Kentucky Report

From Two Systems to One World-Class System of Technical Centers

SREB | High Schools That Work

This report was prepared by the Southern Regional Education Board (SREB) in January 2014 for the Kentucky Department of Education. For more information, contact SREB Senior Vice President Gene Bottoms at (404) 875-9211, or gene.bottoms@sreb.org.

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Introduction and Readers' Guide

Kentucky's Approach to College and Career Readiness

The Kentucky Department of Education (KDE) seeks to position its Career and Technical Education (CTE) system as among the best in the nation. Following KDE's mission "to prepare all Kentucky students for next-generation learning, work and citizenship by engaging schools, districts, families and communities through excellent leadership, service and support," Kentucky legislators took a number of bold steps to ensure that all students receive a quality education to meet future workforce demands: Senate Bill 1, Senate Bill 38 and House Bill 207.

Senate Bill 1, passed in 2009, launched the state's Unbridled Learning initiative. SB1 seeks to align K-12 and postsecondary expectations and increase the number of high school graduates ready for college. SB1 addresses what students should learn and the accountability system used to measure college readiness.

Senate Bill 38, sponsored by Senator Jack Westwood and passed in 2012, aims to provide a career pathway process for secondary education. Through a more rigorous academic focus on CTE, the bill provides for a career-based program of study to make students' high school years more relevant to their futures as working adults. **SB38 requires KDE to issue core content standards for CTE, assess student progress and develop new courses relevant to college and career readiness.**

House Bill 207, signed by Governor Beshear in 2013, unites the state's two CTE systems under the guidance of KDE with the goal of creating a more relevant and efficient system to educate and prepare students for the workplace.

Part of a larger effort to prepare students for a wider range of career and postsecondary options, HB207 seeks to:

- join a solid academic core with quality high school career-technical (CT) studies;
- make career pathway programs more accessible earlier in students' educational trajectories; and
- make CT programs both more intellectually demanding and better aligned with postsecondary and employer requirements.

College Readiness. Being college-ready means that a student has obtained the level of academic preparation needed to succeed in credit-bearing courses in college without the need for remediation. Kentucky's college readiness benchmarks are an ACT score of 18 for English, 20 for reading, 19 for introductory college mathematics, 22 for college algebra and 27 for calculus. Students can also qualify as college-ready by meeting benchmarks on ACT's Compass college placement test or KYOTE (Kentucky Online Testing) exam.

Career Readiness. Career readiness has multiple components. Academic career readiness is measured by Kentucky's college readiness benchmarks or by benchmarks on the Armed Services Vocational Aptitude Battery (ASVAB) exam or the WorkKeys National Career Ready Certificate. Students must score at the fiftieth or higher percentile on the ASVAB or obtain a Silver or higher certificate on the WorkKeys. Technical career readiness is measured with one of the state's 31 Kentucky Occupational Skills Standards Assessments (KOSSA) or an approved industry certification. **To be considered career-ready, a student must have completed a sequence of at least three preparatory courses in a career field or pathway, receive a related industry certification or KOSSA and meet the benchmarks on the ASVAB or WorkKeys.**

Delivery of CTE in Kentucky. CTE in Kentucky is delivered both in comprehensive high schools and in shared-time technical centers. The state currently has 95 state and local technical centers.

Study of Kentucky's Technical Centers. In September 2013, KDE requested that the Southern Regional Education Board (SREB) conduct an external review of its system of 95 technical centers in order to **assess the impact of CTE on student performance, graduation and preparation for college and a career, as well as to examine the strength of the relationships between high school career preparation programs and the regional workforce needs of Kentucky's businesses and industries.** The intent of this review is to determine how well state and local technical centers are performing and whether all centers are on a trajectory to adhere to KDE's mission for CTE and to meet the goals of SB1, SB38 and HB207.

Readers' Guide to the Report

Scope of Work

SREB's study of Kentucky's 95 state and local technical centers included (1) administering teacher and student surveys, (2) conducting desk audits of current data, (3) conducting on-site institutional reviews at six centers, (4) facilitating two focus group interviews, and (5) conducting interviews with a number of state personnel.

The sections that follow briefly describe the research questions that guided the study, the data sources on which it drew and the outline and contents of the report.

Research Questions

Ten research questions guided the study and are answered in 10 sections of the report:

- **Section I: Alignment of CTE Offerings and Workforce Needs Statewide and by Economic Regions:** How aligned are current career pathway programs of study with projected high-skill, high-wage, high-demand job needs in the next decade by major state economic sectors, regionally and statewide?
- **Section II: College- and Career-Readiness Standards:** How well have students at Kentucky's 95 state and local technical centers succeeded in meeting new state benchmarks in career readiness, college readiness or both?
- **Section III: Academic Support Provided by Home High Schools to Technical Center Students:** Have the academic courses taken by CT students at their home high schools been effective in preparing them for success in meeting college- and career-ready academic standards?
- **Section IV: Articulation, Dual Credit and Alignment of Technical Center Programs with Community Colleges:** Do all programs have articulation agreements that provide postsecondary credit opportunities and a proven track record of success, and are secondary career programs aligned with current offerings at the state's community and technical colleges?
- **Section V: Implementation of Individualized Career Learning Plans:** Are students being placed in career pathway programs of study that align with their individual learning plans and regional and state economic sector needs?
- **Section VI: Rigorous Assignments:** Is there a major difference across state and local technical centers in students' perceptions of the rigor of assignments they receive from their CT teachers?
- **Section VII: Professional Development:** Do teachers believe that professional development opportunities allow them to stay current in their career content and to effectively integrate essential academic knowledge and skills into student assignments that meet the emerging trends of the workforce?
- **Section VIII: Continuous Improvement:** Are there perceived differences among the faculty at state and local technical centers on whether their centers foster a culture of continuous improvement?

- **Section IX: Advisory Committees:** Do all technical centers have advisory committees that participate in program reviews to ensure alignment with industry standards, expectations and trends?
- **Section X: Facilities:** Are technical center facilities safe, state-of-the-art and well-maintained so all students can master the full range of skills and competencies required?

Data Sources

Faculty and Student Surveys. In October 2013, SREB asked faculty and students in all 95 state and local centers to complete SREB's Technical Centers That Work (TCTW) Faculty and Student Surveys. All 53 state centers completed the survey, and 27 of the 42 local centers participated.[1] Across state and local centers, 811 teachers completed the faculty survey and 5,387 seniors completed the student survey.

The faculty survey gave technical center teachers an opportunity to provide feedback on their perceptions of the quality of learning opportunities, leadership for instructional practices, student engagement and collaboration within their centers. Teachers also had an opportunity to indicate the professional development they had received and the kinds of professional development they would like to receive in the future. The student survey asked students about the courses they have taken in high school and their perceptions of their high school experiences, including their academic studies, assignments in CT and academic classrooms, work-based learning, expectations, literacy and mathematics instruction, guidance and extra help.

Desk Audit Data. First, SREB reviewed regional data from Kentucky's 10 workforce regions. A series of reports prepared in 2011 for the Kentucky Workforce Investment Board (KWIB) by Maher & Maher and EMSI (Economic Modeling Specialists Intl.) provided data on the targeted industry sectors for the state as a whole and for each of the state's economic regions.

KDE provided a broad range of data on its CT programs at the state and local technical centers. These data, generally covering the 2011-12 and 2012-13 academic years, included, but was not limited to, such items as:

- numbers of students completing a program of study including three or more CT courses
- numbers of students enrolled in programs of study at each center
- career pathways offered by each center
- academic curriculum data, including dual credits earned
- college readiness data, including numbers of students meeting ACT benchmarks
- career readiness data, including numbers of students meeting ASVAB or WorkKeys benchmarks, passing a KOSSA and receiving industry certifications
- technical center faculty and leadership data, as available
- alignments with postsecondary programs and numbers of dual credits earned

Institutional Reviews. SREB conducted institutional reviews in six technical centers across Kentucky. SREB and KDE used college- and career-readiness data to rank centers from highest performing to lowest performing, then chose one state and one local center from each third of the ranking, ensuring that a different workforce region was represented for each center visited. The review team consisted of a former state CTE director, a current Kentucky technical center director and a KDE representative.

Each technical center created a profile of artifacts that consisted of Program Assessment boxes that included the curriculum, unit and lesson plans, classroom assignments, samples of student work and assessments. Each technical center also provided the team with a copy of its TEDS (Technical Education Database System) Report, School Report Card, Perkins Plan and Advisory Council agendas and minutes. The centers also conducted a self-assessment using SREB's *Evaluating the Quality of Career-Technical Programs* rubric.

During the one-day on-site visit, the review team conducted formal interviews with technical center leadership, teachers, students and key central office leaders. The team conducted walkthrough observations and examined center-provided artifacts. The team's analysis was based upon examination of the documents provided by the center, interviews and on-site experiences and observations.

During the six institutional review visits, 53 students, 37 teachers, 10 directors or high school principals, 11 central office staff members, 12 business and industry partners and seven guidance and advisement staff members participated in face-to-face interviews. The team visited 60 classrooms and analyzed dozens of artifacts that contained curriculum maps, lesson plans, projects and assessments. All collected data were considered in developing this report.

Focus Groups. SREB conducted two focus groups on November 12 and 13, 2013. One group was the Commissioner's Superintendent Advisory Committee, which consisted of 11 superintendents representing a cross-section of superintendents from the eight educational cooperatives. The other group included eight members of the CT Advisory Committee, which was comprised of business and industry representing a cross-section of Commonwealth stakeholders. Participants answered a series of questions regarding the current state of technical education within their district, region and state, and their vision for CTE across all workforce regions in Kentucky.

Individual Interviews. One-on-one interviews were held with Terry Holliday, Commissioner of Education; Dale Winkler, State CTE Director; and Shirley Akers, Deputy Executive Director of the Kentucky Center for Education and Workforce Statistics.

Outline and Contents of the Report

Executive Summary. This section of the report offers SREB's four over-arching recommendations related to the state's need to (1) commission an in-depth study that will identify funding priorities and formulate recommendations to create an improved and more equitable funding system for all technical centers, (2) based on a set of best practices priorities, establish an accountability system that not only measures outcomes, but also measures whether all of the components are in place that will maximize opportunities for all students, (3) forge a unified system of world-class technical centers, and (4) establish stronger, more formal ties between the state's secondary and postsecondary education institutions and private sector business and industry partners by creating a robust system of state and regional advisory committees.

Sections I-X. These sections of the report present a fuller description of SREB's findings related to the 10 research questions that drove the study. Each section provides the research question addressed, outlines key findings and makes targeted recommendations intended to help the state achieve a world-class system of technical education offering optional career pathway programs of study leading to success in postsecondary study and the workplace.

Appendices. As a supplement to the main report, Appendices A and B include additional detailed information on state and regional workforce demands, available technical center and community college programs and numbers of program graduates. Appendices C and D align state and regional job opportunities and program graduates by industry sector with a series of detailed recommendations.

Executive Summary

From Two Systems to One World-Class System of Technical Centers

World-class technical centers can help launch high school students on their chosen career pathways toward continued on-the-job learning and postsecondary study leading to industry certifications, associate's degrees or higher, and high-wage, high-skill, high-demand jobs. High-quality career pathway programs of study not only help students acquire valuable credentials, degrees and good-paying jobs, they have the potential to reverse the downward spiral of reduced economic opportunity experienced by young adults, especially young men, during the past two decades.

Achieving a system of world-class technical centers and high-quality career pathway programs of study will require center directors and home high school principals — in partnership with their school districts, KDE, the Kentucky Community and Technical College System (KCTCS) and business and industry partners — to share a vision of what it means to be college and career ready and what it takes to prepare more students for postsecondary education, advanced training and success in the workplace.

The vision for Kentucky's technical centers as presented in this report is not an inferior alternative to the more traditional college-preparatory high school experience. The career pathway programs of study offered by Kentucky's technical centers can represent an equally rigorous option, one that takes a different approach to learning that prepares students for both further study and the workplace. However, technical centers' success is grounded in the quality of the academic and technical preparation and educational and career counseling that technical center students receive at their home high schools and at the technical centers. To achieve a world-class system of technical centers, closer working partnerships in the blending of academic and technical studies are needed between the centers and their home high schools.

As a result of its study of Kentucky's 95 state and local technical centers, SREB offers four over-arching recommendations to the state:

1. Commission an in-depth study that will identify funding priorities and formulate recommendations to create an equitable and adequate funding system for all technical centers.
2. Establish an accountability system that not only measures outcomes, but also measures the implementation of best practices that will maximize opportunities for students.
3. Create a single system of world-class technical centers.
4. Establish stronger, more formal ties between the state's secondary and postsecondary educational institutions and business and industry partners by creating a robust system of state, regional and local advisory committees.

1. One System with Equitable and Adequate Funding for All Technical Centers

The scope of SREB's study of Kentucky's 95 technical centers did not include the depth needed to: (1) address current funding policies for the two sets of state and local technical centers, (2) determine the resources needed to work toward a unified world-class system of technical centers, and (3) propose an equitable and adequate funding system design to address the unique needs of the types of programs offered.

SREB strongly urges the Kentucky General Assembly to approve such a study during its 2014 legislative session to identify funding priorities and formulate recommendations to create an adequate and more equitable funding system for all technical centers.

Select a person or organization to conduct this study that has demonstrated expertise in conducting studies of funding systems for CT systems. An adequate and equitable funding system is essential for the state to move forward in fully unifying its two systems into a world-class network. All technical centers need access to the resources needed to develop new programs and redesign existing programs to better align with state and regional economic priorities. Funds are needed to provide academically and technically rigorous instruction, authentic project-based classroom assignments and assessments, industry-standard technology and software, highly qualified teachers and leaders and industry-standard facilities.

SREB identified some reported inadequacies and inequities in how funds are currently used to pay for CT programs at the state and local centers, including, but not limited to:

- **Assessment and accountability.** CT students who do not meet readiness benchmarks on the ACT are required to take the WorkKeys. However, state centers, but not local centers, receive state funds to pay for the administration of the WorkKeys. There are some local centers that have chosen not to administer this test due to its cost.
- **Career pathway programs of study.** Some local centers appear better able to provide more programs and sustain those programs despite budget cuts. State centers have fared the worst in the face of state budget cuts. Programs leading to jobs in high-demand areas — including some for which new classroom and labs have been built — have languished due to the lack of funds for salaries for teachers. Other programs linked to local industries face elimination without the support of grant funds. Additional state dollars are needed to develop more career pathway programs of study (see *Signature Features of Career Pathway Programs of Study* in Section I of this report).
- **Facilities, equipment and supplies.** Some centers lack classrooms or have limited space in classrooms and shop areas. Many technical centers also lack the facilities, technology and software needed to provide instruction to meet emerging industry-driven standards. Some programs have limited student enrollments because supply budgets have been cut more than 40 percent in the last five years and no equipment purchases with state funds have been made in the last eight years.
- **Industry certification examinations.** State and local centers vary in which industry examinations they offer as well who pays for them — the state, local districts or students themselves. The state cannot have academic and technical career-readiness goals that will be taken seriously by districts and schools until the state pays for these exams. At present, the state lacks a consistent policy regarding how industry certification examinations are to be funded. A system of incentive funding is needed to encourage districts to take on the added cost of getting more students academically and technically career-ready.
- **Salaries and staffing.** Overall, centers lack the funds needed to hire teachers for new and existing programs, and state center teachers have not received a pay raise for over five years. Further, a preliminary review of KDE teacher salary data for state and local technical centers showed that, on average, local technical center teachers earn more than state technical center teachers. A more complete salary analysis is needed to create an equitable and adequate salary system for highly qualified CT teachers.
- **Staff development.** Citing budget cuts, teachers at state centers said that other than required technical update workshops, they received little development on instructional strategies, integrating academic content into the curriculum and better preparing students for industry certification exams.

2. One System of Accountability and Support for All Technical Centers

The state's pioneering work to include CT students in its accountability system represents an excellent step toward creating one system of technical centers. Continued efforts to strengthen the career and technical aspect of the state accountability system can further contribute to the development of a more unified system of technical centers. Kentucky is in the enviable position of having 95 technical centers to serve students across the Commonwealth; however, as currently constituted, these centers share neither a common vision nor a set of proven practices to achieve excellence and meet the state's ambitious college- and career-readiness benchmarks.

Establishing a broad framework of research-based best practices for both technical centers and home high schools is essential if all centers are to implement a 21st-century technical center curriculum and instructional program that will help students meet readiness goals (see *Best Practices Priorities for Kentucky's Technical Centers*, Section II). It is essential that the state also establish a set of indicators to measure the quality of students' experiences in both academic and career-technical classes. Home high schools and technical centers can foster the conditions needed for success by working together to implement eight *Signature Features of Career Pathway Programs of Study* (see Section I) that prepare students academically and technically and with the habits of behavior and mind needed to succeed in career pathway programs of study. At present, the home high schools and technical centers offer only fragmented components of these signature features.

SREB recommends that the state:

- **Set as a target that 90 percent of all students completing a coherent CT sequence of at least three courses will meet academic and technical career-readiness standards.** Provide incentives to districts and schools making significant gains in providing the increased instructional time needed for students to earn a valued industry certification.
- **Rethink how industry certification exams are approved and expand options regarding what constitutes an approved industry certification exam or alternatives to industry certification exams. Approve only industry certification exams or bundles of certification exams (e.g., two or more in a related career pathway) that: (1) lead to employment opportunities that exist within the state, as verified by the Kentucky Labor Cabinet; (2) give students employment preference in a given job, as verified by at least two or more potential employers; (3) provide long-term benefits both to the state economy and to the individual student; and (4) meet the approval of the Kentucky Workforce Investment Board (KWIB).**

  Further, the state should consider additional means through which students can meet technical readiness standards. Many of the high-wage, high-skill, high-demand jobs designated as high-priority career fields by the KWIB will require work experience and more hours of instructional time than students can currently receive during high school. If there is a rush to approve low-level industry certification exams that do not lead to advanced opportunities, this may reduce the number of individuals prepared for high-wage, high-demand jobs.

There are several options that the state might consider:

- Increasing instructional time at the technical center.
- Increasing opportunities to engage in work-based learning.
- Awarding increased accountability points for students who continue in their career pathways to further on-the-job training, postsecondary studies and the acquisition of state-approved industry certifications or degrees.

- Recognizing students as having met technical readiness standards if they pass an end-of-course exam, as approved by KDE and KCTCS, in at least two Advanced Career courses, for which they would receive transcripted postsecondary credits.

Such alternatives to industry certification exams would demonstrate that students have acquired the necessary academic and technical skills to pursue further study in the same career area. At present, not enough students from the technical centers are pursuing postsecondary studies in the same career field.

- **Incentivize technical centers and individual career pathway programs demonstrating significant improvement in the percentage of students meeting academic and technical career-readiness standards.** Consider providing incentive funds to any technical center or career pathway program making significant improvement toward meeting the state's goal of 90 percent of CT sequence completers meeting academic and technical career-readiness standards. These funds could be used to upgrade equipment, supplies, curricula and professional development.

- **Require any technical center in which less than 50 percent of students meet academic and technical career-readiness standards to work collaboratively with an external group, the district and KDE to develop a comprehensive improvement plan that addresses what the feeder high schools can do, and each program can do, to increase the percentage of students meeting readiness benchmarks.** Such plans would ensure that curricula, instruction, student assignments and classroom assessments are fully aligned with relevant academic, technical and 21st-century skills. The improvement plan would also include efforts the feeder high school would need to make to improve student academic readiness in collaboration with the technical center.

- **Establish a framework of proven practices that, when implemented with fidelity, can improve student readiness for college and careers. These practices, as described in *Best Practices Priorities for Kentucky's Technical Centers* (see Section II), will inform districts, technical centers and home high schools as they create and implement improvement plans.**

- **Obtain the input and participation of critical employers from the region who have an interest in high-quality CT programs. As a basis for receiving state support, each technical center would have a general advisory committee that will play a key role in planning, development and implementation of technical center programs, curricula, instruction and assessment.** See Section IX on the roles of advisory committees.

- **Be willing to change center leadership and discontinue programs that fail to make improvements in the number of students meeting academic and technical career-readiness benchmarks after a reasonable period of time.**

- **Assume the cost of assessments of academic and technical readiness for all technical centers.**

3. One System of World-Class Technical Centers

Kentucky's goal is to create a system of world-class technical high schools that provide students with optional career pathway programs of study leading to a good job, advanced training and an associate's degree or higher. With the passage of HB207, the state took a major step toward unifying its two systems of state and local technical centers by creating a leadership structure within KDE to support a single system. However, across all centers, not enough students are meeting readiness standards, and much more needs to be done if the state is to reach its goal of having many more students meet both college-ready and career-ready academic and technical readiness goals.

KDE has a process through which a local school district could submit a request to the state to assume authority for the management and control of a state technical center. SREB recommends:

- **KDE should establish incentives and conditions for local boards of education that own the facilities that house a state-run center to work with the executive director of the Office of Career and Technical Education to develop a comprehensive plan to assume authority for the management and control of that center.** This would involve taking all necessary actions needed to ensure the orderly transfer of personnel, equipment and resources to the local board of education.
  - **Address how the center would be supported in implementing a set of research-based *Best Practices Priorities for Kentucky's Technical Centers*** (see Section II). These best practices include strengthening potential technical center students' academic readiness in grades nine and 10, embedding academics in CT studies, offering a unified system of counseling for careers between home high schools and centers, implementing the eight *Signature Features of Career Pathway Programs of Study* (see Section I), providing for the selection and development of high-quality faculty and ensuring that programming reflects the existing and future needs of business and industry within the area.
  - **Establish a process and criteria for students to attend the technical center.** The technical center director and/or counselor at the home high school should confirm that enrolling students have made thoughtful decisions that align their career goals with the programs in which they are seeking to enroll. Section V of this report presents recommendations for connecting Individualized Learning Plans (ILPs) with students' interests and abilities and potential careers and opportunities at the technical center and beyond.
  - **Create an active general advisory committee at the technical center.** See Section IX of this report and the fourth section of this executive summary for more on these advisory committees.
  - **Offer funding support to modernize offerings in line with regional and statewide employment opportunities, upgrade instructional equipment and software, redesign curriculum and instruction to reflect the *Signature Features of Career Pathway Programs of Study* (see Section I) and design more rigorous assignments (see Section VI).**
- **Commission a feasibility study on converting state technical centers serving multiple districts and high schools into full-time technical high schools offering grades nine-12 or 11-12.** Such full-time technical high schools would better connect academic and CT studies and provide more time for academic and technical instruction, time that is currently being taken up with transportation to and from the center. Other states, including Delaware, Massachusetts, Ohio and Pennsylvania, offer models of full-time technical high schools that serve multiple districts, configured as either grades nine-12 or 11-12.

4. One System of Technical Centers in Partnership with Postsecondary and Industry

A strong partnership with postsecondary education and business and industry is essential to creating a world-class system of technical centers. A connected system of technical centers must address state and regional economic and workforce needs through industry sector priorities. At present, there are major gaps in the state's offerings related to these priorities. As Section I of this report describes, the state's 95 technical centers still offer too many traditional programs and too few programs targeting new and emerging sector priorities.

Although we expect Kentucky's technical centers to become world-class, we cannot expect them to produce graduates with the depth of knowledge and skills needed to fill jobs requiring more than a high school diploma but less than a bachelor's degree. **As such, the career pathway programs offered at Kentucky's technical centers must become better connected to continuing studies at the two-year college and on-the-job training provided by employers.** Local district and center leaders and teachers must view their programs as launching students on career pathway journeys that continue with on-the-job training and postsecondary studies leading to advanced certifications, associate's degrees or higher. Technical center leaders and faculty play a critical role in helping students aspire to further training and education, and the active, frequent presence of community college personnel at the center may result in students identifying the community college as their preferred choice.

SREB recommends that the state:

- **Establish a state-level task force for each of the state's five targeted industry sectors that is comprised of representatives from economic regions experiencing major gaps in the number of qualified applicants for jobs in these sectors. Charge each task force with:**
  - Overseeing the redesign of existing programs and developing new programs that meet modern workplace requirements and incorporate the eight *Signature Features of Career Pathway Programs of Study* that lead to further education and training and well-paying jobs (see Section I).
  - Assessing project assignments, soft skills, completed project quality and students' learning of academic, technical and technology skills.
  - Promoting academically and technically rigorous optional career pathway programs of study featuring dual credit and work-based learning opportunities in aligned, coherent and integrated sequences that offer students different exit and re-entry points on the pathway to further education, training and careers.
  - Advising, supporting and encouraging students engaged in career pathway programs of study through job shadowing, summer internship experiences and other work-based learning opportunities.
- **Support a pilot effort to create a regional advisory committee in an economic region in which major gaps exist between industry sector employment demands and qualified applicants; a majority of its members would be representatives of this industry sector.** Other members would include local superintendents, local community college representatives and representatives from participating districts. The goal of this regional pilot effort is to better align high-quality CT program offerings with employer and workforce needs and to ensure that programs lead to further on-the-job training and postsecondary study.
- **Ask each technical center to establish a robust general technical center advisory committee charged with transforming the center into one offering rigorous instruction in career fields relevant to students, the region and the state. Advisory committee members should have a personal stake in improving the center; two-thirds should be local and regional business and industry representatives who can employ graduates from one or more of the center's programs after high school graduation or offer them additional postsecondary education and training. With an industry representative serving as chair, other members of the committee would include:**
  - A representative from a local two- or four-year college who is responsible for developing career pathway programs of study with technical centers;

- A high school principal, guidance counselor and academic teacher (English, math or science) from one or more of the center's sending home high schools;
- A parent with a son or daughter enrolled at the center;
- A district representative; and
- Others as needed, including CT teachers who are to attend as observers.

- **Charge advisory committees with helping centers that fail to meet state academic and technical career-readiness benchmarks, or that fail to make significant annual progress in meeting such benchmarks, to develop and oversee the implementation of a three-year strategic improvement plan, in consultation with center leadership and an external provider.** See Section IX for a fuller set of recommendations on advisory committees.

- **Charge general technical center advisory committees with addressing other major issues, including:**
  - Having more students meet state accountability goals for college and career readiness.
  - Providing work-based learning experiences that will allow students to learn contextually in real-world workplace settings.
  - Redesigning or repurposing programs that are no longer effective.
  - Examining assignments given to students and the quality of student work to determine if they match workplace and postsecondary readiness standards.
  - Supporting center leaders and teachers in updating their skills to reflect changing workplace requirements and the need for postsecondary study.

Section I: Alignment of CTE Offerings and Workforce Needs Statewide and by Economic Regions

Research Question: How aligned are current career pathway programs of study with projected high-skill, high-wage, high-demand job needs in the next decade by major state economic sectors, regionally and statewide?

Kentucky's Commissioner of Education, Terry Holliday, has stated that, "to make the Kentucky system world-class, we must become more responsive to the regional job markets. One size does not fit all regions, and offerings from center to center are too much alike and lack customization to meet demand in the regional area."

In conjunction with private consultants and leaders from a number of state education and economic and workforce development agencies, the Kentucky Workforce Investment Board (KWIB) has identified five industries and 10 strategic business and industry sectors and subsectors that will be targeted for further investment over the coming years. These targeted industries and sectors were identified after a review of "the current business/industry base in the Commonwealth, current targeted sectors of various state, regional and local economic development organizations in Kentucky, recent project activity and other emerging sectors that have shown growth at the national, state and, possibly, local level."[2] The five targeted industry sectors are:

1. **Automobile and Aircraft Manufacturing:** Focuses on industries engaged in the development of automobile and aircraft assembly, prototype development, conversion and overhauling/rebuilding. Industries that manufacture aircraft and automobile components are also categorized in this sector.

2. **Transportation, Distribution and Logistics:** Focuses on the movement and storage of goods and support activities related to different modes of transportation. Specific modes of transportation include water, rail, road and air.

3. **Business Services and Research and Development (R&D):** Consists of industries that specialize in performing professional, and scientific and technical services for businesses and individuals, including research and development.

4. **Health Care/Social Assistance:** This sector involves industries that provide health care and social assistance to individuals that are delivered by health or social service practitioners.

5. **Energy Creation/Transmission:** Focuses on sectors engaged in the creation of energy (e.g., coal, gas, wind, etc.), transmission of energy (power lines, pipes, etc.) and support the creation and distribution of energy.[3]

SREB drew upon KDE data as well as reports prepared for KWIB by Maher & Maher and EMSI (Economic Modeling Specialists Intl.) in order to determine whether the career pathway programs of study currently available at the state's 95 technical centers are aligned with high-skill, high-wage, high-demand jobs in these five targeted industry sectors.[4]

In the findings that follow, Business Services and R&D have been broken out into five clusters — Business and Administration (Administrative Support), Finance (Financial Services), IT, Marketing, and Science, Technology, Engineering and Mathematics (STEM).

Findings

Overall, SREB found alignment gaps between existing CT programs offered at the state's 95 state and local technical centers and workforce needs both at the state level (see Table 1) and by economic region

(see Table 2). For example, there are either no programs or an inadequate number of programs focusing on broad-based manufacturing, transportation, logistics and distribution, and renewable energy. In the case of the manufacturing sector, historically the largest contributor to the state's economy, current CT program offerings generally focus on single-skill occupations (e.g., welding, machine tool technology, electricity, computer-aided drafting) and fail to meet current manufacturing industry needs. In focus groups, manufacturers and employers from other sectors strongly expressed their need for multi-skilled workers who possess applied literacy and math skills, can work with a range of technology, problem-solve and work in teams.

Table 1: Statewide Summary by Economic Sector of Annual Job Openings and Graduates — 2013

Economic Sector Workforce Needs	Cluster CT Programs Offered	Annual Job Openings	Tech Center Graduates	Tech Center Gap[1] (+/-)	Comm. College Graduates	Total Gap[1] (+/-)
Automobile and Aircraft Manufacturing	Manufacturing	455	2,039	+	319	+
Transportation, Distribution and Logistics	Transportation, Distribution and Logistics	1,401	903	–	578	+
Business Services and Research and Development (R&D)	Business and Administration	1,075	931	–	1,073	+
	Finance	350	139	–		–
	Information Technology	751	461	–	328	+
	Marketing	355	171	–		–
	Science, Technology, Engineering and Mathematics	1,433	150	–	222	–
Health Care/ Social Assistance	Health Science	4,182	2,120	–	6,814	+
Energy Creation/ Transmission	Agriculture and Natural Resources	42	19	–	28	+
	Science, Technology, Engineering and Mathematics	4	15	+	56	+
TOTAL SECTOR			**6,948**		**9,418**	

1 "+" signifies that there are more graduates than there are annual job openings in this field.
"–" signifies that there are fewer graduates than there are annual job openings in this field.

Source: *Kentucky's Targeted Industry Sectors*, May 2011, EMSI and Maher & Maher. Complete Data – 3rd Quarter 2010, KDE.

Note: The state classified STEM as part of two industry sectors for a group of jobs in each sector that requires STEM skills and preparation.

Differences Between State and Regional Projections. In comparing the data presented in Tables 1 and 2, please note that there are discrepancies in the number of projected job openings due to a number of factors.

First, there are differences in state and regional economic sector projections. For example, three of the state sectors project fewer annual job openings than do some regional economic sector counterparts: Automobile and Aircraft Manufacturing, the Finance cluster of Business Services and R&D and Energy Creation/Transmission. The *Kentucky's Targeted Industry Sectors* report limits manufacturing projections to automobile and aircraft manufacturing, whereas regional manufacturing projections are based on the full range of manufacturing industries located in a given region. As a consequence, there are more job openings projected for all regions (3,615, see Table 2) than job openings projected for the whole state (455, see Table 1).

In the case of the Finance cluster of Business Services and R&D, the state specifically looks at jobs in accounting, whereas the regions look at jobs in accounting, banking and insurance. The Energy Creation/Transmission sector shows by far the biggest discrepancy, with 46 annual openings at the state level, but 803 annual openings at the regional level. This sector is much more narrowly focused at the state level and includes jobs in power generation, power transmission and pipeline oversight. At the regional level, this sector is titled "Energy and Natural Resources" or simply "Energy," and as a result includes a much broader range of jobs across the entire industry. Jobs in crude petroleum and natural gas extraction account for the vast majority of the projected 803 annual openings. These jobs are not included at the state level.

Second, there may be discrepancies between state and regional job projections due to overlaps in the collection of data at the regional level that may have caused some jobs to be counted twice.

Third, some job data came from outside the state. Some of the jobs included in the Northern Kentucky region were actually located in Cincinnati and southwest Ohio. State projections do not include any data from outside the state.

Fourth, some regions did not share the same economic priorities as the state. As such, the number of annual job openings in those regions may be lower than those projected statewide for a given economic sector. For example, in some economic regions, STEM was not a priority: Thus there were only 310 regional projected job openings in STEM compared to 1,433 for the state. As Table 1 shows, this appears to be the case for some other sectors and clusters, including Transportation, Distribution and Logistics, IT, Health Care/Social Assistance and others.

Finally, other differences may result from the high-wage, high-demand job requirement. Some regions have jobs with generally lower wages than the rest of the state, whereas other regions have jobs with higher wages than the rest of the state.

Gaps Between Projected Job Openings and Technical Center Graduates. As Table 2 shows, SREB analyzed program offerings at Kentucky's 95 technical centers and found gaps between state-level projected annual job offerings and 2013 technical center graduates in the following sectors and clusters:

- Transportation, Distribution and Logistics
- Business Services and R&D: Business Administration, Finance, IT, Marketing and STEM
- Health Care/Social Assistance: Health Science
- Energy Creation/Transmission

When 2013 graduates from the state's 16 community colleges and 95 technical centers are added together, the gap between state-level annual job openings and graduates shrinks to only one sector: Business Services and R&D — Finance, Marketing and STEM.

As Table 2 shows, analyses of regional industry sector data reveal gaps between projected job openings and 2013 graduates of the state's technical centers and community colleges in all sectors or clusters except Transportation, Distribution and Logistics, Business and Administration, IT and Health Care/Social Assistance. Large gaps between employment opportunities and graduates exist in Manufacturing, Finance, Marketing and Energy Creation/Transmission.

Overall, current technical center offerings are not well aligned with current job opportunities, particularly in such areas as manufacturing, transportation, distribution and logistics and STEM. Because funding is not available to add new 21st-century programs in these areas, Kentucky's technical centers will need to repurpose or redesign some of the existing programs to meet industry needs.

In the sections that follow, findings and recommendations are presented for each of the state's five targeted industry sectors and related clusters. Tables 3 and 4 summarize state and regional recommendations by sector; Appendices C and D offer additional recommendations along with projected job opportunities and program graduates for each industry sector or subsector.

Table 2: Summary of All Regional Economic Sectors' Annual Job Openings Compared to Program Graduates of Technical Centers and Community Colleges

Economic Sector Workforce Needs	Cluster CT Programs Offered	Annual Job Openings – All Regions	Tech Center Grads – by Region^	Tech Center Gap (+/-)	College Grads	Comm. College Gap (+/-)	Total Gap (+/-)
Automobile and Aircraft Manufacturing	Manufacturing	3,615	2,039	–	319	–	–
Transportation, Distribution and Logistics	Transportation, Distribution and Logistics	1,179	903	–	578	–	+
Business Services and R&D	Business and Administration	210	509	+	1,073	+	+
	Finance	2,634	109	–	0	–	–
	Information Technology	337	341	+	328	–	+
	Marketing	141	67	–	0	–	–
	STEM	310	77	–	222	–	–
Health Care/ Social Assistance	Health Science	302	616	+	6,814	+	+
	Agriculture and Natural Resources Manufacturing/ STEM^^	803	29	–	84	–	–
TOTALS		**9,531**	**4,690**	–	**9,418**	–	–

"+" signifies that there are more graduates than there are annual job openings in this field.
"–" signifies that there are fewer graduates than there are annual job openings in this field.
* At the regional level, the full range of manufacturing is considered.
** At the regional level, this includes both Finance and Finance and Insurance.
^ At the state level, the focus is primarily on power generation, transmission and pipeline oversight.
^^ State only includes Agriculture and Natural Resources and STEM, whereas Manufacturing is included regionally. Therefore, these clusters have been combined for the regional examination.

Source: *Kentucky's Targeted Industry Sectors*, May 2011, EMSI and Maher & Maher. Complete Data – 3rd Quarter 2010, KDE.

Note: The state classified STEM as part of two industry sectors for a group of jobs in each sector that requires STEM skills and preparation.

1. Manufacturing

Based on KWIB data, statewide, 455 high-wage, high-skilled workers will be needed annually in the automotive and aircraft manufacturing industry. This projection may be too conservative. During a focus group, a manufacturer from Northern Kentucky indicated there were 680 openings in advanced manufacturing in his region. **Overall, given that Kentucky's economic regions have prioritized other manufacturing sectors in addition to those prioritized by the state, annual projected job openings may be greatly underestimated.** As Table 2 shows, three separate economic regions project greater numbers of annual openings in manufacturing than those projected in the KWIB report. Further, the expansion and renovation of the Corvette manufacturing facility in Bowling Green and the expansion of the Ford truck plant in Louisville both suggest that statewide job openings in the automotive manufacturing sector may also be too low.

