.S. high schools who are taking vocational courses do not have the opportunity to experience in-depth, work-based learning in their field of study prior to graduation. Comprehensive high schools that offer vocational courses often have a difficult time procuring state-of-the-art equipment as well as struggle to recruit teachers with up-to-date experience in the occupational area.

In the United States, the Carl D. Perkins Career and Technical Education Act (known as Perkins) provides almost \$1.3 billion in federal support for CTE programs in all 50 states. The 2006 reauthorization of the legislation included revisions such as requiring “programs of study” that link academic and technical content across secondary and postsecondary education and strengthening local accountability provisions to ensure continuous program improvement.

In this section, we highlight features of the CTE systems in the benchmark states, Massachusetts, New Hampshire and New Jersey, and details on the extent to which:

- Training is available in a wide range of attractive careers
- Students are given authentic work-based learning experiences and if there are enough apprenticeship slots for students who want them
- Teachers are kept up-to-date on industry best practices
- Students receive career guidance and counseling
- Programs lead to industry qualifications
- Qualifications meet global standards and are reviewed/updated regularly
- CTE is seen as a high quality pathway with post-secondary pathway choices for CTE graduates

As background, Massachusetts, New Hampshire and New Jersey’s CTE systems are all organized around regional vocational-technical school districts. Massachusetts is unique in that the state has created specific laws, regulations, and guidelines pertaining to the structure, delivery and requirements for vocational education, which falls under MGL Chapter 74 Law. Therefore, there are state-approved programs known as “Chapter 74” programs as well as Perkins supported programs. Perkins programs must meet specific criteria but are not automatically considered Chapter 74 programs as they have not been formally approved with an on-site review of the facilities, equipment, and program of study by the Department of Education’s Office for Career/Vocational Technical Education.

Training Available in a Wide Range of Attractive Careers

The benchmark states use the 16 National Career Clusters as a starting point or conceptual framework for organizing their CTE programs at the high school level. These Career Clusters were designed to cover the entire world of work, however they are quite broad and each state offers different programs within each career cluster, some very narrow related to particular jobs and others in an occupational area. In general, too many programs in Kentucky and the benchmark states are not putting students on a pathway to high-skill, high-wage careers. For example, programs under the Manufacturing cluster often include Woodworking, Machine Shop Technology/Assistant, and Welding Technology/Welder. Human Services may just be limited to Cosmetology. Not all career cluster areas have offerings. In some cases, industry certification is the goal for students, in other cases, education institutions certify completers’ knowledge and skills.

In both Massachusetts and New Jersey demand for CTE slots exceeds space available.

Authentic Work-Based Learning Experiences

In general, in the U.S., CTE programs do not have enough employer partners to provide apprenticeship or significant work-based learning experiences for all students.

While Massachusetts does not require work-based learning experiences, some students do participate in cooperative education during their junior year of high school. Students are paid wages while accruing high school credit on a worksite related to their technical program in lieu of participating in their technical classes in a school setting. The amount of time spent in work-based learning varies, ranging from 40 hours to 125 hours or more, depending on the program. In 2014, 2,490 students participated in cooperative education, up from 1,359 in 2009. Other forms of work-based learning include job shadowing, internships, or community-based learning projects.⁴⁸

In New Jersey, CTE programs must include at least one Structured Learning Experience (SLE). SLEs may be paid or unpaid. They can include community service, internships, job shadowing, volunteering, cooperative education, or working in a school-based enterprise. As an example of one of the more intensive programs, the Monmouth County Vocational School District’s Academy of Allied Health and Science curriculum includes a rotation at a local hospital for students in the 10th grade, leading to an eight-week internship for students in their senior year.⁴⁹

Teachers Kept Up-to-Date with Industry Best Practices

	Initial Licensure Requirements for Vocational Education Teachers	Professional Development Requirements for Vocational Education Teachers
KY	Varies by career program area. Can be traditional teacher preparation or certification through the occupational-based process.	24 hours of professional learning annually. Schools are encouraged to use 12 of those hours to upgrade CTE professional expertise. This may include internships that provide relevant business experience.
MA	Industry licensure and 7 years experience in industry	Accrue 150 professional development points in their primary licensure field during a five-year period including: <ul style="list-style-type: none"> • 10 points in subject matter knowledge and skills; • 10 points in pedagogy; • 10 points in academic and technical integration; and • 10 points in safety and health. Maintain industry licensure.
NH	Bachelor’s degree in a CTE-related program (work experience can be substituted)	Districts responsible for preparing five-year professional development master plan that focuses on the development and implementation of the Career Pathway Plans of Study, including academic and technical integration.
NJ	Teacher education degree and a concentration in the appropriate occupational area (alternative route applicants can use employment experience)	Alternative route vocational candidates are given a Certificate of Eligibility. They then need a recommendation from their school district after two-year period to be given a permanent CTE certificate (no professional development requirements).

Each state varies in its initial licensing requirements for vocational education teachers. Some states require just basic teacher licensing, others require a degree in the occupational field that they will teach, and some require industry experience. The requirements may also vary depending on the career cluster program area.

In all states, Perkins funds can be used to help teachers stay current with all aspects of an industry and can involve internship programs that provide relevant business experience. Any professional development requirements for CTE instructors in the benchmark states appear to focus mostly on academic and technical integration more than direct experience in a worksite with the intent of staying up-to-date on industry best practices. Kentucky is an exception, encouraging its teachers to maintain relevant business experience.

Students Receive Career Guidance and Counseling

Massachusetts has the most comprehensive career guidance structure of the benchmark states we reviewed. All Chapter 74 CTE programs require students to complete a Career Plan—a comprehensive, formalized written plan that relates learning to career goals. The Plan takes into consideration both formal and informal assessment and includes areas in which a learner needs to increase knowledge and skills to reach documented goals. The Department of Elementary and Secondary Education recently released the Massachusetts Guide for Implementing Individual Learning Plans (ILP). The ILP is a student directed, multi-year, dynamic tool that maps academic plans, personal/social growth, and career development activities while taking into account the student's unique, self-defined interests, needs, and goals for the attainment of postsecondary success. The ILP is suggested to begin in the middle school and continue through high school. And the ILP, though driven by the student, is created with guidance from a school mentor (not necessarily a guidance counselor) and shared with family and other stakeholders. When used as planned, the ILP and the Career Plan are revisited throughout the year.

Massachusetts also has developed a curriculum to guide career planning called the MA Model for Comprehensive School Counseling (The Model). The Model offers a framework for the development and implementation of school counseling programs that promote student success in academic and technical, workplace readiness, and personal social domains. The Model was designed to ensure that students receive the guidance, supports and interventions necessary for post-secondary success.

Additionally, schools with five or more Chapter 74 programs are required (and some other schools choose) to enroll students in a Career Exploratory program. Exploratory programs, typically offered in the first year of high school, allow students to experience different occupational fields before they select their preferred areas of concentration. Students spend a half-year in Exploratory, rotating through all of the programs a school offers or a subset of programs, depending on the Exploratory model the school has developed. The most recent data available indicates that 14,124 CTE students out of a total of 52,865, or nearly 25 percent of all CTE students, participated in Exploratory programs in 2014.⁵⁰

Programs Lead to Industry Qualifications

At the high school level in the benchmark states, most high school students in CTE programs work towards developing competencies in their chosen career cluster. Some are issued industry certification, but others earn a state-approved certificate that attests to their mastery of these competencies. It is more common for students to earn industry-recognized credentials at the post-secondary level. The high school



data reported below addresses Technical Skill Attainment (a Perkins indicator) where students take and pass technical assessments aligned with industry (which includes industry certification exams, but also other exams that may be developed by the state with industry input.)

	Percent of High School CTE Students Earning an Industry-Recognized Credential	Percent of Post-Secondary CTE Students Earning an Industry-Recognized Credential
KY ⁵¹	60% of senior CTE concentrators passed the technical assessment tests.	91%
MA ⁵²	82% earned a state-recognized Chapter 74 certificate or another industry-recognized credential.	55%
NH ⁵³	13% successfully completed all technical skill competencies assessments that are aligned with industry-recognized standards.	96%
NJ ⁵⁴	84% completed the CTE program and passed the available and applicable third party, industry-aligned end of program assessments that are aligned with industry-recognized standards.	100%

Qualifications Meet Global Standards and are Reviewed on a Regular Basis

Typically in the U.S., educational institutions determine available pathways to credentials, with varying levels of input from employers and industry groups. The review and revision process is often ad hoc without a clear timeline or method for updating standards to meet current industry needs.

None of the benchmarked states have a regular schedule for updating industry-recognized credentials. Each state indicates that employer representatives participate on advisory committees and that they validate frameworks and credentials, but details are not always readily available on how this is done and with what frequency. Massachusetts recently convened teams of technical and academic teachers to update the Vocational Education Frameworks. Part of that process involved evaluating the value of credentials on the current list and identifying new credentials attainable by secondary students. The validation process for the revised frameworks and the identified credentials included review and comments from nearly 700 program advisory committee members, including industry and post-secondary representatives, from across the state.⁵⁵

CTE Seen as a High-Quality Pathway with Post-Secondary Pathway Choices for CTE Graduates

While the percentages of students enrolling in CTE programs in the benchmark states are comparable or higher than the U.S. average of 19 percent of public high school graduates who were CTE concentrators⁵⁶, they do not compare with the highest performing international systems, which attract sometimes half or more of the student population. However, New Jersey reports that demand for CTE seats exceeds space available at most schools. County-based vocational-technical school career academies have long been recognized as among the highest performing high schools in New Jersey.⁵⁷ These students outperform their peers on the High School Proficiency Assessment in both mathematics and English Language Arts. Economically disadvantaged and special needs students who enroll in a New Jersey CTE program often show the most significant gains.⁵⁸



Kentucky's System:

CTE is delivered both in comprehensive high schools and in shared-time technical centers. The state currently has 95 state and local technical centers. Kentucky has recently taken a number of steps to strengthen its CTE system. Senate Bill 38, passed in 2012, requires the Kentucky Department of Education to issue core content standards for CTE, assess student progress and develop new courses relevant to college and career readiness. House Bill 207, signed in 2013, unites what had been two separate state CTE systems under the purview of the Kentucky Department of Education with the goal of creating a more relevant and efficient system to educate and prepare students for the world of work.⁵⁹

Wide Range of Attractive Careers

Kentucky organizes its 27 CTE programs around 11 broad program areas: Agriculture, Architecture and Construction, Arts and Humanities, Business and Marketing, Engineering and Technology, Family and Consumer Sciences, Health Science, Information Technology, Manufacturing Technology, Transportation, and Media Arts.⁶⁰ Within each broad career theme, there are specific program areas that typically focus on relatively narrow job skills. For example, choices under the Architecture and Construction Education heading include:

- Air Conditioning
- Building and Apartment Maintenance
- Carpentry
- Electricity
- Masonry
- Plumbing

The CTE career pathways are partially aligned with Kentucky's sector strategies initiative of 2011 that identified areas of workforce growth specific to Kentucky. The five priority areas are: 1) automobile and aircraft manufacturing; 2) transportation, distribution and logistics; 3) business services and research and development; 4) health care/social assistance; and 5) energy creation/transmission.⁶¹ According to a Southern Regional Education Board (SREB) analysis, the current career pathway programs of study available at the state's CTE centers do not fully align with the high-skill, high-wage, high-demand jobs in these five targeted industry sectors. The analysis concludes that there are an inadequate number of programs focused on broad-based manufacturing, transportation, logistics and distribution, and renewable energy.