Across regions, a total of 3,615 job openings are projected annually in Kentucky's manufacturing sector. Yet most of Kentucky's 2013 technical center and community college graduates came out of single-skill occupational programs; some 717 came out of welding programs alone. During focus groups, employers drew significant attention to this problem and questioned how well secondary and community college programs were aligned with workforce needs. **These employers believed the manufacturing programs currently being offered in the technical centers are not designed to provide the technical, academic, problem-solving and soft skills needed in advanced manufacturing. Some technical center programs may need to be redesigned or repurposed to offer an entirely different type of learning experience to better prepare graduates.**

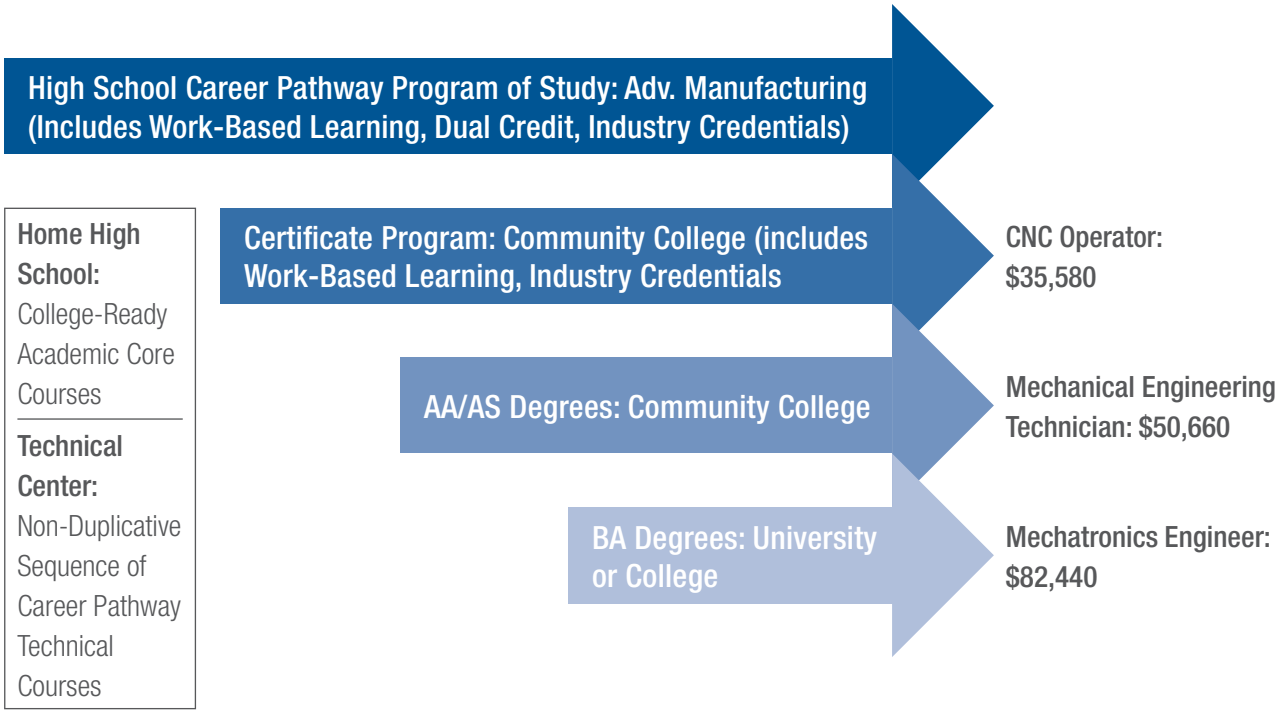
At present, the state lacks a formal structure by which to effectively create an advanced manufacturing career pathway program of study that vertically aligns the programs at Kentucky's technical centers and community colleges and leads to continued education and training, work-based learning and employment opportunities in the manufacturing industry.

Recommendations:

- **Establish a state Manufacturing task force that will study existing technical center manufacturing programs, the quality of student assignments and work in those programs, and the adequacy of their facilities and technology. The task force will make recommendations for redesigning and repurposing existing programs or adopting new ones.**
- **Prioritize the implementation of *Advanced Career — Creating the Future: Design and Production of Tomorrow's Products*. This manufacturing curriculum is currently being developed by SREB, the state of Kentucky and Kentucky manufacturers, and may be applicable in various economic regions of the state.**
- **Create an optional career pathway program of study using the Advanced Career manufacturing curriculum that provides a non-duplicative sequence of technical and college-ready academic courses offered across the technical center, the home high school and the local community college. This curriculum leads to further education (including industry certifications, associate's degrees or higher), work-based learning at industry sites and good jobs in the industry.** A joint educational-industry panel could develop and pilot this pathway as a prototype for others (see Figure 1).

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for the Manufacturing sector.

Figure 1: Optional Career Pathway Program of Study in Advanced Manufacturing[5]



2. Transportation, Distribution and Logistics

The Transportation, Distribution and Logistics sector is expected to offer 1,401 annual job openings statewide. However, neither the technical centers nor the state's community colleges are offering programs in logistics, warehousing and storage, and driving.

The state does appear to have sufficient training capacity to prepare mechanics and technicians for automotive, auto body and diesel repair. However, SREB identified a need to develop a career pathway system that will better connect technical center and community college programs with work-based learning and result in more students acquiring a comprehensive set of industry certifications in these fields.

In 2013, state and local technical centers produced 903 graduates in the Transportation, Distribution and Logistics cluster, with 695 in automotive technology. SREB was unable to obtain data on what percentage of these students continued their education and training at the community college level. However, in 2013, community colleges graduated 578 students in these same three career fields, with the largest numbers in automotive technology (311) and diesel mechanics/technician (170). Community colleges had only a few graduates in aircraft maintenance.

Recommendations:

- **Establish a state Transportation, Distribution and Logistics task force to address improving existing programs and developing new programs as needed in this sector.**
- **Determine and track annually the number of program graduates who acquire related industry certifications, including the number who acquired a single certificate versus a more complete set of certifications.**
- **Develop an optional career pathway program of study in this sector that unites technical centers, community colleges and industry in preparing graduates to acquire a comprehensive set of transportation-related industry credentials. Make work-based learning a critical feature of these programs at both the secondary and postsecondary levels.**

- **Determine whether additional career pathway programs of study are needed to address employment opportunities in distribution and logistics.**
- **Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey in a region of Kentucky with a high need for such a program.**

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for the Transportation, Distribution and Logistics sector.

3. Business Services and Research and Development (R&D)

Business and Administration: Administrative Support

Program offerings in this sector varied across state and local centers. The state centers are primarily preparing students for administrative support, whereas the local centers offer a broader range of programs, including business management, multimedia technology and entrepreneurship. As Table 1 shows, statewide, some 1,075 new jobs are projected to open annually in the area of Business and Administration. To fill these jobs, Kentucky's state technical centers produced 361 graduates and local centers produced 570 graduates, leaving a shortfall of 204. Community colleges graduated 711 students in business administration and general management and 362 in executive assistant programs, for a total of 1,073. SREB could not obtain information on the number of students who began a business services pathway in high school, continued their studies at the community college and earned either an associate's degree or some other type of postsecondary credential.

Note that 3,500 annual job openings are projected for four regional economic sectors — Green River, Bluegrass, Greater Louisville and Northern Kentucky.

A member of the state advisory committee reported that employers in this sector are looking for individuals with technology and software knowledge who can manage projects, anticipate problems and provide solutions.

Recommendations:

- **Establish a state Business Services task force that will develop optional career pathway programs of study in this area.**

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for Business Services and R&D.

Finance: Financial Services

Statewide, 350 annual job openings are projected in the area of financial services. **However, three economic regions of the state have projected openings for 2,341 workers in financial services.** State technical centers offer three programs fitting this sector — accounting, finance and finance technology — and produced 22 graduates in these areas in 2013. Local technical centers offer two programs — accounting and finance — and produced 117 graduates in 2013. At least according to the data received by SREB, none of the state's community colleges offered a program in the financial services area.

Financial services and accounting both represent strong potential career pathways spanning high school and two- and four-year colleges. However, formal, well-designed programs in this sector may already exist in the comprehensive high schools, at least as beginning pathways. Too often, however, the business curriculum does not address some industry needs. It was not possible within the scope of this study to examine program offerings at the comprehensive high schools. Such a study needs to occur, given the large number of projected job openings and the scarce number of programs that exist to meet this demand.

Recommendations:

- **Convene, under the Business Services task force, a panel on the Banking, Finance and Insurance industry. Charge this panel with inventorying current career pathway offerings in this area at the comprehensive high schools and determining their strengths and weaknesses.**

- **Study the need to establish new or improve existing career pathway programs of study in the Financial Services sector.**
- **Investigate whether to adopt the National Academy Foundation's Academy of Finance[6] in strategic regions of the state, either in comprehensive high schools or in technical centers, and develop companion two-year programs at the community colleges.**

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for Financial Services.

Information Technology (IT)

The IT skills gap has received much recent media attention after the federal government began issuing foreign visas to attract workers to fill the gap. In Kentucky, 751 annual job openings are projected in IT. But neither the state nor the local technical centers are providing students with access to computer programming and computer system design career pathways that put them on track for high-paying jobs in the modern IT field. Further investigation is needed to determine whether these 751 jobs accurately reflect the demand for workers with skills in computer programming, computer design and other computer system-related services.

State technical centers provide three primary IT-related programs — network administration, web development and IT — and graduated a total of 185 students in 2013 from these three programs. None of the state centers offered computer programming or computer system design programs. Local technical centers offered four IT-related programs — computer programming, information processing, information support and services, and network administration — and graduated a total of 276 students across the four. In 2013, the state and local technical centers had 461 graduates in the information technology area. All 16 community colleges offer computer and information science programs. In 2013, a total of 328 students graduated from these programs with a certificate or a degree.

Overall, the state is not producing an adequate number of people pursuing advanced study in the highly specialized, high-demand, high-paying field of computer programming and system design.

Recommendations:

- **Convene a state IT task force that will examine existing offerings at the technical centers and community colleges and identify whether their programs meet emerging industry needs.** Consider expanding career pathway programs that prepare students in computer programming and computer systems design. As part of a pathway leading to college degrees and high-paying jobs in the IT field, such programs should include Advanced Placement (AP) Computer Science in high school, dual credit or dual enrollment at local community colleges and work-based learning opportunities with industry.
- **Consider implementing the *Advanced Career: Health Informatics* curriculum being developed by SREB and the state of Ohio.**
- **Consider adopting the *Advanced Career: Informatics* curriculum currently being developed by SREB and the state of Kentucky.** This curriculum launches students into careers in information analysis, for which a growing demand exists across the country.

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for IT.

Marketing

Statewide, there are 355 annual projected job openings in Marketing. Kentucky's state and local technical centers graduated 170 students in this area, leaving a potential job shortfall of 185. SREB received no data from the community colleges that would indicate whether they are producing graduates in this area

Both the local and state technical centers offer a course called Marketing Technology (54 graduates in 2013), and the local centers offer a course in Business Marketing and Marketing Management (42 graduates in 2013). The state's comprehensive high schools may be offering marketing courses, but this was beyond the scope of SREB's study.

Recommendations:

- **Investigate and determine whether there is a need to create a Telemarketing career pathway program of study — 74 annual job openings are projected in this area.**

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for Marketing.

Science, Technology, Engineering and Mathematics (STEM)

At the state level, career fields requiring STEM skills include consulting and services in physical distribution and logistics services, environmental services, engineering, veterinarian, and other professional scientific and technical services. Statewide, there are 1,433 annual job openings in STEM fields. This may be an underestimate, as national labor market projections currently estimate that some 20 percent of all jobs will require STEM knowledge and skills, with half of those jobs available to people with less than a four-year degree.

At present, the state technical centers do not offer any STEM programs. The primary STEM pathway offered at the local technical centers is the Project Lead the Way (PLTW) pre-engineering curriculum. The local centers' PLTW programs graduated 124 students in 2013. The local centers graduated an additional 26 students in other STEM-like pathways, for a combined total of 150. This leaves a potential job shortfall of 1,283.

The state's community colleges offer three programs in STEM — engineering technology, environmental engineering technology and surveying technology. Most of the community colleges' 222 graduates were in engineering technology. Added to the total number of graduates from the technical centers, this leaves a potential job shortfall of 1,061.

Please note that it was beyond the scope of this study to investigate the number of comprehensive high schools offering STEM programs.

Recommendations:

- **Establish a state STEM task force that will examine current STEM-related offerings not only at the technical centers and community colleges, but also in the comprehensive high schools.** This task force could help develop academically and technically rigorous optional career pathway programs of study leading to advanced education and training for STEM careers.
- **Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas.**

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations for STEM.

4. Health Care/Social Assistance: Health Science

Statewide, a projected 4,182 job openings will be available in the Health Care/Social Assistance sector. In 2013, the state and local technical centers produced a combined total of 2,120 graduates in this area, leaving a potential job shortfall of 2,062. The only program offered in this area at the state technical centers is health science (1,134 graduates in 2013). Local technical centers offer four active programs — allied health (431 graduates), health science (124 graduates), PLTW biomedical science (43 graduates) and pre-nursing (388 graduates). At both the state and local centers, limited numbers of career pathways lead to specialized health and medical service programs at the community college and beyond.

The state's community colleges produced 6,814 graduates in 2013, with the four largest fields being: practical nursing (3,832 graduates), registered nursing (916 graduates), administrative/executive assistant (450 graduates) and technical/clinical medical laboratory technician (399 graduates).

Recommendations:

- **Establish a state Health Science task force that would examine current program offerings at the technical centers and community colleges and offer recommendations to identify potential new pathways, strengthen and align existing pathways, and determine whether curriculum and instruction in existing pathways are preparing students for careers in this rapidly changing, technologically advanced industry.**
- **Consider adopting the *Advanced Career: Health Informatics* curriculum, developed by SREB and the state of Ohio, in Kentucky's largest urban areas.**
- **Expand the the implementation of the PLTW biomedical science curriculum which prepares students for a range of health science programs at both the community college level and beyond.**
- **Expand the number of students enrolled in high school pre-nursing career pathway programs of study.** These programs should provide a strong foundation in science and math, offer opportunities to earn dual credit, and emphasize the problem-solving and critical thinking skills needed for success in postsecondary practical nursing and registered nursing programs.
- **Develop a pathway to prepare students for the clinical medical laboratory technician program offered by local community colleges.**

Appendices C and D link annual projected job openings and program graduates with state and regional recommendations related to the Health Care/Social Assistance sector.

5. Energy Creation/Transmission

Statewide, 46 annual job openings are projected in the Energy Creation/Transmission sector. However, four regions have substantially higher projected annual openings based on KWIB reports by sector within the state — Barren River, EKCEP (Eastern Kentucky Concentrated Employment Program), Green River and Western Kentucky (see Appendix B).

At present, state technical centers do not offer any programs related to the Energy Creation/Transmission sector. Local technical centers offer environmental science and natural resource systems (19 graduates in 2013) and electronic technology (15 graduates). The state's community colleges offer three programs in this area — mining technology technicians and petroleum technology technicians (28 graduates across the two programs) and energy management and system technology technicians (56 graduates).

At present, Kentucky's technical centers do not offer a career pathway aimed at preparing students for careers in energy conservation and renewable energy.

Recommendations:

- **Establish a state Energy task force to examine current technical center program offerings and consider what a career pathway program of study spanning secondary and postsecondary studies in this sector might look like.**
- **Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina at one or more technical centers.**
- **Consider adopting the *Advanced Career: Energy and Power* curriculum developed by SREB and the state of West Virginia at one or more technical centers.**

Appendices C and D link annual projected job openings and program graduates with the Energy Creation/Transmission sector.

Recommendations For All Targeted Industry Sectors

- **Establish a task force for each of the state's five targeted industry sectors comprised of representatives from economic regions experiencing major gaps in the number of qualified applicants for jobs in these sectors. Charge each task force with:**
  - Overseeing the redesign of existing programs and developing new programs meeting modern industry requirements that incorporate the eight signature features of high-quality career pathway programs of study leading to further education and training and well-paying jobs.
  - Assessing project assignments, soft skills, completed project quality and students' learning of academic, technical and technology skills.
  - Promoting academically and technically rigorous optional career pathway programs of study featuring dual credit and work-based learning opportunities in aligned, coherent and integrated sequences that offer students different exit and re-entry points on the pathway to further education and training and careers.
  - Advising, supporting and encouraging students engaged in career pathway programs of study.
- **SREB recommends that the state adapt the following eight signature features of high-quality career pathway programs of study and set as a goal that all technical center programs will have these features.**

Signature Features of Career Pathway Programs of Study

1. **Students are able to access high-quality career pathway programs of study that offer technical courses aligned with a college-ready academic core.**

Programs of study include a sequence of at least four non-duplicative, rigorous CT courses that lead to multiple postsecondary options — including employment, advanced training in the career field or an associate's or bachelor's degree. Programs of study offer students opportunities to earn industry certifications and transcripted dual credits. Programs of study also provide students with opportunities to participate in: (1) work-based learning that is developmental, progressive and increasingly intense, and (2) career-technical student organizations (CTSOs) that enhance students' career development, academic engagement and acquisition of 21st-century skills.

2. **Technical center and high school leaders work to create an organization and scheduling structure that enable CT teachers to work frequently with other CT teachers, academic teachers, and counselors to plan integrated academic and technical learning activities aimed at enhancing students' college and career readiness.**

3. **CT course sequences are derived from industry, reflect future employment needs and are designed around authentic projects spanning several days or weeks that require the application of academic, technical, technological and cognitive skills to complete.**

Authentic projects require students to work in teams, engage in independent study and receive some direct instruction. Projects must be sufficiently complex so that students will need to struggle to acquire the deeper learning and skills required of professionals in the field.

4. **Students are given robust project-based assignments that require them to (1) apply their understanding of high school-level math, literacy and science, (2) demonstrate good habits of mind and behavior, and (3) exhibit problem-solving skills to complete.**

Students who experience higher-level authentic assignments show higher achievement than students who experience lower-level assignments. Robust assignments allow students to reflect on what they are learning and see connections between their academic and technical studies and potential future study and careers. Section VI of this report offers a discussion of assignments and a set of criteria for judging whether or not these assignments are robust.

5. **Students are assessed using several strategies — rubrics, exams, written deliverables, teacher observations and external assessments — to determine whether they have mastered academic, technical, technological and cognitive concepts and skills. Students receive feedback and opportunities to relearn and master concepts and skills through authentic assignments.**

The intent of classroom assessment is to advance student learning. End-of-project assignment grades are based on several factors, including: (1) students' demonstration of soft skills, team work and timeliness in completing work, (2) the quality of the products delivered — both the tangible product and the written deliverables as judged by a rubric, and (3) a written exam that determines if students have mastered the technical materials they should read and comprehend to complete the project, the math that was involved in completing the project, the science concepts embedded in the project, and the technical concepts, technology and software used. Comprehensive end-of-course exams for each course are given that assess students' mastery of all technical and academic knowledge and skills used to complete assignments.

6. **Career pathway programs of study are supported with a counseling for careers approach to educational and career exploration that begins no later than the middle grades and continues throughout high school.**

Counseling for careers provides students and their parents with the information and experiences they need to help students identify, establish and stay focused on a career goal and a career pathway program of study. Both academic and CT teachers offer classroom experiences that enable students to explore their interests and aptitudes and learn about available educational and career opportunities. Section V of this report offers a set of guidelines for counseling for careers.

7. **CT courses are taught by highly qualified teachers who have demonstrated their mastery of the academic, technical and 21st-century standards, skills and teaching methods needed to create challenging learning experiences and engage students in those experiences. CT teachers hold the industry credentials that students are expected to acquire in their career pathway programs of study.**

CT teachers need professional development support to stay abreast of changing industry standards, academic and technical college- and career-readiness standards, and the technologies related to the courses and programs they offer. In its work on curriculum integration, the National Research Center for Career and Technical Education (NRCCTE) has outlined five core principles that facilitate integrated, contextual teaching and are critical to supporting high-quality CT teachers. These include (1) developing and sustaining a teacher community of practice centered on the occupational context but including both technical and academic teachers, (2) beginning the process of integrating the curriculum with the technical, not the academic curriculum, (3) understanding that academics offer essential workplace knowledge and skills, (4) maximizing the academic knowledge and skills contained in the occupational curriculum, and

(5) recognizing that CT teachers are not academic teachers, but teachers of academics in the context of their career field.[7] See Section VII for further recommendations on professional development for CT teachers.

8. **CT teachers work with both industry and postsecondary partners to create authentic projects and problems, assess the quality of student work against workplace and postsecondary requirements, offer students work-based learning experiences and provide students with information and advising that eases their transition from the technical center to further education and training and employment.** The state's industry task forces, following the *Signature Features of Career Pathway Programs of Study*, can generate across Kentucky's economic regions more career pathway programs of study like TRACK (see sidebar on Tech Ready Apprentices for Careers in Kentucky).

TRACK: Tech Ready Apprentices for Careers in Kentucky

Currently being piloted in 13 high school technology centers offering manufacturing programs, TRACK is a partnership between the Office of Career and Technical Education and the Kentucky Labor Cabinet to provide pre-apprenticeship opportunities to high school students. Driven by industry, the program seeks to create a pipeline to postsecondary apprenticeship training. Participating employers choose a minimum of four courses from the manufacturing course offerings at the school, with one of the courses being a cooperative education placement. Students successfully completing the program are awarded an industry certification by the employer through the Labor Cabinet and receive credit for all on-the-job hours worked toward the apprenticeship. The certification also counts toward the school district's college- and career-ready accountability index.

Table 3: Summary of Statewide Recommendations For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs

Economic Sector	Recommended Industry Sector Advisory Panel	Recommended Actions
Automobile and Aircraft Manufacturing	■ Establish a state Manufacturing task force that will study existing technical center manufacturing programs, the quality of student assignments and work in those programs and the adequacy of their facilities and technology. The task force will make recommendations for redesigning and repurposing existing programs or adopting new ones.	■ Prioritize the implementation of the *Advanced Career — Creating the Future: Design and Production of Tomorrow's Products* manufacturing curriculum currently being developed by SREB, the state of Kentucky and Kentucky manufacturers, as applicable in different economic regions of the state. http://www.sreb.org/page/1608/Advanced_Career.html ■ Create an optional career pathway program of study using the Advanced Career manufacturing curriculum that provides a non-duplicative sequence of technical and college-ready academic courses offered across the technical center, the home high school and the community college and leads to further education (including industry certifications, associate's degrees or higher), work-based learning at industry sites and good jobs in the industry.

Table 3: Summary of Statewide Recommendations For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs (Continued)		
Economic Sector	**Recommended Industry Sector Advisory Panel**	**Recommended Actions**
Transportation, Distribution and Logistics	■ Establish a state Transportation, Distribution and Logistics task force to address improving existing programs and developing new programs as needed in this sector.	■ Determine and track annually the number of program graduates who acquire transportation sector-related industry certifications, including the number who acquire a single certificate versus a more complete set of certifications. ■ Develop an optional career pathway program of study in this sector that unites technical centers, community colleges and industry in preparing graduates to acquire a comprehensive set of transportation-related credentials. Make work-based learning a critical feature of these programs at both the secondary and postsecondary levels. ■ Determine whether additional career pathway programs of study are needed to address employment opportunities in distribution and logistics. ■ Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey in a region of Kentucky with a high need for such a program. http://www.sreb.org/page/1608/Advanced_Career.html
Business Services and R&D: Business and Administration: Administrative Support	■ Establish a state Business Services task force that will develop optional career pathway programs of study in this area.	
Business Services and R&D: Finance: Financial Services	■ Convene, under the Business Services task force, a panel on the Banking, Finance and Insurance industry. Charge this panel with inventorying current career pathway offerings in this area at the comprehensive high schools and determining their strengths and weaknesses.	■ Study the need to establish new or improve existing career pathway programs of study in the Financial Services sector. ■ Investigate whether to adopt the National Academy Foundation's Academy of Finance in strategic regions of the state, either in comprehensive high schools or in technical centers, and develop companion two-year programs at the community colleges. http://naf.org/files/page/2009/06/AOF_OneSheet. pdf

Table 3: Summary of Statewide Recommendations For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs (Continued)		
Economic Sector	**Recommended Industry Sector Advisory Panel**	**Recommended Actions**
Business Services and R&D: Information Technology	■ Convene a state IT task force that will examine existing offerings at the technical centers and community colleges and identify whether their programs meet emerging industry needs.	■ Consider expanding career pathway programs that prepare students in computer programming and computer systems design. As part of a pathway leading to college degrees and high-paying jobs in the IT field, such programs should include AP Computer Science in high school, dual credit or dual enrollment at local community colleges and work-based learning opportunities with industry. ■ Consider implementing the *Advanced Career: Informatics* curriculum currently being developed by SREB and the state of Kentucky. http://www.sreb.org/page/1608/Advanced_Career.html ■ Consider implementing the *Advanced Career: Health Informatics* curriculum being developed by SREB and the state of Ohio. http://publications.sreb.org/2013/AC_health_Informatics_8_5_13.pdf
Business Services and R&D: Marketing		■ Investigate and determine whether there is a need to create a Telemarketing career pathway program of study — 74 annual job openings are projected in this area.
Business Services and R&D: STEM	■ Establish a state STEM task force that will examine current STEM-related offerings not only at the technical centers and community colleges, but also in the comprehensive high schools. This task force could help develop academically and technically rigorous optional career pathway programs of study leading to advanced education and training and STEM careers.	■ Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf

Table 3: Summary of Statewide Recommendations For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs (Continued)		
Economic Sector	**Recommended Industry Sector Advisory Panel**	**Recommended Actions**
Health Care/Social Assistance	■ Establish a state Health Science task force that would examine current program offerings at technical centers and community colleges and offer recommendations to identify potential new pathways, strengthen and align existing pathways and determine whether curriculum and instruction in existing pathways are preparing students for careers in this rapidly changing, technologically advanced industry.	■ Consider adopting the *Advanced Career: Health Informatics* curriculum, developed by SREB and the state of Ohio, in the Kentucky's largest urban areas. http://publications.sreb.org/2013/AC_health_Informatics_8_5_13.pdf ■ Expand the PLTW Biomedical Science curriculum, which prepares students for a range of health science programs at both the community college level and beyond. ■ Expand the number of students enrolled in high school pre-nursing career pathway programs of study. These programs should provide a strong foundation in science and math, offer opportunities to earn dual credit and emphasize the problem-solving and critical thinking skills needed for success in postsecondary practical nursing and registered nursing programs. ■ Develop a pathway to prepare students for the clinical medical laboratory technician program offered by local community colleges.
Energy Creation/ Transmission	■ Establish a state Energy task force to examine current technical center program offerings and consider what a career pathway program of study spanning secondary and postsecondary studies in this sector might look like.	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina at one or more technical centers. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf ■ Consider adopting the *Advanced Career: Energy and Power* curriculum developed by SREB and the state of West Virginia at one or more technical centers. http://publications.sreb.org/2013/AC_energy_power_4Pager_11_14_13.pdf

Table 4: Summary of Recommendations by Economic Region For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs	
Region/Economic Sector	**Recommended Actions by Region**
Barren River	
Energy	■ Convene an energy sector task force and decide if an energy pathway is needed.
Banking, Finance and Insurance	■ Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf.org/files/page/2009/06/AOF_OneSheet.pdf
Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Bluegrass	
Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Health Care	■ Consider adopting the *Advanced Career: Health Informatics* curriculum, developed by SREB and the state of Ohio. http://publications.sreb.org/2013/AC_health_Informatics_8_5_13.pdf
	■ Expand the PLTW Biomedical Science curriculum, which prepares students for a range of health science programs at both the community college level and beyond.
Energy and Natural Resource Extraction	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
	■ Consider adopting the *Advanced Career: Energy and Power* curriculum developed by SREB and the state of West Virginia. http://publications.sreb.org/2013/AC_energy_power_4Pager_11_14_13.pdf
Transportation, Distribution and Logistics	■ Determine whether an optional career pathway program of study is needed in this sector that unites technical centers, community colleges and industry in preparing graduates to acquire a comprehensive set of transportation-related credentials.
Banking, Finance and Insurance	■ Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf.
Business Support Services	■ Consider developing a career pathway to prepare individuals in computer programming and computer systems.
	■ Consider adopting the *Advanced Career: Informatics* curriculum, currently being developed by SREB and the state of Kentucky. http://www.sreb.org/page/1608/Advanced_Career.html
STEM	■ Consider adopting the Advanced Career: Innovations in Science and Technology curriculum being developed by SREB and the state of Arkansas. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf

Table 4: Summary of Recommendations by Economic Region For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs (Continued)	
Region/Economic Sector	**Recommended Actions by Region**
Cumberlands	
Energy and Natural Resource Extraction	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html.
Transportation, Distribution and Logistics	■ No recommendations.
Finance and Insurance	■ Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf.
Professional Services/ Administrative Support/IT/STEM	■ Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas. See http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf
	■ Convene a STEM task force to examine the need to create optional career pathways in STEM that align with postsecondary education and training and lead to associate's and bachelor's degrees.
EKCEP	
Energy and Natural Resource Extraction	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing	■ Convene an industry panel to determine whether current program offerings are adequate and whether what students are being taught meets industry needs.
Transportation, Distribution and Logistics	■ Convene a transportation panel to determine whether new offerings are needed and how to better align high school programs with community college programs and work-based learning opportunities.
Finance and Insurance	■ Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf.
Professional Services/ Administrative Support/IT/STEM	■ Convening a broad industry panel in the area of Professional Services/Administrative Support/IT/STEM to examine whether or not currently existing programs address workforce needs.

Table 4: Summary of Recommendations by Economic Region For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs (Continued)	
Region/Economic Sector	**Recommended Actions by Region**
Greater Louisville/ Lincoln Trail	
Energy	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html.
Transportation, Distribution and Logistics	■ Develop an optional career pathway in the broad field of transportation, distribution and logistics that includes work-based learning opportunities, leads to postsecondary education and training and culminates in certificates and associate's degrees.
	■ Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	■ Consider adopting the *Advanced Career: Informatics* curriculum currently being developed by SREB and the state of Kentucky. http://www.sreb.org/page/1608/Advanced_Career.html
	■ Consider adopting the National Academy Foundation's Academy of Finance in one or more technical centers or one or more comprehensive high schools: http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
	■ Consider adopting Course One from the *Advanced Career: Project Management* curriculum currently being developed by SREB and the state of North Carolina. http://www.sreb.org/page/1608/Advanced_Career.html
STEM	■ Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf.
Green River	
Energy Sector	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing/Food Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution and Logistics	■ Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	■ Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Professional Services / Administrative Support/IT/STEM/ Marketing	■ Investigate and determine whether there is a need to create a Telemarketing career pathway program of study: 74 annual job openings are projected in this area.

Table 4: Summary of Recommendations by Economic Region For Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs (Continued)	
Region/Economic Sector	**Recommended Actions by Region**
Northern Kentucky	
Manufacturing/Food Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution and Logistics	■ Convene an industry task force to determine if there is a need for a general transportation pathway that focuses on logistics. If so, consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	■ Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf.org/files/page/2009/06/AOF_OneSheet.pdf
Recreation	■ Consider adopting the National Academy Foundation's Academy of Hospitality & Tourism in one or more of the comprehensive high schools or technical centers in this region. http://naf.org/files/page/2009/06/AOHT_OneSheet.pdf
TENCO	
Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution and Logistics	■ Conduct a study to determine the percentage of high school graduates earning the comprehensive credentials needed to work on all parts of vehicles, as well as the percentage of graduates earning credentials on specialized parts, in order to determine if the balance is appropriate or if more students need to be encouraged to attend community college to earn the full set of credentials.
Banking, Finance and Insurance	■ No recommendations.
STEM	■ Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf
Western Kentucky	
Agriculture and Food Production	■ No recommendations.
Energy	■ Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Transportation, Distribution and Logistics	■ Convene a Transportation, Distribution and Logistics task force for the region that includes experts from postsecondary institutions and economic development organizations to examine the need to create a broad-based curriculum in the area of transportation, distribution and logistics.
Manufacturing	■ Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html

Section II: College- and Career-Readiness Standards

Research Question: How well have students at Kentucky's 95 state and local technical centers succeeded in meeting new state benchmarks in career readiness, college readiness or both?

Findings

A number of Kentucky's 95 state and local technical centers are functioning at a high level and producing significant percentages of students with the academic knowledge and skills needed to meet state college- and career-readiness benchmarks. However, a significant number of state and local technical centers are experiencing much less success in preparing students to meet technical career-readiness benchmarks. Overall, extreme differences exist in student academic and technical achievement across centers; such marked differences signal that all centers, with adequate support from the state and local district, must strive to improve their curricula, instruction and assessments to meet the state's college- and career-readiness goals.

For students in career-technical (CT) pathways, industry certification examinations represent an important measurement of academic and technical knowledge and skills. Such examinations also serve as a valuable source of accountability data, as a mechanism for earning college credits and as evidence of employability. Although the state offers a broad range of these examinations, SREB identified problems and inconsistencies not only in how they were selected and assessed, but also in their overall quality and relevance. In particular, industry stakeholders at present are insufficiently involved in identifying and approving certification examinations.

As part of its study of the state's system of technical assessments, SREB looked at the Kentucky Occupational Skills Standards Assessment (KOSSA), exploring whether it met acceptable reliability and validity standards. 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. All technical centers have received state funding to take the KOSSA exam, but only the state centers have received state funding for the WorkKeys exam. Inequities in funding the WorkKeys exam have placed local centers at a considerable disadvantage compared to the state centers. If all of the state's 95 centers are to thrive, a more coherent, consistent policy is needed in this area.

Finally, SREB also explored how the state's technical centers use assessment data. Although there is evidence that centers are using assessment data to drive instructional improvement and reward students and schools for their successes, more support is needed to make continuous data-driven improvement an integral part of the culture of all technical centers.

In the subsections that follow, an in-depth exploration of these findings and a series of recommendations for actions are provided to improve technical centers.

Meeting College- and Career-Readiness Benchmarks

A higher percentage of students at Kentucky's technical centers have the academic skills needed to complete challenging assignments in their CT classrooms and labs. However, based on Kentucky's *College and Career Readiness for All* benchmarks, CT students appear to be better prepared academically than they are technically. As described in the introduction to this report, KDE defines academic career readiness as having met the benchmarks set for college readiness on the ACT, ACT's Compass college placement test, or the KYOTE exam, or by performing at a satisfactory level on the WorkKeys or ASVAB. As Table 5 shows, in the 2012-13 school year, 63 percent of students at all 95 state and local centers met academic career-ready benchmarks;

49 percent met technical career-ready benchmarks; 40 percent met both academic and technical career-ready benchmarks; and 41 percent met college-ready benchmarks. However, great variance existed among the 95 centers in the percentage of students meeting academic and technical career-readiness benchmarks. State centers had significantly higher percentages of students meeting academic, technical and combined academic and technical career-readiness benchmarks. As Table 5 shows, although 6 percent more students at the local centers are meeting college-ready benchmarks compared to their peers at the state centers, 10 percent more students at the state centers are meeting state career-ready academic benchmarks compared to students at the local centers. This may be because students at the local centers are not taking the WorkKeys or ASVAB exams. As noted, local centers reported not being able to give the WorkKeys or ASVAB exams due to their cost. State centers receive state funds to administer these exams.

Table 5: Variances Among State and Local Centers in the Percentage of Students Meeting College- and Career-Readiness Benchmarks

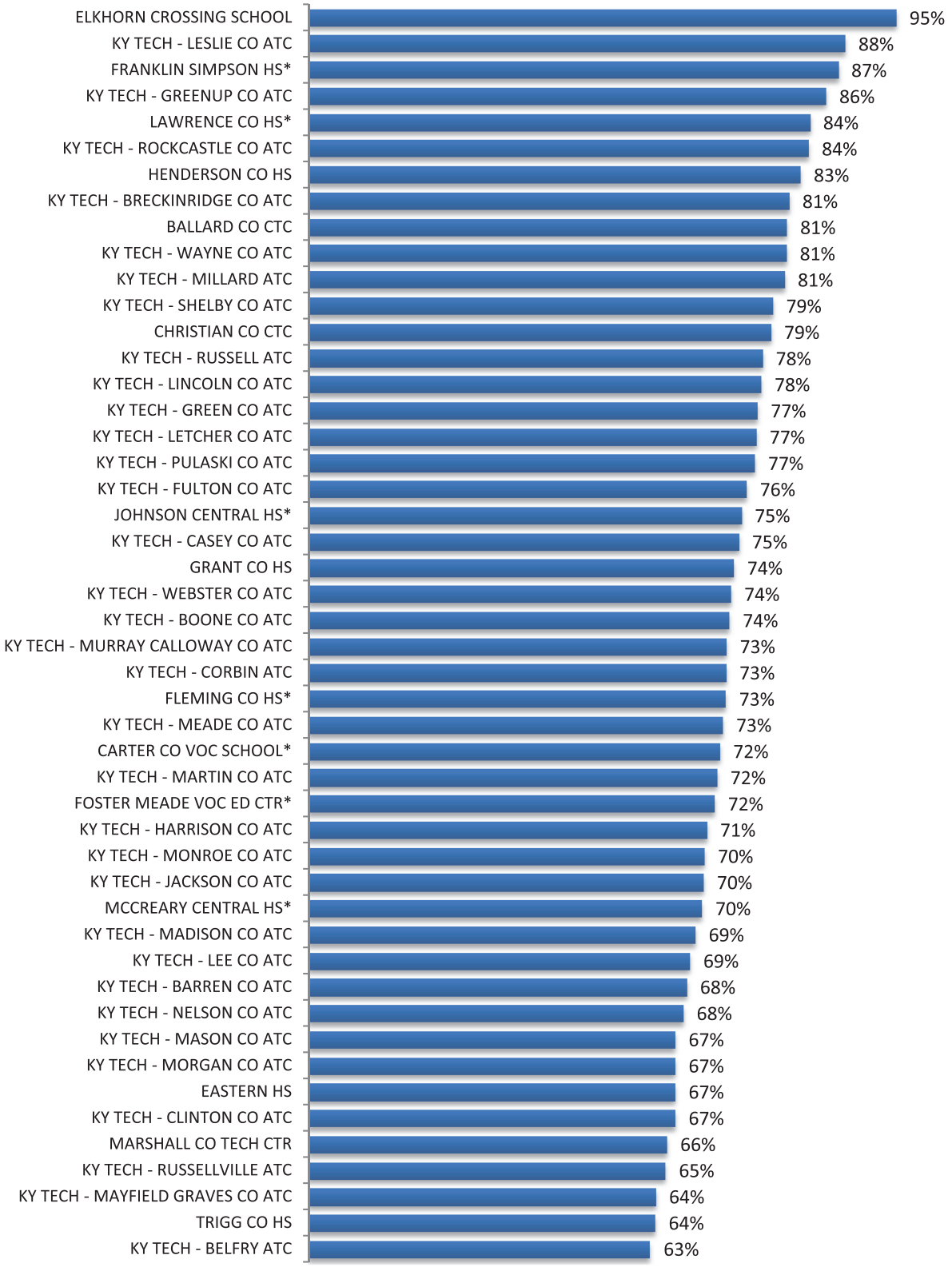
		College-Ready (%)	Career-Ready Academic[1] (%)	Career-Ready Technical (%)	Career-Ready Academic & Technical[1] (%)
All centers	*n* = 95 sites	41	63	49	40
State centers	*n* = 53 sites	38	68	52	43
Local centers	*n* = 42 sites	44	58	46	36

1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

Source: Data provided by KDE for the 2012-13 school year.

Figures 2 through 7 illustrate the high degree of variance in student performance across centers. The percentage of students meeting academic career-readiness benchmarks ranged from 95 percent at the highest performing site (Figure 2) to 25 percent at the lowest performing site (Figure 3). The percentage of students meeting technical readiness benchmarks ranged from 76 percent at the highest performing site (Figure 4) to only 13 percent at the lowest performing site (Figure 5). The percentage of students meeting both academic and technical career-readiness benchmarks ranged from 71 percent at the highest performing site (Figure 6) to just 10 percent at the lowest performing site (Figure 7).

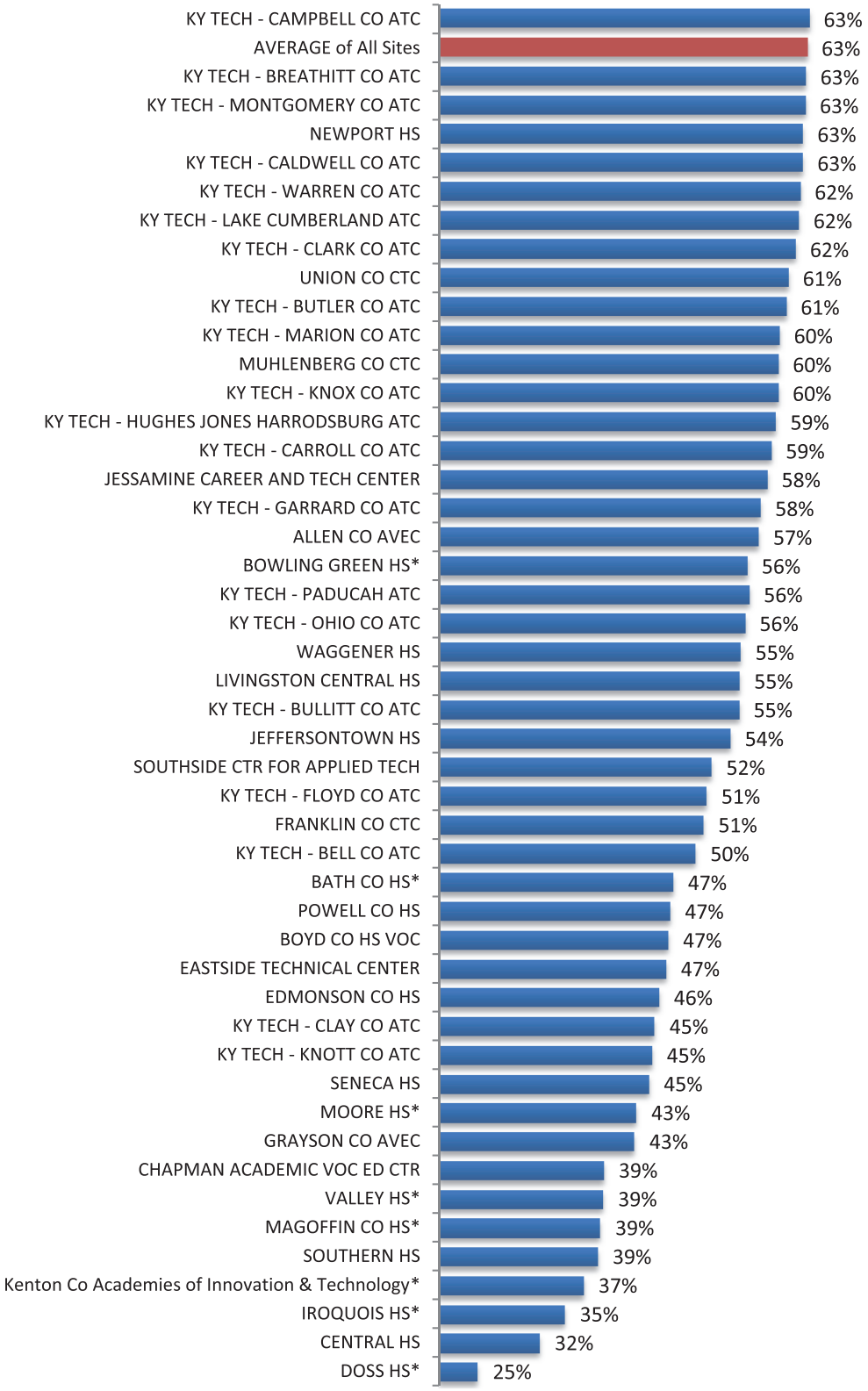
Figure 2: Percentage of Students Meeting Academic Career-Ready Benchmarks[1]



1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

* School did not participate in the TCTW Student and/or Faculty Surveys

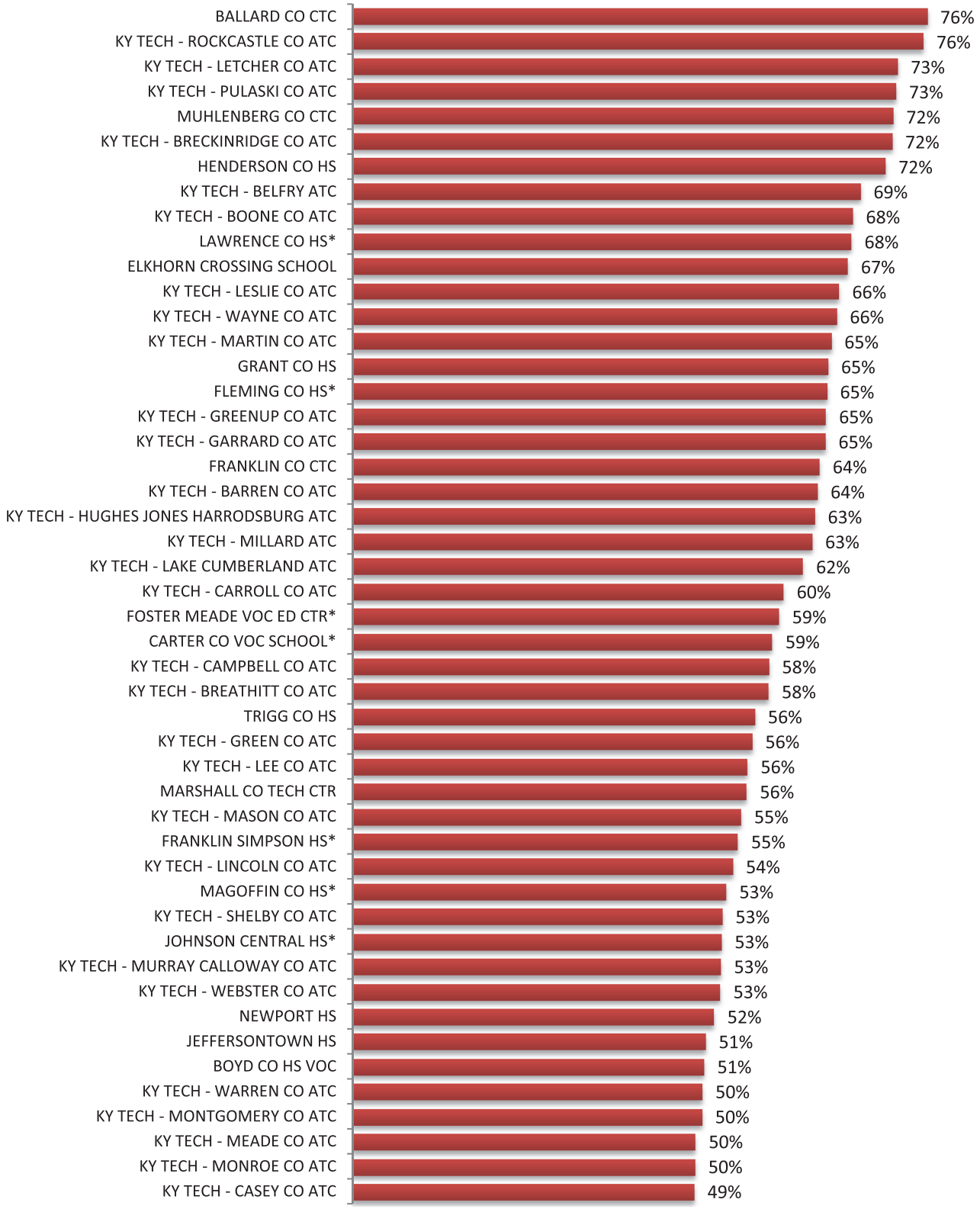
Figure 3: Percentage of Students Meeting Academic Career-Ready Benchmarks[1] (Continued)



1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

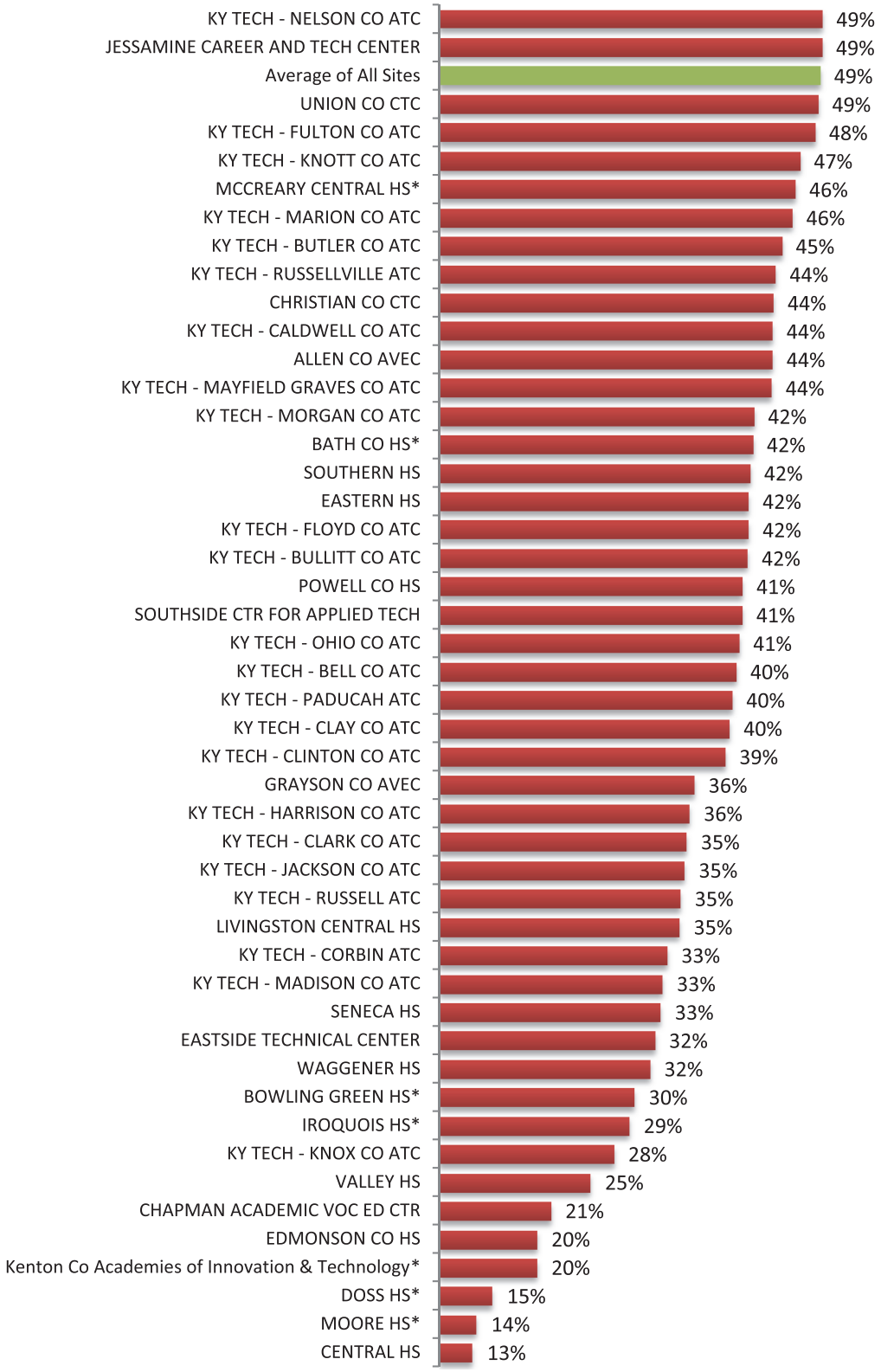
* School did not participate in the TCTW Student and/or Faculty Surveys

Figure 4: Percentage of Students Meeting Technical Career-Ready Benchmarks



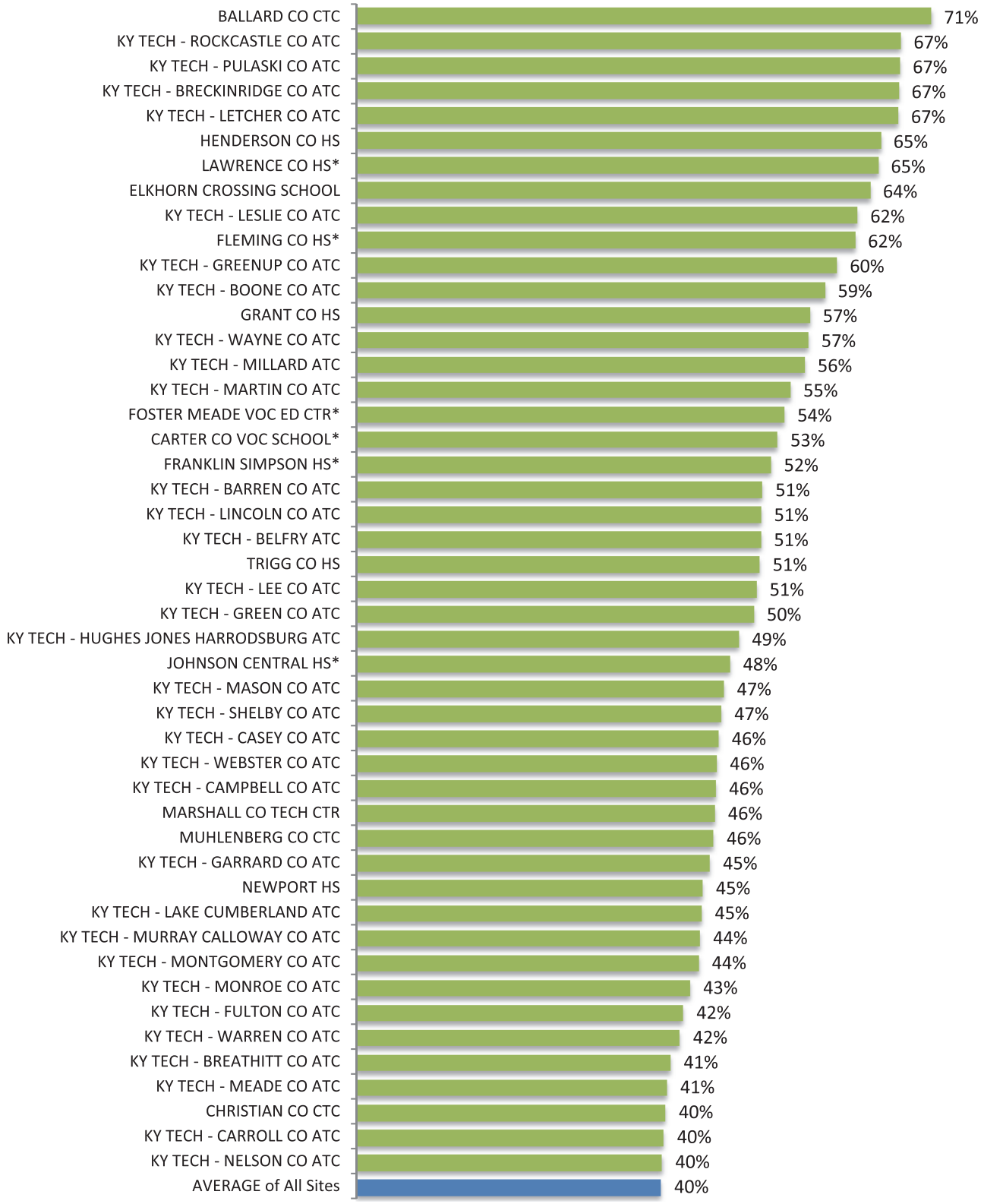
* School did not participate in the TCTW Student and/or Faculty Surveys

Figure 5: Percentage of Students Meeting Technical Career-Ready Benchmarks (Continued)



* School did not participate in the TCTW Student and/or Faculty Surveys

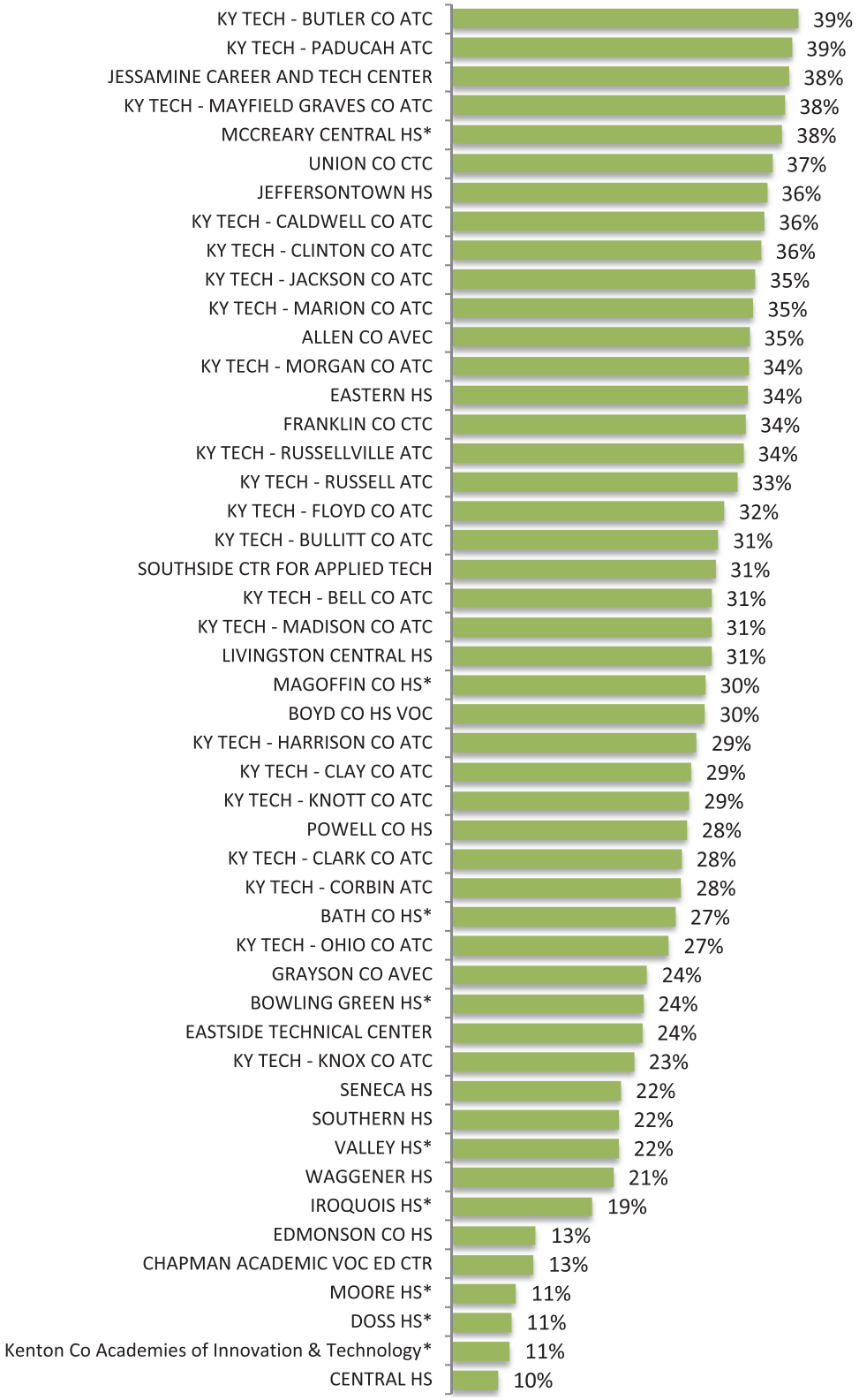
Figure 6: Percentage of Students Meeting Academic[1] and Technical Career-Ready Benchmarks



1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

* School did not participate in the TCTW Student and/or Faculty Surveys

Figure 6: Percentage of Students Meeting Academic[1] and Technical Career-Ready Benchmarks (Continued)



1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

* School did not participate in the TCTW Student and/or Faculty Surveys

As Tables 6 and 7 show, for comparison purposes, state and local technical centers were broken down into three groups according to the percentage of students at each center meeting academic and technical career-readiness benchmarks. Out of a total of 53 state centers, 21 sites ranked in the top, 20 sites ranked in the middle and 12 sites ranked in the bottom. Out of a total of 42 local centers, only those sites that participated in the TCTW Faculty and Student Surveys were included, or 27 sites. Of these, just five ranked in the top, eight in the middle and 14 in the bottom.

Table 6: Percentage of Students Meeting Academic and Technical Career-Readiness Benchmarks at State Centers

State Centers by Performance Levels		Career-Ready Academic[1] (%)	Career-Ready Technical (%)	Both (%)
Top	*n* = 21 sites	75	62	54
Middle	*n* = 20 sites	65	48	39
Bottom	*n* = 12 sites	57	38	31

1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

Source: Data provided by KDE for the 2012-13 school year.

Table 7: Percentage of Students Meeting Academic and Technical Career-Readiness Benchmarks at Local Centers

Local Centers by Performance Levels		Career-Ready Academic[1] (%)	Career-Ready Technical (%)	Both (%)
Top	*n* = 5 sites	78	70	61
Middle	*n* = 8 sites	62	51	40
Bottom	*n* = 14 sites	46	35	24
Others[2]	*n* = 15 sites	60	45	38

1 Academic career readiness is defined as having scored at a satisfactory level on the WorkKeys, ASVAB, ACT or a college placement examination like ACT's Compass.

2 "Others" are sites that did not participate in the TCTW Faculty or Student Surveys.

Source: Data provided by KDE for the 2012-13 school year.

Variance existed across the three performance levels and across state versus local centers. **More state centers placed in the top of student performance, with fewer centers in the bottom; the opposite was true for local centers, where more sites placed in the bottom than in the top and middle combined.** On first glance, it would appear that somewhat larger percentages of students at local centers ranked in the top or middle met benchmarks compared to students at the state centers. However, these figures do not include some 15 local centers that failed to participate in the TCTW Faculty and Student Surveys. SREB was unable to combine these centers' data into its site rankings.

Overall, all centers — both state and local — must do better if they are to help greater numbers of students meet the state's academic and technical career-readiness benchmarks; as Tables 6 and 7 show, some have much further to go than others.

Interviewed administrators were aware of the challenges inherent in moving all centers toward meeting the state's academic and technical career-readiness benchmarks, especially for those local centers that were adjusting to the state's new accountability standards. As one superintendent stated during a focus group session:

> *I have been working closely with our technical center during the last couple of years to increase the percentage of students who are career-ready, and my first major challenge is to educate technical center staff on what career readiness means in terms of changing... instructional practices. The second is to ensure that our technical centers are equally competent in all areas. There is a disconnect between the technical center staff and the local district... Technical center employees must understand the importance of career readiness and what it means to our district, and how we can work together in a unified way to connect the technical center to the total high school experience.*

Recommendations:

- **Set as a target that 90 percent of all students completing a coherent CT sequence of at least three courses will meet both academic and technical career-readiness benchmarks.** The state should provide incentives to all districts, schools and centers making significant gains in the percentage of CT students meeting these ambitious but necessary goals.

- **Incentivize technical centers and individual career pathway programs that demonstrate significant improvement in the percentages of students successfully meeting academic and technical career-readiness standards.** Any technical center or career pathway program meeting or making significant progress toward meeting the state's goal of 90 percent of CT sequence completers meeting academic and technical career-readiness standards would receive additional incentive funds to upgrade equipment, supplies and curriculum for instruction and provide professional development for center staff.

- **Require any CT center in which less than 50 percent of students meet academic and technical career-readiness standards to work collaboratively with an external group, the district and KDE to develop a comprehensive improvement plan that addresses what each CT program must do to make continued gains in the percentage of students meeting benchmarks.** Such plans should focus on improving curricula and instructional quality and ensuring that curricula, instruction, student assignments and classroom assessments are fully aligned with relevant academic, technical and 21st-century skills. (See Section I for *Signature Features of Career Pathway Programs of Study,* this section's sidebar for *Best Practices Priorities for Kentucky's Technical Centers* and Section VI for recommendations on rigorous assignments.)

- **Failure to demonstrate improvement in the number of students meeting academic and technical career-readiness benchmarks after a period of three years should serve as a criterion for changing center leadership and discontinuing those programs that fail to make improvements.** At present, the state has few mechanisms for cutting ineffective programs. As one state official commented, "It has literally taken years to get rid of unproductive programs. We must find ways to change that mindset."

- **Establish a guiding framework of proven practices that, when implemented with fidelity, can improve student readiness for college and careers. These practices, as described in *Best Practices Priorities for Kentucky's Technical Centers* (see the sidebar), will inform districts, technical centers and home high schools as they create and implement their educational processes.**

- **The state should bear the cost of academic and technical assessments at all technical centers, whether state or locally run.** At present, CT students demonstrate academic career readiness by meeting benchmarks on either the ACT or Compass examinations or the WorkKeys or ASVAB examinations. However, the ASVAB and WorkKeys should be administered only if CT students do not meet college-readiness benchmarks on the ACT or Compass. The money presently being used to pay for WorkKeys assessments for students at the state centers who have already met state college-readiness benchmarks on the ACT or Compass could be used to pay for WorkKeys assessments at local centers, which currently do not receive funding for the WorkKeys.

Industry Certification Examinations

Currently, Kentucky offers more than 210 approved industry certifications. For a certification to receive state approval, an online form must be completed and the assessment must be reviewed by KDE staff. A given certification must meet the following criteria in order to be considered for federal Perkins accountability or the career readiness component of KDE's *College and Career Readiness for All* benchmarks:

1. Recognized, endorsed or required by industry.
2. Written and verified by national or state industries.
3. Curriculum and certification aligned with state and/or national standards.

Best Practices Priorities for Kentucky's Technical Centers

1. **Prepare students for multiple options after high school — both postsecondary study and work — by providing them with access to challenging, optional career pathway programs of study incorporating rigorous academic and technical studies and authentic, problem-based learning experiences.** Working in conjunction with its postsecondary and business and industry partners, the state must work to redesign its existing programs or design new programs to meet this goal. (See Section I for *Signature Features of Career Pathway Programs of Study*.)

2. **Support CT teachers in designing quality assignments that engage students in learning required knowledge and skills and result in products that demonstrate learning of required content.** Students need to be engaged in challenging and authentic assignments that require tthem to (1) apply critical thinking and problem-solving skills, (2) use technology and software, and (3) apply literacy, math and technical skills to complete. (See Section VI for recommendations regarding rigorous assignments.)

3. **Train all teachers to support students' overall literacy development, especially in grades nine and 10.** Getting students to grade level in literacy will require (1) technical centers to partner with the home high schools, with all teachers receiving training in how to engage students in reading grade-level texts in their subject areas, (2) reading comprehension strategies that can help students make sense of content-area texts, (3) designing reading and writing assignments that are likely to motivate students who lack engagement in school activities, and (4) reading and writing in ways that are distinct to students' content areas.

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4. Certification must be an end-of-program assessment related to students' identified career pathway achieved through a sequence of courses. (Source: KDE — KOSSA and Industry Certification List)

SREB uncovered a number of issues related to the selection, approval, administration and assessment of industry certification exams across the state.

First, little evidence indicated that industry was involved in selecting or approving certifications either locally, regionally or statewide. During focus groups, many industry partners expressed frustration at what they perceived as their lack of ownership of or involvement in the certification selection and approval process.

Second, technical center directors and superintendents noted budget constraints limited their ability to give students industry certification exams. Industry certification exams are vitally important not only for accountability purposes, but also for identifying needed areas of instructional or programmatic improvement. Further, they offer students a powerful and valuable incentive to continue in their chosen career pathways. At present, not enough students pursue further education and training in the same program of study after high school. Students' failure to follow their career pathways into continued learning reveals a weak connection between the secondary and postsecondary components of the state's career pathway programs of study.

Third, although industry certifications may currently be recommended by local districts and technology centers, one interviewee commented, "It's my sense that in order to meet accountability requirements, districts are looking to find easy examinations that may or may not have the most value to employers, the state's economy or individual students." In their haste to approve low-level industry certification exams that do not lead to advanced opportunities in a given career field, school districts and technical centers may be reducing the number of individuals who are academically, technically and cognitively prepared for the high-skill, high-wage, high-demand jobs available in their region or the state.

Best Practices Priorities for Kentucky's Technical Centers

4. **Use a balanced approach to instruction in mathematics that emphasizes understanding, reasoning and application of mathematics while building procedural fluency.** Students need to receive math instruction that develops their math understanding and allows them to apply that understanding to the kinds of multi-step problems required in the modern workplace. As with literacy, the technical centers must partner with the home high schools to improve math instruction.

5. **Implement a counseling for careers program designed to help students develop an understanding of their career interests and aptitudes, learn about career opportunities and the required level of preparation for those opportunities, and adopt habits of success for school, life and the workplace.** Students need to engage in rich and varied experiences that help them learn about and explore careers, including taking a career exploratory course; working during high school, job-shadowing, or visiting a work site; and receiving advisement on educational and career planning with a counselor or with a parent and teacher adviser.

6. **Implement a range of extra help strategies and initiatives to help students meet raised expectations.** For those students who need extra help and support in literacy and math, supplemental instruction should be directly related to their technical studies. Some students may need extended time at their centers to receive such instruction.

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Best Practices Priorities for Kentucky's Technical Centers

7. **Implement senior transition courses in literacy and mathematics to teach students the skills they need to learn and think independently after high school.** Students who do not meet literacy and math standards may need access to senior transition courses, but not at the expense of their technical labs and courses. With a grant from the Gates Foundation, SREB developed readiness courses specifically to help close readiness gaps in literacy and math.

8. **Implement organizational structures that allow for teachers to collaborate across disciplines.** The state must encourage cross-disciplinary collaboration across occupational fields and academic disciplines by allowing technical center teachers to work with home high school teachers, either virtually or through face-to-face shared staff development.

9. **Provide every technical center with leadership that supports continuous improvement and teacher development.** Kentucky's technical centers need directors who (1) are instructional leaders, (2) have the knowledge and skills to set clear goals and priorities for the continuous improvement of their programs, (3) offer ongoing feedback that allows teachers to improve their instruction, and (4) support staff development.

Fourth, SREB has long held the position that industry certifications should hold value for employers — that is, all things being equal, employers should offer hiring preference to persons passing exams that are important to their industry. Passing an industry exam should carry with it increased earning opportunities, thus benefitting both the individual and the state economy. Further, passing an exam should offer long-term value to the individual, meaning the exam demonstrates that the individual passing it has sufficient depth of knowledge and the skills needed to adapt to continuously evolving workplace requirements. **Based on these views, SREB advocates that employers, departments of education and other agencies (e.g., workforce councils) must participate in the process of selecting and approving industry certification exams.**

Variation in Examinations' Depth and Complexity. How many such exams must a student pass to be considered as having met technical readiness standards? **Many industry certification examinations associated with certain high-wage, high-skill, high-demand jobs are impossible to pass at the high school level; such examinations exceed the time, experience and scope of the high school curriculum and require further study at the postsecondary level as well as a certain number of hands-on work or apprenticeship hours before candidates are considered prepared to take them.** For example, several Kentucky technical centers offer automotive training programs. Full Automotive Service Excellence (ASE) certification requires candidates to complete a series of certification examinations as well as two years of work experience; students may take a number of these examinations while in high school, but must complete the full series at the postsecondary level.

Other industry certifications may require students to take just one course, or a portion of one course, in order to be considered qualified to take the related exam, as SREB found in a 2009 study of the use of industry certification examinations as alternative high school assessments.[8] In this study, SREB determined that industry examinations should be offered as part of a sequence of related courses in a career pathway program of study. In *Observations of*

10 Randomly Chosen Industry Certification Exams, in the sidebar, SREB compared two state-approved industry certifications representing different degrees of depth and complexity. SREB found that although both certifications have value in the workplace, only one sought to prepare students for continued learning in the field. In the case of more narrowly focused certifications that may be earned after only minimal course work, SREB recommends that a series of related exams be "bundled" together as a means of ensuring students are not only prepared for entry into their career field, but are also receiving the foundation needed for further education and training.

Recommendations:

- **Study and reshape the state's existing industry certification examination selection and approval process. A multi-step formal process led by KDE would seek to approve those certifications that lead to higher paying jobs, address high-demand areas and add value to the state economy:**
  - First, for each proposed industry certification, the Kentucky Labor Cabinet must validate that jobs are available within the region or the state that certification holders would be qualified to fill.
  - Second, a group of employers should study and validate that graduates possessing such certifications would receive preference for employment.
  - Third, KCTCS should work with KDE to review each proposed industry certification exam and determine the amount of credit hours that would be earned for having passed it. An exam that requires no more than 150 hours of instruction should not earn the same number of credits as an exam that requires 600 or more hours of instruction. Earned credit hours would count toward students' advanced training in the field.
  - Fourth, final validation and approval of industry certification examinations should be made by the Kentucky Workforce Investment Board.

Observations of 10 Randomly Chosen Industry Certification Exams

SREB reviewed 10 randomly chosen industry certification examinations accepted by KDE. They included:

- AAFCS Pre-PAC Fashion, Textiles and Apparel
- Adobe Certified Expert
- Assessment of Skills and Knowledge for Business (ASK): Fundamental Business Concepts
- Certified Pharmacy Technician
- Cisco Certified Entry Network Technician (CCENT)
- Help Desk Institute (HDI): Support Center Team Lead
- KY Early Care & Education Orientation Certificate
- Microsoft Technology Associate (MTA Development Track): Exam 98-373: Mobile Development Fundamentals
- National Manufacturing Badge
- NCCER: Sheet Metal (Level 1)

After a review, SREB determined that some of these examinations are rigorous, applicable and recognizable in the workforce. For example, the Cisco and Microsoft certifications are high-quality exams developed by internationally recognized industry leaders. Although a student passing either of these exams would likely require more certifications to be fully employable without a college education, both represent major steps toward career entry.