When the State Workforce Investment Board next reviews the sectors, a representative from the Office of Career Technical Education will be part of the steering committee.⁶² Additionally, the Office of Career Technical Education is currently exploring a process by which the local Workforce Investment Boards will assist in CTE program assessment, development, and deployment.⁶³

The breadth and depth of qualifications offered in each career path varies widely, with some programs focused on a single specific job and others covering a broader swath of occupations within an industry area. In some cases, students are earning company-specific credentials, such as CISCO or A+ networking. The SREB analysis noted this too, commenting that in the case of manufacturing, current CTE programs tend to focus on narrow occupations (e.g., welding, computer-aided drafting, etc.) rather than broad based skills that would allow students to pursue various education and training pathways.⁶⁴

Another recent analysis of Kentucky's CTE funding notes that requests for expanding pathways and initiating new programs currently exceed state funding amounts for these programs. One recommendation was to reduce the total number of pathways and to focus on state-specified priority career areas.⁶⁵

Authentic Work-Based Learning Experiences

According to the KY Career Pathways bill of 2012, CTE programs should give students the opportunity to learn in integrated school- and work-based environments. Work-based learning can be implemented through various forms, including job shadowing, mentoring, internships, practicums, school-based enterprises, cooperative education, and apprenticeships.⁶⁶

Cooperative education is one work-based learning option. It requires students to spend a minimum of 10 hours per week in a salaried position relating to a student's career goals as identified in his or her individual learning plan. There are no data on the number of students participating in this or other work-based learning experience options.⁶⁷

A recent analysis on Kentucky's CTE system notes that the state has not provided additional funding to schools to purchase or update CTE equipment in several years. The report notes that an additional allocation of \$3.5 million is needed to maintain or update those resources. Most CTE teachers and administrators surveyed across the state felt that "basic needs for equipment, classroom materials, supplies and other resources are limiting students' opportunities to practice their skills and restricting the state's ability to reach its goals."⁶⁸

It is important to note that work experience programs, while useful, do not typically involve the employer taking responsibility for helping the student to acquire specific skills detailed in an industry-developed qualification. They are thus no substitute for systems of the kind that Singapore and Switzerland have embraced in which either the education system or the employers or both assume full responsibility for providing the experiences and the supervision needed by the student to become fully competent in a job leading to a rewarding career.

Kentucky does have career academies that offer simulated work environments to students in different occupational areas. One example of a career academy that provides authentic work-based learning is the Elkhorn Crossing School in Scott County where students can focus on Media Arts, Biomedical Sciences, Pre-Engineering, Health Services or Law and Justice. Simulated work-based learning goes hand-in-hand with rigorous academic studies in the core subjects at Elkhorn Crossing. Another strong program is the Kentucky Federation for Advanced Manufacturing (Kentucky FAME), a highly regarded partnership of regional manufacturers offering apprenticeship-style training.

Teachers Kept Up-to-Date with Industry Best Practices

The teacher certification process for CTE varies by program. A few programs require teachers to complete a traditional teacher preparation program. Other program areas allow teachers to be certified through the occupational-based process, which requires teachers to have work experience in the related area in order to be granted a one-year teaching certificate. During their first year of teaching, these teachers are required to complete training in order to receive a five-year certificate through the Educational Professional Standards Board.



All teachers are required to participate in 24 hours of professional learning annually. CTE teachers are encouraged to use this time to acquire up-to-date industry practices. The Kentucky Department of Education Office of Career and Technical Education allots a portion of federal Perkins dollars each year for state-level teacher professional development. For example, the Office coordinates annual technical upgrade training sessions for all CTE teachers.⁶⁹ Perkins funds can be used to help teachers stay current with all aspects of an industry and can involve internship programs that provide relevant business experience.

Students Receive Career Guidance and Counseling

Kentucky has a program of study dedicated to providing a continuum of career education experiences for all middle and high school students. “Pathway to Careers” courses include Career Choices in middle school, which introduces students to a broad range of career opportunities. All students are required to create an Individual Learning Plan (ILP) in the sixth grade. The ILP is updated annually. It provides many resources for exploring careers and educational pathways.⁷⁰ For secondary students, Career Options and Career Networking give students job search skills and focuses on exploration in the 14 career clusters. This coursework helps students to select a career pathway by the end of grade 10 and participation may count towards credit in some of the career pathway options. It is suggested, but not required, that teachers teaching career education courses have some career externship experience in business and industry.⁷¹

There is no mandate for career guidance in Kentucky schools. A Kentucky official notes that the majority of guidance counselors in schools have not been properly trained or certified to provide career guidance.⁷²

Programs Lead to Industry Qualifications

Students who are enrolled in or have completed three courses within a career pathway in Kentucky take the Kentucky’s Occupational Skills Standards Assessment (KOSSA) to determine career readiness. Students who pass a KOSSA test (score a 70 percent or above) receive a KOSSA certificate. The certificate is endorsed by the related business and industry groups. Many of the KOSSA certificates contain seals from Kentucky businesses that endorse the certificates (for example, UPS endorses a marketing certificate).⁷³

Industry certification is a component of the state’s accountability system. A recent report by the Southern Regional Education Board (SREB) recommended that as the state continues to identify and implement rigorous industry certification examinations, the KOSSA should be phased out in areas in which industry certifications exist.⁷⁴

Kentucky also has been piloting the Tech Ready Apprentices for Careers in Kentucky (TRACK) program. This is an industry-driven program to create a pipeline for students to enter post-secondary apprenticeship training. All student participants in the pilot advanced manufacturing program moved into full-time apprenticeships with their industry partners.⁷⁵

Recently SREB highlighted Kentucky’s Advanced Manufacturing Technician program, originally developed by Toyota in partnership with the Kentucky Community & Technical College System. It prepares high school students with the academic, technical and workplace skills necessary to succeed in advanced manufacturing careers. The program offers work-based learning experiences in a manufacturing

environment. Students learn about safety and lean manufacturing and acquire problem-solving and communication skills. After high school, students finish an associate degree in five semesters while earning up to \$40,000 each year. Community college students in the program work three days a week for Toyota and spend two days engaged in intensive related studies. Those who complete the program are hired at starting salaries of at least \$60,000 a year and can continue their studies at the bachelor's level or higher.⁷⁶

In 2012, 91 percent of postsecondary CTE students in KY received an industry-recognized credential, certificate or degree.⁷⁷

Qualifications Meet Global Standards and Are Reviewed on a Regular Basis

The Kentucky Department of Education's Office of Career and Technical Education creates new career pathways based upon three criteria: 1) student college and career readiness aspirations, 2) innovative concepts that support industry and economic development opportunities in Kentucky, and 3) specialized needs of regional business and industry. Districts and schools interested in creating new pathways are required to submit the scope of the pathway and labor market and economic development information to the Kentucky Department of Education. Districts and schools need to identify the skill sets and credentials students will develop and the job duties they will be able to perform as a result. Statements of support from regional employers are also required, indicating the projected need for trained workers in the occupational area and the desired entry-level skill set and credentials to be acquired.⁷⁸

Pathways that align to national industry certifications (i.e., automotive technology's automotive service excellence certification) are reviewed annually. Other programs are reviewed on a three-year cycle. Schools and districts can request revisions to the pathways offered at their school on an annual basis.⁷⁹

Career and Technical Education is Seen as a High-Quality Pathway

The Office of Career and Technical Education defines a CTE concentrator as one that has completed two credits and has enrolled in the third CTE course in a sequence within a pathway. To be considered a completer of a technical program, a student must successfully complete four credits in a sequence of courses and graduate from high school.⁸⁰

There are almost 36,000 CTE preparatory students (those who have completed two credits and are enrolled in at least the third credit of a career major).⁸¹ Overall, 18 percent of public high school students are CTE preparatory. In 2013-14, 47 percent of high school seniors were considered CTE concentrators, meaning that by the time they are ready for graduation, these students would have completed at least two CTE credits and be enrolled in a third.⁸² The high proportion of student enrollment may be in part due to Kentucky's school accountability system which awards points to schools that increase the number of students who complete rigorous career preparation programs.

While only 61 percent of CTE concentrators in their senior year scored proficient or advanced in reading/Language arts and 45 percent scored proficient or advanced in math on state tests, almost all (98.66 percent) earned a high school diploma or equivalent in 2012.⁸³ In 2011-12, 89 percent of CTE concentrators who completed the program and graduated from school, entered post-secondary education or advanced training, entered the military, or were employed in the reporting year during the second quarter.⁸⁴

How Does Kentucky Compare?

Our analysis of Kentucky revealed the following:

As in the three benchmark states, but unlike the international jurisdictions, many of Kentucky's CTE programs do not give high school students exposure to a wide range of attractive careers within their area of focus. Instead, most CTE programs are organized around narrow job bands that are unlikely to lead to high-wage, high-skill jobs.

- Finland, Singapore and Switzerland all have strong employer involvement in devising career pathways that introduce students to a wide range of careers with additional post-secondary education and training options.
- Ontario's CTE system also aims to give students multiple options upon graduation, but a primary goal seems to be keeping high school students engaged and therefore more likely to earn a diploma.
- New Jersey is supporting the creation of model CTE curricula in high-skill, high-wage or high-demand occupations.

As with the other benchmarked states, student work-based learning experiences in Kentucky vary widely depending on the ability of school-based teachers to partner with local employers who are willing to give high school students the opportunity to do real work in authentic job settings. In contrast, the top-performing international jurisdictions prioritize giving students high-quality hands-on job experiences over a significant period of time to ensure they build the skills necessary to transition into the workplace and/or post-secondary pathways.

- Swiss students spend 3-4 years as paid apprentices doing real entry-level work under the guidance of credentialed trainers within the company.
- Finland requires CTE students to spend at least six months within a three-year program in the workplace.
- Singapore's ITE system is school-based but the equipment they work on is state-of-the-art and provided by employers. Employers are also highly involved in the development of standards, curriculum and assessments in partnership with the vocational institutions. Every student in a polytechnic is required to do an internship of two to six months, where they complete a project for the employer and receive a small allowance.

Most, but not all of Kentucky CTE teachers are required to have four years of work experience in a related career area, which is less than the Massachusetts requirement but more than New Hampshire or New Jersey. In the states, CTE programs have employer advisory committees but teachers may or may not have the opportunity to spend time in workplaces and to stay on top of workforce skill needs. Kentucky does encourage its CTE teachers to stay up-to-date with industry practices and suggests that one half of teacher professional development time be spent staying current with industry practices. However, it is unclear what percentage of teachers actually follow this recommendation. A recent report by the SREB suggests that budget cuts in Kentucky have limited teacher development on instructional strategies, the integration of academic content, and student preparation for industry certification exams.

- Most international jurisdictions have rigorous CTE teacher credentialing standards that include educational degrees and industry experience. Finland's CTE teachers are required to have an appropriate Master's degree or a polytechnic degree plus three years of work experience in the



field. Swiss teachers must have a higher education degree in the relevant field and at least six months work experience in the field. (In Switzerland, employer partners also must meet quality standards in order to take apprentices, including designating staff to work with the students.)