Other exams sparked questions. **The first question is related to the curriculum associated with the certification exams.** SREB compared two exams with greatly different aims: (1) the National Manufacturing Badge, a certification provided

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Observations of 10 Randomly Chosen Industry Certification Exams

through Project Lead The Way (PLTW) and SkillsUSA, and (2) the Certified Pharmacy Technician certification. The curriculum associated with the National Manufacturing Badge is designed to help students learn more about the field. Students must complete the PLTW curriculum, comprised of three or more courses, in order to earn it as an end-of-program certification. The Certified Pharmacy Technician certification is offered after just one course; its curriculum is designed to help students pass the exam. Although both certifications have value in the workplace, only the curriculum for the National Manufacturing Badge provides additional benefits (i.e., it not only helps students pass the exam, but also prepares them for further learning). By contrast, the Certified Pharmacy Technician curriculum does not deepen students' related knowledge of the field. It may be taken in isolation, outside the context of a complete curriculum (i.e., as a focused career pathway program of study).

The second question is related to the amount of course work needed to pass an exam. The two certifications described above require the completion of different amounts of course work — three courses versus one course. In examining the other eight randomly selected industry certification examinations, SREB found that course work requirements ranged from as little as part of one course to at least three or four courses (e.g., the Microsoft Technology Associate sequence). Some of the shorter courses may require technical center students to have taken additional foundational courses as prerequisites to sitting for the exam. For example, a student could be required to take advanced biology and chemistry in addition to the Certified Pharmacy Technician course before being allowed to take the certification exam. In some cases, this would increase course work requirements and extend students' related knowledge of the field.

- **Expand options regarding what constitutes an approved industry certification exam or alternatives to industry certification exams.** Where suitable industry exams are not available, the state might consider such alternative measures of technical readiness as (1) passing an end-of-course exam developed jointly by KDE and KCTCS in at least two courses in a career field, or (2) passing an approved end-of-course exam developed by a third party (e.g., SREB's Advanced Career programs, through which passing students receive transcripted postsecondary credits). Such alternatives to industry certification exams, along with other potential alternative options, would demonstrate that students have acquired the necessary credentials and plan to pursue further study in the same area.

- **Set as criteria that industry certification examinations must include both depth of knowledge and complexity as indicators of sufficient preparation for continued learning in the field.** Grubb and Oakes' review of industry-based examinations was based on the idea that rigor addresses both the *depth of knowledge* measured by an examination and the *complexity* of the exam.[9] To ensure that CT curricula are both rigorous and meet industry standards, policies and procedures related to the selection of industry certification need to draw upon the expertise and guidance of industry partners.

- **Consider requiring all CT teachers of record in courses or programs leading to industry certification examinations to take and pass these exams themselves.** State-provided summer training may be needed to prepare teachers to take exams.

- **Create a system of stackable credentials offering a progression of entry-level, intermediate and advanced certifications beginning in high school and continuing through postsecondary certificate, credential and degree programs.** In high school, stackable credentials are an integral component of career pathway programs of study and provide a seamless transition to postsecondary education

and varied work-based learning opportunities in industry. Such a model will require significant alignment between KDE, KCTCS and industry training programs.

- **Define the amount of transcripted community college credit that will be awarded to students who successfully pass state-approved certification examinations and meet academic readiness standards, based on the level, depth and scope of technical material assessed in those examinations.** KDE, KCTCS and industry partners could work in partnership to determine how many transcripted credits may be applied toward program certificates or associate's degrees.
- **Incentivize technical centers and CT programs that demonstrate improvement in the percentages of students successfully passing industry certification examinations.**

The Kentucky Occupational Skills Standard Assessment (KOSSA)

At present, the KOSSA is the most widely used technical assessment in the state. Assessment items are created and evaluated by educators and industry representatives serving on the KOSSA Task Force and include multiple choice questions and multiple choice scenarios. Each item in the assessment item bank is linked to specific skill standards. The Skill Standards Assessment System serves as a performance indicator for Perkins accountability. Vocational/Technical Skill Proficiency is measured by the percentage of secondary students who receive a Skill Standards Certificate and part of the career readiness measure for CT preparatory students (i.e., those who complete three CT courses). In 2012-13, 20,817 Kentucky CT students took the KOSSA: 8,775 students (42 percent) successfully passed the exam (KDE, KOSSA results, July 2013).

SREB explored whether reliability and validity studies exist for the KOSSA. Before items are approved for inclusion in the Skill Standards Assessment Item Bank, they are piloted in schools offering the assessments. Industry and education representatives then evaluate student responses. This review and evaluation of items is accomplished through the use of a Standard Item Analysis Report that provides performance information on each assessment item. Industry and education representatives work in teams to review items based on student outcome data and ensure that items are accurately linked to standards. Because this is an industry-driven system, great emphasis is placed on the professional judgment of industry representatives as to the importance of items to be included in the assessment. Following this pilot year, new assessment items approved by the KOSSA Task Force are added to the item bank as official test questions. Data continue to be collected on items and review and revision of items occur annually.

KDE is transitioning the KOSSA to an online assessment system in order to provide centers with detailed reports on each skill standard and how students performed so staff can align curricula and create units or lessons based on identified needs.

Recommendations:

- **Eliminate the use of the KOSSA in CT areas in which robust, high-quality, industry-approved certification examinations have been identified.**
- **If the KOSSA remains in use, consider requiring teachers of record in the related career field to take and pass the teacher version of the exam.** This may require the provision of summer training for existing teachers to prepare for these exams.

Inequitable Funding for Assessments

The burden of cost for administering assessments was identified as a major concern for districts. As noted, whereas state centers received a grant to pay for the WorkKeys assessment, local centers expressed frustration at having to pay for it themselves, arguing that it represented a significant financial burden for their districts. Personnel at some local centers stated that they could not administer the WorkKeys due to its cost; some believed this negatively impacted their college- and career-readiness scores.

As noted in an earlier subsection on academic and technical career-readiness standards, CT students at state centers who met ACT or Compass benchmarks were still being required to take the WorkKeys. Although such duplicative test-taking presented an unnecessary financial burden to local centers, a number of participants noted the "soft skills" section of the WorkKeys has merit for students, centers and employers seeking an assessment of students' workplace readiness skills.

Various certification examinations are in use at different locations (i.e., state or local technical centers; CT programs in comprehensive high schools) across the state, for which the state maintains a recognized list. Overall, however, SREB found there was little consistency across centers as to who pays for these certification examinations. Some centers require students to pay for them, whereas in other cases, school districts or the state pays for students to take them.

Recommendations:

- **Consider adding one of the WorkKeys soft skills assessments that address workplace readiness if the KOSSA is discontinued.**
- **Develop a consistent policy regarding which certification examinations will be used and how they will be funded.** Students, parents and counselors must receive accurate information about which industry certification opportunities are available through the CT pathways in their schools.

Using Assessment Data

All CT programs are expected to use outcome data to identify student progress on the state's academic and technical college- and career-readiness assessments. The director of one technical center SREB's institutional review team visited stated that the faculty were just beginning to work with assessment data in order to understand where students were and to identify their needs. At the time of one center visit, a state center had recently received assessment data from the local high school and was in the process of exploring the meaning of these data with teachers.

Personnel at one state center proudly announced they had the highest number of students passing the WorkKeys in the state, with some 93 percent receiving silver and gold certificates. They accomplished this by embedding WorkKeys-like assessment questions in all student classroom examinations and by incorporating literacy and math standards into all CT assignments.

Other centers attributed their improved performance on career-readiness assessments to their practice of sharing data and information with teachers and using those data to develop interventions to meet student needs. However, during SREB's institutional review visits to six centers, it was discovered that most were still employing a "test prep" approach to preparing students for academic and technical assessments — often in the form of intensive pull-out sessions.

Statewide and at selected centers, schools and students received special recognition and other incentives for meeting college- and career-readiness standards. At graduation, students are awarded honors for meeting college (academic) and career (technical) readiness standards, with the highest honors awarded to students meeting both college- and career-readiness standards. One local center has established a set of criteria that allow qualified students to receive two years of paid tuition to a local community college. Last year, 82 students qualified, and 25 took advantage of the center's offer.

Recommendations:

- **Encourage the use of academic and technical assessment data to guide school and classroom improvements in instruction and student performance.** Some school leaders and teachers will need extensive professional development in how to interpret assessment results and align their curricula, instruction, assignments and assessments with industry standards.
- **Discourage the use of "test prep" approaches to preparing students for academic and technical assessments.** Instead, classroom activities and student assignments should be designed around real-world, project-based authentic learning that requires the application of literacy, math, technical and 21st-century skills.

Section III: Academic Support Provided by Home High Schools to Technical Center Students

Research Question: Have the academic courses taken by CT students at their home high schools been effective in preparing them for success in meeting college- and career-ready academic standards?

Findings

Based on the results of SREB's student surveys, too few students at Kentucky's state and local technical centers are completing college-ready academic courses at their home high schools; reading texts and related documents in all courses; completing mathematics assignments that emphasize reasoning, understanding and application of critical math concepts; and engaging in intellectually demanding and relevant assignments in all classes.

Institutional review and other data show little is being done at either the state or local technical centers to embed essential work-related math and literacy standards into assignments that address real-world problems. If the state is to graduate 90 percent of its CT students academically career-ready, home high schools will need to work harder to enroll CT students in a college-ready academic core and to employ teaching strategies that help those students meet or exceed the state's higher standards for literacy and math.

Also, a major change will be required in what and how students are taught at their technical centers: There, high school-level literacy and math standards must become essential tools that students use to complete authentic, real-world assignments in their career fields of study.

CT Students' Completion of the College-Ready Academic Core

As Table 9 shows, senior survey results indicate just 26 percent of students attending both the state and local centers reported completing all three parts of the recommended academic core, defined as four years of college-preparatory English, four years of math (Algebra I and higher), and three years of college-ready lab science courses. Seventeen percent more students reported completing the college-ready academic core at local centers than at state centers. However, this figure must be interpreted with caution because of the lack of participation of 15 local centers in SREB's surveys. At both the state and local centers, considerably more students reported completing the math (28 percent more) and science (26 percent more) components of the college-ready academic core than reported completing the English component of the college-ready academic core.

Table 9: Percentage of CT Students Completing the College-Ready Academic Core

	Meet Curriculum		Meet Parts of Curriculum		
	All 3 Parts (%)	2 Parts (%)	English (%)	Mathematics (%)	Science (%)
All centers	26	30	37	65	63
State centers	20	29	31	61	57
Local centers*	37	32	49	73	73

* 15 local centers did not participate in the student or faculty surveys.

Source: 2013 TCTW Survey for Kentucky.

Just 37 percent of students at the state and local centers reported completing the recommended college-ready English courses in the academic core. Indeed, most students reported that they were enrolled in lower-level English courses. Although more students at the local centers (49 percent) reported taking college-preparatory English compared to students at the state centers (37 percent), these differenced may be attributable to the omission of 15 local centers from SREB's student survey data.

CT Students' Experiences with Literacy Instruction

As Table 10 shows, at least half of the students surveyed indicated they were not engaged in the types of experiences in their core academic classes at their home high schools that engages them in reading grade-level non-fiction texts and allows them to demonstrate their understanding of those texts through written papers and oral discussion.

Just 43 percent of seniors at state and local centers who responded to SREB's survey reported having the kinds of intensive experiences with grade-level texts that teachers are taught to deliver through the Gates Foundation-funded Literacy Design Collaborative (LDC). The LDC's college- and career-ready literacy strategies integrate literacy standards into academic and technical assignments in a way that advances students' literacy and academic and technical achievement.

CT Students' Experiences with Mathematics Instruction

Table 10 also shows that less than half of the students at the state and local centers who responded to SREB's survey reported receiving math instruction that develops their understanding of math concepts and allows them to apply that understanding to the solution of complex, multi-step problems focused on modern workplace issues. It appears that many of the teachers at these students' home high schools either did not receive Mathematics Design Collaborative (MDC) training to use formative assessments or were failing to use these tools and strategies in their instruction. Further disaggregation of the data will be needed in order to determine which technical center students are not receiving instruction that prepares them to meet state college- and career-ready math standards. Given that most students reported completing four years of college-ready math, more attention must be paid to how they are being taught.

CT Student Experiences with Challenging Assignments

As Table 10 shows, less than half of the students in all technical centers reported they were given challenging and relevant assignments. SREB's survey asked students if their assignments: (1) pushed them to engage in deeper learning, (2) required them to apply academic knowledge and skills to complete authentic work, and (3) required them to often work in teams to learn from and learn with other students.

Table 10: Percentage of CT Students Experiencing Literacy Across the Curriculum, a Balanced Approach to Math Instruction and Assignments Matter

	Rich Literacy Experiences		Balanced Approach to Math		Assignments Matter[1]	
	Intensive (%)	Moderate (%)	Intensive (%)	Moderate (%)	Intensive (%)	Moderate (%)
All centers	43	32	47	27	48	27
State centers	38	34	45	27	47	28
Local centers	50	30	51	27	48	26

1 *Assignments Matter* captures the number of students reporting they had experienced challenging and meaningful assignments in their core academic classes at their home high schools.

Source: 2013 TCTW Survey for Kentucky

Integration of Academic Standards into CT Assignments

As Table 11 shows, at the 80 technical centers responding to SREB's faculty surveys, about one-third of teachers reported their center employed a staff member whose role was to help CT teachers embed academic literacy and math standards into their assignments. This finding held true across all centers, both low- and high-performing.

However, the extent to which CT teachers reported believing in the importance of helping students master academic content varied greatly according to their centers' overall performance. Table 12 shows 83 percent of teachers at high-performing centers said they believed that it is very important to help students master the essential academic standards needed to graduate from high school and to be college- and career-ready, compared to just 69 percent of teachers at low-performing centers.

Recommendations:

- **Offer intensive staff development to both home high school teachers and CT teachers at the technical centers in the use of Gates Literacy Design Collaborative (LDC) strategies to engage CT students in reading disciplinary-related texts and expressing their understanding of those texts orally and in writing.** Teachers in both the home high schools and the centers must incorporate these interdisciplinary literacy strategies in all academic and CT courses, especially in grades nine and 10. Use of the LDC tools and strategies in CT classrooms will require some modification in task assignments in order to fit the unique nature of each career and technical area.

Industry Perspectives on Kentucky Students' Preparedness for the Workplace

At a meeting of SREB's Commission on Career and Technical Education held on December 9-10, 2013, at the Governor's Mansion in Frankfort, Kentucky, Dennis Dio Parker, Assistant Manager of Toyota's North American Production Support Center and North American Lead of Toyota's Advanced Manufacturing Technician Program stated, "Toyota needs talented people to make [it] competitive. There is definitely a skill gap. We can't get workers. With technology growth and changes, that gap will widen even more. CTE can no longer be single-skill focused. Toyota needs a multi-skilled workforce. It is scary that only 35 percent of 12th-grade students are reading on a proficient level."

During a focus group, a manufacturer from Northern Kentucky commented, "We do not employ graduates from the high school technical center because they lack the literacy and numeracy skills needed to make sound judgments, the ability to analyze and solve problems and the ability to work in teams. These are skills essential to our industry."

Table 11: Percentage of Technical Centers in which a Staff Member Helps Teachers Embed Academic Standards into CT Assignments

Does a staff member at your technical center assist teachers in developing lesson plans to embed reading, mathematics and/or science standards into career-technical assignments?	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Yes	32	33	33

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Table 12: Percentage of Teachers Who Believe It Is Very Important to Help Students Master Academic Content			
	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Teachers believe it is **very important** to help students master the content in English/ language arts, mathematics and science courses needed to graduate from high school.	72	83	69

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

- **Enroll more CT students in college-preparatory English courses in their home high schools that engage them in reading informational texts and in preparing written reports based on their reading and related research. Further, more CT students — especially male students, who are more likely to have poor literacy skills — need to be better engaged in reading grade-level texts and documenting and expressing their understanding of those texts orally and in writing in their CT classes.**

According to the Georgetown Public Policy Institute,[10] young men between the ages of 18 and 19 are having more difficulty accessing opportunities than are young women. Young men's participation in the labor force has dropped from 80 percent in 1980 to just 65 percent in 2010. Between 1980 and 1990, young men earned an average of 85 cents on the dollar; by 2011, their average earnings were just 58 cents on the dollar. In 1980, 24 percent of young men earned a bachelor's degree compared to 21 percent of young women. By 2010, only 28 percent of young men earned a bachelor's degree, compared to 36 percent of young women. There are many reasons why young men are having difficulty finding good jobs and getting degrees. Many are less proficient than young women at using computers. They may lack critical learning skills. But most importantly, high school English classes and other academic classes often set lower literacy standards for young men than for young women.

- **Offer intensive staff development to help home high school math teachers use Gates Mathematics Design Collaborative (MDC) strategies that emphasize teaching math for reasoning, understanding and application to multi-step problems.** MDC strategies, when used effectively by teachers, can improve the math performance of CT students.

- **Make math an integrated part of all student assignments at the technical centers by working with industry partners to formulate authentic, project-based assignments that require students to apply high school-level math concepts to complete the project.** Unlike "pull-out" programs focused on intensive drilling of math lessons, this process would teach math as a just-in-time application of concepts and skills. This might require the assignment of a math specialist from the home high school to the center who would work with CT teachers on math integration in both classroom instruction and project-based assignments. Authentic projects can include a formative assessment lesson that pre-assesses students' ability to do the math required by the assignment; those identified as needing more help can be supported with a series of steps that ensure students will be able to learn and apply the math concepts successfully.

- **Adopt and offer transitional college-ready literacy and math courses to seniors at technical centers who have not met literacy and math standards.** Developed by SREB and teams of state and local educators from 14 states, these transitional literacy and math courses should be offered as a fourth English or math course. Technical center directors should work with the local school district to secure a trained teacher to teach these transitional courses at the center and also to work with CT teachers on embedding math concepts in their instruction and assignments.
- **Consider offering statistics as an optional fourth math course for CT students at home high schools.**
- **Offer intensive staff development to district leaders, home high school principals and technical center directors that allows these leaders to help all teachers reshape their assignments to make them more student-centered, intellectually demanding, relevant and reflective of college- and career-ready grade-level standards.** All assignments must make greater use of literacy standards and strategies, independent student research, teamwork and technology to complete assignments.

Advanced Career — Creating the Future: Design and Production of Tomorrow's Products

The approach that SREB and the state of Kentucky are taking to embed math in a new advanced manufacturing curriculum may work for CT programs at state and local technical centers. This approach may require that CT teachers receive special instruction and support on how to embed in their curricula the sciences and technical literacy and math standards most needed in the modern workplace as well as for entry into postsecondary study and advanced training.

Section IV: Articulation, Dual Credit and Alignment of Technical Center Programs with Community Colleges

Research Question: Do all programs have articulation agreements that provide postsecondary credit opportunities and a proven track record of success, and are secondary career programs aligned with current offerings at the state's community and technical colleges?

In July 2013, Kentucky took a major step toward creating a stronger system of optional career pathway programs of study spanning high school and community college when KDE Commissioner Terry Holliday and KCTCS President Michael B. McCall signed a Dual Credit Memorandum of Understanding (MOU) that sought to provide secondary students with "a seamless path to postsecondary education while reducing student expense and time to credential attainment" (KCTCS and KDE, July 9, 2013). The agreement was designed according to "national standards for best practices for dual credit as outlined by the National Association of Concurrent Enrollment Partnerships (NACEP)" and aligned with the regional standards of the Southern Association of Colleges and Schools, Commission on Colleges (SACS-COC). Since the signing of the MOU, KDE, the Office of Career and Technical Education and KCTCS worked together to prepare a handbook to assist secondary and postsecondary partners in implementing this dual credit agreement. The handbook states the following:

- Dual Credit courses provide highly relevant and academically sound courses for secondary students, especially in areas of high-skill, high-wage, and high-demand programs.
- Dual Credit programs add value to the junior and senior years of high school by enhancing the college- and career-readiness of secondary students.
- Dual Credit programs will increase student matriculation from high school to college.
- Dual Credit programs reduce the time and cost to attain a postsecondary credential.
- Dual Credit programs increase completion rates and decrease remediation rates for secondary and postsecondary students.[11]

How Dual Credit Is Awarded

- College credit will be awarded for courses taken for dual credit with a KCTCS college upon the student's completion of the course requirements and will become part of the student's official college transcript. The award of college credit will be in compliance with appropriate accreditation standards for the KCTCS College.
- All KCTCS colleges will recognize credit awarded under this agreement as stated in KCTCS policy and according to accreditation requirements.
- College credit awarded pursuant to this agreement will be applied to KCTCS program requirements in an applicable postsecondary program that the KCTCS college is approved to offer.
- Each local KCTCS college will permit qualified dual credit students to enroll in a maximum of 12 credit hours per academic year. Exceptions above the 12 hour limit may be considered and approved by the Chief Academic Officer at the local KCTCS college based on the specific curriculum or program offered during the dual credit experience. In addition, exceptions may be allowed for dual credit students enrolled in Early or Middle Colleges.
- High school credit will also be awarded by the secondary school upon successful completion of the course. The award of high school credit will be in compliance with state standards.

Source: Dual Credit Memorandum of Understanding between the Kentucky Community and Technical College System and the Kentucky Department of Education, July 9, 2013.

Under the MOU, "courses accepted for dual credit toward an undergraduate credential at KCTCS must be college-level course work relevant to the credential or degree sought and meet KCTCS college standards for content, quality, and rigor pursuant to the requirements of [SACS-COC]." Further, dual credit students "have the opportunity to earn a certificate, diploma, or degree once they transition to a KCTCS college. Students receive other career opportunities such as earning industry certifications and may transfer to a four-year postsecondary institution to complete a bachelor's degree."

Findings

At present, the promise inherent in the Dual Credit MOU has not been fully realized. SREB's findings suggest that the state has not fully implemented clear, well-developed optional career pathway programs of study that (1) begin early in high school, (2) combine a college-ready academic core with CT programs offered at state and local technical centers, (3) offer dual credits, industry credentials and work-based learning opportunities, and (4) vertically align with local community college programs leading to certificates, credentials, associate's degrees or higher and well-paying jobs. The potential to develop such pathways exists, but at present, the system is characterized by fragmented programs offered by local institutions and organized according to their own unique conditions. Kentucky's high schools, technical centers, postsecondary institutions and industry partners must come together to standardize optional career pathway programs of study, unify the fragmentary components that currently comprise them and fill in any existing gaps. These gaps include the role of work-based learning and the creation of promotional materials that will help parents, counselors, students and industry leaders understand how optional career pathways can prepare students for both college and careers.

Dual Credit and Dual Enrollment

If more students are given the opportunity to earn college credit while in high school, technical centers' performance may improve. As Table 13 shows, SREB's senior survey results indicate significantly more students at the top-performing centers (44 percent) than at low-performing centers (27 percent) completed three or more courses for college credit. Table 14 shows 54 percent of students at high-performing centers completed a dual enrollment or concurrent enrollment class at their high school compared to 44 percent at low-performing centers.

Table 13: Percentage of Students at Technology Centers Completing Courses for College Credit by Performance Levels

How many college courses will you have earned credit for by the time you graduate?	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
0	35	27	39
1	15	13	16
2	16	16	18
3	11	13	10
4	8	10	7
5	15	21	10

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Table 14: Percentage of Students Taking Dual-Enrollment, Joint-Enrolled or Concurrent Enrollment Classes by Performance Levels			
Completed a dual-enrollment, joint-enrollment or concurrent-enrollment class at your high school	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Yes	46	54	44
No	54	46	56

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

SREB's six institutional review visits found it is still unclear whether the state's dual credit policy will be implemented consistently across the state. A number of technical center directors expressed concerns about dual credit, especially regarding inconsistencies in implementation in some regions. Concerns raised included:

- Some community colleges have elected to decide annually which courses they will allow for dual credit: This makes it difficult for technical center and high school leaders and counselors to plan and promote dual credit options.
- Some community colleges have set college credit-earning limits that are below the limit set by the state. For example, one technical center director stated, "more community colleges are placing their own restrictions on dual credit."
- One technical center director noted that two years ago, students earned 125 dual credits. But when KCTCS implemented a $50 per class administration fee, students stopped enrolling. This director worked with KCTCS to create additional articulation agreements and articulated credits. Under this new agreement, students had to complete three credit hours at KCTCS before applying for the credits. Once they completed the class and filled out the related paperwork, they were awarded the credit without paying the $50 fee.
- One technical center director said the community college serving her center requires that 70 percent of the students in the class meet college entrance requirements for any student to receive dual credit.

Technical center directors also acknowledged problems existed on their end in communicating the availability and benefits of dual credit. One director admitted his center was not doing an adequate job of working with students, parents and the community college to promote career pathway programs of study or to help students formulate individual programs leading from high school to postsecondary credentials, certificates and degrees.

Students' Post-High School Plans

As shown in Table 5 in Section II, 63 percent of all technical center students met state academic career-ready benchmarks. This would seem to suggest many technical center graduates are ready for postsecondary studies, and indeed, SREB's senior survey results indicate most technical center students have gotten the word that postsecondary study is essential to their future success. As Table 15 shows, 75 percent of seniors who responded to the survey expressed an intention to pursue some form of postsecondary education and training. About 45 percent said that they planned to enroll in a four-year college or university; a total of 30 percent said that they planned to pursue some form of sub-baccalaureate education (i.e., 17 percent planned to enroll in a two-year community college, 11 percent planned to enroll in technical or business school and

two percent planned to enter an on-the-job training program). Note that fewer than one in five of all senior survey respondents (17 percent) reported planning to enroll in community college after graduation, compared to more than two in five (45 percent) reporting plans to enroll in a four-year college or university.

Table 15: Students' Stated Post-High School Plans by Performance Levels

What is the one thing that will take the largest share of your time in the first year after you leave school?	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Attending a four-year college or university	45	44	43
Taking courses at a two-year or community college	17	20	17
Taking courses at a technical or business school	11	10	11
Working full-time	13	13	13
Working part-time, but not attending school or college	3	2	3
Working as an apprentice or in an on-the-job training program	2	3	2
Full-time military service	5	4	5
Being a homemaker	1	0	1
Other	6	4	6

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Table 16 further breaks out seniors' post-high school plans by gender. A high percentage — 89 percent — of young women who responded to the survey reported planning to pursue some form of postsecondary education (60 percent four-year college or university, 24 percent community college, 5 percent technical or business school). By comparison, just 61 percent of young men (34 percent four-year college or university, 13 percent community college, 14 technical or business school) reported planning to pursue some postsecondary education.

These wide discrepancies in students' stated post-high school goals and plans — across all technical center students and across gender lines — **suggest there is a weak link between students' studies at their technical centers and further education and training.** In Kentucky, as across the nation as a whole, young men are not getting the message that optional career pathway programs of study can prepare them for a broad range of postsecondary educational options and also help them earn credentials that lead to greater earnings. An educational campaign is needed to help students — especially male students — see the connections between their high school CT studies and related programs at local community colleges, including dual credit-earning opportunities that can potentially save them money and shorten the time needed to earn a valuable credential or degree in a well-paying career field. **Although it is important for all schools to create "postsecondary-going cultures," it is essential that technical centers and community colleges work together to foster postsecondary aspirations, especially for male students, and raise students' awareness of the excellent value offered by the state's community colleges.**

Table 16: Students' Stated Post-High School Plans by Gender			
What is the one thing that will take the largest share of your time in the first year after you leave school?	**All Students (*n* = 5,320) (%)**	**Male (*n* = 3,155) (%)**	**Female (*n* = 2,165) (%)**
Attending a four-year college or university	45	34	60
Taking courses at a two-year or community college	17	13	24
Taking courses at a technical or business school	11	14	5
Working full-time	13	19	5
Working part-time, but not attending school or college	3	3	2
Working as an apprentice or in an on-the-job training program	2	4	1
Full-time military service	5	7	1
Being a homemaker	1	0	0
Other	6	6	3

Source: 2013 TCTW Survey for Kentucky

Data collected during institutional review visits to six technical centers also revealed a high percentage of students were not planning to continue their education in the same career field they had studied in high school. Previous research on career pathway programs of study showed that a majority of high school students do not stay in the same program of study in college, but that participation in a program of study made students more motivated to remain in school and make informed choices about college and careers; further, the number of program of study courses taken in high school was significantly related to staying in the same Career Cluster in college and earning a college credential.[12] When offered before they enroll in a technical center program, intensive career counseling, career development and career exploration can result in students making more informed choices about the career pathway programs they choose to study.

Teachers' Perceptions of Their Role in Preparing Students for College and Careers

SREB's faculty survey probed CT teachers' perceptions of their role, as well as their centers' role, in preparing students for postsecondary study and careers. Perceptions about the mission of the technical centers varied greatly across high-performing and low-performing centers. As Table 17 shows, a significantly higher percentage of teachers at high-performing centers perceived their centers' mission is to prepare students both for employment and continued study, and it is very important that students acquire the academic knowledge and skills necessary for success in postsecondary studies and careers. Further, significantly more teachers at high-performing centers compared to low-performing centers believed that it is very important that students be prepared to pass industry-recognized certification exams.

It is important to highlight the fact that only 61 percent of faculty strongly agreed that their school's goals and priorities are clear, and far less than half strongly agreed that the surrounding community (40 percent) and business and industry (44 percent) support their programs. This lack of confidence clearly indicates that technical center leaders and teachers need to proactively reach out to their communities and business and industry to communicate the value of their programs to students and the wider community.

Table 17: Technical Center Teachers' Perceptions about Mission, Instruction and Accountability for Student Performance

	All Centers[1] (*n* = 80) (%)	High- Performing Centers (*n* = 26) (%)	Low- Performing Centers (*n* = 26) (%)
Teachers believe it is **very important** to prepare all students with the academic knowledge and skills needed to be successful in postsecondary studies and/or careers.	71	81	68
Teachers believe it is **very important** to help students master the content in English/language arts, mathematics and science courses needed to graduate from high school.	72	83	69
Teachers believe it is **very important** to help students acquire the technical knowledge and skills needed to get a good job.	79	87	73
Teachers believe it is **very important** to prepare all students for the dual objective of employment and further study.	72	83	67
Teachers believe it is **very important** to develop students' abilities to solve problems and think critically.	73	81	69
Teachers believe it is **very important** to ensure students earn a high school diploma.	82	86	81
Teachers believe it is **very important** to prepare all students to pass an exam that will give them a credential that is valued by employers.	74	85	67
Teachers **strongly agree** that the goals and priorities are clear at the technical center.	61	74	57
Teachers **strongly agree** that the surrounding community actively supports our center's instructional goals.	40	51	33
Teachers **strongly agree** that local and regional businesses and industries support improving the quality of our programs.	44	52	36

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Recommendations:

- **Hold joint regional meetings — electronically or face-to-face, convened by KDE and KCTCS — to explain the Dual Credit MOU and its intentions to local KCTCS leaders, school district personnel, technical center directors and high school counselors.** These meetings will help ensure that local community colleges, school districts and technical centers interpret the MOU consistently.

- **Revise the dual credit fee structure and make it acceptable to all partners.**
- **Work across KDE, KCTCS, technical centers and home high schools to promote optional career pathway programs of study and dual credit and dual enrollment opportunities to students and parents, through:**
  - Students' Individualized Learning Plans.
  - Promotional materials, jointly developed by industry representatives and technical center and home high school leaders, that connect high school career pathway programs of study with work-based learning and community college programs leading to credentials, certificates or associate's degrees and high-skill, high-wage, high-demand jobs.
  - A jointly developed website that provides evidence of the benefits of completing career pathway programs of study linking high school and community college.
- **Provide technical center directors with timely and accurate data on how many of their students are earning dual credits as well as how many credits they have earned.**
- **Ask technical center leaders and community leaders in each region to become more proactive in educating students and parents about the opportunities that center graduates have for continued study in their career field at local community colleges.** This might include:
  - Helping students understand the long-term benefits associated with advanced training in their career fields.
  - Arranging field trips to the local community college to visit with teachers in programs related to students' career fields.
  - Setting aside time during the school year for community college counselors to meet with groups of students or individual students to map out how dual credits earned in high school connect seamlessly with programs at the community college, save students money and shorten time to degree.
  - Encouraging technical center directors and community college leaders to work with industry leaders to create a "learn and earn" program for technical center graduates moving on to the community college in their career pathway.
- **Set a goal that the same numbers of male and female students will earn dual credits and pursue postsecondary studies.** CT teachers at the technical centers can have a powerful influence on students' postsecondary aspirations and plans, but they will need development on the ways in which they can help achieve this goal. This is particularly important in the case of male students — who currently comprise about 60 percent of the enrollment at the technical centers — because their overall declining earnings and participation in the labor market have been linked to their comparative lack of postsecondary education and high-value credentials.

Section V: Implementation of Individualized Career Learning Plans

Research Question: Are students being placed in career pathway programs of study that align with their individual learning plans and regional and state economic sector needs?

Findings

SREB's institutional review visits and faculty and student survey data indicated that most students are not receiving the experiences, information and assistance needed to develop four- to six-year individualized learning plans (ILPs) in optional career pathway programs of study leading to industry certifications, further education and good jobs. Ideally, effective ILPs: (1) align with students' college and career goals, (2) outline non-duplicative sequences of CT courses and college-ready academic courses, beginning at the secondary level and extending to related postsecondary programs, and (3) identify potential job opportunities related to students' career pathway programs of study and link those jobs with postsecondary education and training, industry credentials and work-based learning experiences required for entry. As a core component of students' annual course enrollment and college and career planning activities, ILPs would be reviewed with students and their parents by a school counselor or a trained teacher adviser.

Institutional review visits to six technical centers revealed that most did not employ a consistent counseling for careers approach to help students prepare and revise their optional career pathway program ILPs and connect their interests and abilities to potential careers and related education and training options. Overall, ILPs are not being used effectively to help students plan optional career pathway programs of study that will prepare them for work, advanced training and college.

Students' Educational and Career Exploratory Experiences

SREB's senior survey data showed most technical center students were not experiencing a diverse range of educational and career exploratory activities that would allow them to gain a greater understanding of their interests, aspirations, abilities or the educational and career opportunities available to them. As Table 18 shows, across state and local centers, only:

- 26 percent of respondents reported attending a meeting at school with their parents to talk about their plans after high school graduation.
- 37 percent of respondents reported that a counselor or other adult helped them understand their skills, aptitudes and abilities and think about potential career goals.
- 21 percent participated in organized job-shadowing experiences.
- 35 percent attended a career fair.
- 37 percent visited a workplace to learn about careers.
- 26 percent took a career and educational exploratory class.

Most technical center students did not appear to have access to a set of educational and career exploratory experiences that would enable them to learn about careers and the educational pathways leading to those careers, or to learn about their own interests, aptitudes and abilities. Only 11 percent of surveyed seniors reported participating in the following three types of career exploratory experiences: (1) taking a career exploratory course, (2) working during high school, job-shadowing, or visiting a work site, and (3) receiving advisement on education and career planning with a counselor or with a parent and a teacher adviser.

Table 18: Students' Educational and Career Exploratory Experiences, by Performance Levels	All Centers[1] (*n* = 80) (%)	High- Performing Centers (*n* = 26) (%)	Low- Performing Centers (*n* = 26) (%)
A counselor or adult has helped me understand my strengths, skills, aptitudes and abilities.	37	38	33
A counselor or adult has helped me think about potential career goals.	42	43	38
I have spent time researching possible careers.	60	61	55
I know what jobs and careers will be in high demand.	53	54	49
I took a career and educational exploratory class.	26	28	25
I heard guest speakers talk about various careers.	63	64	62
I heard guest speakers talk about colleges.	72	74	69
I have visited a workplace to learn about what they do.	37	37	35
I answered questions about myself and was given information about good career options for me.	51	54	47
I participated in job shadowing.	21	21	20
I attended a career fair.	35	39	32
I attended a college fair.	53	53	52

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Students receiving *intensive* educational and career exploratory experiences participate in all three activities. Without such experiences, most students will not have the understanding or motivation to design and complete a challenging optional career pathway program of study.

As Table 19 shows, 12 percent more students experiencing intensive assistance with education and career planning reported that they were planning to attend a four-year college or university after graduating from high school. These data, in addition to those provided in Tables 15 and 16 in Section IV, suggest CT students are receiving little information about opportunities at their local community colleges. Home high schools, technical centers and community colleges must work together to increase the visibility of community college staff at the high schools and technical centers in order to educate counselors, teachers, students and parents about the high-value programs offered on their campuses.

These student survey findings were consistent with teacher and student interviews at the six technical centers visited. Both teachers and students acknowledged students received little one-on-one educational and career advisement, unless initiated by the student. Students reported they received most of their help with their ILPs from their teachers. Students also noted their parents were not automatically involved in developing their ILPs, unless they requested an appointment with a counselor. Improving technical center performance will depend in part on enrolling students who have chosen to

attend the technical center because its programs relate to their stated educational and career goals and increase their aspirations to pursue advance training and postsecondary studies. This is especially important for male students.

Survey results and student interview data suggested many students are attending technical centers for the wrong reasons. Some have been placed by the local high school at the technical center and are taking courses that do not match their educational and career goals.

Table 19: Students' Stated Post-High School Plans

What is the one thing that will take the largest share of your time in the first year after you leave school?	All Students (n = 5,397) (%)	Intensive Career Exploratory Experiences (n = 579) (%)	Other (n = 4,818) (%)
Attending a four-year college or university	45	55	43
Taking courses at a two-year or community college	17	13	17
Taking courses at a technical or business school	10	10	10
Working full-time	13	10	14
Working part-time, but not attending school or college	2	1	3
Working as an apprentice or in an on-the-job training program	3	3	2
Full-time military service	5	5	5
Other	5	3	5

Source: 2013 TCTW Survey for Kentucky

Only about half of the seniors who responded to SREB's student survey strongly agreed that the CT courses taken at the center had successfully prepared them for a career or further education. Students reported that some students at the center were attending it as a place to hang out, not as a means of preparing them for their career goals. In focus groups, students talked about how students were being placed in programs at the center with little career and educational planning. For example, students in one local center complained that counselors were placing seniors in advanced CT courses for which they weren't prepared and in which they had little interest. These students described several problems with this process:

- First, such "first-time" seniors slowed the pace of instruction and prevented those in the career pathway who were seeking a credential from receiving the attention and instructional rigor they needed to perform well on their certification exams.
- Second, such "first-time" seniors were filling up the class, preventing juniors with a serious interest from enrolling.
- Third, students felt these ill-placed seniors sometimes disrupted the learning environment.

Some counselors reported certain career pathways were being underutilized. Undersubscribed career pathways may be attributed to a number of possible causes: First, word has gotten out to students that a particular career pathway does not lead to employment or further training at the postsecondary level; second, a program has an ineffective teacher; or third, schools are using the program as a place to warehouse students rather than seeking to change the program, the teacher or both.

Recommendations:

- **Provide students in grades eight, nine and 10 with a comprehensive set of educational and career exploratory experiences that will help them to make informed decisions about optional career pathway programs of study.** These experiences include: participating in career exploratory CT classes in eighth or ninth grade, job shadowing at work sites and visiting technical centers, community colleges and other postsecondary institutions.

- **Offer individualized career counseling to all students, provided by guidance counselors or a trained teacher mentor.** Consideration should be given, where possible, to placing career counselors in the technical centers who will work with home high school counselors to provide career counseling to students and parents.

- **Both the high schools and the technical centers need to actively engage parents in understanding the value of students becoming college and career ready and earning postsecondary credits and industry certifications while in high school.**

- **Advertise optional career pathway programs of study (i.e., those meeting the signature features described in Section I of this report) in printed materials and on the websites of local school districts, home high schools, technical centers and community colleges.** Further, beginning with the middle grades, technical centers and community colleges should create informational materials for use during career counseling and course enrollment periods.

- **Technical center leaders must do more to make the programs offered more attractive to students and parents.** Strategies might include:

  - **Securing the assistance of business and industry leaders in counseling technical center students regarding the career and postsecondary opportunities available to them.** Business and industry partners can help students develop workplace-readiness skills by providing opportunities for students to participate in work-based learning.

  - **Reorganizing technical center offerings to greatly broaden and modernize existing career pathway programs of study.** A major barrier to providing students with multiple career pathway programs of study is the current "silo" configuration of most technical center program offerings. Many programs are designed to prepare single-skilled workers, whereas the modern workplace now seeks multi-skilled individuals with cross-disciplinary training.

  - **Offering a one-period exploratory course at the center to ninth- or 10th-graders that would allow them to spend up to six weeks exploring each of six different career fields.** In such a course, students would learn how to use related technology, complete a short project, learn about advanced training opportunities in a given field, test their interests and aptitudes and use these experiences as a basis for making an informed career pathway choice.

  - **Explore ways of improving student persistence in a CTE pathway into advanced training or postsecondary studies.** Business leaders, secondary educators and postsecondary faculty should help more students understand the additional educational opportunities that are connected to the career pathways they are studying in their technical centers.

- **Offering advanced career programs that are aligned with emerging opportunities in the state and reflect new types of CT instruction.** Many of these recommendations are outlined in Section I.

- **Technical centers should partner with the home high schools and local community colleges or four-year colleges and universities to offer a two-week, full-day summer STEM experience targeted to eighth-, ninth- and 10th-graders.** The Georgia Institute of Technology, for example, offers middle grades and high school students access to such an experience during the summer that allows them to explore STEM through a team project.

Section VI: Rigorous Assignments

Research Question: Is there a major difference across state and local technical centers in students' perceptions of the rigor of assignments they receive from their CT teachers?

Findings

Leaders at state and local technical centers are becoming more focused on meeting state college- and career-readiness standards. SREB's institutional review visits revealed most technical centers have revised their mission statements to focus on college and career readiness. Further, reviewed school improvement plans highlighted initiatives to increase the number of students meeting academic and technical career readiness standards. Since the passage of SB1 and the implementation of the state's new assessments, CT teachers appear to be taking greater ownership of their students' academic *and* technical preparation. **However, the state has not yet established a coherent vision of 21st-century instruction that engages students in authentic, real-world assignments that require them to apply a broad range of cognitive, academic, technical, technological and 21st-century skills to complete.**

Students' Experiences with Rigorous Assignments

SREB's senior surveys asked students to report on the types of assignments they received in their CT courses; survey questions probed for evidence of the level of rigor of those assignments, based on a set of 10 indicators of rigor (see the *Ten Indicators of Rigorous CT Assignments* sidebar). SREB quantified the rigor of students' CT studies depending on the number of these indicators students reported experiencing: That is, their studies were considered *intensive* if they had experienced assignments that included seven to 10 of these indicators, *moderate* if they experienced three to six indicators and *low* if they experienced just zero to two of these indicators. As Table 20 shows, slightly more students at high-performing technical centers (32 percent) reported experiencing intensive CT assignments compared to students at low-performing centers (26 percent). However, at all centers for which SREB received survey data, just 30 percent of students reported experiencing assignments that required the application of cognitive, academic, technical, technological and 21st-century skills to complete.

Table 20: Variance across Centers in the Percentage of Students Reporting Experiencing Rigorous Assignments, by Center Performance Levels

Rigorous CT Studies		All Centers[1] (n = 80) (%)	High-Performing Centers (n = 26) (%)	Low-Performing Centers (n = 26) (%)
Intensive	7-10 indicators	30	32	26
Moderate	3-6 indicators	39	39	40
Low	0-2 indicators	31	28	34

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

If Kentucky's goal is for 90 percent of students at all of its centers to perceive their assignments as demanding and of high value, much work needs to be done.

Students' Experiences of Specific Indicators of Rigorous Assignments

Based on the data presented in Table 21, on average, 48 percent of students reported having assignments that required them to: (1) develop logical arguments to support the solution to a problem, (2) predict outcomes based on observations and information provided, and (3) make inferences from information to develop solutions for a project or problem. These are the types of cognitive skills that 21st-century employers often say they need in the workplace.

Also on average, 54 percent of students reported having assignments that required them to: (1) apply their academic and technical knowledge and skills to complete assignments in new situations within their areas of study, (2) conduct background research, such as reading technical documents, before formulating a plan or solution, or (3) use math to solve a complex problem.

Just 38 percent of students, on average, reported developing and testing a hypothesis and using software or other technology to complete an extended project covering several days of class time.

CT students need to experience authentic, real-world assignments that require the application of academic, technical, cognitive and 21st-century skills. Survey results revealed that across state and local centers, CT assignments were not sufficiently rigorous and were not engaging CT students in authentic learning. SREB analyses showed that just 8 percent of all respondents reported having assignments that contained the following six indicators associated with intellectually demanding assignments:

- Do background research such as reading technical article(s) and manuals in order to complete assignments.
- Make inferences from information collected and make logical arguments for a proposed solution for a problem or a plan for completing the project assignment.
- Use high school-level math to complete the assignment.
- Learn and apply technical knowledge and skills to new situations.
- Use new computer software or technology to complete the assignment.
- Complete an extended project requiring planning, developing a solution and presenting the results orally and in writing.

Ten Indicators of Rigorous CT Assignments

Rigorous CT assignments ask students to:

1. Predict outcomes based on observations or information provided.
2. Develop a logical argument for the solution to a problem or project.
3. Do background research for a problem or project, such as reading technical article(s), before developing a plan or solution.
4. Make inferences from information provided to develop a solution for a problem or project.
5. Use math to solve complex problems related to a career-technical area.
6. Apply academic knowledge and skills to a career-technical area.
7. Apply technical knowledge and skills to new situations.
8. Develop and test hypotheses.
9. Complete an extended project that requires planning, developing a solution or product and presenting the results orally or in writing.
10. Use computer software or other technology related to a career-technical area to complete assignments at least weekly.

Table 21: Percentage of Students Reporting Experiencing Indicators of Rigorous Assignments, by Center Performance Levels			
Rigorous CT Studies Indicators	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Predict outcomes based on observations or information provided.	53	55	51
Develop a logical argument for your solution to a problem or project.	46	47	44
Do background research for a problem or project, such as reading technical article(s), before developing a plan or solution.	50	50	51
Make inferences from information provided to develop a solution for a problem or project.	46	47	45
Use math to solve complex problems related to my career-technical area.	49	53	44
Apply academic knowledge and skills to my career-technical area.	59	61	54
Apply technical knowledge and skills to new situations.			
Develop and test hypotheses.	35	35	33
Complete an extended project that requires planning, developing a solution or product and presenting the results orally or in writing.	46	48	43
Used computer software or other technology related to your career-technical area to complete assignments weekly.	34	37	30

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Observations at the Technical Centers

The senior survey results described above were consistent with data collected during SREB's institutional review visits to six technical centers. Although review teams noted some outstanding examples of students being engaged in challenging and authentic assignments, such examples were the exception. Too often, students were disengaged, instruction was uninspired and procedurally focused, and the material being covered was insufficiently challenging. The review team observed students sitting passively at their desks. Teachers read aloud from PowerPoint presentations rather than giving students a challenging, real-world assignment that would engage them in reading the technical materials needed to complete that assignment. Teachers were also seen reading to students from the textbook, with no student engagement. **At present, it would appear CT teachers do not know how to move from procedurally based instruction to engaging students in challenging, multi-day assignments that require them to conduct background research and develop a work plan for completing assignments.**

The institutional review team also noted that although most centers visited had an initiative to embed literacy and numeracy into CT classes, the literacy focus did not attempt to engage students in reading technical materials related to an assignment, and the level of numeracy was focused largely on middle grades math. During interviews, many teachers admitted that they did not have the skills needed to effectively incorporate math and literacy into more robust, real-world assignments. **The instructional approaches observed reflected the worst of remedial academic instruction — teaching isolated academic skills disconnected from application.**

Questioning techniques often used by teachers indicated they did not know how to ask questions to cause students to think more deeply about assignments and to take ownership of their learning.

Site team reviews of center-provided instructional and assessment materials revealed expectations for student assignments and assessments were at a low level. Most assessments were multiple-choice or fill-in-the-blank items. Although the rigor of assignments varied across different career pathways, in the main, CT teachers and leadership appeared to have failed to grasp that their students were capable of doing much more than is currently being expected of them. Although some teachers were assigning more comprehensive and challenging project assignments that require reading, writing and math to complete — for example, students in biomedical and health science classes were doing more reading, writing and research to complete their assignments — this was more the exception than the norm.

In interviews, some students indicated they were completing a major senior research and writing project with the assistance of outside business and industry partners. Students in early childhood reported creating digital storybooks and presenting their work to the class. Students in biomedical science were doing research on different types of cancer and preparing a written paper for their English and biomedical science instructors.

Teachers' Perceptions of the Rigor of Their Assignments

As shown in Table 22, critical differences exist in how teachers at high- and low-performing centers perceived the rigor of their assignments. First, significantly more teachers at high-performing centers than at low-performing centers reported requiring their students to:

- Read and interpret technical materials in completing assignments (86 percent vs. 68 percent)
- Demonstrate critical knowledge about technical and academic competencies to complete assignments (56 percent vs. 40 percent)

Second, significantly more teachers at high-performing centers than at low-performing centers strongly agreed that:

- They are encouraged to give challenging assignments (74 percent vs. 63 percent)
- Their center emphasizes academic skills in reading, mathematics and science that are embedded in assignments (65 percent vs. 57 percent)

However, as Table 21 shows, technical center students did not perceive that their assignments are as challenging as their teachers believed they are. For example, only 50 percent of the seniors who responded to the survey reported being required to read technical materials to complete assignments; compare this with the 76 percent reported by their teachers. Further, although 65 percent of all surveyed teachers strongly agreed that they are encouraged to give challenging assignments, just 30 percent of all surveyed seniors reported that their assignments offered an intensive level of rigor (see Table 19).

These conflicting data strongly suggest that center leaders and teachers are struggling to redefine what challenging assignments in CT classrooms look like — assignments that reflect the context of the workplace and require a more complex set of academic and technical knowledge and skills to complete.

Table 22: Teachers' Perceptions of the Rigor of Their Assignments, by Center Performance Levels			
Perceptions of Rigor	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Teachers require students to read and interpret technical books and manuals in carrying out assignments.	76	86	68
Teachers require students to demonstrate critical knowledge about technical and related academic competencies used to complete an assignment **daily or weekly.**	49	56	40
Teachers **strongly agree** that they are encouraged to give students challenging assignments.	65	74	63
Teachers **strongly agree** that their center emphasizes academic skills in reading, mathematics and science that are embedded in problems, projects and tasks students are assigned.	57	65	57

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Recommendations:

A world-class technical high school system demands that the assignments given to students by CT teachers change dramatically to reflect the requirements of the 21st-century workplace.

- **Improve the quality of instruction in all technical centers by offering teachers and center leaders intensive training and experiences related to (1) the rapidly changing, increasingly complex requirements of the 21st-century workplace, and (2) constructing rigorous project-based learning assignments that challenge students to think and problem-solve.** Instructional plans should engage students in using academic and technical skills and technology to complete assignments, often in the context of team learning.
- **Provide CT teachers with intensive training on classroom practices and questioning techniques that help students take greater ownership of their learning.**
- **Give CT students complex, real-world assignments spanning several days that require them to:**
  - Do background research to develop a plan of work and schedule for the assignment.
  - Develop a logical argument for their plan.
  - Learn to use new technology and software to complete the work.
  - Apply high school-level literacy and math knowledge and skills to complete.
  - Work effectively with a team.
  - Demonstrate problem-solving and creativity in the completion of work.
  - Take ownership of work rather than waiting on the teacher to give instructions.
  - Demonstrate time management skills.
  - Produce exemplary products or services.

- Demonstrate, on end-of-project exams, that they can read and comprehend related technical materials, do the math involved and demonstrate mastery of the related technology, software and technical content.

- **Provide technical center leaders and teachers with external assistance and staff development to help them shift the culture of their centers away from 20th-century instructional models toward those required to prepare students for the 21st-century workplace. Make the following transitions:**
  - From teacher-directed, procedurally based instruction to student-driven, project-based and problem-based assignments
  - From teacher-centered to teacher-facilitated, student-centered learning
  - From knowing-it-all to giving assignments that may require students and teachers to learn together
  - From having all of the answers to asking good questions that result in students finding the answers
  - From preparing students who follow procedures to preparing students who can analyze an assignment and develop their own procedures

Section VII: Professional Development

Research Question: Do teachers believe that professional development opportunities allow them to stay current in their career content and to effectively integrate essential academic knowledge and skills into student assignments that meet the emerging trends of the workforce?

Research has shown that professional development that changes practices must be embedded in classrooms and occur over at least 40 hours for each major change sought (see How Teacher Professional Development Affects Student Achievement, in the sidebar).

Dramatically raising the quality of instruction at Kentucky's 95 technical centers from its current level to what will be needed to create a world-class system of technical high school centers will require a major investment in professional development. In order to prepare students with the cognitive, academic, technical, technological and 21st-century skills needed for the modern workplace, existing teachers will need intensive professional development on how to formulate rigorous, authentic assignments grounded in project-based learning.

New teachers entering the profession with a wealth of business and industry experience will need the support of a fast-track teacher induction system that will help them plan standards-based and project-based instruction, use research-based instructional strategies, assess students to promote learning and effectively manage their classrooms.

All teachers will need to foster an understanding of the math concepts that are essential to entering and advancing in careers and further study and embed these concepts into instruction and assignments. All teachers will also need to design assignments that engage students in doing research, conducting background reading and formulating related work plans to complete their assignments.

How Teacher Professional Development Affects Student Achievement

Yoon et al. (2007) examined nine controlled studies of professional development efforts to determine how much time is needed to make an impact. In general, the more time invested, the better results. Yoon and his colleagues noted that when efforts spanned less than 30 hours, they showed no significant effects on student learning. Efforts that ranged between 30 and 100 hours, at an average of 49 hours, showed positive and significant effects on student achievement. Yoon et al. also found that professional development efforts were also more effective if they were directly related to a teacher's practice, integrated with other school reform efforts and engaged teachers in collaborative communities.

Source: Kwang Suk Yoon, Teresa Duncan, Silvia Wen-Yu Lee, Beth Scarloss, and Kathy L. Shapley. *Reviewing the Evidence on How Teacher Professional Development Affects Student Achievement* (Issues & Answers Report, REL 2007- No. 033). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest, 2007.

Overall, shifting the instructional cultures of the state's 95 technical centers will require leaders and teachers to adopt 21st-century teaching strategies that will prepare students for a 21st-century workplace. Boring drill techniques will not help more students meet the state's higher accountability requirements. Technical centers need to harness students' natural interests by engaging them in solving complex problems that allow them to see the connections between what they learn in their academic and technical classrooms and the real world of work.

Findings

SREB's faculty survey solicited information on teachers' professional development experiences over the past three years across five critical areas of teaching practice that will need to be addressed if the culture of teaching and learning at the technical centers is to change. These five areas include (1) using project-based learning in instruction and assignments, (2) embedding math content in CT assignments, (3) designing authentic assignments that require students to apply academic, technical and 21st-century skills, (4) constructing assignments that require students to do background research for a problem or project, such as reading technical materials, before developing a plan or solution, and (5) raising expectations for student performance. As Table 23 shows, only 10 percent of teachers reported they had received 40 or more hours of professional development on using project-based learning in instruction and assignments. Further:

- Just 5 percent reported that they had taken part in training on how to identify the math content needed in the workplace and embed that content in their CT assignments.
- Six percent participated in professional development focused on authentic assignments that require students to use math, literacy, problem-solving, technology, software and 21st-century skills to complete.
- Only 4 percent received training on how to help students conduct the research needed to complete an assignment, and just 7 percent participated in professional development on raising expectations.

Industry representatives interviewed as part of SREB's study said they want to hire multi-skilled individuals who are creative problem-solvers. They believed many CT programs are still too focused on teaching students to follow procedures and are failing to offer authentic assignments that motivate students to tackle complex projects that tap into students' natural interests and require them to apply a full range of academic, technical and workplace skills to complete.

In a focus group, superintendents recognized the importance of collaborating closely with technical centers to improve the quality of instruction and increase student academic and technical achievement, but they believed that technical center teachers and leaders had not received the training needed to forcefully address the college- and career-readiness standards that have become part of the state accountability system. This lack of preparation may be

Table 23: Percentage of Teachers Reporting Having Received 40 or More Hours of Professional Development on Critical Topics During the Past Three Years

Professional Development Topics	All Centers[1] (n = 80) (%)
Using project-based learning in instruction and assignments	10
Understanding math content needed in workplace and embedding math in CT assignments	5
Designing authentic project assignments in my career field that will require students to use math, literacy, problem-solving, technology and software and 21st-century skills to complete	6
Constructing assignments that have students design and conduct research as part of an assignment in their career field	4
Raising expectations for student performance	7

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

attributed to several factors. For the past two decades, Kentucky's technical centers have not been part of the state's accountability system. As such, in the past, technical center leaders and teachers have not seen the need to change what or how they teach. Finally, because of declining levels of state and federal support in recent years, many technical centers have been compelled to eliminate professional development opportunities.

In interviews, both teachers and leaders at the technical centers admitted they had little or no in-depth professional development on instructional strategies to integrate academics into their instruction and assignments. In lieu of embedding core literacy and math skills into their instruction and career-focused assignments, teachers described how they pulled academically deficient students out of their technical classes for 25-minute sessions of intensive academic instruction.

Recommendations:

- **Provide intensive professional development to technical center teachers on how to design authentic, rigorous, project-based assignments in their career areas that require students to use math, literacy, problem-solving, technology, software and 21st-century skills to complete.** Such training will need to include:
  - A major emphasis on helping CT teachers identify and embed essential math skills and concepts into planned lessons and authentic project-based assignments.
  - Assistance and instructional support related to helping students conduct background research for a problem or project before developing a plan or solution.
- **Over a two-year period, embed this intensive professional development into the technical centers' daily work, emphasizing the high-wage, high-skill, high-demand career pathways that are essential to the state of Kentucky.** Years 1 and 2 would both include eight days of professional development in support of revising the curriculum. On some of these days, training will be provided on the features of project-based learning; other development will focus on creating rigorous assignments, using software effectively, developing students' cognitive abilities and applying 21st-century skills.
- **Require all new, alternatively certified CT teachers entering the profession from business and industry to participate in the 15-month fast-track teacher induction program developed by SREB in conjunction with the NRCCTE.** This professional development includes instructional planning, instructional strategies, classroom assessment and classroom management. It also includes learning how to integrate literacy and math content into classroom instruction and assignments. Training will commence with a two-week institute the summer before new teachers begin teaching and conclude the following summer, after their first year of teaching, with an additional two weeks of training. The program also includes school support in the form of a mentor for each participating teacher, guided principal support during the first year of teaching and three more weekends in which new teachers come together with other new teachers to focus on the next nine weeks of instruction.
- **Teachers who have low student passing rates on certification exams and/or academic and technical standard assessments should also participate in the fast-track teacher induction program, following the same schedule as outlined above.**
- **Support technical center leaders and teachers in taking advantage of other national staff learning experiences, including the National Summer Staff Development Conference, sponsored by SREB, that is being held July 16 - 19, 2014, in Nashville, Tennessee.** This conference will provide leaders and teachers with opportunities to learn what high-performing technology centers are doing to improve the quality of their programs.

Section VIII: Continuous Improvement

Research Question: Are there perceived differences among the faculty at state and local technical centers on whether their centers foster a culture of continuous improvement?

Through faculty surveys, document reviews, focus groups and interviews, SREB probed whether Kentucky's state and local technical centers fostered a culture of continuous improvement. Institutional review team members learned that the state centers shared a common mission statement that was developed as a state-wide project: "With high expectations and strong partnerships, Kentucky Tech will actively engage all students in the mastery of academic and technical skills needed to be ready for college and a career." In the case of the local centers, home high schools and center staff jointly developed their shared mission statements; most of these did focus on the dual purpose of preparing students for college and careers.

Findings

SREB has identified six key indicators that capture whether school leaders are fostering a culture of continuous improvement in their schools. Leaders focused on continuous improvement:

1. Set clear school goals and priorities.
2. Support teachers in maintaining a demanding yet supportive environment that pushes students to do their best.
3. Stress monthly that teachers should teach all students to the same high standards.
4. Ensure that teachers are continually learning and seeking new ideas on how to improve achievement.
5. Work with teachers in teams to improve student achievement.
6. Ensure that teachers use data continuously to evaluate academic and technical programs and activities.

As Table 24 shows, faculty surveys indicated that more teachers at high-performing technical centers (57 percent) believed that their leaders maintained an intensive focus on continuous

Table 24: Faculty Perceptions of School Leaders' Focus on Continuous Improvement by Center Performance Levels

Focus on Continuous Improvement		All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
Intensive	4-6 indicators	47	57	43
Moderate	2-3 indicators	21	16	26
Low	0-1 indicators	18	12	18

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

improvement compared to teachers at low-performing centers (43 percent). SREB defined an *intensive* focus on continuous improvement as including four to six of those indicators; a *moderate* focus as including two to three indicators; and a *low* focus as including either zero or one indicator.

Teachers' perceptions of the presence of individual indicators of a culture of continuous improvement were sharply varied across high- and low-performing centers. As Table 25 shows, differences were particularly significant for the following indicators:

- The goals and priorities for their schools are clear (74 percent vs. 57 percent).
- Teachers maintain a demanding yet supportive environment that pushes students to do their best (70 percent vs. 53 percent).
- Teachers are continually learning and acquiring new ideas on how to improve student achievement (68 percent vs. 54 percent).
- Teachers and school administrators work as a team to improve student achievement (70 percent vs. 54 percent).

During SREB's institutional review visits to six technical centers, review team members observed more intensive efforts to track individual student assessment results by school leaders at the high-performing centers than at low-performing centers. High-performing centers were using "data walls" that prominently recorded student assessment results in order to raise awareness of student achievement. Such centers were observed to be taking steps to upgrade student assignments as a means of helping students apply core academic skills to the completion of applied learning assignments.

Table 25: Faculty Perceptions of Indicators of Continuous Improvement by Center Performance Levels

Indicators of Continuous Improvement	All Centers[1] (*n* = 80) (%)	High-Performing Centers (*n* = 26) (%)	Low-Performing Centers (*n* = 26) (%)
They **strongly agree** that the goals and priorities for their school are clear.	61	74	57
They **strongly agree** teachers in their school maintain a demanding yet supportive environment that pushes students to do their best.	59	70	53
The principal stresses monthly that they should teach all students to the same high standards.	62	69	64
They **strongly agree** that teachers in their school are continually learning and seeking new ideas on how to improve student achievement.	60	68	54
They **strongly agree** that teachers and school administrators work as a team to improve student achievement in their school.	57	70	54
They **strongly agree** that teachers in their school use data continuously to evaluate the school's academic and technical programs and activities.	55	58	58

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

Institutional review visits also found little evidence of collaboration among teachers, in general or related specifically to improving the quality of assignments and embedding academic skills into instruction or assignments. Functionally at least, several of the centers SREB visited were still operating as "one-room schoolhouses" in which each occupational area was an entity unto itself. There is some evidence that this curricular isolation is prevalent in many of Kentucky's 95 technical centers.

Recommendations:

- **Provide technical centers directors with professional development on how to work with their teachers on a series of "action-oriented" projects focused on improving curriculum and instruction so that more students meet career readiness goals.** In "action-oriented" professional development, leaders work directly with their faculty to apply what they are learning. Center directors would not just learn about doing classroom observations, but participate in training that included classroom observations and providing feedback as a routine part of their work. Center directors should:
  - **Conduct classroom observations and provide feedback to teachers that helps them improve the quality of assignments and assessment, classroom instruction, classroom management and student engagement in and ownership of their own learning.**
  - **Be proactive in providing teachers with professional development that is focused on using instructional strategies to integrate higher-level academic content into project-based learning.**
  - **Seek outside funding and resources to support the creation and maintenance of a culture of continuous improvement.**
- **Consider adopting selective leadership modules, like those offered by SREB, that all prospective technical center directors would complete to become effective instructional leaders.** Each module requires the participant to identify a problem in their school, then to work with faculty to analyze the problem and develop and implement a solution. For example, a module on creating a culture of higher expectations would require the center director to engage faculty in determining the current level of expectations and planning how to engage students in meeting higher expectations.

Section IX: Advisory Committees

Research Question: Do all technical centers have advisory committees that participate in program reviews to ensure alignment with industry standards, expectations and trends?

Findings

Overall, SREB found many of Kentucky's 95 technical centers do not have an effective advisory committee structure. However, across state and local centers, teachers and leaders reported having advisory committees and described the kinds of activities these committees undertook. Eighty-six percent of teachers at high-performing centers and 69 percent of teachers at low-performing centers reported having participated in at least one annual meeting with employers and postsecondary faculty to set performance standards for completers. Half or more of the teachers at the high- and low-performing centers reported that advisory committees participated in the following activities:

- Providing input on the curriculum
- Providing feedback on the relevance of assignments
- Reviewing classroom assignments
- Reviewing student work
- Assisting with job-shadowing, project-based learning, apprenticeships and internships
- Analyzing equipment and supply needs and making recommendations

Although aware of the presence and involvement of advisory committees, teachers did not appear to believe that their external partners — community or business and industry — offered a great deal of support. This was true even at the high-performing centers. As Table 26 shows, just 51 percent of the teachers at high-performing centers strongly agreed that the surrounding community actively supported their center's goals, and only 52 percent strongly agreed that local and regional business and industry support was helping to improve the quality of their programs. At the low-performing centers, even fewer teachers agreed that they had the support of their community (33 percent) and business and industry partners (36 percent).

Table 26: Teacher Perceptions of Community and Industry Support of Center Goals, by Center Performance Levels

Community and Industry Support	All Centers[1] (n = 80) (%)	High-Performing Centers (n = 26) (%)	Low-Performing Centers (n = 26) (%)
Teachers **strongly agree** that the surrounding community actively supports our center's instructional goals.	40	51	33
Teachers **strongly agree** that local and regional businesses and industries support improving the quality of our programs.	44	52	36

1 Out of a total of 95 centers, 15 local centers did not participate in the TCTW surveys. Out of the 80 remaining, 26 sites ranked in the top, 28 sites in the middle and 26 sites in the bottom.

Source: 2013 TCTW Survey for Kentucky

In focus groups, business and industry representatives agreed new policies and practices are needed to better connect business and industry to Kentucky's technical centers, and that such practices must be consistent across both state and local centers. They also said advisory committee members can help make CT instruction more relevant and challenging by interviewing students, examining assignments and assessments, listening to and critiquing student presentations and judging students' finished products.

Overall, the business and industry focus group recommended that industry serve as a change agent that will ensure innovation in the state's 95 technical centers. At present, as described in Section II and elsewhere in this report, industry representatives reported feeling frustrated by their lack of involvement in the state's CTE.

Recommendations:

- **Ask all technical centers to establish a robust advisory committee charged with transforming the center into a high-performing technical center that offers rigorous instruction in career fields relevant to students, the region and the state.** Although technical centers may also elect to continue employing program advisory committees, they may accomplish more in the immediate future with general advisory committees structured according to the recommendations below.
- **Select advisory committee members who have a personal need to see the center improve. Two-thirds of the committee's members should be local and regional business and industry representatives who can employ graduates from one or more of the center's programs after high school graduation or offer additional postsecondary education and training.**

  With an industry representative serving as chair, other members of the committee would include:

  - A representative from a local two- or four-year college who is responsible for developing career pathway programs of study with area high schools;
  - A high school principal, guidance counselor and academic teacher (English, math or science) from one or more of the center's sending home high schools;
  - A parent with a son or daughter enrolled at the center;
  - A district representative; and
  - Others as needed, including CT teachers who are asked to attend as observers.
- **Charge advisory committees with addressing at least two major issues annually. Advisory committees can:**
  - Help more students meet state accountability goals for college and career readiness.
  - Provide work-based learning experiences that will allow students to learn contextually in real-world workplace settings.
  - Redesign or repurpose programs that are no longer effective.
  - Examine assignments given to students and the quality of student work to determine if they match workplace and postsecondary readiness standards.
  - Help more students recognize the opportunities available to them as they pursue their career fields, resulting in more students — especially male students — pursuing advanced training and postsecondary study.
  - Support center leaders and teachers in updating their skills to reflect changing workplace requirements and the need for postsecondary study.
  - Track the center's progress annually on state accountability performance indicators.

- **Charge advisory committees with taking actions that will make each technical center a world-class educational institution and a place they would be pleased to send their children and grandchildren.** Committees can help:
  - Find resources to upgrade facilities and technology.
  - Develop and implement a plan to enhance the visibility and value of the technical center in the community among parents, educators and the business community.
  - Develop a set of experiences that will help students acquire habits of behavior and mind that will enhance their careers and personal lives.
- **Pilot a sector advisory committee in a high-demand field, like manufacturing, in one economic region of the state.** Ask this committee to work with all technical centers in the region to develop and implement a plan to improve existing programs and offer new programs that more accurately reflect the increasingly demanding requirements of this industry sector.

Section X: Facilities

Research Question: Are technical center facilities safe, state-of-the-art and well-maintained so all students can master the full range of skills and competencies required?

Findings

Overall, the facilities visited by the SREB team were well-maintained, but some were older and in need of renovations. Some buildings, especially those built in the mid-1960s and early 1970s, were not equipped with classrooms in trade and industrial programs or had extremely limited space in both classroom and shop areas. Centers especially need to update their facilities and technology in order to provide instruction in new and emerging industries and occupations serving industry-driven workforce development needs. At present, according to one state official, "our career centers are not very responsive to the job market and sector strategies." Limited facilities — and limited budgets to upgrade related equipment and technology — meant that some programs were compelled to limit student enrollments, and others were unable to be launched. At one new center, additional space was needed to develop a new manufacturing program.

All centers were attempting to upgrade what they could, given the funds available to them. For example, one center converted a family and consumer science classroom into a culinary arts program. One school district bonded a $3M renovation project to update its technical facilities.

However, institutional review visits, focus groups and interviews found that centers and programs were under-resourced. One state center director noted supply budgets had been cut more than 40 percent in the last five years and no equipment purchases with state funds had been made for the past eight years. Centers and programs reported not having adequate numbers of computers to serve students, or the funds needed to keep up with software upgrades. One center's largest program, health science, had only one working hospital bed; the others were hand-cranked and not up to modern standards. At another center, students could not be trained on the newest car models because the auto tech program's alignment rack needed to be replaced.

Overall, despite increased interest in CTE in Kentucky, the state's technical centers appear to be struggling to maintain or expand programs due to limited federal, state and local funding. **Institutional site review data strongly suggest that there is a budget discrepancy in how state and local technical centers are funded. Whereas local technical centers have more programs and have been able to sustain those programs even during the recession, many state centers, operating in isolation from their local districts, have more outdated programs and equipment.**

If 80 percent of Kentucky CT students are to meet career readiness standards, fundamental changes must be made at the state, regional and district levels in how technical center needs are evaluated. This will require the creation of state, regional and district strategic plans to increase capacity, identify the action steps needed to make short- and long-term budget decisions, leverage federal funding opportunities, match resources — including financial and human support — to center need, and lay the foundation for their long-term success.

Recommendations:

- **The 2014 General Assembly should authorize and fund a study of the technical centers' financial needs and formulate recommendations for an equitable funding system for all 95 state and local centers.** The intent is to ensure that all 95 centers have 21st-century facilities, technology, career pathway programs and highly qualified teachers and leaders.

An equitable system of funding should provide the same level of support to state and local centers for salaries, technology, instructional materials, and professional development for CTE programs, teachers and administrators. It should also support the development of new or revised career pathway programs that will prepare students for new and emerging industries and occupations.

Endnotes

1 Local centers not participating included four centers in the Eastern Kentucky Concentrated Employment Program (EKCEP) region, three in the Ten Counties (TENCO) region, one in Northern Kentucky, one in the Cumberland region, two in the Barren River region and four in Greater Louisville (Jefferson County).

2 Kentucky Workforce Investment Board. *Kentucky's Unbridled Future: Strategic Economic Development Plan*, January 2012. See http://kwib.ky. gov/stateplan2012/AttachmentC.pdf.

3 These definitions of industry sectors are taken in part or in full from definitions developed by the U. S. Census Bureau in the North American Industry Classification System (NAICS) system. See http://www. census. gov/eos/www/naics/index.html.

4 EMSI and Maher & Maher. *Kentucky's Target Industry Sectors*, Kentucky Workforce Investment Board, May 2011. Unless otherwise stated, all job projection data cited in Section I come from this report and related materials prepared by EMSI and Maher & Maher for KWIB. Projections are for the period 2010 to 2018. See http://www. kysectorstrategies. com/resources/report-kentuckys-target-sector-initiative and http://www. kysectorstrategies.com/resources/category/know-your-region for more information.

5 This figure is a modified version of one presented in *Beyond the Books: A Look at Career & Technical Education — Realizing Postsecondary & Career Readiness through Pathways TN*, a presentation made by Danielle Mezera, Assistant Commissioner, Career and Technical Education, Tennessee Department of Education, at the SREB Commission on CTE meeting held in Frankfort, KY, on December 9-10, 2013.

6 See http://naf. org/files/page/2009/06/AOF_OneSheet. pdf.

7 NRCCTE Curriculum Integration Workgroup. *Capitalizing on Context: Curriculum Integration in Career and Technical Education*, National Research Center for Career and Technical Education, University of Louisville, 2010.

8 *Measuring Technical and Academic Achievement: Employer/Certification Examinations' Role in High School Assessment*, Southern Regional Education Board, 2009.