- Teacher professional development often emphasizes ensuring that faculty go back to industry. This is required for Singapore’s ITE teachers.

• Kentucky does appear to have a relatively well-defined career counseling program for students in middle and high school. All students, starting in the sixth grade, are required to create an Individual Learning Plan, which is then updated annually. An introductory course in grade 9 or 10 of the high school introduces the career cluster options and helps students to select a career pathway by the end of grade 10. However, career guidance is not mandated in Kentucky schools and a state official notes that the majority of guidance counselors have not been properly trained or certified.

- Career counseling is provided by community-based centers in Switzerland to help students line up apprenticeships.
- Finland and Ontario incorporate guidance counseling into the school day at the upper secondary level.
- Singapore has plans to install counselors in its polytechnics and ITE colleges, with employer partners involved in hosting visits and providing resources. Counselors will undergo extensive training to provide them with a realistic understanding of the economy.
- Massachusetts requires all CTE students to create a Career Plan and an Individual Learning Plan to help them identify skills, interests and goals and to facilitate their transition to post-secondary learning or employment. Students in schools with five or more state-approved CTE programs are required to enroll in a Career Exploratory program to help them select a preferred area of concentration. Currently, 25 percent of all CTE students participate.

• In Kentucky, almost two-thirds of senior CTE concentrators in high school passed the technical assessment tests in 2011-12. In the benchmark states, high school students take technical assessments that may include industry certification exams or may be developed by the state with industry input. The assessments vary from state to state so are not directly comparable. Kentucky has developed its own system of measuring student career readiness in each career cluster. Students can earn a Kentucky Occupational Skills Standards Assessment (KOSSA) certificate, which is endorsed by related business and industry groups as a signal that the student is ready for entry-level work in that industry. A recent report by the Southern Regional Education Board (SREB) recommended that as the state continues to identify and implement rigorous industry certification examinations, the KOSSA should be phased out in areas in which industry certifications exist.⁸⁵

- Finland and Switzerland have established industry qualification systems developed by industry. CTE programs are organized to prepare students to earn qualification certificates in a wide range of career pathways, signifying they have vocational competence, knowledge and skills. Ontario’s vocational systems is aligned with the Red Seal program, certifying skilled trades.
- Singapore’s vocational institutions work closely with employer partners to stay up-to-date on occupational standards. Employers advise the various institutions and programs and help assess candidates for diplomas.

In Kentucky, career pathways that align to national industry certification are reviewed annually and other programs are reviewed on a three-year cycle. However, as mentioned earlier, the career areas are not completely in sync with the identified state sectors of growth and some of the certifications offered are for narrow job skills. In the benchmark states, the review and revision of industry qualifications is often ad hoc without a clear timeline or method for updating standards to meet current industry needs. While schools and districts may be required to reference labor market data and economic development information, employers are generally not taking the lead.

- Finland, Ontario, Singapore, and Switzerland have systems in place to regularly review and update vocational qualifications in partnership with employers.

More than two-thirds of students in Kentucky take at least one CTE course and almost half (47 percent) of all graduating seniors in 2013-14 were considered CTE concentrators, having completed two CTE credits and enrolled in a third pathway course. The state may be seeing higher enrollment in part due to its school accountability system that rewards schools for increasing the number of students who complete career preparation programs. When looking at the high school student body as a whole, 18 percent of Kentucky high school students are CTE concentrators.

- In all the international jurisdictions except Ontario, a significant percentage of upper secondary students enroll in a vocational, rather than a general academic, pathway. In both Switzerland and Singapore, this is true for more than half of the student population. In Finland, it is a little less than half. Participation in all these cases means participation in a full program of study, not just one or two courses.
- New Jersey has the highest CTE student enrollment rate of the benchmark states and demand for CTE programs exceeds space available in most schools.

Kentucky and the benchmark states all report very high graduation rates for CTE students. Similarly, Kentucky and the benchmark states, except New Hampshire, report that almost all CTE students are entering post-secondary education, training, the military or employment after graduation. Each state tracks the data a little differently. The data are not disaggregated to see a breakdown by education, training, or work pathways, nor does the data report on remediation rates for CTE students in post-secondary education, however, nationally these figures are high for students in general.

- Singapore boasts one of the highest upper secondary completion rates overall (98 percent) and the Institute of Technical Education colleges have an 83 percent graduation rate with 87 percent of graduates securing employment.⁸⁶
- In the benchmark states and Kentucky, completion rates include students who earn a high school equivalency (such as a GED), which may contribute to the high rate of completion.



DATA FOR INDICATOR 7: CREATE AN EFFECTIVE SYSTEM OF CAREER AND TECHNICAL EDUCATION AND TRAINING



Is there a Career and Technical Education (CTE) system that supports 21st century careers?

- To what extent is training available to students in a wide range of high-skill, high-demand and well-paying careers?
- To what extent does training occur in authentic work environments which include up-to-date equipment, academic integration and work-based learning?
- Are there enough apprenticeship slots for all CTE students who want them?
- To what extent are instructors provided the opportunity to become familiar with state-of-the-art work practices?
- To what extent is information available to students, parents and counselors that will help students make informed career choices?

Do CTE programs lead to industry-recognized qualifications?

- Do all programs lead to qualifications that are widely recognized by industry?
- Are qualifications continuously adjusted to the needs of economic sectors at the state, national, and global levels?

Is the CTE system attractive to a broad range of students and parents?

- What proportion of students choose to pursue a CTE program of study?
- What percent complete those programs at the secondary level?
- What percent go on to post-secondary education or training or work?

International Data

Is there a Career and Technical Education (CTE) system that supports 21st century careers?

To what extent is training available to students in a wide range of attractive careers?

Finland: The Finnish National Board of Education is responsible for developing national CTE qualifications including career areas to be covered. The career areas cover eight fields and include within them more than 50 vocational qualifications. The most popular vocational qualifications are Technology and Transport, Business and Administration, and Health and Social Services.⁸⁷ The qualifications are developed by a broad range of stakeholders, including representatives from the Ministries of Education and Employment and the Economy, unions, industry, and universities.⁸⁸ The qualifications support flexible and efficient transition to the labor market as well as occupational development and career change. Lifelong learning skills are emphasized and students can include modules from other vocational qualifications. Students embark on working towards CTE qualifications after they complete a common academic program of study beginning at age 16.

Ontario: Ontario's Specialist High Skills Major (SHSM) is an Education Ministry-approved specialized program that allows high school students in grades 11 and 12 to focus their learning on broad economic sectors (such as agriculture, environment, hospitality and tourism, sports, or transportation, for example). These 19 career areas are the industries deemed to be in demand by the Ministry of Education.⁸⁹ The career certifications and curricula were developed in consultation with employer, industry, and union representatives from each sector.⁹⁰ The SHSM frameworks are designed to ensure that students have opportunities to pursue work, apprenticeship, college and university. Post-secondary institutions and business/industry provided input to recognize and support the content of the frameworks.⁹¹

Singapore: Vocational education is a vital part of the country's economic development system; seats in CTE institutions (ITEs and Polytechnics) are designated based on the projections of the number of positions that will be available in any given occupation.⁹² The occupational skill standards framework and matching course structure was created by the Vocational and Industrial Training Board, consisting of five representatives from government, four from labor, three from employer associations, and seven senior business executives. Each curriculum area, such as automotive, construction, mechanical engineering, has an advisory committee made up of experts in that field.⁹³ The curriculum at the Institute for Technical Education is very practice-oriented with about 85 percent focused on career-related modules and 15 percent emphasizing broader life skills (such as communication, teamwork, problem solving and customer service).⁹⁴ ITE counts among its almost 100 industry partners global players like ABB, Cisco, Conrad Centennial, Hewlett Packard, IBM, Microsoft, Rolls Royce, Siemens, Singapore Airlines Engineering and Yokogawa. The polytechnics offer 150 diploma programs.

Switzerland: The Swiss dual-track vocational and education training system prepares students for 240 occupations and professions—including high-tech, human service, banking, pre-engineering and health, as well as traditional trades and crafts. The content of these programs is based on industry standards. The State Secretariat for Education, Research, and Innovation (SERI) and the Swiss Federation for Vocational Education and Training (SFIVET) work closely with industry associations in the development of curriculum frameworks and training plans. The employers also ensure that there are enough apprenticeship slots available to students as students spend time working at a training company while also taking theoretical classes at school. In addition, they attend inter-company courses to enhance vocational practical skills.⁹⁵

INDICATOR 7: CREATE AN EFFECTIVE SYSTEM OF CAREER AND TECHNICAL EDUCATION AND TRAINING

State Data	KY Data
<p>The benchmark states use the 16 National Career Clusters as a starting point and/or conceptual framework for organizing their CTE programs at the high school level. The Career Clusters were designed to cover the entire world of work. However, the CTE programs offered within these clusters often have a narrow job focus and do not introduce students to a wide range of high-skill, high-wage career options.</p> <p>MA: Massachusetts has revamped the 16 National Career Clusters into 11 based on career clusters identified under state law which authorizes and establishes vocational technical education programs leading to employment associated with agriculture, allied health, automotive, construction, marketing, service occupations, industrial-manufacturing programs and technical programs. From these categories the Massachusetts Department of Education developed 11 industry clusters and designed vocational and technical frameworks for each technical training area contained within each cluster. The eleven clusters either directly match the 16 National Career Cluster pathways or address occupations contained in almost all of the 16.⁹⁶</p> <p>NH: All 63 CTE programs offered in New Hampshire fit within the 16 career clusters identified at the national level. CTE is delivered through comprehensive high schools, regional career and technical centers, and stand-alone career academies. There are 325 total programs being offered in the 2015 school year; the most popular offerings are automotive mechanics technician, building/construction trades, cooking and related culinary arts, engineering, health professions and related services, and teacher education.⁹⁷</p> <p>NJ: The state has adopted the federal framework of the 16 career clusters and has defined 79 corresponding pathways within them. The New Jersey Department of Education used its Perkins Leadership funds to support a CTE Partnership Grant Program to support the creation of model programs of study, including curricula in high-skill, high-wage, or high-demand occupations based on labor and workforce development information. These model programs are required to include business and industry standards to prepare students for successful entry into a career or postsecondary studies. The state also consults with Workforce Investment Boards (WIBs) with regard to new career and technical program approvals to address local needs for workforce development. Local education agencies and community colleges applying for Perkins funding are required to consult with the local WIB as part of the application process.⁹⁸</p>	<p>Kentucky organizes its 27 CTE programs around eleven broad program areas: Agriculture, Architecture and Construction, Arts and Humanities, Business and Marketing, Engineering and Technology, Family and Consumer Sciences, Health Science, Information Technology, Manufacturing Technology, Transportation, and Media Arts.⁹⁹ The Office of Career Technical Education (OCTE) continues to develop and revise Programs of Study and Career Pathways to align with economic sectors and industry standards.</p> <p>The CTE career pathways appear to somewhat align with Kentucky's sector strategies initiative of 2011 that identified areas of workforce growth specific to Kentucky. The five targeted sectors include: Automobile and Aircraft Manufacturing; Transportation, Distribution and Logistics; Business Services and Research and Development; Health Care/Social Assistance; and Energy Creation/Transmission. The state is getting ready to refresh state and regional sectors through the state Workforce Investment Board and a steering committee that will include Kentucky Department of Education/CTE representation.¹⁰⁰ The Kentucky Department of Education's Office of Career Technical Education is currently exploring a process by which the local Workforce Investment Boards will assist in CTE program assessment, development, and deployment.¹⁰¹ Requests for expanding pathways and initiating new programs currently exceed state funding amounts for these programs. One option is to reduce the total number of pathways and to focus on state-specified priority career areas.¹⁰² Creating additional pathways with appeal to students (such as in the Arts, for example) may allow more students to be engaged and develop specific marketable competencies.¹⁰³</p>



International Data

To what extent does training occur in authentic work environments, which include up-to-date equipment, academic integration and work-based learning?