9 W. Norton Grubb and Jeannie Oakes. *Restoring Value to the High School Diploma: The Rhetoric and Practice of Higher Standards*. Educational and the Public Interest Center, Arizona State University and Educational Policy Research Unit, University of Colorado at Boulder, 2007.

10 Anthony P. Carnevale, Andrew R. Hanson, and Artem Gulish. *Failure to Launch: Structural Shift and the New Lost Generation*. Georgetown University, Georgetown Public Policy Institute, Center on Education and the Workforce, 2013.

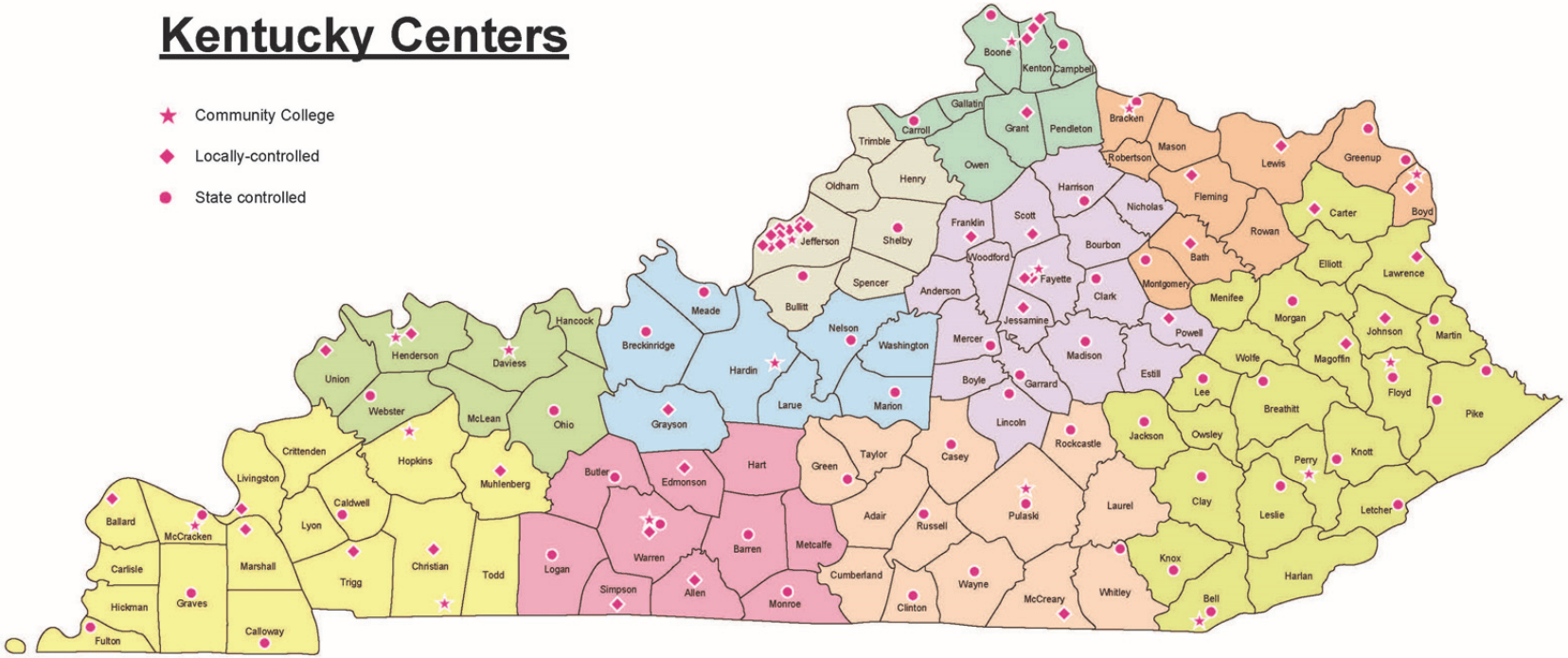
11 p. 4, Kentucky Community and Technical College System. *Dual Credit Handbook for the implementation of the Kentucky Department of Education, Office of Career and Technical Education and Kentucky Community and Technical College System Memorandum of Understanding*, 2012-2013.

12 Corinne Alfeld and Sharika Bhattacharya. *Mature Programs of Study: Examining Policy Implementation at the Local Level*. National Research Center for Career and Technical Education, University of Louisville, 2013.

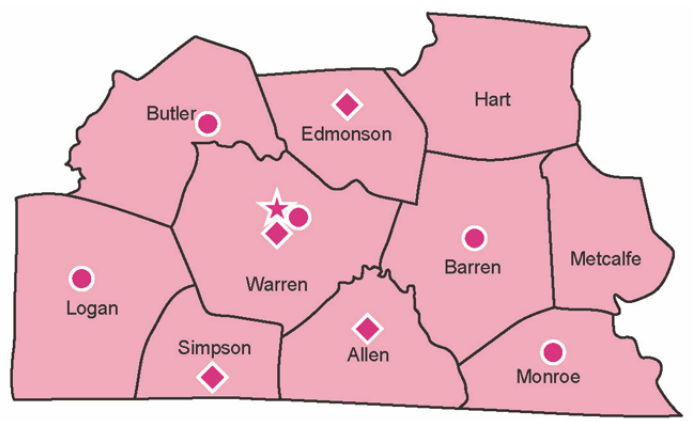
Appendix A

Information for each of the 10 Regions in Kentucky

Data supplied by the Kentucky Department of Education (2012-2013 school year)


Kentucky Centers
Community College
Locally-controlled
State controlled
Boone
Kenton
Campbell
Gallatin
Carroll
Grant
Pendleton
Bracken
Trimble
Owen
Robertson
Mason
Lewis
Greenup
Oldham
Henry
Harrison
Fleming
Nicholas
Carter
Boyd
Franklin
Scott
Rowan
Jefferson
Shelby
Bourbon
Woodford
Bath
Elliott
Lawrence
Spencer
Anderson
Fayette
Clark
Montgomery
Menifee
Meade
Bullitt
Jessamine
Morgan
Johnson
Martin
Hancock
Nelson
Powell
Breckinridge
Washington
Mercer
Madison
Wolfe
Magoffin
Henderson
Daviess
Hardin
Boyle
Garrard
Estill
Lee
Floyd
Union
Larue
Marion
Breathitt
Webster
McLean
Ohio
Grayson
Lincoln
Pike
Rockcastle
Jackson
Owsley
Crittenden
Hopkins
Taylor
Casey
Knott
Livingston
Butler
Edmonson
Hart
Green
Perry
Muhlenberg
Caldwell
Clay
Ballard
McCracken
Lyon
Adair
Russell
Pulaski
Laurel
Leslie
Letcher
Warren
Barren
Metcalfe
Carlisle
Marshall
Trigg
Christian
Todd
Logan
Knox
Cumberland
Wayne
Harlan
Simpson
Allen
Monroe
Clinton
McCreary
Whitley
Bell
Hickman
Graves
Calloway
Fulton

Barren River	Number of schools or community colleges in the region	
	State-administered Schools	5
	Locally-controlled Schools	4
	Community Colleges	1
	State-administered schools in the region	
	Barren County ATC	
	Butler County ATC	
	Monroe County ATC	
	Russellville ATC	
	Warren County ATC	
	Locally-controlled schools in the region	
	Allen County AVEC	
	Bowling Green HS	
	Edmonson County HS	
	Franklin Simpson HS	
	Community colleges in the region	
	Southcentral Kentucky Community and Technical College	



★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting and Finance Tech	1	Russellville	3
Administration Support	3	Barren Co, Monroe Co	31
Air Conditioning Technology	2	Barren Co, Butler Co	7
Automotive Technology	5	Barren Co, Butler Co, Monroe Co, Russellville, Warren Co	76
Carpentry	4	Barren Co, Butler Co, Monroe Co, Warren Co	33
Computer Aided Drafting	2	Barren Co, Russellville	25
Computerized Manufacturing and Machining	2	Barren Co, Russellville	28
Electricity	3	Barren Co, Monroe Co, Russellville	20
Health Sciences	5	Barren Co, Butler Co, Monroe Co, Russellville, Warren Co	101
Industrial Maintenance Tech	1	Butler Co	8
Information Technology	3	Barren Co, Russellville, Warren Co	24
Network Administration	1	Barren Co	8
Welding (Manufacturing)	4	Barren Co, Monroe Co, Russellville, Warren Co	61
Wood Products Manufacturing	1	Monroe Co	8

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy	84	-84
Finance & Insurance	84	-79
Manufacturing	350	-160
Transportation, Distribution, & Logistics	46	57

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

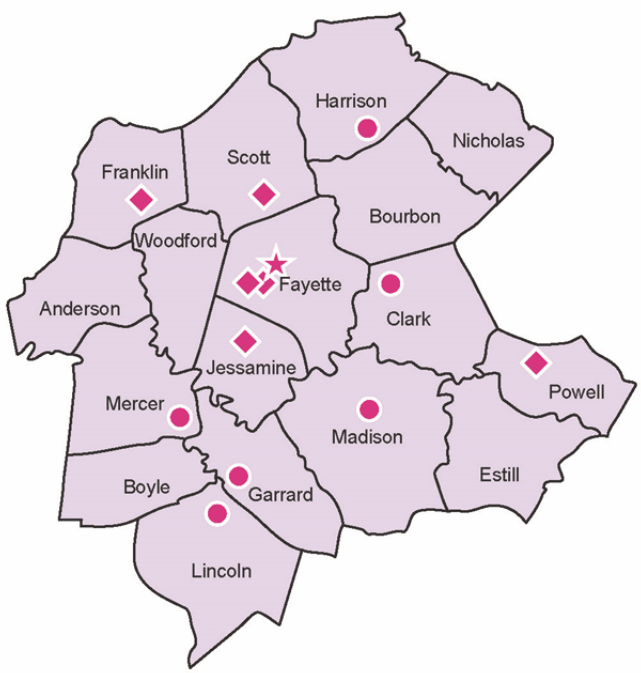
Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	2	Allen Co, Franklin Simpson	1
Administration Support	2	Allen Co, Franklin Simpson	3
Ag Power Structured Tech Sys	2	Edmonson Co, Franklin Simpson	13
Agribusiness Systems	1	Franklin Simpson	0
Allied Health	3	Allen Co, Bowling Green Franklin Simpson	10
Animal Systems	2	Edmonson Co, Franklin Simpson	4
Automotive Technology	3	Allen Co, Bowling Green, Edmonson Co	26
Business Multimedia	1	Allen Co	10
Business Technology	4	Allen Co, Bowling Green, Edmonson Co, Franklin Simpson	82
Carpentry	1	Bowling Green	2
Computer and Information Technology	1	Bowling Green	0
Consumer and Family Management	1	Franklin Simpson	6
Culinary and Food Services	1	Franklin Simpson	0
Early Childhood Education	1	Franklin Simpson	0
Entrepreneurship	1	Allen Co	4
Fashion and Interior Design	1	Bowling Green	0
Finance	1	Allen Co	1
Fundamentals of Teaching	2	Bowling Green, Franklin Simpson	1
Horticulture and Plant Sciences	2	Edmonson Co, Franklin Simpson	10
Industrial Maintenance Tech	1	Allen Co	3
Information Support and Services	1	Franklin Simpson	0
Marketing	4	Allen Co, Bowling Green, Edmonson Co, Franklin Simpson	6
Masonry	1	Franklin Simpson	0
Multimedia Technology	1	Bowling Green	6
Pre-Nursing	2	Allen Co, Franklin Simpson	22
Retailing/Wholesaling	1	Franklin Simpson	0
Web Development/ Administration	1	Franklin Simpson	0
Welding (Construction)	1	Franklin Simpson	0
Welding (Manufacturing)	1	Edmonson Co	2

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	1	Bowling Green	32
Autobody/ Collision and Repair Technology/ Technician	1	Bowling Green	15
Automobile/ Automotive Mechanics Technology/ Technician	1	Bowling Green	43
Business Administration and Management, General	1	Bowling Green	4
Computer and Information Sciences, General	1	Bowling Green	18
Culinary Arts/ Chef Training	1	Bowling Green	42
Diagnostic Medical Sonography/ Sonographer and Ultrasound Technician	1	Bowling Green	9
Engineering Technology, General	1	Bowling Green	1
Executive Assistant/ Executive Secretary	1	Bowling Green	2
Fire Science/ Fire-fighting	1	Bowling Green	311
Health Unit Coordinator/ Ward Clerk	1	Bowling Green	34
Licensed Practical/ Vocational Nurse Training	1	Bowling Green	14
Medical Administrative/ Executive Assistant and Medical Secretary	1	Bowling Green	20
Medical Radiologic Technology/ Science v Radiation Therapist	1	Bowling Green	10
Respiratory Care Therapy/ Therapist	1	Bowling Green	5
Surgical Technology/ Technologist	1	Bowling Green	9

Bluegrass	Number of schools or community colleges in the region	
	State-administered Schools	6
	Locally-controlled Schools	6
	Community Colleges	1
	State-administered schools in the region	
	Clark County ATC	
	Garrard County ATC	
	Harrison County ATC	
	Hughes Jones Harrodsburg ATC	
	Lincoln County ATC	
	Madison County ATC	
	Locally-controlled schools in the region	
	Eastside Technical Center	
	Elkhorn Crossing School	
	Franklin County CTC	
	Jessamine CTC	
	Powell County HS	
	Southside Center for Applied Tech	
	Community colleges in the region	
	Bluegrass Community and Technical College	



★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	3	Harrison Co, Hughes Jones, Madison Co	19
Automotive Technology	6	Clark Co, Garrard Co, Harrison Co, Hughes Jones, Madison Co	62
Carpentry	5	Clark Co, Garrard Co, Harrison Co, Hughes Jones, Madison Co	37
Computer Aided Drafting	3	Garrard Co, Lincoln Co, Madison Co	14
Computerized Manufacturing And Machining	3	Harrison Co, Lincoln Co, Madison Co	20
Electricity	3	Garrard Co, Hughes Jones, Madison Co	29
Health Sciences	5	Garrard Co, Harrison Co, Hughes Jones, Lincoln Co, Madison Co	136
Industrial Maintenance Tech	2	Harrison Co, Lincoln Co	10
Information Support And Services	1	Lincoln Co	1
Information Technology	3	Clark Co, Harrison Co, Hughes Jones	21
Marketing Technology	1	Madison Co	8
Network Administration	1	Lincoln Co	4
Nursing	1	Hughes Jones	
Principles Of Technology	1	Hughes Jones	
Web Development / Administration	1	Lincoln Co	2
Welding (manufacturing)	5	Clark Co	50
Wood Products Manufacturing	1	Lincoln Co	8

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Manufacturing	1022	-764
Healthcare	542	-141
Energy & Natural Resources	38	-26
Transportation, Distribution, & Logistics	60	89
Finance & Insurance	326	-337
Professional Services	406	-44

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

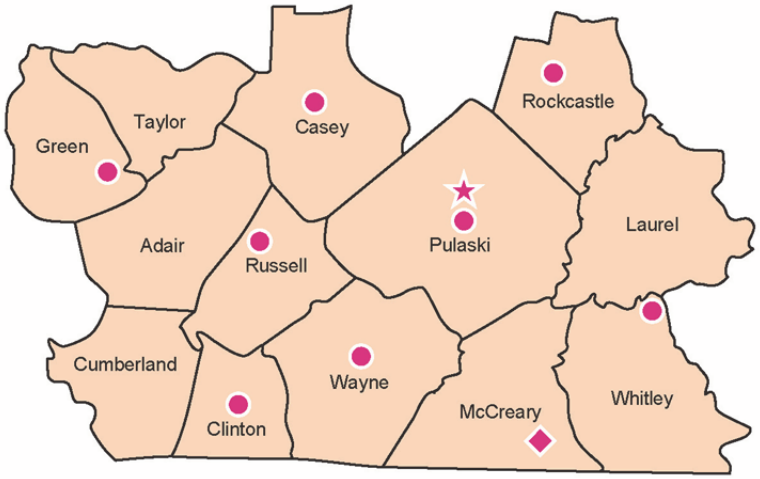
Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	1	Powell Co	10
Administration Support	1	Powell Co	2
Ag Power Structured Tech	3	Eastside, Jessamine, Powell Co	9
Agribiotechnology	1	Jessamine	5
Agribusiness Systems	1	Jessamine	2
Allied Health	5	Elkhorn, Franklin Co, Jessamine, Powell Co, Southside	57
Animal Systems	3	Eastside, Jessamine, Powell	82
Autobody / Collision Repair Tech	1	Eastside	31
Automotive Technology	2	Eastside, Franklin Co	50
Biomedical Technology	2	Franklin Co, Jessamine	0
Business Management	1	Powell Co	47
Business Technology	2	Jessamine, Powell Co	19
Carpentry	3	Franklin Co, Powell Co, Southside	39
Computer & Information Sciences And Support	1	Franklin Co	0
Computer Programming	2	Eastside, Jessamine	70
Consumer And Family Management	1	Powell Co	23
Culinary And Food Services	2	Jessamine, Southside	31
Diesel Technology	1	Eastside	13
Early Childhood Education	2	Jessamine, Powell Co	57
Electricity	1	Southside	29
Electronics Technology	1	Southside	15
Emergency Medical Technology	1	Jessamine	4
Engineering	2	Franklin Co, Jessamine	1
Env Science/Natural Resources	1	Eastside	6
Fashion And Interior Design	1	Jessamine	12
Fashion Marketing	1	Jessamine	1
Finance	1	Powell Co	10
Fire Protection And Safety Technology	2	Eastside	33
Health Sciences	1	Jessamine	1
Horticulture And Plant Sciences	3	Eastside, Jessamine, Powell Co	28
Hospitality Travel Tourism & Recreation	1	Jessamine	0
Industrial Maintenance Tech	1	Powell	17
Information Support And Services	2	Franklin, Jessamine	10
Law Enforcement/Police Science	1	Jessamine	1
Marketing	1	Jessamine	28
Masonry	1	Southside	16
Multimedia Technology	1	Elkhorn	18
Network Administration	2	Eastside, Jessamine	26
Pltw Biomedical Sciences	2	Franklin, Jessamine	34
Pltw Engineering	3	Elkhorn, Franklin, Jessamine	23
Pre-nursing	4	Elkhorn, Franklin, Jessamine, Southside	170
Sports Marketing	1	Jessamine	0
Technology	1	Powell	0
Telemedia Technology	1	Eastside	12
Web Development / Administration	1	Jessamine	84
Welding (manufacturing)	2	Franklin Co, Southside	7

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	1	Bluegrass	47
Architectural Drafting and Architectural CAD/CADD	1	Bluegrass	7
Business Administration and Management, General	1	Bluegrass	31
Computer and Information Sciences, General	1	Bluegrass	22
Drafting and Design Technology/Technician, General	1	Bluegrass	6
Engineering Technology, General	1	Bluegrass	42
Environmental Engineering Technology/Environmental Technology	1	Bluegrass	9
Executive Assistant/Executive Secretary	1	Bluegrass	72
Biology Technician/Biotechnology Laboratory Technician	1	Bluegrass	12
Clinical/Medical Laboratory Technician	1	Bluegrass	10
Criminal Justice/Law Enforcement Administration	1	Bluegrass	3
Dental Hygiene/Hygienist	1	Bluegrass	55
Emergency Medical Technology/Technician	1	Bluegrass	
Licensed Practical/Vocational Nurse Training	1	Bluegrass	523
Medical Administrative/Executive Assistant and Medical Secretary	1	Bluegrass	64
Medical Radiologic Technology/Science v Radiation Therapist	1	Bluegrass	35
Medical/Clinical Assistant	1	Bluegrass	16
Registered Nursing/Registered Nurse	1	Bluegrass	104
Respiratory Care Therapy/Therapist	1	Bluegrass	16
Surgical Technology/Technologist	1	Bluegrass	9
Autobody/ Collision and Repair Technology	1	Bluegrass	10
Automobile/Automotive Mechanics	1	Bluegrass	13
Diesel Mechanics Technology	1	Bluegrass	4

Cumberlands	Number of schools or community colleges in the region	
	State-administered Schools	8
	Locally-controlled Schools	1
	Community Colleges	1
	State-administered schools in the region	
	Casey County ATC	
	Clinton County ATC	
	Corbin ATC	
	Green County ATC	
	Lake Cumberland ATC	
	Pulaski County ATC	
	Rockcastle County ATC	
	Wayne County ATC	
	Locally-controlled schools in the region	
	McCreary Central HS	
	Community colleges in the region	
	Somerset Community College	



★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting And Finance Tech	2	Casey Co, Wayne Co	7
Administration Support	5	Casey Co, Clinton Co, Green Co, Rockcastle Co, Wayne Co	67
Automotive Technology	8	Casey Co, Clinton Co, Corbin, Green Co, Lake Cumberland, Pulaski Co, Rockcastle Co, Wayne Co	93
Carpentry	4	Clinton Co, Lake Cumberland, Pulaski Co, Wayne Co	61
Computer Aided Drafting	1	Corbin	5
Computerized Manufacturing And Machining	3	Green Co, Lake Cumberland, Wayne Co	21
Electricity	6	Casey Co, Clinton Co, Corbin, Green Co, Lake Cumberland, Rockcastle Co	48
Emergency Fire Management	1	Corbin	15
Health Sciences	7	Casey Co, Clinton Co, Corbin, Green Co, Lake Cumberland, Pulaski Co, Rockcastle Co, Wayne Co	151
Horticulture	1	Casey Co	0
Industrial Maintenance Tech	1	Lake Cumberland	10
Information Technology	2	Corbin Co, Pulaski Co	14
Marketing Technology	1	Green Co	4
PLTW Biomedical Sciences	1	Corbin	0
Welding (manufacturing)	8	Casey Co, Clinton Co, Corbin, Green Co, Lake Cumberland, Pulaski Co, Rockcastle Co, Wayne Co	118
Wood Products Manufacturing	1	Green Co	3

Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	1	McCreary Central	0
Administration Support	1	McCreary Central	7
Allied Health	1	McCreary Central	11
Automotive Technology	1	McCreary Central	9
Carpentry	1	McCreary Central	7
Env Science/ Natural Resources	1	McCreary Central	3
Financial Services (marketing)	1	McCreary Central	0
Horticulture And Plant Sciences	1	McCreary Central	3
Marketing	1	McCreary Central	8
Printing Technology	1	McCreary Central	16
Retailing/ Wholesaling	1	McCreary Central	0

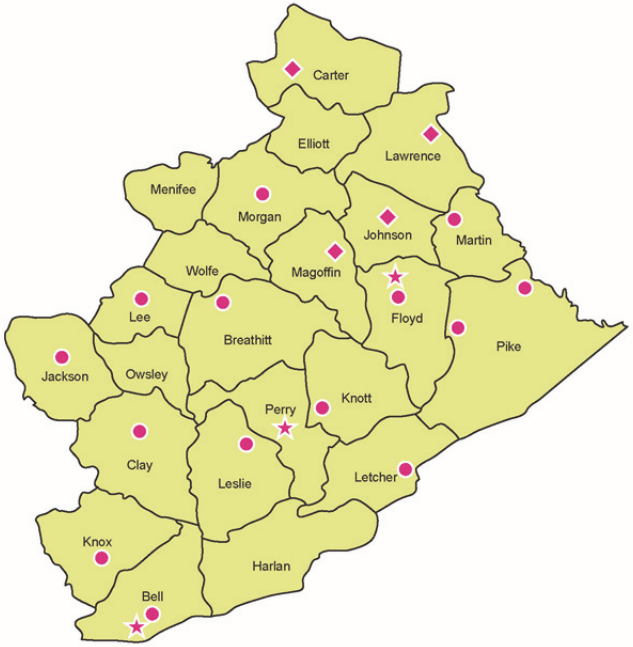
Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	46	-43
Manufacturing	16	137
Transportation, Distribution, and Logistics	12	87
Finance & Insurance	65	-58
Professional Services	211	-111

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	1	Somerset	13
Animation, Interactive Technology, Video Graphics and Special Effects	1	Somerset	6
Business Administration and Management, General	1	Somerset	56
Computer and Information Sciences, General	1	Somerset	36
Culinary Arts/Chef Training	1	Somerset	2
Drafting and Design Technology/ Technician, General	1	Somerset	2
Engineering Technology, General	1	Somerset	11
Executive Assistant/ Executive Secretary	1	Somerset	15
Graphic Communications, General	1	Somerset	18
Child Care Provider/Assistant	1	Somerset	78
Clinical/Medical Laboratory Technician	1	Somerset	34
Cosmetology/Cosmetologist, General	1	Somerset	31
Criminal Justice/Law Enforcement Administration	1	Somerset	51
Emergency Medical Technology/Technician	1	Somerset	1
Fire Science/Fire-fighting	1	Somerset	1
Licensed Practical/Vocational Nurse Training	1	Somerset	278
Medical Administrative/Executive Assistant and Medical Secretary	1	Somerset	99
Medical Radiologic Technology/Science v Radiation Therapist	1	Somerset	12
Medical/Clinical Assistant	1	Somerset	17
Pharmacy Technician/Assistant	1	Somerset	26
Registered Nursing/Registered Nurse	1	Somerset	46
Surgical Technology/Technologist	1	Somerset	7
Aircraft Powerplant Technology/ Technician	1	Somerset	29
Autobody/ Collision and Repair Technology/ Technician	1	Somerset	4
Automobile/ Automotive Mechanics Technology/ Technician	1	Somerset	17
Diesel Mechanics Technology/Technician	1	Somerset	19

EKCEP	Number of schools or community colleges in the region	
	State-administered Schools	14
	Locally-controlled Schools	4
	Community Colleges	3
	State-administered schools in the region	
	Belfry ATC	
	Bell County ATC	
	Breathitt County ATC	
	Clay County ATC	
	Floyd County ATC	
	Jackson County ATC	
	Knott County ATC	
	Knox County ATC	
	Lee County ATC	
	Leslie County ATC	
	Letcher County ATC	
	Martin County ATC	
	Millard ATC	
	Morgan County ATC	
	Locally-controlled schools in the region	
	Carter County Voc School	
	Johnson Central HS	
	Lawrence County HS	
	Magoffin County HS	
	Community colleges in the region	
	Big Sandy Community and Technical College	
	Hazard Community and Technical College	
	Southeast Kentucky Community and Technical College	



★ Community College ◆ Locally-controlled ● State controlled

State Technical Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	9	Bell Co, Breathitt Co, Floyd Co, Knott Co, Knox Co, Lee Co, Leslie Co, Letcher Co, Martin Co	126
Autobody/ Collision Repair Tech	3	Bell Co, Clay Co, Morgan Co	28
Automotive Technology	11	Bell Co, Breathitt Co, Clay Co, Floyd Co, Jackson Co, Knott Co, Knox Co, Lee Co, Martin Co, Millard	88
Building/ Apartment Maintenance	3	Clay Co, Knott Co, Millard Co	16
Carpentry	12	Belfry, Bell Co, Breathitt Co, Clay Co, Floyd Co, Jackson Co, Knott Co, Knox Co, Lee Co, Leslie Co, Letcher Co, Martin Co	82
Computer Aided Drafting	3	Knox Co, Letcher Co, Morgan Co	14
Computerized Manufacturing And Machining	2	Belfry, Floyd Co	0
Diesel Technology	2	Belfry, Letcher Co	50
Electricity	8	Belfry, Breathitt Co, Knox Co, Lee Co, Leslie Co, Letcher Co, Martin Co, Millard	67
Health Sciences	14	Belfry, Bell Co, Breathitt Co, Clay Co, Floyd Co, Jackson Co, Knott Co, Knox Co, Lee Co, Leslie Co, Letcher Co, Martin Co, Millard, Morgan Co	310
Industrial Maintenance Tech	3	Floyd Co, Letcher Co, Millard	27
Information Support and Services	2	Leslie Co, Morgan Co	4
Information Technology	5	Bell Co, Clay Co, Floyd Co, Knott Co, Knox Co	36
Motorcycle/ Powersports	1	Knott	1
Multimedia Technology	1	Leslie	9
Network Administration	2	Leslie, Morgan	8
Web Development / Administration	1	Morgan	0
Welding (manufacturing)	9	Belfry, Clay, Floyd, Jackson, Knox, Lee, Leslie, Letcher, Morgan	76
Wood Products Manufacturing	1	Jackson	5

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	341	-337
Manufacturing	50	321
Transportation, Distribution, and Logistics	36	127
Finance & Insurance	76	-70
Professional Services	128	208

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI
Completed Data – 3rd Quarter 2010, KDE

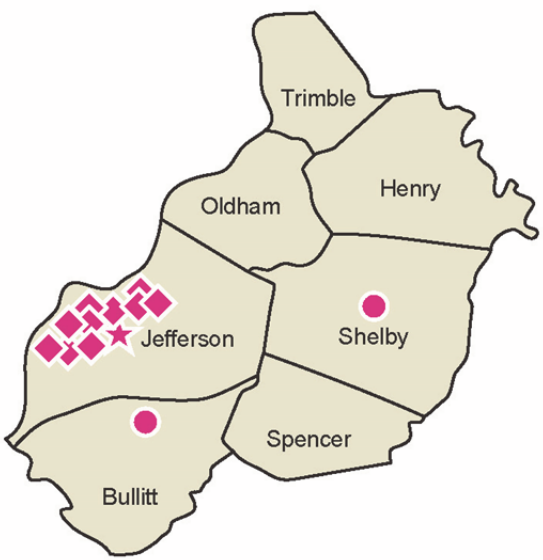
Local Technical Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	2	Johnson, Lawrence Co	5
Administration Support	2	Johnson, Magoffin Co	33
Ag Power Structured Tech	1	Johnson	18
Allied Health	3	Carter, Johnson, Magoffin Co	72
Animal Systems	3	Johnson, Lawrence Co, Magoffin Co	12
Biomedical Technology	1	Johnson	0
Business Management	1	Johnson	8
Business Technology	2	Johnson, Lawrence Co	3
Carpentry	4	Carter, Johnson, Lawrence, Magoffin	55
Computer Programming	1	Carter	12
Consumer And Family Management	2	Johnson, Magoffin	19
Culinary And Food Services	2	Johnson, Lawrence	15
Early Childhood Education	2	Johnson, Lawrence	5
Electricity	1	Magoffin	10
Engineering	2	Johnson, Lawrence	0
Env Science/Natural Resources	2	Johnson, Lawrence	4
Fashion And Interior Design	1	Johnson	0
Finance	1	Johnson	1
Fundamentals Of Teaching	2	Johnson, Magoffin	16
Geographic Information Systems	1	Carter	0
Horticulture And Plant Sciences	3	Johnson, Lawrence, Magoffin	25
Hospitality Services	1	Lawrence	0
Hospitality Travel Tourism & Recreation	1	Lawrence	0
Information Processing	1	Johnson	0
Information Support And Services	3	Carter, Johnson, Magoffin	33
Information Technology	1	Lawrence	0
Management Entrepreneurship	1	Lawrence	0
Marketing	1	Johnson	
Multimedia Technology	1	Johnson	0
Network Administration	2	Carter, Johnson	2
PLTW Biomedical Sciences	1	Johnson	0
PLTW Engineering	2	Johnson, Lawrence	26
Pre-nursing	3	Johnson, Lawrence, Magoffin	35
Telemedia Technology	1	Johnson	5
Visual Communications	1	Johnson	0
Web Development	1	Johnson	21
Welding (manufacturing)	2	Carter Magoffin	28

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	1	Big Sandy	8
Animation, Interactive Technology, Video Graphics and Special Effects	1	Big Sandy	1
Business Administration and Management, General	3	Big Sandy, Hazard, Southeast	48
Computer and Information Sciences, General	3	Big Sandy, Hazard, Southeast	27
Drafting and Design Technology/ Technician, General	3	Big Sandy, Hazard, Southeast	13
Engineering Technology, General	2	Big Sandy, Southeast	24
Executive Assistant/ Executive Secretary	2	Big Sandy, Southeast	27
Graphic Communications, General	1	Big Sandy	5
Graphic Design	1	Big Sandy	9
Surveying Technology/Surveying	2	Big Sandy, Hazard	5
Energy Management and Systems Technology/ Technician	1	Big Sandy	9
Mining Technology/ Technician	1	Hazard	7
Child Care Provider/ Assistant	2	Hazard, Southeast	15
Clinical/ Medical Laboratory Technician	2	Hazard, Southeast	38
Cosmetology/ Cosmetologist, General	2	Big Sandy, Hazard	15
Criminal Justice/ Law Enforcement Administration	3	Big Sandy, Hazard, Southeast	26
Dental Hygiene/ Hygienist	1	Big Sandy	12
Fire Science/ Fire-fighting	1	Hazard	2
Health Information/Medical Records Technology/ Technician	1	Hazard	4
Licensed Practical/ Vocational Nurse Training	3	Big Sandy, Hazard, Southeast	287
Medical Administrative/ Executive Assistant and Medical Secretary	2	Big Sandy, Hazard	50
Medical Radiologic Technology/ Science v Radiation Therapist	2	Hazard, Southeast	26
Physical Therapist Assistant	2	Hazard, Southeast	16
Registered Nursing/ Registered Nurse	3	Big Sandy, Hazard, Southeast	137
Respiratory Care Therapy/ Therapist	2	Big Sandy, southeast	43
Social Work	2	Big Sandy, Hazard	49
Surgical Technology	2	Hazard, Southeast	15
Autobody/ Collision and Repair Technology	3	Big Sandy, Hazard, Southeast	17
Automobile/ Automotive Mechanics	3	Big Sandy, Hazard, Southeast	26
Diesel Mechanics Technology	3	Big Sandy, Hazard, Southeast	46

Greater Louisville	Number of schools or community colleges in the region	
	State-administered Schools	2
	Locally-controlled Schools	10
	Community Colleges	1
	State-administered schools in the region	
	Bullitt County ATC	
	Shelby County ATC	
	Locally-controlled schools in the region	
	Central HS	
	Doss HS	
	Eastern HS	
	Iroquois HS	
	Jeffersontown HS	
	Moore HS	
	Seneca HS	
	Southern HS	
	Valley HS	
	Waggener HS	
	Community colleges in the region	
	Jefferson Community and Technical College	



★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	1	Shelby	26
Automotive Technology	2	Bullitt, Shelby	30
Carpentry	1	Bullitt	4
Computerized Manufacturing And Machining	1	Shelby	7
Health Sciences	2	Bullitt, Shelby	54
Industrial Maintenance Tech	1	Shelby	9
Information Support And Services	1	Shelby	8
Printing Technology	1	Bullitt	4
Web Development / Administration	1	Shelby	6
Welding (manufacturing)	1	Bullitt	15

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	38	-36
Manufacturing	35	-33
Transportation, Distribution, and Logistics	311	-169
Finance & Insurance	762	-753

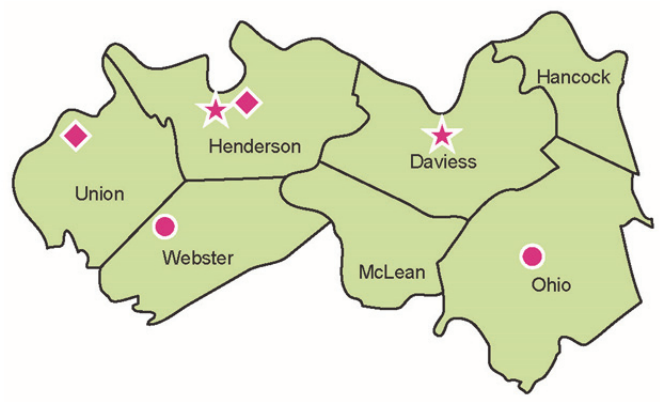
Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	2	Iroquois, Valley	5
Air Conditioning Technology	1	Iroquois	4
Allied Health	4	Central, Moore, Valley, Waggener	66
Animal Systems	1	Seneca	5
Autobody/ Collision Repair Tech	1	Southern	16
Automotive Technology	1	Southern	21
Biomedical Technology	2	Moore, Valley	0
Business Management	5	Central, Doss, Eastern, Jeffersontown, Southern	58
Business Marketing And Marketing Management	2	Central, Moore	42
Business Multimedia	2	Seneca, Southern	45
Carpentry	1	Iroquois	7
Computer Programming	1	Eastern	0
Consumer And Family Management	2	Eastern, Southern	0
Culinary And Food Services	1	Waggener	0
Early Childhood Education	1	Seneca	7
Electricity	1	Iroquois	6
Electronic Communications Technology	1	Jeffersontown	2
Engineering	2	Iroquois, Jeffersontown	0
Fashion And Interior Design	1	Eastern	0
Finance	3	Central, Doss, Southern	33
Fundamentals of Teaching	1	Seneca	0
Geographic Information Systems	2	Eastern, Southern	0
Health Sciences	4	Central, Moore, Valley, Waggener	42
Horticulture And Plant Sciences	1	Seneca	1
Information Processing	1	Southern	0
Information Support And Services	4	Doss, Eastern, Seneca, Southern	20
Law Enforcement/ Police Science	1	Seneca	0
Machine Tool Technology	1	Southern	27
Management Entrepreneurship	1	Iroquois	14
Marketing	2	Seneca, Southern	4
Masonry	1	Iroquois	5
Network Administration	2	Central, Eastern	27
PLTW Biomedical Sciences	3	Moore, Valley, Waggener	3
PLTW Engineering	2	Iroquois, Jeffersontown	21
Pre-law Studies	1	Seneca	0
Printing Technology	1	Eastern	0
Web Development / Administration	3	Doss, Eastern, Waggener	9
Welding (construction)	1	Iroquois	4
Welding (manufacturing)	1	Jeffersontown	20