Finland: All qualifications that make up the Finnish CTE system include on-the-job learning. The minimum length of this work-based component is six months out of the three-year program. There is a written contract between employers and students and students do not get paid for their duties.¹⁰⁴ The objective is to give students the opportunity to apply learning in practice.¹⁰⁵

Ontario: Cooperative education courses provide authentic learning experiences in a workplace setting that enable students to build sector-specific knowledge and skills. Each Specialist High Skills Major (SHSM) pathway requires that students complete a minimum of two credits (a total of 220 hours)¹⁰⁶ in cooperative education in a work-based setting. Some students complete these credits after school, in the summer, or through virtual cooperative education. Cooperative education placements are arranged for students by their secondary school. Placements vary in length, depending on the number of credits students are earning and the placements available in the community.¹⁰⁷ In order to launch an SHSM in a school and receive Ministry funding, schools must provide evidence that they have strong relationships and partnerships with employers and post-secondary institutions.

Singapore: While Singapore’s system is school-based, government works in concert with industry to ensure that school-based experiences simulate the work environment as closely as possible and employers participate in the development of standards, curriculum, and assessments in partnership with the vocational institutions. Employers provide state-of-the-art equipment for instruction so students train in modern workshops and laboratories.¹⁰⁸ Every student in a polytechnic has to do an internship of two to six months, usually in the third year of the program. Someone at the company is assigned to each student and he/she is responsible for grading the student during the work experience period. During the internship, students are expected to complete a project with a deliverable that is agreed upon with the employer.¹⁰⁹ They also receive a small allowance, typically around SGD\$450 a month.¹¹⁰

Switzerland: Students spend 3-4 years as a paid apprentice, rotating among three learning sites-workplace, intercompany courses, and school. Employer associations ensure that there are adequate numbers of apprenticeships. Students do real entry-level work under the guidance of credentialed trainers within the company.¹¹¹ Students earn an average monthly wage of USD\$600 to USD\$700, rising to around USD\$1,100 to USD\$1,200 by the time they are in their third year.¹¹²

Are there enough apprenticeship slots for all CTE students who want them?

Finland: No data available on if there are enough apprenticeship slots. Finland does have a comprehensive Youth Guarantee Scheme. A Eurofound evaluation found that, in 2011, 83.5 percent of young job seekers received a successful offer within 3 months of registering as unemployed.¹¹⁸ The Finnish scheme has led to personalized plans for young people being drawn up more quickly, ultimately lowering unemployment.

Ontario: No data available to confirm but can assume that cooperative learning slots are often limited and depend on a school’s ability to find employer partners.

Singapore: No data available indicating a shortage of apprenticeship slots. The government is working to implement the ASPIRE Committee’s recommendation of creating more place and train (apprenticeship) opportunities where students study and work at the same time. The government intends to offer monetary incentives to encourage employer participation.

Switzerland: The employer associations take responsibility for ensuring there are adequate numbers of apprenticeships.¹¹⁹

State Data	KY Data
<p>MA: Work-based learning is not a state requirement for CTE. The decision whether or not to offer it is a matter of local discretion. The main work-based learning initiative is cooperative education. Students can enter cooperative education after 1.5 years in the program (typically this occurs in the second half of the junior year in high school). Districts that run cooperative education require that students maintain a certain level of academic performance in order to participate. Students are paid wages while accruing high school credit on a worksite related to their technical program in lieu of participating in their technical classes in a school setting. The amount of time spent in work-based learning varies, ranging from 40 to 125 hours or more, depending on the program. In 2014, 2,490 students participated in cooperative education, up from 1,359 in 2009. Other forms of work-based learning include job shadowing, internships, or community-based learning projects.¹¹³ The state made \$1.1million of Vocational Equipment grants available in 2013 to help prepare students for the workforce.</p> <p>NH: New Hampshire’s 30 regional vocational high schools offer a variety of different vocational programs of study. A majority of these programs are completely school-based, but a few offer short internships in companies in a local area in a given occupation. The level of up-to-date equipment used in schools varies depending upon the school’s ability to partner with local businesses. A number of schools have their own stores that sell products to students and the community that are student run. Some schools offering early education certificates have on-site pre-school programs where students train alongside teachers. Students in some programs participate in short-term, 20 hour workplace learning.</p> <p>NJ: CTE programs must include at least one Structured Learning Experience (SLE). SLEs may be paid or unpaid. They can include community service, internships, job shadowing, volunteering, cooperative education, or working at a school-based enterprise. As an example of one of the more intensive programs, the Monmouth County Vocational School District’s Academy of Allied Health and Science curriculum includes a rotation at a local hospital for students in the 10th grade, leading to an eight-week internship for students in their senior year.¹¹⁴</p>	<p>The KY Career Pathways bill of 2012 gives students the opportunity to learn in integrated school- and work-based environments. Work-based learning can be implemented through various forms, including job shadowing, mentoring, internships, practicums, school-based enterprises, cooperative education, and apprenticeships.¹¹⁵</p> <p>Cooperative education is one work-based learning option. It requires students to spend a minimum of 10 hours per week in a salaried position relating to a student’s career goals as identified in his/her individual learning plan. There are not data on the number of students participating in this or other work-based learning experience options.¹¹⁶</p> <p>A recent funding analysis on Kentucky’s CTE system notes that the state has not provided additional funding to schools to purchase or update CTE equipment in several years. The report notes that an additional allocation of \$3.5 million is needed to maintain/update those resources. Most CTE teachers and administrators surveyed across the state felt that “basic needs for equipment, classroom materials, supplies and other resources are limiting students’ opportunities to practice their skills and restricting the state’s ability to reach its goals.”¹¹⁷</p>
<p>In general, in the U.S., there are not enough work-based learning slots for all CTE students. CTE programs therefore offer more limited worksite visits or shadowing opportunities.</p> <p>MA: There are waiting lists for vocational schools, not specifically for apprenticeship slots.¹²⁰</p> <p>NH: No data available</p> <p>NJ: Demand for CTE programs exceeds the space available at most schools. Statewide, county vocational-technical schools get an average of almost 2.5 applications for each available seat. No specific data on apprenticeship slot availability.¹²¹</p>	<p>Kentucky does offer a variety of work-based learning opportunities for students, including apprenticeships, but it is unclear what percentage of students are given this opportunity. It is likely there are not enough employer slots available for all CTE students who want them.</p> <p>The Department of Education intends to expand student work-based learning opportunities.¹²²</p>



International Data

To what extent are instructors provided the opportunity to become familiar with state-of-the-art work practices?

Finland: Vocational institutions provide up-to-date technology to ensure practical, hands-on teaching. Teachers of vocational subjects are well educated: they are required to have an appropriate Master’s degree or a polytechnic degree (or the highest possible qualification in their occupational field) plus three years of work experience in the field.¹²³ Vocational teachers are trained in pedagogy and teaching practice at five vocational teacher education colleges and one Swedish-speaking university. This training is provided free of charge for students. Vocational teachers are also required to participate in continuing training each year (usually up to 5 hours per school year) to keep their classroom competencies up-to-date. In addition, many teachers take part in on-the-job learning periods.¹²⁴ Alongside teachers, there are workplace instructors who supervise students during on-the-job learning periods. These are generally experienced foremen and skilled workers who guide students and assess their vocational skills.¹²⁵

Ontario: Specialist High Skills Majors (SHSM) are offered within comprehensive secondary schools. Typically SHSM major credit teachers are already teaching in the school and have a special interest or expertise in delivering CTE instruction. There is no minimum requirement specified but teacher expertise is a factor taken into account by the Ministry of Education when approving SHSM programs. However, in a number of the sectors that have the major credits aligned with Technological Education, teachers are required to have industry experience.¹²⁶ The Ministry allots money for Specialist High Skills Major professional development of teachers and administrators. This can include providing opportunities for staff (core teachers, co-op teachers, administrators) to visit relevant industry sites and postsecondary programs related to the major.¹²⁷

Singapore: The Institute of Technical Education hires lecturers with at least three years of relevant experience in their specialization area. The ITE also requires its staff to go back to industry for an assignment of at least three months. A Total System Capability Scheme was put in place in 2007, targeting 85 percent of its faculty to remain up-to-date by demonstrating ability to “Do or Lead” in consultancy or industry projects. Without this ability, faculty do not get promoted.¹²⁸

Switzerland: The Swiss Federal Institute for Vocational Education and Training offers training courses leading to a federal certificate to people who work in industry and wish to teach part-time in a CTE school at the upper secondary level. Entry requirements for the training course include a higher education degree in the relevant field and at least six months work experience in the field. Firms need to meet quality standards to be licensed to take apprentices. To acquire a license, companies must meet technical and staff criteria and demonstrate that the content of the training meets the needs of the occupation.¹²⁹