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	1	Jefferson	6
Aircraft Powerplant Technology/Technician	1	Jefferson	4
Automobile/ Automotive Mechanics Technology/Technician	1	Jefferson	56
Business Administration and Management, General	1	Jefferson	103
Cabinetmaking and Millwork/ Millwright	1	Jefferson	2
Child Care Provider/ Assistant	1	Jefferson	36
Clinical/Medical Laboratory Technician	1	Jefferson	28
Commercial Photography	1	Jefferson	25
Computer and Information Sciences, General	1	Jefferson	38
Cosmetology	1	Jefferson	1
Criminal Justice/ Law Enforcement Administration	1	Jefferson	38
Culinary Arts/ Chef Training	1	Jefferson	22
Diagnostic Medical Sonography/ Sonographer and Ultrasound Technician	1	Jefferson	15
Emergency Medical Technology/ Technician (EMT Paramedic)	1	Jefferson	25
Engineering Technology, General	1	Jefferson	17
Executive Assistant/ Executive Secretary	1	Jefferson	6
Fire Science/ Fire-fighting	1	Jefferson	6
Graphic Communications, General	1	Jefferson	3
Health Information/ Medical Records Technology/ Technician	1	Jefferson	17
Health Services/ Allied Health/ Health Sciences, General	1	Jefferson	1
Health Unit Coordinator/ Ward Clerk	1	Jefferson	12
Licensed Practical/ Vocational Nurse Training	1	Jefferson	345
Medical Administrative/ Executive Assistant and Medical Secretary	1	Jefferson	2
Medical Radiologic Technology/ Science v Radiation Therapist	1	Jefferson	20
Medical/ Clinical Assistant	1	Jefferson	14
Nuclear Medical Technology/ Technologist	1	Jefferson	11
Occupational Therapist Assistant	1	Jefferson	17
Pharmacy Technician/ Assistant	1	Jefferson	33
Physical Therapist Assistant	1	Jefferson	19
Real Estate	1	Jefferson	6
Registered Nursing/ Registered Nurse	1	Jefferson	136
Respiratory Care Therapy/ Therapist	1	Jefferson	25
Social Work	1	Jefferson	23
Surgical Technology/ Technologist	1	Jefferson	8

Green River	Number of schools or community colleges in the region	
	**State-administered Schools**	2
	Locally-controlled Schools	2
	Community Colleges	2
	State-administered schools in the region	
	Ohio County ATC	
	Webster County ATC	
	Locally-controlled schools in the region	
	Henderson County HS	
	Union County CTC	
	Community colleges in the region	
	Henderson Community College	
	Owensboro Community and Technical College	

★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Automotive Technology	1	Ohio	5
Carpentry	1	Ohio	6
Computer Aided Drafting	1	Webster	10
Computerized Manufacturing and Machining	2	Ohio, Webster	2
Health Sciences	2	Ohio, Webster	18
Information Support And Services	1	Ohio	34
Marketing Technology	1	Ohio	18
Welding (manufacturing)	2	Ohio, Webster	21

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	235	-235
Manufacturing	241	-15
Transportation, Distribution, and Logistics	54	-33
Finance & Insurance	104	-80
Professional Services	225	-183

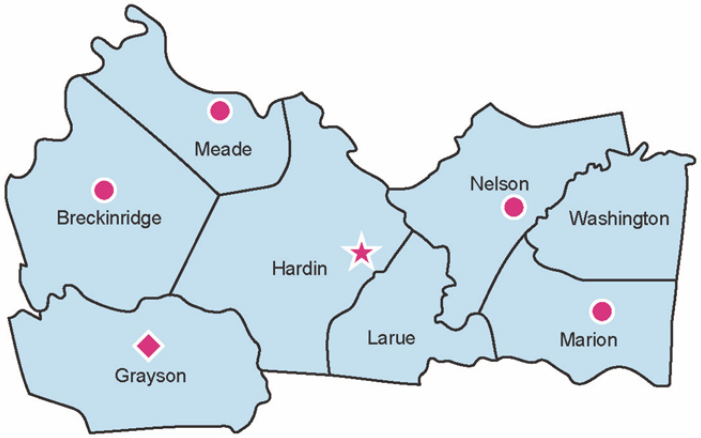
Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	1	Henderson	1
Ag Power Structured Tech Sys	1	Union	26
Agribiotechnology	1	Union	8
Agribusiness Systems	2	Henderson, Union	0
Allied Health	2	Henderson, Union	92
Animal Systems	2	Henderson, Union	42
Automotive Technology	1	Henderson	15
Carpentry	1	Henderson	20
Computer Programming	1	Henderson	1
Consumer And Family Management	1	Henderson	1
Culinary And Food Services	1	Henderson	14
Early Childhood Education	1	Henderson	28
Electricity	1	Union	15
Engineering	1	Henderson	0
Finance	1	Henderson	24
Food Science & Processing	1	Henderson	0
Horticulture And Plant Sciences	2	Henderson, Union	4
Industrial Maintenance Tech	1	Union	10
Information Support And Services	2	Henderson, Union	1
Law Enforcement/ Police Science	1	Henderson	0
Machine Tool Technology	1	Henderson	15
Network Administration	1	Henderson	10
PLTW Engineering	1	Henderson	2
Pre-nursing	1	Henderson	39
Retailing/ Wholesaling	1	Henderson	24
Telemedia Technology	1	Union	7
Visual Communications	1	Henderson	31
Welding (manufacturing)	1	Henderson	18

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	2	Henderson, Owensboro	13
Business Administration and Management, General	2	Henderson, Owensboro	64
Computer and Information Sciences, General	2	Henderson, Owensboro	38
Culinary Arts/ Chef Training	1	Owensboro	6
Drafting and Design Technology/ Technician, General	1	Owensboro	2
Engineering Technology, General	2	Henderson, Owensboro	27
Executive Assistant/ Executive Secretary	1	Owensboro	31
Biology Technician/ Biotechnology Laboratory Technician	1	Owensboro	1
Child Care Provider/ Assistant	2	Henderson, Owensboro	43
Clinical/ Medical Laboratory Technician	2	Henderson, Owensboro	54
Cosmetology/ Cosmetologist, General	1	Owensboro	26
Criminal Justice/Law Enforcement Administration	1	Owensboro	18
Dental Hygiene/Hygienist	1	Henderson	9
Emergency Medical Technology/ Technician	1	Owensboro	40
Fire Science/Fire-fighting	1	Owensboro	5
Licensed Practical/ Vocational Nurse Training	2	Henderson, Owensboro	352
Medical Administrative/ Executive Assistant and Medical Secretary	1	Owensboro	23
Medical Radiologic Technology/ Science v Radiation Therapist	1	Owensboro	9
Medical/ Clinical Assistant	1	Henderson	20
Registered Nursing/ Registered Nurse	2	Henderson, Owensboro	102
Social Work	1	Owensboro	7
Surgical Technology/Technologist	1	Owensboro	3
Autobody/ Collision and Repair Tech	1	Owensboro	1
Automobile/Automotive Mechanics	1	Owensboro	6

Lincoln Trail	Number of schools or community colleges in the region	
	**State-administered Schools**	4
	Locally-controlled Schools	1
	Community Colleges	1
	State-administered schools in the region	
	Breckinridge County ATC	
	Marion County ATC	
	Meade County ATC	
	Nelson County ATC	
	Locally-controlled schools in the region	
	Grayson County AVEC	
	Community colleges in the region	
	Elizabethtown Community and Technical College	

★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	1	Breckinridge	15
Air Conditioning Technology	2	Meade, Nelson	15
Automotive Technology	4	Breckinridge, Marion, Meade, Nelson	40
Carpentry	4	Breckinridge, Marion, Meade, Nelson	28
Computer Aided Drafting	1	Nelson	5
Computerized Manufacturing And Machining	2	Breckinridge, Marion	29
Emergency Fire Management Svcs	1	Meade	9
Health Sciences	4	Breckinridge, Marion, Meade, Nelson	114
Industrial Maintenance Tech	1	Marion	0
Information Support And Services	1	Breckinridge	13
Information Technology	2	Marion, Nelson	3
Marketing Technology	1	Meade	24
Web Development / Administration	2	Breckinridge, Nelson	0
Welding (manufacturing)	4	Breckinridge, Marion, Meade, Nelson	36
Wood Products Manufacturing (manufacturing	1	Nelson	3

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	38	-36
Manufacturing	35	-33
Transportation, Distribution, and Logistics	311	-169
Finance & Insurance	762	-753

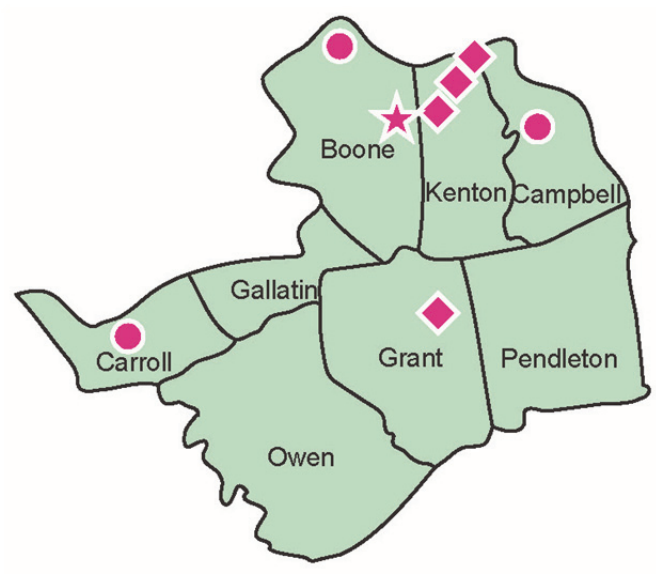
Source: Kentucky's Targeted Industry Sectors May 2011, EMSI
Completed Data – 3rd Quarter 2010, KDE

Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Allied Health	1	Grayson	10
Automotive Technology	1	Grayson	15
Carpentry	1	Grayson	16
Electricity	1	Grayson	7
Marketing	1	Grayson	15
Network Administration	1	Grayson	0
Welding (manufacturing)	1	Grayson	16

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Automobile/ Automotive Mechanic	1	Elizabethtown	60
Business Administration and Management	1	Elizabethtown	68
Child Care Provider/ Assistant	1	Elizabethtown	123
Computer and Information Sciences, General	1	Elizabethtown	19
Criminal Justice/ Law Enforcement Administration	1	Elizabethtown	35
Culinary Arts/ Chef Training	1	Elizabethtown	22
Diesel Mechanics Technology/ Technician	1	Elizabethtown	63
Drafting and Design Technology/ Technician, General	1	Elizabethtown	16
Emergency Medical Technology/ Technician	1	Elizabethtown	2
Engineering Technology	1	Elizabethtown	23
Executive Assistant/ Executive Secretary	1	Elizabethtown	41
Fire Science/ Fire-fighting	1	Elizabethtown	3
Licensed Practical/ Vocational Nurse Training	1	Elizabethtown	182
Medical Administrative/ Executive Assistant and Medical Secretary	1	Elizabethtown	62
Medical Radiologic Technology/ Science v Radiation Therapist	1	Elizabethtown	12
Real Estate	1	Elizabethtown	1
Registered Nursing/ Registered Nurse	1	Elizabethtown	41
Social Work	1	Elizabethtown	33

Northern Kentucky	Number of schools or community colleges in the region	
	**State-administered Schools**	3
	Locally-controlled Schools	4
	Community Colleges	1
	State-administered schools in the region	
	Boone County ATC	
	Campbell County ATC	
	Carroll County ATC	
	Locally-controlled schools in the region	
	Chapman Academic Voc Ed Center	
	Grant County HS	
	Kenton County Academies of Innovation and Technology	
	Newport HS	
	Community colleges in the region	
	Gateway Community and Technical College	

★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	1	Carroll	20
Autobody / Collision Repair Tech	2	Boone, Campbell	19
Automotive Technology	2	Campbell, Carroll	33
Carpentry	2	Campbell, Carroll	21
Diesel Technology	1	Boone	26
Electricity	2	Boone, Campbell	25
Health Sciences	3	Boone, Campbell, Carroll	31
Industrial Chemical Technology	1	Carroll	0
Industrial Maintenance Tech	1	Carroll	12
Information Support And Services	1	Campbell	2
Masonry	1	Campbell	9
Metal Fabrication	1	Boone	17
Network Administration	1	Campbell	7
Welding (manufacturing)	3	Boone, Campbell, Carroll	50

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Manufacturing	978	-669
Transportation, Distribution, and Logistics	553	-451
Finance & Insurance	1219	-1219
Recreation	80	-80

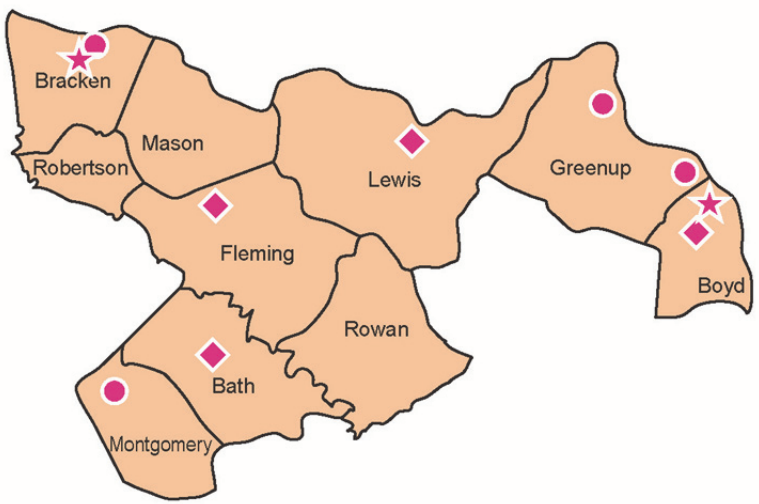
Source: Kentucky's Targeted Industry Sectors May 2011, EMSI
Completed Data – 3rd Quarter 2010, KDE

Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Administration Support	2	Grant, Newport	11
Air Conditioning Technology	1	Kenton	0
Allied Health	3	Grant, Kenton, Newport	10
Animal Systems	1	Grant	6
Autobody / Collision Repair Tech	1	Kenton	3
Automotive Technology	2	Grant, Kenton	22
Biomedical Technology	1	Grant	0
Business Management	1	Grant	6
Business Multimedia	1	Grant	0
Business Technology	2	Grant, Newport	18
Carpentry	2	Kenton, Newport	16
Computer Aided Drafting	1	Kenton	0
Consumer And Family Management	2	Grant, Newport	9
Culinary And Food Services	1	Grant	12
Early Childhood Education	2	Grant, Newport	21
Electricity	2	Grant, Kenton	14
Engineering	1	Grant	0
Env Science/natural Resources	1	Grant	1
Fashion And Interior Design	1	Grant	0
Fundamentals Of Teaching	1	Grant	0
Health Sciences	2	Grant, Kenton	12
Horticulture And Plant Sciences	1	Grant	4
Hospitality Services	1	Newport	0
Industrial Automation Tech	1	Kenton	0
Information Processing	1	Grant	1
Information Support And Services	1	Grant	5
Information Technology	1	Grant	2
Multimedia Technology	1	Kenton	0
Network Administration	1	Grant	3
PLTW Biomedical Sciences	2	Gran, Kenton	6
PLTW Engineering	2	Grant, Kenton	16
Pre-nursing	1	Grant	12
Visual Communication	1	Newport	13
Welding (manufacturing)	2	Grant, Kenton	16

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	1	Gateway	8
Business Administration and Management	1	Gateway	87
Computer and Information Sciences	1	Gateway	10
Drafting and Design Technology/ Technician	1	Gateway	1
Engineering Technology	1	Gateway	2
Executive Assistant/ Executive Secretary	1	Gateway	2
Graphic Design	1	Gateway	5
Energy Management and Systems Technology/ Technician	1	Gateway	12
Allied Health Diagnostic	1	Gateway	13
Child Care Provider/Assistant	1	Gateway	38
Cosmetology/ Cosmetologist, General	1	Gateway	8
Criminal Justice/ Law Enforcement Administration	1	Gateway	43
Emergency Medical Technology/ Technician	1	Gateway	10
Health Unit Coordinator/ Ward Clerk	1	Gateway	14
Licensed Practical/ Vocational Nurse Training	1	Gateway	238
Medical Administrative/ Executive Assistant and Medical Secretary	1	Gateway	27
Medical/Clinical Assistant	1	Gateway	38
Pharmacy Technician/ Assistant	1	Gateway	8
Registered Nursing/ Registered Nurse	1	Gateway	34
Autobody/ Collision and Repair Technology/ Technician	1	Gateway	11
Automobile/ Automotive Mechanics Technology/ Technician	1	Gateway	68

TENCO	Number of schools or community colleges in the region	
	**State-administered Schools**	4
	Locally-controlled Schools	4
	Community Colleges	2
	State-administered schools in the region	
	Greenup County ATC	
	Mason County ATC	
	Montgomery County ATC	
	Russell ATC	
	Locally-controlled schools in the region	
	Bath County HS	
	Boyd County HS VOC	
	Fleming County HS	
	Foster Meade VOC ED Center	
	Community colleges in the region	
	Ashland Community and Technical College	
	Maysville Community and Technical College	

★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting And Finance Tech	1	Montgomery	0
Administration Support	3	Greenup, Montgomery, Russell	49
Automotive Technology	3	Greenup, Mason, Russell	27
Carpentry	1	Montgomery	8
Computer Aided Drafting	2	Greenup Russell	28
Electricity	3	Greenup, Mason, Russell	32
Finance	1	Montgomery	3
Health Sciences	3	Greenup, Mason, Montgomery	26
Horticulture And Plant Sciences	1	Greenup	4
Information Support And Services	1	Russell	0
Network Administration	1	Russell	3
Web Development / Administration	1	Russell	0
Welding (manufacturing)	4	Greenup, Mason, Montgomery, Russell	37

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	23	-22
Manufacturing	105	63
Transportation, Distribution, and Logistics	12	42
Finance & Insurance	49	-25
Professional Services	27	122
Education	2	44

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

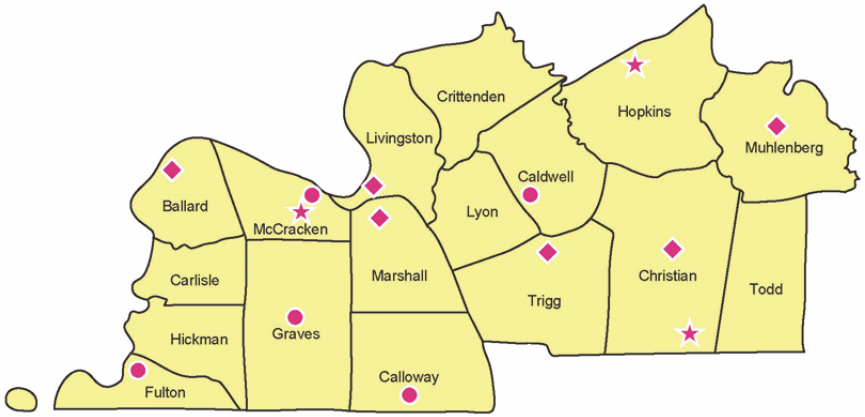
Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	1	Foster-Meade	6
Administration Support	2	Bath, Foster-Meade	15
Ag Power Structured Tech	3	Bath, Boyd, Fleming	35
Agribusiness Systems	2	Boyd, Foster-Meade	2
Allied Health	3	Bath, Boyd, Fleming	41
Animal Systems	3	Bath, Boyd, Fleming	26
Autobody / Collision Repair Tech	1	Fleming	11
Automotive Technology	2	Boyd, Fleming	16
Business Management	1	Boyd	6
Business Multimedia	1	Bath	0
Business Technology	3	Bath, Boyd, Foster-Meade	1
Carpentry	1	Foster-Meade	23
Consumer And Family Management	2	Boyd, Fleming	14
Culinary And Food Services	2	Bath, Fleming	16
Early Childhood Education	3	Bath, Boyd, Fleming	45
Engineering	2	Fleming, Foster-Meade	0
Env Science/Natural Resources	1	Bath	1
Finance	2	Bath, Fleming	15
Fundamentals Of Teaching	1	Bath	1
Horticulture And Plant Sciences	3	Bath, Boyd, Foster-Meade	32
Information Processing	1	Fleming	8
Information Support And Services	2	Bath, Fleming	13
Network Administration	1	Boyd	5
Pltw Engineering	2	Fleming, Foster-Meade	20
Pre-nursing	4	Bath, Boyd, Fleming, Foster-Meade	70
Technology	3	Bath, Fleming, Foster-Meade	5
Telemedia Technology	1	Fleming	6
Web Development / Administration	1	Boyd	24
Welding (manufacturing)	2	Boyd, Foster-Meade	40

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	2	Ashland, Maysville	24
Business Administration and Management	2	Ashland, Maysville	77
Computer and Information Sciences	2	Ashland, Maysville	25
Culinary Arts/ Chef Training	2	Ashland, Maysville	20
Drafting and Design Technology/ Technician	1	Ashland	5
Engineering Technology	1	Maysville	18
Executive Assistant/ Executive Secretary	2	Ashland, Maysville	60
Real Estate	1	Maysville	2
Energy Management and Systems Technology/ Technician	1	Maysville	17
Child Care Provider/Assistant	2	Ashland, Maysville	38
Cosmetology/Cosmetologist, General	2	Ashland, Maysville	20
Criminal Justice/ Law Enforcement Administration	1	Ashland	26
Emergency Medical Technology/Technician	1	Ashland	2
Fire Science/Fire-fighting	1	Ashland	1
Licensed Practical/ Vocational Nurse Training	2	Ashland, Maysville	244
Medical Administrative/ Executive Assistant and Medical Secretary	2	Ashland, Maysville	43
Medical Radiologic Technology/ Science v Radiation Therapist	1	Ashland	7
Medical/Clinical Assistant	1	Maysville	50
Nursing Assistant/ Aide and Patient Care Assistant/ Aide	1	Maysville	6
Pharmacy Technician/ Assistant	1	Ashland	9
Registered Nursing/ Registered Nurse	2	Ashland, Maysville	59
Respiratory Care Therapy/ Therapist	2	Ashland, Maysville	14
Surgical Technology/ Technologist	2	Ashland, Maysville	21
Automobile/ Automotive Mechanics Technology/ Technician	2	Ashland, Maysville	39
Diesel Mechanics Technology/ Technician	2	Ashland, Maysville	19

Western Kentucky	Number of schools or community colleges in the region	
	State-administered Schools	5
	Locally-controlled Schools	6
	Community Colleges	3
	State-administered schools in the region	
	Caldwell County ATC	
	Fulton County ATC	
	Mayfield/Graves County ATC	
	Murray/Calloway County ATC	
	Paducah ATC	
	Locally-controlled schools in the region	
	Ballard County CTC	
	Christian County CTC	
	Livingston Central HS	
	Marshall County Tech Center	
	Muhlenberg County CTC	
	Trigg County HS	
	Community colleges in the region	
	Hopkinsville Community College	
	Madisonville Community College	
	West Kentucky Community and Technical College	



★ Community College ◆ Locally-controlled ● State controlled

State Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	1	Mayfield	4
Administration Support	2	Fulton, Mayfield	8
Autobody/ Collision Repair Tech	1	Paducah	9
Automotive Technology	4	Caldwell, Fulton, Murray, Paducah	34
Carpentry	5	Caldwell, Fulton, Mayfield, Murray, Paducah	49
Computer Aided Drafting	1	Paducah	3
Computerized Manufacturing And Machining	3	Fulton, Mayfield, Murray	24
Cosmetology (secondary)	1	Paducah	8
Culinary And Food Services	2	Caldwell, Murray	28
Electricity	2	Caldwell, Mayfield	23
Health Sciences	5	Caldwell, Fulton, Mayfield, Murray, Paducah	85
Information Support And Services	1	Fulton	3
Information Technology	2	Caldwell, Paducah	8
Radio And TV	1	Paducah	2
Welding (manufacturing)	4	Caldwell, Mayfield, Murray, Paducah	49

Economic Sector	Annual Job Openings	Gap Between Grads and Job Openings
Energy & Natural Resource Extraction	111	-107
Manufacturing	131	120
Transportation, Distribution, and Logistics	90	-7
Healthcare	35	183
Tourism	4	-4
Agriculture and Food Production	36	-14

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Completed Data – 3rd Quarter 2010, KDE

Local Program Offerings

Program	# of Offer	Schools Offer	Grads
Accounting	1	Ballard	0
Administration Support	3	Ballard, Livingston, Trigg	19
Ag Power Structured Tech	2	Livingston, Trigg	14
Agribiotechnology	1	Livingston	0
Agribusiness Systems	1	Livingston	4
Allied Health	4	Ballard, Christian, Marshall, Trigg	62
Animal Systems	2	Livingston, Trigg	10
Autobody / Collision Repair Tech	2	Ballard, Marshall	12
Automotive Technology	3	Christian, Marshall, Muhlenberg	27
Biomedical Technology	1	Marshall	0
Business Management	2	Ballard, Marshall	2
Business Multimedia	2	Ballard, Trigg	9
Business Technology	3	Ballard, Livingston, Trigg	19
Carpentry	4	Ballard, Christian, Livingston, Marshall	14
Consumer And Family Management	2	Livingston, Trigg	22
Early Childhood Education	1	Trigg	6
Electricity	2	Christian, Muhlenberg	18
Engineering			3
Entrepreneurship	2	Christian, Muhlenberg	4
Env Science/ Natural Resources	2	Ballard, Muhlenberg	4
Fashion And Interior Design	1	Trigg	0
Finance	1	Ballard	7
Fundamentals Of Teaching	1	Trigg	5
Health Sciences	2	Ballard, Muhlenberg	69
Horticulture And Plant Sciences	2	Livingston, Trigg	10
Industrial Maintenance	1	Muhlenberg	15
Information Processing	1	Trigg	5
Information Support And Services	2	Christian , Marshall	13
Machine Tool Technology - Secondary	1	Christian	8
Marketing	2	Livingston, Trigg	0
Multimedia Technology	1	Marshall	2
Network Administration	2	Christian, Marshall	1
PLTW Engineering	2	Christian, Trigg	17
Pre-nursing	1	Christian	1
Sports Marketing	1	Ballard	1
Technology	1	Livingston	0
Web Development / Administration	2	Christian, Trigg	10
Welding (manufacturing)	2	Christian, Marshall	65

CC Program Offerings

Program	# of Offer	Schools Offer	Grads
Advanced Manufacturing Technology	3	Hopkinsville, Madisonville, W Kentucky	48
Animation, Interactive Technology, Video Graphics and Special Effects	1	W Kentucky	11
Business Administration and Management, General	3	Hopkinsville, Madisonville, W Kentucky	110
Computer and Information Sciences, General	3	Hopkinsville, Madisonville, W Kentucky	65
Culinary Arts/Chef Training	1	W Kentucky	11
Drafting and Design Technology/Technician, General	1	W Kentucky	6
Engineering Technology, General	2	Hopkinsville, Madisonville	18
Executive Assistant/Executive Secretary	2	Madisonville, Hopkinsville	65
Graphic Communications, General	1	W Kentucky	7
Graphic Design	1	W Kentucky	1
Logistics and Materials Management	1	W Kentucky	2
Mining Technology/Technician	1	Madisonville	7
Petroleum Technology/Technician	1	W Kentucky	14
Child Care Provider/Assistant	3	Hopkinsville, Madisonville, W Kentucky	128
Clinical/ Medical Laboratory Technician	2	Madisonville, W Kentucky	103
Cosmetology/Cosmetologist, General	1	W Kentucky	24
Criminal Justice/ Law Enforcement Administration	3	Hopkinsville, Madisonville, W Kentucky	69
Dental Hygiene/ Hygienist	1	W Kentucky	15
Diagnostic Medical Sonography/ Sonographer and Ultrasound Technician	1	W Kentucky	12
Emergency Medical Technology/ Technician	2	Madisonville, W Kentucky	23
Fire Science/ Fire-fighting	2	Madisonville, W Kentucky	6
Health Services/ Allied Health/Health Sciences, General	1	W Kentucky	10
Health/ Medical Physics	1	W Kentucky	2
Licensed Practical/ Vocational Nurse Training	3	Hopkinsville, Madisonville, W Kentucky	872
Medical Administrative/ Executive Assistant	2	Madisonville, W Kentucky	46
Medical Radiologic Technology/ Science v Radiation Therapist	2	Madisonville, W Kentucky	25
Nursing Assistant/ Aide and Patient Care Assistant/Aide	1	W Kentucky	32
Occupational Therapist Assistant	1	Madisonville	21
Pharmacy Technician/ Assistant	1	W Kentucky	18
Physical Therapist Assistant	2	Madisonville, W Kentucky	29
Registered Nursing/ Registered Nurse	3	Hopkinsville, Madisonville, W Kentucky	
Respiratory Care Therapy/Therapist	2	Madisonville, W Kentucky	257
Security and Protective Services, Other	1	W Kentucky	3
Social Work	1	Hopkinsville	18
Surgical Technology/ Technologist	1	W Kentucky	5
Autobody/ Collision and Repair Technology/ Technician	1	W Kentucky	3
Automobile/ Automotive Mechanics Technology/ Technician	1	W Kentucky	9
Diesel Mechanics Technology/ Technician	1	W Kentucky	19
Marine Transportation, Other	1	W Kentucky	1
Truck and Bus Driver/ Commercial Vehicle Operation	1	W Kentucky	10

Appendix B

High-Wage, High-Demand Jobs Compared to State, Local and Community College Course Offerings

Appendix B : High Wage, High Demand Jobs Compared to State, Local, and Community College Course Offerings

Economic Sector	High-Wage, High Demand Jobs within Sector	Annual Jobs	Total Jobs	Cluster	State Program Offer	12-13 Graduates-State	Local Program Offer	12-13 Graduates-Local	Cluster Total	Gap* +/ -	CC Program Offer	# of CC Program Offer	CC Grads	CC Cluster Total
Automobile and Aircraft Manufacturing	Automobile Manufacturing	36	455	Manufacturing	Computer Aided Drafting	96	Computer Aided Drafting	0	2039	1584	Advanced Manufacturing Technology	14	259	319
	Truck Trailer Manufacturing	9			Computerized Manufacturing and Machining	147	Electronic Communications Technology	2			Architectural Drafting and Architectural CAD/ CADD	1	7	
	Vehicular Lighting Equipment Manufacturing	2			Industrial Maintenance Tech	76	Food Science and Processing System	0						
	All Other Motor Vehicle Parts Manufacturing	343					Industrial Automation Tech	0			Cabinet-making and Millwork/ Millwright	1	2	
	Aircraft Manufacturing	54					Industrial Maintenance Tech	45						
	Other Aircraft Parts and Auxiliary Equipment Manufacturing	6			Metal Fabrication	17	Machine Tool Technology - Secondary	50						
					Building/ Apartment Maintenance	16	Carpentry	198		+	Drafting and Design Technology/ Technician, General	10	51	
					Carpentry	333								
					Electricity	244	Electricity	98						
					Industrial Chemical Technology	0								
	All Other Transportation Equipment Manufacturing	6			Welding (Manufacturing)	512	Welding (Manufacturing)	205						
Transportation, Distribution, and Logistics	Inland Water Freight Transportation	22	1401	Transportation, Distribution, and Logistics	Autobody/ Collision Repair Tech	56	Autobody/ Collision Repair Tech	73	903	(498)	Aircraft Powerplant Technology/ Technician	2	33	578
	General Freight Trucking, Long-Distance, Truckload	161												
	General Freight Trucking, Long-Distance, Less Than Truckload	121												
	Specialized Freight (except Used Goods) Trucking, Local	27									Autobody/ Collision and Repair Technology/ Technician	9	51	
	Specialized Freight (except Used Goods) Trucking, Long-Distance	96												

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Complete Data – 3rd Quarter 2010, KDE

Appendix B : High Wage, High Demand Jobs Compared to State, Local, and Community College Course Offerings

Economic Sector	High-Wage, High Demand Jobs within Sector	Annual Jobs	Total Jobs	Cluster	State Program Offer	12-13 Graduates-State	Local Program Offer	12-13 Graduates-Local	Cluster Total	Gap* +/ -	CC Program Offer	# of CC Program Offer	CC Grads	CC Cluster Total
Transportation, Distribution, and Logistics	Other Airport Operations	8		Transportation, Distribution, and Logistics	Automotive Technology		Automotive Technology				Automobile/ Automotive Mechanics Technology/ Technician	13	311	
	Other Support Activities for Air Transportation	13												
	Support Activities for Rail Transportation	6									Diesel Mechanics Technology/ Technician	9	170	
	Navigational Services to Shipping	21			Automotive Technology	493	Automotive Technology	202						
	Motor Vehicle Towing	9												
	Other Support Activities for Road Transportation	6									Marine Transportation, Other	1	1	
	Freight Transportation Arrangement	47			Diesel Technology	59				▬				
	All Other Support Activities for Transportation	5									Truck and Bus Driver/ Commercial Vehicle Operation	2	10	
	Couriers and Express Delivery Services	395					Diesel Technology	19						
	General Warehousing and Storage	428									Logistics and Materials Management	1	2	
	Other Warehousing and Storage	38			Motorcycle/ Powersports	1								
Business Services and R&D	Offices of Lawyers	369	1075	Business and Administration	Administration Support	361	Administration Support	97	856	(219)	Business Administration and Management, General	16	711	1,073
	Title Abstract and Settlement Offices	31					Business Management	170						
	Translation and Interpretation Services	25					Business Multimedia	64						
	Administrative Management and General Management	503					Business Technology	142						
	Consulting Services									▬	Executive Assistant/ Executive Secretary	13	362	
	Human Resources Consulting Services	30					Entrepreneurship	8						
							Telemedia Technology	31						

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Complete Data – 3rd Quarter 2010, KDE

Appendix B : High Wage, High Demand Jobs Compared to State, Local, and Community College Course Offerings

Economic Sector	High-Wage, High Demand Jobs within Sector	Annual Jobs	Total Jobs	Cluster	State Program Offer	12-13 Graduates-State	Local Program Offer	12-13 Graduates-Local	Cluster Total	Gap* +/ -	CC Program Offer	# of CC Program Offer	CC Grads	CC Cluster Total
Business Services and R&D	Corporate, Subsidiary, and Regional Managing Offices	118					Visual Communications Art Technology Management Entrepreneurship	44 14						
	Offices of Certified Public Accountants Tax Preparation Services Other Accounting Services	122 83 145	350	Finance	Accounting Finance Finance and Accounting Tech	9 3 10	Accounting Finance	22 95	139	(211) ▬				
	Custom Computer Programming Services Computer Systems Design Services Computer Facilities Management Services Other Computer Related Services	95 304 116 236	751	Information Technology	Network Administration Web Development/ Administration Information Technology	40 30 8 107	Computer and Information Technology Computer Programming Information Processing Information Support and Services Network Administration	0 83 14 106 73	461	(290) ▬	Computer and Information Sciences, General	16	328	328
	Marketing Consulting Services Media Representatives Display Advertising	264 11 80	355	Marketing	Marketing Technology	54	Business Marketing and Marketing Management Fashion Marketing Fashion and Interior Design Sports Marketing Marketing	42 1 12 1 61	171	(184) ▬				
	Process, Physical Distribution, and Logistics Consulting Services Environmental Consulting Services	317 113	1433	Science, Technology, Engineering and Mathematics	Principles of Technology	0	Agri-biotechnology Geographic Information Systems	13 4	150	(1283)	Engineering Technology, General	13	208	222

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Complete Data – 3rd Quarter 2010, KDE

Appendix B : High Wage, High Demand Jobs Compared to State, Local, and Community College Course Offerings