State Data	KY Data
<p>In all benchmark states, Perkins funds can be used to help teachers stay current with all aspects of an industry and can involve internship programs that provide relevant business experience.</p> <p>MA: To earn primary licensure as a vocational technical teacher, candidates generally must have seven years of experience working in industry, along with an occupational license or certification if required in the field (for example, master electrician’s license, registered nurse, licensed engineer). There are several ways that CTE teachers are kept up-to-date with industry practices. To maintain vocational technical educator licensure (Chapter 74), teachers must earn 150 professional development points (PDPs) in their primary licensure field during a five-year period, which is required for licensure renewal. The 150 PDPs must include 10 points in subject matter knowledge and skills; 10 points in pedagogy; 10 points in academic and technical integration; and 10 points in safety and health. These requirements ensure that vocational teachers stay current in their field. Vocational teachers are also required to maintain their industry licensure. The state offers a well-attended Connecting for Success professional development conference for vocational educators with program-specific offerings to connect teachers with industry representatives on new technologies. CTE programs also require Program Advisory Committees that play a key role in establishing, supporting, reviewing, and validating each program’s facility, equipment, curriculum, and teacher currency. Some committee representatives also contribute equipment and/or supplies to enhance the training that students receive.¹³⁰</p> <p>NH: CTE teacher certification requirements vary based on content areas. At minimum, CTE teachers need a bachelor’s degree in a CTE-related program, but work experience can be substituted. Individual districts are responsible for developing teacher professional development plans that focus on the development and implementation of the Career Pathway Plans of Study, including academic and CTE integration.¹³¹</p> <p>NJ: CTE teachers can be certified with a teacher education degree and a concentration in the appropriate occupational area. The New Jersey Statewide CTE annual conference addresses work-based learning, business engagement, and other business-related topics, but the focus does not appear to be on placing teachers in the workplace.¹³² New Jersey has formed “talent networks” with pools of employers in seven industry sectors, including transportation and hospitality, to inform CTE programs about workforce needs and training. The 100 high school CTE programs in the state are also required to have advisory committees that include employers.</p>	<p>The teacher certification process for CTE varies by program. The following programs require the teacher to complete a traditional teacher preparation program in an accredited college or university and to hold a statement of eligibility or provisional teaching certificate: Agriculture, Business and Marketing, Engineering and Technology, and Family and Consumer Services. The majority of teachers in the other program areas were certified through the occupational-based certification process. This requires four years of work experience in the related area (two years of work experience must have been within the last five years). The teachers must also meet benchmark scores on the COMPASS and National Occupational Competency Testing Institute tests that align with the program area to be taught. These teachers are given one-year certificates. During their first year of teaching, they must attend an eight-day New Teacher Institute and complete the Kentucky Teacher Internship Program. The teachers then must enroll in a 64-hour CTE Teacher Preparation program offered at four of the public universities in Kentucky. They must complete six hours of college credit each year to renew their teaching certificate. Upon completion of the 64-hour program, teachers are awarded a five-year certificate through the Educational Professional Standards Board.</p> <p>All teachers are required to participate in 24 hours of professional learning annually. It is highly encouraged that 12 of those hours for CTE teachers focus on up-to-date industry practices. The Kentucky Department of Education Office of Career and Technical Education allots a portion of federal Perkins dollars each year for state-level teacher professional development. For example, the Office coordinates yearly technical upgrade training sessions for all CTE teachers.¹³³ Perkins funds can be used to help teachers stay current with all aspects of an industry, including participation in internship programs that provide relevant business experience.</p>



International Data

To what extent is information available to students, parents and counselors that will help students make informed career choices?

Finland: Counseling begins in upper secondary. VET programs include at least 1.5 credits (approximately 1.5 weeks total)¹³⁴ of guidance counseling to help students navigate education and training options, occupations and the world of work. Counseling is scheduled into the school day. Guidance counselors have master’s-degree-level teacher training. Each student has an individual study plan to document progress in studies, assessment of learning, identification and recognition of student competencies, on-the-job learning experiences, and vocational skills demonstrations.¹³⁵ In the workplace, guidance is coordinated by a qualified workplace instructor.

Ontario: The Specialist High Skills Major incorporates career exploration activities, allowing students to explore career options through worksite tours, career conferences or competitions, simulation activities, and contact with a career mentor. Students are also required to have “Reach Ahead Experiences” to help them make informed choices about future careers. This can include interviewing an employee in the field of work they are considering, visiting an approved apprenticeship delivery site, attending a college or university class in their area of interest, etc.¹³⁶

Singapore: The government is currently putting together an action plan to improve the alignment between ITE offerings and industry needs, including coordinating and improving education and career guidance systems. Each polytechnic and ITE college will have six counselors on staff. For every five secondary school/junior college/centralized institute students, there will be one assigned counselor.¹³⁷ Counselors will undergo extensive training to provide them with a realistic understanding of the economy. The training will include information from Singapore’s Economic Development Board on job projections. Employers will be involved, making videos and hosting student visits. The ITE will be a partner, introducing students to the courses available relating to different careers. Each component is designed to give students an informed choice.¹³⁸

Switzerland: Each canton (state) in Switzerland operates a network of community-based career centers specially organized and staffed to help young people in the transition from grade 9 to the next stage of their education. These centers are organized outside the education system but do outreach in the schools as well as offering individual consultations to students and their families. Centers are located in easy-to-reach town centers. The services these centers offer range from interest inventories, help with resume-writing and portfolio development, and assistance in lining up “sniffing” opportunities or short pre-apprenticeships to sample prospective apprenticeship sites. The student then takes the responsibility for writing an actual application letter for an apprenticeship. This is a very competitive process and the career counselors support students through this process, helping them persevere until they have found the right match.¹³⁹



State Data	KY Data
<p>MA: Career counseling starts in grade 9 and continues through grade 12. A Career Plan—a comprehensive, formalized written plan that relates learning to career goals—is required of all students enrolled in Chapter 74 CTE programs. The Plan is based on a personal interest inventory and student experience in career exploratory programs and should include areas in which a learner needs to increase knowledge and skills to reach documented goals. The Department of Elementary and Secondary Education recently released the Massachusetts Guide for Implementing Individual Learning Plans (ILP). The ILP is a student directed, multi-year, dynamic tool that maps academic plans, personal/social growth, and career development activities while taking into account the student’s unique, self-defined interests, needs, and goals for the attainment of postsecondary success. The ILP is suggested to begin in the middle school and continue through high school. And the ILP, though driven by the student, is created with guidance from a school mentor (not necessarily a guidance counselor) and shared with family and other stakeholders. The ILP and the Career Plan both facilitate the transition from high school to post-secondary learning or employment, and they both should be revisited throughout the year. The ILP has the potential to fulfill and expand upon the requirements of the Career Plan.</p> <p>There is also curriculum available to guide career planning. The MA Model for Comprehensive School Counseling (The Model) offers a framework for the development and implementation of school counseling programs that promote student success in the academic/technical, workplace readiness, and personal social domains. The Model ensures that students receive the guidance, supports and interventions necessary for post-secondary success.</p> <p>Additionally, schools with five or more Chapter 74 programs are required (and some other schools choose) to enroll students in a Career Exploratory program. Exploratory programs, typically offered in the first year of high school, allow students to experience different occupational fields before they select their preferred areas of concentration. Students spend a half-year in Exploratory, rotating through all the programs a school offers or a subset of programs, depending on the Exploratory model the school has developed. In 2014, 14,124 technical students out of a total of 52,865 technical students or nearly 25 percent of all technical education students participated in Exploratory programs.¹⁴⁰</p> <p>NH: Guidance counselors use Career Pathway Plans of Study (CPPOS) to help students transition from high school to postsecondary education, training or work. By connecting high school graduation requirements and postsecondary courses, the CPPOS helps students map plans of study that result in academic and industry credentials.</p> <p>NJ: Districts are required to develop and implement a comprehensive K-12 guidance and academic counseling program for all students to facilitate career awareness, exploration, and preparation.¹⁴¹</p>	<p>Kentucky has a program of study dedicated to providing a continuum of career education experiences for middle and high school students. “Pathway to Careers” courses include Career Choices in middle school, which introduces students to a broad range of career opportunities. All students are required to create an Individual Learning Plan (ILP) in the sixth grade. The ILP is updated annually. It provides many resources for exploring careers and educational pathways.¹⁴² For secondary students, Career Options and Career Networking give students job search skills and focus on exploration in the 14 career clusters. This coursework helps students to select a career pathway by the end of grade 10 and may count towards credit in some of the career pathway options. It is suggested, but not required, that teachers teaching career education courses have some career externship experience in business and industry.¹⁴³</p> <p>There is not a mandate for career guidance in Kentucky schools. The majority of guidance counselors in schools have not been properly trained or certified to provide career guidance.¹⁴⁴</p> <p>The Department of Workforce Investment is developing an online tool called Focus Explorer that integrates the following data: 1) skill set and interests; 2) real time labor market data; 3) short-term, medium-term, and long-term education and training options; and 4) education partners that offer those programs across the state. The first phase of the system will be rolled out fall 2015.¹⁴⁵</p>



International Data

Do CTE programs lead to industry-recognized qualifications?¹⁴⁶

Do all programs lead to qualifications that are widely recognized by industry?

Finland: The Finnish CTE system is based on the vocational qualifications framework. Individual qualifications are developed in cooperation with employers to ensure student readiness for transition into the labor market.¹⁴⁷ At different points in their training, students are expected to demonstrate their skills in tests arranged as either practical work situations or as practical assignments. The curricula and assessments are issued by the National Board of Education. The tests are devised and implemented in cooperation with business and industry. Students who complete the three-year program earn vocational qualifications that signify that they have the necessary vocational competence, knowledge and skills.¹⁴⁸

Ontario: Sector-recognized basic industry certifications are identified in each career area, including first aid, CPR and other safety qualifications that can give students an advantage when entering the workplace. Students receive a Red Seal on their Ontario Secondary School Diploma when they complete a specific set of 8 to 10 courses in their selected field of study.¹⁴⁹ After graduation from high school, vocational students may enter the workforce, a post-secondary program to expand their skills, or an apprenticeship in their occupational area or trade. Vocational education and training is regulated by the Red Seal Program, a voluntary partnership between Canada's federal, provincial and territorial governments. The Canadian Council of Directors of Apprenticeship is responsible for the Red Seal program that certifies skilled trades (currently 57 designated trades). Obtaining a Red Seal endorsement acknowledges a journey person's competence and quality workmanship.

Singapore: It is the responsibility of the postsecondary institutions to organize curriculum updates. They work in close partnership with employers to stay up-to-date on changes in occupational standards. Employers advise the various CTE institutions and programs and help assess candidates for diplomas.¹⁵⁰

Switzerland: Each industry sector in partnership with the State Secretariat for Education, Research, and Innovation (SERI), develops qualifications and assessments for the industry, establishes curriculum, and provides, through their affiliated training companies, varying amounts of course work during the three- or four-year upper secondary vocational education program. Each occupation has a qualification certificate that is attained through a final assessment, and is standardized across the country. Students who complete the CTE program earn a nationally recognized qualification that is portable, and the opportunity to move directly into full-time employment or to continue on to additional education or training.¹⁵¹

State Data

KY Data

Typically, in the states, industry-recognized credentials are awarded at the postsecondary level. The high school data reported below addresses Technical Skill Attainment (a Perkins indicator) where students take and pass technical assessments aligned with industry (which includes industry certification exams but also other exams that may be developed by the state with industry input.)

MA: In 2011-12, 82 percent of CTE concentrators received a state-recognized Chapter 74 Certificate or another industry-recognized credential.¹⁵²

In 2012, 55 percent of postsecondary CTE students in MA received an industry-recognized credential, certificate or degree.¹⁵³

NH: Secondary CTE Technical Skill Assessments available to students include the National Automotive Technicians Education Foundation's Automotive Service Excellence certification, Adobe, CISCO certification, Emergency Medical Technician, and American Welding Society certification.¹⁵⁴ The state was awarded a federal grant from the Department of Education in 2008 to develop and implement Rigorous Programs of Study that include statewide articulation agreements. The state developed dual enrollment options for students in the fields of Accounting and Health Science.¹⁵⁵

In 2010-11, 13.38 percent of CTE concentrators successfully completed all technical skill competencies assessments that are aligned with industry-recognized standards.¹⁵⁶

In 2012, 96 percent of postsecondary CTE students in NH received an industry-recognized credential, certificate or degree.¹⁵⁷

NJ: In 2011-12, 84 percent of CTE concentrators completed the CTE program and passed the available and appropriate third party, industry-aligned end of program skills assessments that are aligned with industry-recognized standards.¹⁵⁸

In 2012, 100 percent of postsecondary CTE students in NJ received an industry-recognized credential, certificate or degree.¹⁵⁹

Kentucky's Occupational Skills Standards Assessment (KOSSA) is one of two measures that can be given to high school students to determine career readiness in each of the career areas. It is given to any student who is enrolled in or has completed three courses within a career pathway. Most of the exams include a multiple-choice section and a scenario-writing section. Students who pass (receive a 70 percent or above) a KOSSA test receive a KOSSA certificate. The certificate is endorsed by the related business and industry groups. Many of the KOSSA certificates contain seals from Kentucky businesses that endorse the certificates (for example, UPS endorses a marketing one).¹⁶⁰

A recent report by the Southern Regional Education Board (SREB) recommended that as the state continues to identify and implement rigorous industry certification examinations, the KOSSA should be phased out in areas in which industry certifications exist.¹⁶¹

The Kentucky Department of Education also reports that it aims to provide students with opportunities to achieve stackable credentials recognized and supported by business and industry.¹⁶²

KY also has been piloting the Tech Ready Apprentices for Careers in Kentucky (TRACK program). This is an industry-driven program to create a pipeline for students to enter post-secondary apprenticeship training. All student participants in the pilot advanced manufacturing program moved into full-time apprenticeships with their industry partners.¹⁶³

An example of a well-regarded program cited in another SREB report is the Advanced Manufacturing Technician program, originally developed by Toyota in partnership with the Kentucky Community & Technical College System. It prepares technicians with the academic, technical and workplace skills necessary to succeed in advanced manufacturing careers. The program offers work-based learning experiences in a manufacturing environment. Students learn about safety and lean manufacturing and acquire problem-solving and communication skills. After high school, students finish an associate's degree in five semesters while earning up to \$40,000 each year. They work three days a week for Toyota and spend two days engaged in intensive related studies. Those students who complete the program are hired at starting salaries of at least \$60,000 a year and can continue their studies at the bachelor's level or higher.¹⁶⁴

In 2011-12, 60 percent of senior CTE concentrators passed the technical assessment tests.

In 2012, 91 percent of postsecondary CTE students in KY received an industry-recognized credential, certificate or degree.¹⁶⁵



International Data

Are qualifications continually adjusted to the needs of economic sectors at the state, national and global levels?

Finland: The Finnish National Board of Education developed the qualification requirements for vocational qualifications in partnership with employers in 2008–2010. The Qualification Requirements for different qualifications are reformed on the average every 5 to 10 years, but they can be renewed when necessary, either partially or completely. The cycle of revision and updating is influenced by changes to the qualifications structure and legislation, changes in the relevant occupations and changing needs in the world of work.

Ontario: The Ontario College of Trades has the mandate and powers to regulate all approved trades in Ontario, including setting standards for training and certification and identifying the competencies that must be demonstrated. In August 2014, the Ontario Ministry of Training, Colleges and Universities announced that all 45 publicly assisted colleges and universities signed agreements to ensure that their programs are linked to the economic needs of local and global employers and that the programs are coordinated across the province. Ontario will periodically survey programs to ensure that the range of economic needs in the province is met.¹⁶⁶

Singapore: Every year the Ministries of Manpower and Education, the economic development agencies, and the post-secondary institutions come together to discuss the manpower needs for the economy in the coming years. The discussion influences the programs and courses to be offered by polytechnics and the ITE. Both the polytechnics and the ITE have a robust curriculum development and review process to ensure that they meet industry standard. Their Academic Advisory Committees include industry leaders and professionals who advise them on trends and developments in the industry sector.¹⁶⁷ For example, the ITE training has shifted from a manufacturing focus to a greater emphasis on training for the services sector in the last ten years. This is in line with the government’s economic policies and manpower projections. Skill standards developed in 2005 include communications technology, product design and tourism.¹⁶⁸

Switzerland: Employers take the lead in determining when new occupational programs need to be developed and/or when existing programs need to be revised. Industry associations and the government work in partnership to define the curriculum frameworks or “training plans” for entry into each of the 240 occupations in which there are apprenticeships. The training plans define the knowledge, abilities, and attitudes required. The plan also identifies where each skill is to be learned: in the workplace, the school, or the inter-company training center. Each occupation has a qualification certificate that is attained through a final assessment, and is standardized across the country.¹⁶⁹



INDICATOR 7: CREATE AN EFFECTIVE SYSTEM OF CAREER AND TECHNICAL EDUCATION AND TRAINING

State Data	KY Data
<p>Typically in the U.S., educational institutions determine available pathways to credentials, with varying levels of input from employers and industry groups. The review and revision process is often ad hoc without a clear timeline or method for updating standards to meet current industry needs.</p> <p>MA: While there is not a regular schedule for updating industry-recognized credentials, Massachusetts recently convened teams of technical and academic teachers to update the Vocational Education Frameworks. Part of that process involved evaluating the value of credentials on the current list and identifying new credentials attainable by secondary students. The validation process for the revised frameworks and the identified credentials included review and comments from nearly 700 program advisory committee members, including industry and post-secondary representatives, from across the state.¹⁷⁰</p> <p>NH: The state has a regional CTE structure with four regional consortia. Policy documents indicate that employer representatives are responsible for validating competencies at the secondary and post-secondary level, but details are unavailable on how this is done and with what frequency.¹⁷¹</p> <p>NJ: Employers work with county vocational-technical schools to keep programs aligned with industry needs and to develop new programs that address emerging demands. For example, a consortium of districts is working with several colleges to develop a program in Sustainable Design, Construction and Energy to prepare students for advanced study and careers in a sustainability-focused construction industry.¹⁷²</p>	<p>The Kentucky Department of Education's Office of Career and Technical Education creates new career pathways based upon three criteria: 1) student college and career readiness aspirations, 2) innovative concepts that support industry and economic development opportunities in Kentucky, and 3) specialized needs of regional business and industry. Districts and schools interested in creating new pathways are required to submit the scope of the pathway and labor market/economic development information. Districts and schools need to identify the skill sets and credentials students will develop and the job duties they will be able to perform as a result. Statements of support from regional employers are also required, indicating projected need for trained workers in the occupational area and desired entry-level skill set and credentials.¹⁷³</p> <p>Pathways that align to national industry certifications (i.e., automotive technology's automotive service excellence certification) are reviewed annually. Other programs are reviewed on a three-year cycle. Schools and districts can request revisions to the pathways offered at their school on an annual basis.¹⁷⁴</p>



International Data

Is the CTE system attractive to a broad range of students and parents?

What proportion of students choose to pursue a CTE program of study?

Finland: Finnish students are drawn to CTE pathways because they offer both theoretical and applied learning along with the opportunity to continue higher education after receiving a professional qualification. After compulsory education ends at approximately age 16, 42 percent of Finland’s high school students transition to vocational upper-secondary programs compared to 50 percent who transition to general upper-secondary education.¹⁷⁵ The majority of VET providers offer both upper secondary VET and further vocational training.¹⁷⁶

Ontario: The SHSM program has grown rapidly since its introduction in the 2006-07 school year. In the 2014-15 school year, there are approximately 1,680 SHSM programs with 42,000 students enrolled in programs in over 660 schools (more than 75 percent of all secondary schools in the province.) This represents approximately 12 percent of all grade 11 and 12 students, although in some school board districts, the percentage is as high as 40 percent.¹⁷⁷ A 2011 survey showed that within six months of graduating from high school 64 percent of SHSM students were pursuing a postsecondary program: 31 percent in university, 27 percent in college, and 6 percent in an apprenticeship/pre-apprenticeship.¹⁷⁸

Singapore: After compulsory education, students at approximately 16 or 17 years of age can choose to go to junior college (similar to the upper division of high school) for 2-3 years, a polytechnic for three years of industry-oriented education, or an Institute of Technical Education (ITE) for 1-2 years leading to a National ITE Certificate. About 40 percent of students choose to enroll in one of the five polytechnics. Another 25 percent, typically those who do not perform as well, go to the ITE (there are now three campuses in Singapore). Therefore, a total of about 65 percent pursue some form of CTE.¹⁷⁹ In 2010, an independent survey of Singaporeans found that 69 percent viewed ITE favorably.¹⁸⁰ As of 2014, 87 percent of ITE graduates are hired in their fields within six months of graduation, leading more students to see vocational education as a strong choice for future success. From 1995 to 2006, ITE doubled the number of full-time students enrolled.

Switzerland: CTE is the mainstream upper secondary program, serving 70 percent of Swiss students.¹⁸¹

What percent complete those programs at the secondary level?

Finland: 62 percent VET upper secondary completion rate in 2009¹⁹¹

Ontario: 84 percent high school graduation rate in 2014 (no data on SHSM students)¹⁹²

Singapore: Upper secondary completion rate of more than 98 percent overall. The Institute of Technical Education colleges have an 83 percent graduation rate.¹⁹³

Switzerland: 71 percent upper secondary pre-vocational/vocational program graduation rate in 2008¹⁹⁴

What percent go on to post-secondary education or training or work?

Finland: In 2013, 68 percent of students who received an upper secondary vocational qualification were employed one year after graduation. Data not available on post-secondary education or training enrollment.¹⁹⁹

Ontario: A 2011 survey showed that within six months of graduating from high school, 64 percent of SHSM students were pursuing a postsecondary program: 31 percent in university, 27 percent in college, and six percent in an apprenticeship/pre-apprenticeship.²⁰⁰

Singapore: Eighty-seven percent of ITE graduates were employed in 2012.²⁰¹ Within ten years of leaving the Institute of Technical Education, about half of graduates will go back to school, most of them to the polytechnics for a diploma. And a significant fraction of polytechnic graduates will go on to university, either right after they get their diploma or later on.²⁰²

Switzerland: The Federal Vocational Baccalaureate (FVB) allows a student to enroll in a Swiss university of applied sciences (UAS) without taking an entrance examination. In 2013, 14 percent of VET graduates also obtained an FVB, giving some indication of how many CTE graduates might enroll in university.²⁰³ An OECD report notes that vocational school graduates have a lower unemployment rate (3.1 percent) than those with a general education (5.1 percent).²⁰⁴