Economic Sector	High-Wage, High Demand Jobs within Sector	Annual Jobs	Total Jobs	Cluster	State Program Offer	12-13 Graduates-State	Local Program Offer	12-13 Graduates-Local	Cluster Total	Gap* +/ -	CC Program Offer	# of CC Program Offer	CC Grads	CC Cluster Total
	Other Scientific &Technical Consulting Services	258					Engineering	4			Environmental Engineering Technology/ Environmental Technology	1	9	
	Engineering Services	361					PLTW Engineering	124						
	Veterinary Services	189												
	All Other Professional, Scientific, and Technical Services	195					Technology	5		-	Surveying Technology/ Surveying	2	5	
Health Care/ Social Assistance	Offices of Physicians (except Mental Health Specialists)	794	4182	Health Science	Health Sciences	1134	Allied Health	431	2120	(2062)	Allied Health Diagnostic, Intervention, and Treatment Professions, Other	1	13	6814
	Offices of Dentists	301									Biology Technician/ Biotechnology Laboratory Technician	2	13	
	Offices of Chiropractors	78					Biomedical Technology	0			Clinical/ Medical Laboratory Technician	19	399	
	Offices of Optometrists	46									Dental Hygiene/ Hygienist	4	91	
	Offices of Mental Health Practitioners (except Physicians)	34					Health Sciences	124			Dental Laboratory Technology/ Technician	1	10	
	Offices of Physical, Occupational and Speech Therapists, and Audiologists	260									Diagnostic Medical Sonography/ Sonographer and Ultrasound Technician	3	36	
	Offices of Podiatrists	6			Nursing I/ Pre-LPN	0					Emergency Medical Technology/ Technician (EMT Paramedic)	9	82	

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Complete Data – 3rd Quarter 2010, KDE

Appendix B : High Wage, High Demand Jobs Compared to State, Local, and Community College Course Offerings

Economic Sector	High-Wage, High Demand Jobs within Sector	Annual Jobs	Total Jobs	Cluster	State Program Offer	12-13 Graduates-State	Local Program Offer	12-13 Graduates-Local	Cluster Total	Gap* +/ -	CC Program Offer	# of CC Program Offer	CC Grads	CC Cluster Total
Health Care/ Social Assistance	Offices of All Other Miscellaneous Health Practitioners	125			PLTW Biomedical Science	0	PLTW Biomedical Science	43		-	Health Information/ Medical Records Technology/ Technician	2	21	
	Outpatient Mental Health and Substance Abuse Centers	10					Pre-Nursing	388			Health Services/ Allied Health/ Health Sciences, General	2	11	
	Kidney Dialysis Centers	98									Health/ Medical Physics	1	2	
	Freestanding Ambulatory Surgical and Emergency Centers	249									Health Unit Coordinator/ Ward Clerk	3	28	
	All Other Outpatient Care Centers	79									Licensed Practical/ Vocational Nurse Training	16	3832	
	Medical Laboratories	29									Medical Radiologic Technology/ Science v Radiation Therapist	11	160	
	Diagnostic Imaging Centers	27									Medical Administrative/ Executive Assistant and Medical Secretary	12	450	
	Home Health Care Services	388									Medical/ Clinical Assistant	7	180	
	General Medical and Surgical Hospitals	831									Nuclear Medical Technology/ Technologist	2	16	
	Psychiatric and Substance Abuse Hospitals	58									Nursing Assistant/ Aide and Patient Care Assistant/ Aide	2	38	
	Specialty (except Psychiatric and Substance Abuse) Hospitals	108									Occupational Therapist Assistant	2	38	

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Complete Data – 3rd Quarter 2010, KDE

Appendix B : High Wage, High Demand Jobs Compared to State, Local, and Community College Course Offerings

Economic Sector	High-Wage, High Demand Jobs within Sector	Annual Jobs	Total Jobs	Cluster	State Program Offer	12-13 Graduates-State	Local Program Offer	12-13 Graduates-Local	Cluster Total	Gap* +/ -	CC Program Offer	# of CC Program Offer	CC Grads	CC Cluster Total
Health Care/ Social Assistance	Ambulance Services	4									Pharmacy Technician/ Assistant	5	82	
	Nursing Care Facilities	650									Physical Therapist Assistant	6	94	
	Other Residential Care Facilities	7									Registered Nursing/ Registered Nurse	15	916	
											Respiratory Care Therapy/ Therapist	10	157	
											Surgical Technology/ Technologist	11	145	
Energy Creation/ Transmission	Oil and Gas Pipeline and Related Structures Construction	39	42	Agriculture and Natural Resources	None	0	Env Science/ Natural Resources Sys	19	19	(23)	Mining Technology/ Technician	2	14	28
	Pipeline Transportation of Refined Petroleum Products	3								-	Petroleum Technology/ Technician	1	14	
	Electric Power Generation	3	4	Science, Technology, Engineering and Mathematics	None	0	Electronics Technology	15	15	11	Energy Management and Systems Technology/ Technician	3	56	56
	Electric Bulk Power Transmission and Control	1								+				

Source: Kentucky's Targeted Industry Sectors May 2011, EMSI Complete Data – 3rd Quarter 2010, KDE

Appendix C

Employment Gaps Statewide and Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs

Economic Sector	Annual Projected Job Opportunities/ No. of Graduates 2013	Recommended Actions
Automobile and Aircraft Manufacturing	455 annual job openings 2,039 tech center graduates 319 community college graduates	• Establish a state manufacturing task force that will study existing technical center manufacturing programs, the quality of student assignments and work in those programs and the adequacy of their facilities and technology. The task force will make recommendations for redesigning and repurposing existing programs or adopting new ones. • Prioritize the implementation of the *Advanced Career – Creating the Future: Design and Production of Tomorrow's Products*[1] manufacturing curriculum currently being developed by SREB, the state of Kentucky and Kentucky manufacturers, as applicable in different economic regions of the state. http://www.sreb.org/page/1608/Advanced_Career.html • Create an optional career pathway program of study using the Advanced Career manufacturing curriculum that provides a non-duplicative sequence of technical and college-ready academic courses offered across the technical center, the home high school, the local community college and leads to further education (including industry certifications, associate's degrees or higher), work-based learning at industry sites, and good jobs in the industry.
Transportation, Distribution and Logistics	1,401 annual job openings 903 tech center graduates 578 community college graduates	• Establish a state Transportation, Distribution and Logistics task force to address improving existing programs and developing new programs as needed in the transportation, distribution and logistics sector. • Determine and track annually the number of program graduates who acquire transportation sector-related industry certifications, including the number who acquired a single certificate versus a more complete set of certifications. • Develop an optional career pathway program of study in this sector that unites the technical centers, community colleges and industry in preparing graduates to acquire a comprehensive set of transportation-related credentials. Make work-based learning a critical feature of these programs at both the secondary and postsecondary levels. • Determine whether additional career pathway programs of study are needed to address employment opportunities in distribution and logistics. • Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey in a region of Kentucky with a high need for such a program. http://www.sreb.org/page/1608/Advanced_Career.html

[1] Advanced Career (AC) is SREB's new approach to career and technical education (CTE) designed to prepare students for more college and career options after high school. It is being developed by High Schools That Work (HSTW) in partnership with states and industry partners. AC represents a new way to strengthen the caliber of education in comprehensive high schools or technical centers. AC programs are open to all high school students, not just one segment of students. Each AC pathway consists of four courses that emphasize state standards for college preparation.

Economic Sector	Annual Projected Job Opportunities/ No. of Graduates 2013	Recommended Actions
Business Services and R&D Business and Administration	1,075 annual job openings 931 tech center graduates 1,073 community college graduates	• Establish a state Business Services task force that will develop optional career pathway programs of study in this area.
Business Services and R&D Finance	350 annual job openings 139 tech center graduates 0 community college graduates	• Convene, under the Business Services task force, a panel on the Banking, Finance and Insurance industry. Charge this panel with inventorying current career pathway offerings in this area at the comprehensive high schools and determining their strengths and weaknesses. • Study the need to establish new or improve existing career pathway programs of study in the Financial Services sector. • Investigate whether to adopt the National Academy Foundation's Academy of Finance in strategic regions of the state, either in comprehensive high schools or in technical centers, and develop companion two-year programs at the community colleges. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Business Services and R&D IT	751 annual job openings 461 tech center graduates 328 community college graduates	• Convene a state IT task force that will examine existing offerings at the technical centers and community colleges and identify whether their programs meet emerging industry needs. • Consider expanding career pathway programs that prepare students in computer programming and computer systems design. As part of a pathway leading to college degrees and high-paying jobs in the IT field, such programs should include Advanced Placement (AP) Computer Science in high school, dual credit or dual enrollment at local community colleges and work-based learning opportunities with industry. • Consider implementing the *Advanced Career: Informatics* curriculum currently being developed by SREB and the state of Kentucky. http://www.sreb.org/page/1608/Advanced_Career.html • Consider implementing the *Advanced Career: Health Informatics* curriculum being developed by SREB and state of Ohio. http://publications.sreb.org/2013/AC_health_Informatics_8_5_13.pdf
Business Services and R&D Marketing	355 annual job openings 171 tech center graduates 0 community college graduates	• Investigate and determine whether there is a need to create a Telemarketing career pathway program of study – 74 annual job openings are projected in this area.

Economic Sector	Annual Projected Job Opportunities/ No. of Graduates 2013	Recommended Actions
Business Services and R&D STEM	1,433 annual job openings 150 tech center graduates 222 community college graduates	• Establish a state STEM task force that will examine current STEM-related offerings not only at the technical centers and community colleges, but also in the comprehensive high schools. This task force could help develop academically and technically rigorous optional career pathway programs of study leading to advanced education and training and STEM careers. • Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf
Healthcare/ Social Assistance	4,182 annual job openings 2,120 tech center graduates 6,814 community college graduates	• Establish a state Health Science task force that would examine current program offerings at the technical centers and community colleges and offer recommendations to identify potential new pathways, strengthen and align existing pathways, and determine whether curriculum and instruction in existing pathways are preparing students for careers in this rapidly changing, technologically advanced industry. • Consider adopting the *Advanced Career: Health Informatics* curriculum, developed by SREB and the state of Ohio, in Kentucky's largest urban areas. http://publications.sreb.org/2013/AC_health_Informatics_8_5_13.pdf • Expand the PLTW Biomedical Sciences curriculum, which prepares students for a range of health science programs at both the community college level and beyond. • Expand the number of students enrolled in high school pre-nursing career pathway programs of study. These programs should provide a strong foundation in science and math, offer opportunities to earn dual credit, and emphasize the problem-solving and critical thinking skills needed for success in postsecondary practical nursing and registered nursing programs. • Develop a pathway to prepare students for the clinical medical laboratory technician program offered by local community colleges.
Energy Creation/ Transmission	46 annual job openings 34 tech center graduates 84 community college graduates	• Establish a state Energy task force to examine current technical center program offerings and consider what a career pathway program of study spanning secondary and postsecondary studies in this sector might look like. • Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina at one or more technical centers. http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf • Consider adopting the *Advanced Career: Energy and Power* curriculum developed by SREB and the state of West Virginia at one or more technical centers. http://publications.sreb.org/2013/AC_energy_power_4Pager_11_14_13.pdf

Appendix D

Employment Gaps by Economic Regions and Proposed New Career Pathway Programs of Study or the Redesign, Repurposing and Expansion of Existing Programs

Appendix D: Employment Gaps by Economic Regions and Proposed New Programs and Redesign, Repurposing, and Expansion of Existing Programs

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
Barren River			
Energy	Projected:84 job openings annually in the energy sector/ 0 graduates in 2013/ 0 from community colleges	No current programs.	• Convene an industry panel to determine whether an energy career pathway is needed in this region. • Consider adopting the *Advanced Career: Clean Energy Technology*[1] curriculum developed by SREB and the state of South Carolina. See http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Banking, Finance and Insurance	Projected: 84 annual job openings/ 5 graduates in 2013	Three programs.	• Investigate whether to adopt the National Academy Foundation's Academy of Finance in strategic locations. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Manufacturing	Projected: 350 annual openings/190 graduates from state and local technical centers/32 from community colleges	Currently do not have enough offerings to address 21st-century manufacturing requirements.	• Establish a regional industry panel to review the appropriateness of current program offerings in the manufacturing sector. Determine if programs need to be redesigned or repurposed, and map out a more comprehensive set of pathways aligned to the needs of industry. • Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Bluegrass			
Manufacturing	Annual projected job openings: 1,022 / 2013 graduates: 261 from high school technical centers; 60 from community colleges	Current offerings at the technical centers and community colleges are completely inadequate to meet current and growing needs in the manufacturing industry; there are only 4 programs at the technical centers in the region and these focus on single skills of welding and computerized manufacturing; 1 program focuses on the broad area of industrial maintenance. Three programs are available at	• Establish a regional industry panel to review the appropriateness of current program offerings in the manufacturing sector. Determine if programs need to be redesigned or repurposed, and map out a more comprehensive set of pathways aligned to the needs of industry. • Increase the number of students pursuing manufacturing in this region by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html

[1] Advanced Career (AC) is SREB's new approach to career and technical education (CTE) designed to prepare students for more college and career options after high school. It is being developed by High Schools That Work (HSTW) in partnership with states and industry partners. AC represents a new way to strengthen the caliber of education in comprehensive high schools or technical centers. AC programs are open to all high school students, not just one segment of students. Each AC pathway consists of four courses that emphasize state standards for college preparation.

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
		community college – 2 CAD; 1 Advanced Manufacturing	
Health Care	542 annual openings / 398 graduates from area technical centers; 860 graduates from community colleges	High school technical centers offer 3 different programs with the largest enrollment being in pre-nursing science; number of graduates in health science is 136; pre-nursing is 170. Community colleges offer a full range of offerings in the health care sector with 860 graduates; 523 in practical nursing; 104 in registered nursing programs. No program offerings at the technical centers prepare students to work in offices in a range of medical facilities; one program is offered at the community college with 64 completers. Annual projection is for 351 persons needed to fill annual vacancies.	• Expand the PLTW Biomedical Sciences curriculum in the technical centers. This program prepares students for a range of health science programs at both the community college level and beyond. • Conduct an audit to determine if health and pre-nursing students are taking the right sequence of science and math courses, including AP science courses, to ensure that they are not only ready to pass the industry certification but have the academic credentials needed to pursue advanced training in the health care field. • Convene an industry panel to develop the framework for a career pathway spanning secondary and postsecondary education for office support positions in the broad health care industry. • Consider adopting the *Advanced Career: Health Informatics* curriculum, developed by SREB and the state of Ohio. http://publications.sreb.org/2013/AC_health_Informatics_8_5_13.pdf
Energy and Natural Resource Extraction	Projected: 38 jobs annually; 15 graduates from technical centers; 0 from community colleges. No jobs are projected to work in the Clean or Renewable Energy sector.	At present, only the local technical centers provide graduates (15 from electronics technology).	• Consider adopting the *Advanced Career: Energy and Power* curriculum developed by SREB and the state of West Virginia. http://publications.sreb.org/2013/AC_energy_power_4Pager_11_14_13.pdf • Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. See http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Transportation, Distribution and Logistics	Projected: 60 annual job openings /152 graduates from technical centers; 27 graduates from community colleges.	All of the current offerings deal with the repair of automotive, diesel, auto-body. No program exists dealing with the broader set of skills needed for the transportation industry, including logistics and other specialized work.	• Determine the number of graduates from both the technical centers and the community colleges who acquire industry certifications in this area, including the number who acquire only a single skill certificate, not a complete set of certificates, compared to the number who acquire a complete set of certificates. • Formalize career pathways linking the technical centers, the community colleges and work-based training in industry settings to increase the number of graduates who earn a comprehensive set of credentials in this area. • Convene an industry panel to study other broad training needs in the

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
			area of transportation, distribution and logistics and determine whether career pathway programs spanning secondary and postsecondary education are needed. • Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	Projected annual opening of 326 jobs / 10 graduates	One program in accounting; no other programs at technical centers and none at the community college to prepare persons for the banking, finance, insurance and real estate industries.	• Convene a banking, finance and insurance panel to study the need for establishing career pathway programs spanning secondary and postsecondary education. • Investigate whether to adopt the National Academy Foundation's Academy of Finance in strategic locations in the region, including comprehensive high schools or technical centers, and develop a companion two-year program at the community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Business Support Services	Projected: 173 openings / 367 graduates from technical centers; 103 graduates from community colleges	Offerings are adequate to provide administrative support, computer-related services for administrative management, business technology and information support and services; programs to develop computer programmers and computer system design services appear to be weak or non-existent.	• Consider developing a career pathway to prepare individuals in computer programming and computer systems design. This may include AP Computer Science in high school and an associate's degree and options for further training and study in partnership with industry. • Consider adopting the *Advanced Career: Informatics* curriculum currently being developed by SREB and the state of Kentucky. http://www.sreb.org/page/1608/Advanced_Career.html
STEM	Annual projected job openings: 233/ 24 technical center graduates; 51 from community colleges.	Existing programs in technical centers include Principles of Technology and PLTW Pre-Engineering; two programs at the community colleges: Engineering Technology and Environmental Engineering Technology/Environmental Technology.	• The Bluegrass region features four-year universities and high-tech industries. At least 20% of the jobs in this region require STEM-like skills(e.g., four-year degrees, associate's degrees or other special training). • Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf. • Convene a special industry/higher education panel to examine the need to create a STEM pathway spanning secondary and postsecondary education.
Cumberlands			
Energy and Natural Resource Extraction	Projected: 46 annual job openings with 34 of these in crude petroleum and natural gas extraction/ 3	At present, only the local technical centers provide graduates (3 from environmental science/natural resources).	• Convene a panel from the petroleum and natural resource extraction industry to determine whether there is a need to develop an energy pathway curriculum spanning secondary and postsecondary education. • Consider adopting the *Advanced Career: Clean Energy Technology*

Appendix D: Employment Gaps by Economic Regions and Proposed New Programs and Redesign, Repurposing, and Expansion of Existing Programs

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
	graduates from technical centers and no graduates from community college		curriculum developed by SREB and the state of South Carolina. See http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing	Annual projected job opportunities: 57/ 278 graduates from technical centers and 15 graduates from community college	128 of graduates were in welding manufacturing; 21 were in computerized manufacturing and machining; 10 were in industrial maintenance technician. There are no programs that prepare students broadly for work in the manufacturing industry.	• Convene an industry panel to determine whether the region offers the right mix of programs to attract and grow new manufacturing industries. • Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution and Logistics	Projected annual openings: 19 / 99 technical center graduates; 69 community college graduates	No additional programs are needed.	
Banking, Finance and Insurance	Annual Projected job opportunities: 65 / 7 graduates from technical centers; no graduates from community colleges	One active program in accounting and finance with 7 graduates.	• Convene a banking, finance and insurance committee to study the need for establishing career pathway programs spanning secondary and postsecondary education. • Investigate whether to adopt the National Academy Foundation's Academy of Finance in strategic locations in the region, including comprehensive high schools or technical centers, and develop a companion two-year program at the community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Professional Services	Annual projected openings: 211/ 29 from the STEM sector, 161 from the computer IT field, 17 from administrative management support, and 4 from marketing. At the high school level, 14 graduates from the IT area, 0 from STEM; at the community college level, 11 from STEM and 36 from computer and	Information Technology is the only program offered at the technical centers; 0 programs offered in STEM; 0 offered in administrative support. Computer and Information Technology is offered at the community college, as is a general engineering technology program.	• There is a great need to offer programs with a STEM focus in this region and to address growing gaps in IT. • Convene a panel comprised of industry and postsecondary representatives to examine the development of IT pathway(s) spanning secondary and postsecondary education, including Computer System Design Service and Computer Facility Management Service. There may be courses in these pathway(s) that can serve a dual purpose. • Convene a panel to examine the creation of a STEM pathway spanning secondary and postsecondary education that offers multiple exit and re-entry points. • Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas, combined with appropriate AP courses in mathematics and science. http://publications.sreb.org/2013/AC_science_technology_4pager_11

Appendix D: Employment Gaps by Economic Regions and Proposed New Programs and Redesign, Repurposing, and Expansion of Existing Programs

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
	information science		_14_13.pdf.
EKCEP			
Energy and Natural Resource Extraction	Projected: 341 jobs annually; 208 in natural gas extraction; 92 in bituminous coal and lignite surface mining	No current programs.	• Convene a panel from the petroleum and natural gas extraction industry to determine current industry workforce needs and establish a career pathway spanning secondary and postsecondary education. • Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. See http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing	Projected: 50 annual openings / 321 graduates from area technical centers; 21 graduates from community colleges	Current offerings: Industrial Maintenance and Welding with 127 graduates from technical centers and 2 programs at the community college with a total of 21 graduates	• Convene an industry panel to determine whether current program offerings are adequate and whether what students are being taught suits the needs of the industry.
Transportation, Distribution and Logistics	Projected: 36 jobs annually /19 of these in courier and express delivery service	Three current programs at technology centers: automotive technology with 102 graduates; one auto collision repair with 28 graduates; diesel tech with 32 graduates. There are three programs at community colleges that produced 89 graduates.	• Convene an industry panel to determine whether current offerings are adequate, whether students are being taught the skills they need and whether additional career pathway(s) spanning secondary and postsecondary education are needed in this area. • Determine how many students are receiving only one versus a set of specialized certifications in these fields.
Banking, Finance and Insurance	Projected: 76 annual job openings / 6 graduates from accounting; none from the community college	No formal career pathway programs to prepare people for the banking, finance and insurance industry.	• Convene a banking, finance and insurance committee to study the need for establishing career pathway programs spanning secondary and postsecondary education. • Investigate whether to adopt the National Academy Foundation's Academy of Finance in strategic locations in the region, including comprehensive high schools or technical centers, and develop a companion two-year program at the community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Professional Services/ Administrative Support/ IT/ STEM	Projected annual openings: 128 / 312 graduates from technical centers; 120 from community colleges	Offerings exceed employment demands; however, it is suspected that many of these graduates are taking jobs outside the region.	• Consider convening a broad industry panel in the area of professional services/IT/STEM to examine whether existing programs address the industry needs, whether students are begin taught the skills needed to adapt to the requirements of the current workplace, and whether students are acquiring the appropriate certifications. • Charge the panel with considering how to strengthen career pathway programs spanning secondary and postsecondary education and create structures and placement services that can help graduates find

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
			employment within and outside the region.
Greater Louisville/ Lincoln Trail			
Energy	Projected: 38 job opportunities annually/ 2 graduates from the technical centers	No current programs.	• Consider whether there is sufficient need to adopt two Advanced Career curriculum pathways: (1) the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina (see http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf) and (2) the *Advanced Career: Energy and Power* curriculum developed by SREB and the state of West Virginia (see http://publications.sreb.org/2013/AC_energy_power_4Pager_11_14_13.pdf).
Manufacturing	Projected: 661 annual openings / 253 graduates from technical centers; 84 from community colleges	Technical center programs consist of two Welding/Manufacturing curricula: Computerized Manufacturing and Machining and Machine Tool Technology. The community colleges offer Advanced Manufacturing: 66 graduates; Drafting Design and Technology General: 16 graduates. *Note*: There appears to be a huge gap between the number of jobs available and known formal career pathways in the technology centers and community colleges leading to employment in this field. SREB questions whether this is the true extent of manufacturing offerings in this region. There must have been a gap in the data SREB received. There was not sufficient time or resources to investigate this issue.	• Convene an industry panel to determine current industry needs for single-skill specialized training versus more broad-based training in manufacturing (e.g., learning more specialized skills through advanced training opportunities on the job, apprenticeships or customized short-term programs at the community college). • If the data SREB received are accurate (see *Note* at left), immediate attention must be paid to the creation of pathways spanning secondary and postsecondary education that are designed to prepare students to go into the workforce in the Advanced Manufacturing sector emerging in the greater Louisville area and throughout Kentucky. • Due to the diversity of manufacturing industries in the Greater Louisville/Lincoln Trail area, it is recommended that consideration be given to the adoption of the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution, and Logistics	Projected: 311 jobs annually / 137 from the technology centers and 191 from the community colleges	Current programs are designed to prepare students for maintenance of vehicles (e.g., air, automotive, trucks or diesel). No programs exist that prepare students to go into the	• Convene a transportation, distribution and logistics panel to determine the percentage of graduates who acquire a comprehensive set of certifications for the repair of transportation equipment and vehicles compared to the percentage who require only specialized certification in one or more aspects of service repair to vehicles. • Charge the panel with examining the need to prepare graduates with a

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
		warehousing, storage and distribution area or address the administration and logistics services needed in the transportation industry. There are no programs to prepare truck drivers for long and short-distance hauling.	broad set of skills in the field of transportation, distribution and logistics, including warehouse management, and determine whether there is a need to develop an optional career pathway in this area. • Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	Projected: 762 annual openings/ 33 graduates from technical centers; 0 from community colleges *Note*: SREB does not believe that these are accurate data; there must be more programs being offered in comprehensive high schools, full-time technical high schools and community colleges than reflected in the data SREB received. Time did not allow for follow-up research on this issue.	Only one current program in finance exists that produces 33 graduates from the technical center.	• Convene an advisory committee composed of persons from the banking, finance and insurance industries to examine and assess programs currently available in high schools, technical centers and community colleges. Identify whether gaps exist between what these programs teach and the skills needed in available jobs. • Consider adopting the National Academy Foundation's Academy of Finance in one or more technical centers or one or more comprehensive high schools: http://naf. org/files/page/2009/06/AOF_OneSheet. pdf • Consider adopting Course One from the *Advanced Career: Project Management* curriculum currently being developed by SREB and the state of North Carolina. http://www.sreb.org/page/1608/Advanced_Career.html • Consider implementing the *Advanced Career: Informatics* curriculum currently being developed by SREB and the state of Kentucky, modifying the curriculum to apply informatics skills as needed in the banking, finance, and insurance industry. http://www.sreb.org/page/1608/Advanced_Career.html
Green River			
Energy Sector	235 jobs annually: 180 in the Crude Petroleum and Natural Gas Extraction sector; 22 in Natural Gas distribution / 0 graduates from area technical centers; 0 graduates from community colleges	No current programs at either the technical centers or at community colleges.	• Convene a regional industry panel to determine whether there is a need to develop a special career pathway to prepare students for the crude petroleum and natural gas extraction industry. • Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. See http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Manufacturing	Projected: 241 annual job openings / 129 graduates from technical schools and 15 from community	Program offerings at technical centers are limited to welding, machine tool technology, industrial maintenance and	• Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based

Appendix D: Employment Gaps by Economic Regions and Proposed New Programs and Redesign, Repurposing, and Expansion of Existing Programs

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
	college	computerized manufacturing and machining and welding. There is one program each in these five areas. There are no broad-based manufacturing programs that prepare students to handle a range of automated technologies or receive the multi-skilled training needed to prepare for a career in modern advanced manufacturing.	learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html • Convene an industry panel to examine whether existing specialized programs should remain as essentially single-skill programs, or if some need to be redesigned to prepare graduates with a broader range of technologies and skills for jobs in the industry. Charge the panel with examining the quality of current instruction and the mix of academic, technical, technological, 21st-century and cognitive skills that students learn and demonstrate through these programs.
Transportation, Distribution and Logistics	Projected: 54 annual openings / 21 graduates from the technical centers and 7 from the community colleges	All current programs deal with the repair of transportation vehicles both at the high school and community college level. No curriculum exists to prepare students with the broader range of skills needed in the area of transportation of goods and services, warehousing, storing, retrieving, preserving, etc.	• Convene an industry panel to assess the need to develop career pathway program(s) that will prepare graduates with a broad understanding of the many roles, functions and skills needed to work in the area of transportation, distribution and logistics. • Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	Projected: 104 annual job openings / 24 graduates from technical centers; 0 from community colleges	Current programs are limited to one in financial studies. There appears to be no formalized career pathway in banking, finance and insurance to prepare students broadly for this industry with the range of technology skills and academic, literacy and math skills needed to enter and advance in a career.	• Convene a banking, finance and insurance panel to explore the need to develop a formal career pathway in this area. Determine if local high schools are offering such curricula and if so, whether these program(s) are adequate to meet student and industry needs. • Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf. org/files/page/2009/06/AOF_OneSheet. pdf
Professional Services/ Information Technology/ Marketing/ STEM	Projected: 225 annual openings / 42 graduates from technical centers and 160 from community colleges	Formal program to prepare students for administrative management and support from the technical schools – two programs at the community colleges in business administration and management and executive assistant and executive secretary –	• Investigate and determine whether there is a need to create a Telemarketing career pathway program of study – 74 annual job openings are projected in this area.

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
		together produces 95 graduates; which would meet the 73 annual openings in this area. IT offerings consist of four technical center programs that produce 21 graduates; computer and information programs at the community college produce 38 graduates. These numbers seem adequate to address annual job openings. Telemarketing has 85 annual openings with 74 being in telemarketing bureaus and other contact centers; there are 18 graduates in this area. In the STEM area, there are projected to be 33 annual openings, with 27 graduates in engineering technology at the community college.	
Northern Kentucky			
Manufacturing	978 jobs annually, with 175 in the food manufacturing industry / 180 graduates from technical centers; 9 from community colleges	Offerings at the technical centers are limited to an industrial maintenance program. Advanced manufacturing is offered at the community college. Northern Kentucky has an excess of manufacturers and manufacturing job openings but no formalized career pathway system to introduce students to these industries or jobs.	• The gap between projected annual openings in manufacturing and the number of students in pathways being prepared to enter manufacturing should be addressed as this region's top priority. • Convene an industry panel made up of a cross-section of manufacturers that will examine current institutional capacity to address their workforce needs. SREB did not receive data that would allow it to determine the number of regional high schools offering the Project Lead the Way engineering curriculum, which many industry leaders have endorsed. Additional research and study is needed in this area. • Further, the industry panel should consider advocating for the adoption of the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, which blends the curriculum with work-based learning and further education and training at the local community college. Many of the projects designed for this curriculum would also have application in food manufacturing.

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
			http://www.sreb.org/page/1608/Advanced_Career.html • Consider adopting the *Advanced Career: Automated Joining Materials* curriculum currently being developed by SREB and the state of Ohio. The first two courses of this pathway should be available in the fall of 2015. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution and Logistics	Projected: 553 jobs annually / 102 graduates from technical centers; 79 from community colleges	Current offerings in this sector are limited to the repair of transportation vehicles (e.g., personal automobiles and other types of vehicles). There are no existing programs that prepare students broadly for the transportation, distribution and logistics industry, including preparing truck drivers for short- and long-distance runs.	• Convene an industry panel to analyze the effectiveness of existing programs that prepare students who hold comprehensive industry or specialized certifications to work only on parts of a vehicle. Charge the panel with determining the number of such graduates who actually enter the field. • Charge the panel with determining the need for a general transportation pathway that focuses on logistics and other skills. • Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Banking, Finance and Insurance	Projected: 1,219 annual job openings / 0 graduates from technical centers; 0 from the community colleges.	No current programs are offered either by the technical centers or the community colleges on which SREB received data.	• Convene an industry panel to examine industry needs and determine which career pathways related to banking, finance and insurance are most needed in the region. • Consider adopting the National Academy Foundation's Academy of Finance in strategic regional locations, and developing a companion two-year program at the local community college. http://naf.org/files/page/2009/06/AOF_OneSheet. pdf • Consider adopting Course One from the *Advanced Career: Project Management* curriculum currently being developed by SREB and the state of North Carolina. http://www.sreb.org/page/1608/Advanced_Career.html • *Note*: Many of these programs may be covered in current high school offerings as beginning pathways; however, it is too often the case that the old business curriculum does not address some industry needs. Within the scope of this study, it was not possible to look at offerings in comprehensive high schools. However, the large number of openings in this area and comparative scarcity of programs addressing them strongly suggests that there may be gaps in the database that SREB received. This issue must be further researched.
Recreation	Projected: 80 annual job openings / 0 graduates from technical centers	The following programs exist – Hospitality Services and Sports Marketing – but there is no record of graduates from these programs	• Consider adopting the National Academy Foundation's Academy of Hospitality & Tourism in one or more of the comprehensive high schools or technical centers in this region. See http://naf.org/files/page/2009/06/AOHT_OneSheet.pdf

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
		at technical centers or community colleges.	
TENCO			
Manufacturing	Projected: 105 jobs annually / 168 graduates from technical centers; 46 graduates from community colleges	At the technical centers, current programs are limited to Welding. SREB identified a need for a broader-based curriculum to prepare students for the emerging range of manufacturing jobs available in this region.	• Convene an industry panel to determine whether welding should stand alone as a specialized specific training program or whether a more general manufacturing pathway would provide graduates with greater adaptability to industry needs in this region. • Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Transportation, Distribution and Logistics	Projected: 12 jobs annually / 54 graduates at the technical centers and 58 at the community colleges	Current offerings in this sector are limited to the repair of transportation vehicles (e.g., personal automobiles and other types of vehicles) at both the technical centers and community colleges. *Note*: This region may have too much capacity in producing graduates to repair transportation vehicles; some of that capacity may need to be shifted to new areas. There are no existing programs that prepare students broadly for the transportation, distribution and logistics industry, including preparing truck drivers for short- and long-distance runs.	• Conduct a study to determine the percentage of graduates who earn comprehensive credentials to work on all parts of vehicles compared to the percentage who earn a more narrow set of specialized credentials. The region should strive to increase the number of students who earn more comprehensive sets of credentials; this will require a more tightly aligned system of career pathways between secondary and postsecondary education.
Banking, Finance and Insurance	Projected: 49 annual job openings/24 graduates from technical centers	Three programs limited to Accounting and Finance.	• No recommendations
Professional Services	Projected: 4 annual job openings/ 124 graduates from technical centers, 159 from the community	Job availabilities should be reviewed, as there are 0 jobs available in IT but 53 graduates from technical centers and 25	• Examine the number of students earning highly-valued certificates from current offerings under professional services; the number of students going into these fields for continued learning or advanced training; the number of graduates who are earning both the academic readiness and

Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
	college	graduates from community colleges.	technical readiness. Take steps to close any gaps.
STEM	Projected: 24 annual openings / 25 graduates from technical centers; 18 from community college	Local technical centers offer Engineering and PLTW Engineering and Technology; the community college offers a general engineering technology program.	• Consider adopting the *Advanced Career: Innovations in Science and Technology* curriculum being developed by SREB and the state of Arkansas, including AP courses in math and science. http://publications.sreb.org/2013/AC_science_technology_4pager_11_14_13.pdf.
Western Kentucky			
Agriculture and Food Production	Projected: 36 jobs annually/ 22 graduates from technical centers; 0 graduates from community college.	Current programs include Agribusiness, Animal Systems, Agri-biotechnology and Ag Power Structure	• No recommendations
Energy	Projected: 111 annual job openings/4 graduates from technical centers; 21 from community colleges	Current programs include Environmental Science/Natural Resources at the technical centers; Mining Technology/Technician and Petroleum Technology/Technician at the community college.	• Convene an energy task force to examine whether additional programs are needed in this sector. • Consider adopting the *Advanced Career: Clean Energy Technology* curriculum developed by SREB and the state of South Carolina. See http://publications.sreb.org/2013/AC_clean_energy_4pager_11_14_13.pdf
Transportation, Distribution and Logistics	Projected: 90 annual job openings/ 83 graduates from technical centers; 42 graduates from community colleges	All current programs at the technical centers deal with the repair of transportation vehicles; all programs at the community colleges deal with the same, with the exception of one offering bus and truck driver training.	• Convene a regional task force to examine the need to create a broad-based career pathway curriculum that would prepare graduates to work in the field of transportation, distribution and logistics. • Charge the task force with examining the number of graduates from existing transportation repair programs at the technical centers and the community colleges in order to determine the number of graduates who earn a complete set of credentials compared to those who earn only certain credential components. • Charge the task force with examining how many graduates actually go to work in the field in order to determine whether the region has an oversupply of persons being prepared to repair vehicles and an undersupply of persons prepared to work in other areas of the transportation, distribution and logistics sector. • Consider adopting the *Advanced Career: Global Logistics and Entrepreneurship* curriculum being developed by SREB and the state of New Jersey. http://www.sreb.org/page/1608/Advanced_Career.html
Manufacturing	Projected: 131 annual job openings / 251 graduates from technical centers; 54 from the community	All current offerings are specialized skills; none prepare students for the mix of academic, technical, 21st-century and	• Convene an industry task force to inventory existing programs and determine whether there is a need to redevelop some existing programs in the technical centers and community colleges to include a broad-based, multi-skilled curriculum designed to prepare students for

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Region/ Economic Sector	Annual Projected Job Opportunities/ No. of Graduates in 2013	Alignment of CT Program with Job Requirements and Opportunities	Recommended Actions
	college	cognitive skills needed in advanced manufacturing.	advanced manufacturing jobs. • Increase the number of students pursuing manufacturing by adopting the Advanced Career Manufacturing pathway developed by SREB and Kentucky entitled, *Creating the Future: Design and Production of Tomorrow's Products*, blending the curriculum with work-based learning and further education and training at the local community college. http://www.sreb.org/page/1608/Advanced_Career.html
Health Care	Projected: 35 jobs annually / 218 graduates from technical centers; 1,560 from community colleges	Current high school programs deal with health science and pre-nursing. Community college programs include 16 specialties with 872 persons earning a licensed vocational practical nursing certificate, and 257 earning a registered nursing certificate.	• Convene an industry panel to examine the quality of existing programs, the number of students earning licensures in those programs and the number of graduates entering the field or continuing further study. Based on this study, this panel should formulate recommendations for redesigning or repurposing programs as needed.

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