INDICATOR 7: CREATE AN EFFECTIVE SYSTEM OF CAREER AND TECHNICAL EDUCATION AND TRAINING

State Data	KY Data
<p>MA: Currently 21 percent of public high school students are enrolled in CTE courses.¹⁸²</p> <p>NH: Currently 18 percent of public high school students are enrolled in CTE courses.¹⁸³</p> <p>NJ: Currently 25 percent of public high school students are enrolled in CTE courses.¹⁸⁴ Demand for CTE programs exceeds the space available at most schools. County vocational-technical school career academies have long been recognized as some of the highest performing high schools in New Jersey.¹⁸⁵ These students outperform their peers on the High School Proficiency Assessment in both math and ELA. Economically disadvantaged and special needs students who enroll in a CTE program often show the most significant gains.¹⁸⁶</p>	<p>68 percent of KY high school student take at least one CTE course.¹⁸⁷</p> <p>KDE/OCTE defines a CTE concentrator or preparatory student as one that has completed two credits and has enrolled in the third course in a sequence within a pathway. To be considered a completer of a technical program, a student must successfully complete four credits in a sequence of courses and graduate from high school.¹⁸⁸</p> <p>There are almost 36,000 preparatory students (those who have completed two credits and are enrolled in at least the third credit of a career major).¹⁸⁹ Overall, 18 percent of public high school students are preparatory. In 2013-14, 47 percent of graduating seniors were CTE concentrators.¹⁹⁰</p> <p>Kentucky is working to elevate the status of CTE programs by ensuring they are built on college readiness standards in addition to career readiness standards. The high proportion of student enrollment may be in part due to Kentucky's school accountability system, which awards points to schools that increase the number of students who complete rigorous career preparation programs.</p>
<p>MA: 96 percent of CTE concentrators earned a high school diploma or equivalent in 2012¹⁹⁵</p> <p>NH: 98 percent of CTE concentrators earned a high school diploma or equivalent in 2012¹⁹⁶</p> <p>NJ: 99.89 percent of CTE concentrators earned a high school diploma in 2012¹⁹⁷</p>	<p>98.66 percent of CTE concentrators earned a high school diploma or equivalent in 2012.¹⁹⁸</p>
<p>Perkins legislation requires states to report on placement data after students have left secondary school. Each state tracks the data a little differently. The data are not disaggregated to see a breakdown by education, training or work pathways.</p> <p>MA: In 2011-12, 96 percent of CTE concentrators who left secondary education were in post-secondary education or advanced training including registered apprenticeships, in the military services or employment 9-12 months after they left secondary education.²⁰⁵</p> <p>NH: In 2011-12, 68 percent of CTE concentrators who completed their secondary CTE education were in post-secondary education or advanced training, in the military services or employment in the second quarter following the program year in which they left secondary education.²⁰⁶</p> <p>NJ: In 2011-12, 94 percent of CTE concentrators who completed a CTE program and attained a secondary school diploma, left secondary education one year before the reporting year, and were identified as placed in employment, in the military service, in an apprenticeship, or in post-secondary education or advanced training following the program year in which they left secondary education.²⁰⁷</p>	<p>In 2011-12, 89 percent of CTE concentrators who completed the program and graduated from school, entered post-secondary education or advanced training, entered the military, or were employed in the reporting year during the second quarter.²⁰⁸</p>



Career Major Options by Jurisdiction

Finland	Ontario	Singapore	Switzerland
Humanities and education	Agriculture	ITE offers 99 courses across 11 sectors of industry under six schools of study: Applied & Health Sciences Business & Services Design & Media Electronics & Info-Communications Technology Engineering Hospitality	CTE offers over 230 career pathways to students. The 20 most popular occupations, accounting for over 60 percent of all apprenticeship contracts, are the following, in order of popularity: Commercial employee Retail clerk Healthcare worker Social care worker Electrician IT technician Cook Mechanical engineer Draughtsman Retail assistant Logistician Automotive mechanic Cabinetmaker Farmer Gardener Hairdresser Bricklayer Carpenter Dental Assistant Motor mechanic
Culture	Arts and Culture		
Social science, business and administration	Aviation and Aerospace		
Natural sciences	Business		
Technology, communication and transport	Construction		
Natural resources and the environment	Energy		
Social services, health and sport	Environment		
Tourism, catering and domestic services	Food Processing		
	Forestry		
	Health and Wellness		
	Horticulture and Landscaping		
	Hospitality and Tourism		
	Information and Communications Technology		
	Justice, Community Safety, and Emergency Services		
	Manufacturing		
	Mining		
	Non-Profit		
	Sports		
	Transportation		

INDICATOR 7: CREATE AN EFFECTIVE SYSTEM OF CAREER AND TECHNICAL EDUCATION AND TRAINING

Massachusetts	New Hampshire	New Jersey	Kentucky
Agriculture and Natural Resources	Agriculture, Food and Natural Resources	Architecture and Construction	Architecture and Construction
Arts and Communication	Architecture and Construction	Arts, A/V Technology and Communications	Business and Marketing
Business and Consumer Services	Arts, Audio Video Technology & Communication	Government and Public Administration and Law, Public Safety, Corrections and Security	Engineering and Technology
Construction	Business, Management, and Administration	Hospitality and Tourism	Family and Consumer Sciences
Education	Education and Training	Health Science	Health Science
Health Services	Finance	Human Services	Information Technology
Hospitality and Tourism	Government and Public Administration	Manufacturing	Manufacturing Technology
Information Technology Services	Health Science	Marketing	Transportation
Legal and Protective Services	Hospitality and Tourism	Science, Technology, Engineering and Mathematics	Visual Media
Manufacturing, Engineering and Technology	Human Services	Transportation, Distribution and Logistics	
Transportation	Information Technology		
	Law, Public Safety, and Security		
	Manufacturing		
	Marketing, Sales and Services		
	Science, Technology, Engineering and Mathematics		
	Transportation, Distribution and Logistics		



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KENTUCKY RISING

Profiles of Benchmarked Jurisdictions

On the 2013 NAEP assessment, eighth-grade students in Kentucky scored 270 in reading. This was higher than the average score of 266 for public school students in the U.S. The reading “score gap” between higher performing students in Kentucky and lower performing students was 44 points, not significantly different than what it was in 1992. On the math portion of the 2013 NAEP test, Kentucky 8th graders scored 281, below the national average of 284. The score gap between higher performing and lower performing students in math was 46 points, not significantly different than what it was in 1990.



The coal industry in Kentucky, which has long been a central part of the state’s economy, is declining. Kentucky does have a heavy concentration in durable manufacturing, including a strong presence in the motor vehicle industry. The state is recovering from the recent recession and its economy is forecast to grow roughly in line with the national economy.¹ The fastest growing counties in the state are in the area bounded by Lexington, Louisville, and Northern Kentucky, and that is where the majority of the jobs are. The rural areas in Eastern and Western Kentucky are losing residents, and therefore are not as prosperous.

Kentucky has been a leader in education reform for two decades. In 1990, it was the first state in the nation to create academic standards that included definitions of what students should know and be able to do. The state created an assessment system to measure student success on those standards using academic and non-academic indicators.

In February 2010, Kentucky was the first state to adopt the Common Core State Standards and incorporated them into the Kentucky Core Academic Standards. The state signed on to the Partnership for Assessment of Readiness for College and Career (PARCC), but withdrew in 2014. The state intends to issue a request for proposals for new tests.

Kentucky is one of the few states that recognizes the distinction between college- and career-ready measures, reports on both, and includes them within the statewide accountability system. Kentucky breaks down its indicators into College Ready (which is based on student achievement on the ACT or a college placement exam) and Career Ready (which is comprised of a “career-ready academic” and “career-ready technical” indicator). The state also assigns a bonus half-point to schools for students who meet both the college-ready and career-ready indicators. The state has seen significant gains in student college and career readiness, moving from 34 percent in 2010 to 62 percent in 2014.

Kentucky has one of the highest high school graduation rates in the country. In the 2013-14 school year, 87 percent of Kentucky students graduated on time. However, Kentucky lags way behind the national average of residents with at least a bachelor’s degree. Only one in five Kentuckians (21.5 percent) have reached that level of educational attainment.

¹ Commonwealth of Kentucky, Quarterly Economic & Revenue Report, First Quarter Fiscal Year 2015, Governor’s Office for Economic Analysis and Office of State Budget Director.



Since 2005, Massachusetts has led the nation in all but one NAEP math and reading exam given. The state's low-income and minority students performed above the national average on NAEP in 2012. If Massachusetts were a country, its 8th graders would have placed second in the world on the 2011 TIMSS science test and sixth in math among 63 countries.¹ On PISA 2012, if Massachusetts were a country, it would place 4th in the world in reading proficiency and 9th in math proficiency out of 65 countries and economies.² Driven by strong information technology and biotech industries and the presence of some of the world's best universities, Massachusetts has recently seen strong economic growth and an increase in high-wage jobs.

In the middle 1990s, Massachusetts' students were performing right in the middle of the pack on national tests. In 1992, 23 percent of the state's 8th graders met proficiency standards in math according to NAEP. Business leaders worried that students would not be globally competitive and pushed legislators to take action. In 1993, Massachusetts passed the Education Reform Act, which put in place rigorous, statewide standards in English language arts, math, history/social science, foreign languages, health, and science, technology and engineering. The Massachusetts Common Core of Learning outlined what students were expected to know and be able to do by the time they graduated from high school. The state also created a high school exit exam, known as the MCAS, which was first implemented in 1998.

The Education Reform Act also included a complex formula to address school funding inequities. Massachusetts' leaders changed the state's school funding formula so that more tax dollars would be invested in schools in low-income areas. The formula takes into account cost-of-living variances and a community's ability to fund schools.

Massachusetts recently rolled out a new educator evaluation system to integrate teacher and administrator performance with curriculum goals. This year, student performance, including MCAS year-to-year improvement scores, will be incorporated. In addition, the state made teacher certification more difficult and moved to hold colleges with teacher preparation programs more accountable for their graduates' performance in the classroom.

In 2009, Massachusetts was one of the first states to adopt the Common Core State Standards. The state is considering using the Partnership for Assessment of Readiness for College and Career's (PARCC) assessments in grades 3-8 as a possible replacement for MCAS English and Math tests. It continues to use its own state tests in other core subjects as well as continuing to administer high school leaving examinations.

¹ Chang, Kenneth. Expecting the Best Yields Results in Massachusetts. *New York Times*. September 2, 2013.

² Crotty, James Marshall. If Massachusetts Were a Country, Its Students Would Rank 9th in the World. *Forbes*. September 29, 2014.

Eighth-grade students in New Hampshire ranked third in math and sixth in reading compared to other U.S. states on the 2013 NAEP test. On the 2011 TIMSS test, only Singapore outperformed New Hampshire in science and only 5 education systems outperformed the state in math.



Following the recent recession, New Hampshire's economic recovery remains slow, but steady. Manufacturing is the largest sector of the state's economy, accounting for 25 percent of all jobs in New Hampshire; the state's second-largest industry is year-round tourism. One of the projected fastest growing job markets is health care. With its proximity to Boston, southern New Hampshire is home to a number of information technology firms.

For more than ten years, New Hampshire held a top spot in a national survey of children's well being, however child poverty rate is on the rise.¹ New Hampshire is notable for the academic achievement of low-income and minority students. Thirty-eight percent of low-income 4th graders score at or above the proficient level on the NAEP math exam, 13 percentage points higher than the national average. The state gets high marks for its return on investment in education –student achievement is excellent relative to state spending.²

New Hampshire is the only state that prohibits the use of time-based credits. In 2005, New Hampshire eliminated the Carnegie Unit, the core unit around which U.S. schools typically measure credits for high school graduation. In its place, the state mandated that all public high schools measure credit according to students' mastery of material, rather than time spent in class. The state requires school districts to base students' advancement on their mastery of locally developed competencies. It created a statewide "Competency Validation Rubric" to help districts measure the quality of their assessments. Because New Hampshire is a strong "local control" state, the implementation of competency-based education varies from school to school.

In 2010, five New England states (Maine, New Hampshire, Rhode Island, Connecticut and Vermont) formed the New England Secondary School Consortium, a regional partnership to develop innovations in the design and implementation of secondary education. The consortium's goals include increasing five-year graduation rates, decreasing dropout rates, improving college readiness, and boosting the percentage of students enrolling in postsecondary education. As part of this work, the New Hampshire Department of Education is engaged in strategic planning to examine teacher quality, the distribution of teachers among schools, and teacher effectiveness.

¹ The 2014 KIDS COUNT Data Book. The Annie E. Casey Foundation.

² Leaders and Laggards. U.S. Chamber of Commerce, 2012.



Eighth-graders in New Jersey ranked second in math and third in reading on the 2013 NAEP test. On the 2011 TIMSS test, only three education systems scored higher than New Jersey in science and five systems scored higher than the state in math. New Jersey is one of the most diverse states in the country and the state has struggled to close a persistent achievement gap. New Jersey saw some improvement with the 2013 NAEP, especially the gap between Latino and white students in eighth-grade reading (the gap closed by 10 points since 2011) and math (the gap closed by 11 points since 2011).

New Jersey's economy is driven by several major industries, including pharmaceuticals, financial, chemical development, and telecommunications. This correlates with the fact that the state has a large and well-educated labor pool. New Jersey ranks sixth in the U.S. in the percentage of the population with a bachelor's degree. New Jersey is also home to top universities, such as Princeton and Rutgers, and boasts a strong scientific community.

New Jersey spends \$25 billion a year on education and has one of the highest per pupil expenditures. The School Funding Reform Act of 2008 was passed in an effort to end years of inequities in school aid. Allocations are based on a per-pupil adequacy budget, reflecting an analysis of what it should cost to educate a child in an efficiently functioning school district. At-risk students (those eligible for free or reduced lunch, with limited English proficiency status, and special education) are given additional funds. Because there are additional challenges in meeting students' needs in very poor communities, additional at-risk weight increases as the poverty concentration in a community increases, boosting overall funding. However, a recent study noted that the Garden State had dropped in fair school funding from second to 12th place nationally, citing budget cuts during the recession that disproportionately affected low-income districts.¹

The New Jersey Core Curriculum Content Standards were first adopted by the State Board of Education in 1996. Curriculum is decided at the local level. In 2010, New Jersey adopted the Common Core State Standards. The Partnership for Assessment of Readiness for College and Careers (PARCC) assessment will be implemented during the 2014-15 school year.

New Jersey has recently made several changes to its accountability system. In 2012, the state passed a law, with bipartisan support, that would make it more difficult for teachers to earn tenure and requiring that teachers be evaluated on multiple measures, including student performance on standardized tests. Under the old law, tenure was awarded after three years on the job. Under the new law, teachers are required to work for four years, with one of those years under the guidance of a mentor, and consistently earn positive annual performance evaluations before attaining tenure. Teachers would also be held accountable for student performance. The original plan was to use student PARCC test results in teacher evaluations and school effectiveness designations, but those high stakes have been delayed.

¹ Is School Funding Fair? Rutgers Education Law Center, 2014.

The world is catching up to Finland, but its student achievement scores are still very impressive. In 2012, Finland ranked fifth in science, sixth in reading, and twelfth in math on the PISA exams. This was a drop from 2009 when Finland ranked second in science, third in reading, and sixth in math. In 2006 and 2003, Finland ranked first or second in all three subjects. On the TIMSS assessments, Finland eight-graders placed fifth in science and eighth in reading in 2011.



Finland underwent an economic transformation in the early 1990s. Once its major trade partner, the Soviet Union, collapsed, the government invested resources in developing its telecommunications sector. Now Finland is counted among the world's high technology leaders, with a very modern economy centered on the telecommunications, consumer electronics, forest products, and metals industries.

Finland's student achievement success is not the product of a particular initiative or investment. The country's modern education system was built over time. One critical element, however, is the quality of teachers. Teaching is Finland's "most respected" profession, and primary school teaching is the most sought-after career. Teacher education programs are highly selective, admitting only one out of every ten students who apply. Teacher education is heavily research-based, with a strong emphasis on pedagogical content knowledge. Students must also spend a full year teaching in a school associated with their university before graduating and earning a master's degree, which is required of all teachers.

Once on the job, teachers are given autonomy to plan their lessons and use their professional judgments when implementing the national curriculum. As such, teachers are happy in their jobs and the country has a very high retention rate with about 90 percent of teachers remaining in the profession for the duration of their careers.

Students do not take exams for accountability purposes. Schools are only formally evaluated periodically, with an exam administered to a sample of students in grades 6 and 9. Finnish schools are comprehensive and untracked until upper secondary school, at which point students may choose to attend either an academic or vocational school. Approximately 47 percent of graduates choose to enroll in vocational schools.

The only formal, national test is the university matriculation exam: a set of four open-ended exams that are based on problem-solving skills rather than subject mastery. Although most students who go on to university take this exam, it is not required for graduation from upper secondary school or even for university admissions—some universities admit students based on other standards.



Fifteen-year-old students in Ontario placed 4th in reading, 11th in math, and 8th in science on the 2012 PISA. Ontario student achievement matched the Canadian average in all three subjects. On the 2011 TIMSS, eighth-grade students in Ontario placed 9th in math and 12th in science out of 63 participating countries.

Ontario has a population of approximately 13 million, making up 40 percent of the Canadian population. It is Canada’s largest province and has the largest economy, accounting for almost half of the country’s manufacturing GDP. The main international export is motor vehicles. Ontario is projected to lead the provinces in average economic growth over the next few years.

In Canada, education is the responsibility of the ten provinces and three territories. Canada as a whole has one of the highest, if not the highest, rates of immigration per capita in the world. According to an OECD report, Canada takes in 40,000 newcomers to its public schools each year, 80 percent of which are non-English speaking. PISA results suggest that within three years of arrival in Canada, immigrants score an average of 500 on the PISA exam, a score well above the U.S. average and very strong by international standards. Canada is also one of very few countries where there is no gap between the performance of its immigrant and native students on the PISA.

The Ontario Ministry of Education oversees the provincial system. It provides 100 percent of school funding. Ontario has in place a province-wide curriculum, along with an aligned assessment and accountability framework. In recent years, the Ministry has chosen to hone in on a few clear goals: increasing the passing rate of literacy and numeracy in elementary schools from 55 percent to 75 percent and increasing the high school graduation rate from 68 percent to 85 percent. A recent report notes that significant progress has been made to date: 71 percent of 3rd and 6th grade students are achieving provincial standards in literacy and numeracy, and the high school graduation rate has risen to 83 percent.¹

Teacher candidates are drawn from the top-third of secondary school graduates and the province has invested in teacher development and support. The competence and professionalism of the teaching force has allowed the Ministry to avoid top-down school reforms and encourage local experimentation and innovation. The provincial government works collaboratively with administrators and teachers (including teachers’ unions) to encourage experimentation and innovation. The role of the Ministry is to highlight best practices and serve as a clearinghouse. This approach has helped engender broad public support.

And, the reforms seem to be paying off. In 2012, more than nine out of ten people (91 percent) in Ontario aged 25 to 64 had completed high school. In that same year, 53 percent of Canadian adults held a tertiary qualification, the highest share among OECD countries (the OECD average is 32 percent). This high ranking is due in part to Ontario’s high rate of vocational college attainment, in addition to university completion.

¹. Achieving Excellence: A Renewed Vision for Education in Ontario. April 2014.

First in 2009 and then in 2012, Shanghai's 15-year-old students ranked number one in the world on the PISA reading, math, and science exams.

Shanghai is China's largest city, with a population of over 20 million, and one of the largest cities in the world. It accounts for only 1 percent of China's population and less than 1 percent of its land area, but Shanghai produces one-eighth of China's income. Sitting at the mouth of the Yangtze River, Shanghai is an important economic, financial, trade, and shipping center. Key industries include telecommunication, car production, high-tech products, and steel production. It should be noted that Shanghai is wealthier than the rest of China and is not representative of the country as a whole.



In 1985, Shanghai, for the first time, set its own exams for entrance into its higher education institutions. This allowed Shanghai to make a critical shift in curriculum and assessment. It moved away from a heavy emphasis on memorization and rote learning to an emphasis on cross-disciplinary studies and the ability to solve real-world problems.

This was followed in 1998 by an integration of sciences and humanities and an even greater emphasis on active inquiry in the learning process. Over time, Shanghai produced a curriculum balanced between a core curriculum that is the same for all students, an enriched curriculum that permits students to choose their own electives and an inquiry-based curriculum, which is implemented mainly in extra-curricular activities.

Over the last two decades, Shanghai has worked to improve teacher capacity as well, raising the level of education required to teach. Many teachers now have master's degrees. All new teachers are assigned a mentor for about three years who provides support in instructional content and delivery. Every teacher is expected to participate in at least 240 hours of professional development every five years. Teachers are encouraged to lecture less and stimulate active student engagement more. Shanghai created a web platform to facilitate teacher collaboration and sharing of best practices. Shanghai also encourages school collaboration, pairing good schools with weaker ones and sending in handpicked leaders and teachers to transfer effective management practices.

While Shanghai has adopted a policy of integration, allowing migrant children to attend public schools alongside the children of Shanghai citizens, Shanghai continues to struggle with China's hukou policy where resident permit requirements often make it difficult for migrants to attend public schools. Reform of this policy is at the top of China's domestic policy agenda. This is part of the jurisdiction's focus on ensuring greater access to education for all students, as well as greater support for struggling students. By 2020, Shanghai hopes to create universal free preschool programs to give students a head start for primary school and put them on even footing with children who attend private preschools.



In 2012, Singapore ranked number two in mathematics and three on science and reading on PISA.

In less than 50 years, Singapore has gone from an impoverished island with no natural resources and a population a majority of whom were illiterate, to a country of 5.4 million people with living standards that match those of the most highly developed industrial nations. Today, Singapore is home to one of the

world's largest and busiest ports. It is also one of the world's major telecommunications hubs and a leader in consumer electronics, pharmaceuticals, financial services and information technology.

Singapore's secondary education system is centralized, coherent, and well funded. There is a well-aligned system of curriculum, assessment, and instruction. In 2004, the government developed the "Teach Less, Learn More" initiative, which moved instruction further away from the rote memorization and repetitive tasks on which it had originally focused to deeper conceptual understanding and problem-based learning. In 2008, the practice of grouping students into ability-based tracks was abandoned with students now sorted into three different "bands" in secondary school based on their ultimate educational goal. Although students take the majority of their classes within their bands, there is more flexibility for students to take classes in other bands.

Singapore is also notable for its investment in building educator capacity, especially the selection, training, and ongoing professional development of principals and teachers. Singapore's teachers are drawn from the top-third of their secondary school class and entry is competitive. Beginning teachers are compensated at levels roughly equal to beginning engineers. They are trained in one of Singapore's most prestigious higher education institutions. Singapore goes to considerable pains to identify the teachers with the greatest potential and then give them the training and job opportunities they need to climb up well defined career ladders that offer a variety of career paths to top leadership positions in teaching, school management, or the Ministry of Education.

In 1992, the government created the Institute for Technical Education (ITE) where students learn vocational and technological skills in state-of-the-art facilities supported by international corporations. As of 2014, 87 percent of ITE graduates are hired in their fields within six months of graduation. Recently, the Singaporean government has sought to further strengthen its vocational education programs by articulating career pathways and further expanding workplace partnerships.