College and Career Ready Self-Assessment Tool for Virginia Career and Technical Education Programs

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Summary

School districts across the country are working to better prepare students for college and careers before they leave high school. These efforts are driven by changing workforce expectations and needs, and widening income disparities between college graduates and high school graduates. For example, experts estimate that by 2018, 63 percent of all new jobs in the United States and 64 percent in Virginia will require at least some postsecondary education and training, and that employers nationally will need 22 million new workers with postsecondary degrees (Carnevale, Smith, & Strohl, 2010).

At current rates of degree attainment, however, there won't be enough college graduates to meet that need (Carnevale, Smith, & Strohl, 2010). Far too many students still graduate from high school unprepared for the transition to postsecondary education and training, or lack the knowledge and skills they need to compete and succeed in the workplace.

CTE programs

Career and technical education (CTE) programs have a history of helping students gain the valuable knowledge, skills, abilities, and dispositions that prepare them for a career (Bishop & Mane, 2003) and help them apply course content to real-world situations (Shumer, Stringfield, Stipanovic, & Murphy, 2011). This includes incorporating traditional academics into more applied programs. By doing so, CTE programs help schools assure graduates of having more choices after high school than they might otherwise, while supporting employers' demand for a more skilled workforce.

It is important to develop and sustain high school programs—including CTE programs—capable of helping students graduate from high school prepared for college and careers. The Virginia Department of Education's (VDOE's) Office of Career and Technical Education supports CTE programs in Virginia public schools, serving more than 550,000 students in grades 6 through 12.

Program self-assessment

The Office of Career and Technical Education, in partnership with CNA, has developed a tool that lets local CTE program leaders assess how well their programs provide students with access to the content, experiences, and supports they need to become college and career ready. This tool is the **College and Career Ready Self-Assessment Tool for Career and Technical Education Programs**.

The Self-Assessment Tool guides division- and school-level CTE program leaders through a **self-directed, structured, evidence-gathering and evaluation process**. Its purpose is to determine how well CTE programs incorporate the **practices** and **content** students need in order to graduate from high school prepared to enter credit-bearing courses in college or career training programs, or to begin careers. By collecting evidence and completing the tool's worksheets, leaders can identify their program's strengths and gaps and develop action plans that facilitate a cycle of continuous improvement.

As part of the tool, one section provides an accompanying list of resources that offer both additional insight on the topic of CTE programming and examples of states or districts working towards strong CTE programs of their own.

Caveat

This self-assessment tool is intended as a *starting point* for determining whether a program is effective at preparing students for college and careers.

A more comprehensive program evaluation would require more detail about how each element of the CTE program is implemented, as well as information about the causal connections between students' participation in the program and long-term outcomes.

The College and Career Ready Self-Assessment Tool for CTE Programs

This College and Career Ready Self-Assessment Tool for CTE Programs provides a means to help CTE program leaders[1] assess how well their current program provides students with access to the content, experiences, and supports they need to be prepared for college and careers when they graduate from high school.

The tool relies on a combination of evidence from empirical research studies and best practices gathered from interviews with experts in CTE programming, published policy recommendations, and existing documents that support CTE program improvement. As such, this document represents the best information available at this time.

A self-directed instrument, the tool is designed to guide CTE program leaders through (1) a systematic evidence-gathering process, (2) reflective self-assessment to identify program strengths and gaps, and finally (3) development of short- and long-term action plans to facilitate a cycle of continuous improvement.

As CTE leaders develop and refine their own programs, reviewing what other states or districts working towards the same goals are doing can provide additional insight and examples. The tool is accompanied by a list of resources from across the country that experts pointed to as demonstrating promising practices in the CTE field. Examples include strong academic/workforce partnerships, assessment systems, and approaches to integrating academic and technical content.

Defining college and career readiness

The tool's self-assessment process aims at helping CTE program leaders understand how well their programs incorporate fundamental elements of both *college readiness* and *career readiness*, and to use this information to continuously improve their programs.

The definitions of college readiness and career readiness the tool uses are based on empirical research and expert input.

- ***College readiness*** refers to students having the knowledge and skills needed to succeed in entry-level, credit-bearing courses in workforce training programs and/or in two- or four-year colleges. Research finds that participation in a strong academic high school curriculum and high achievement in those courses is associated with college enrollment, success in credit-bearing college courses, and earning college credentials (e.g., Adelman, 2006; Association for Career and Technical Education, 2010; Berkner &

[1] The primary audience for this document is individuals who develop, continuously improve, and ensure that resources are available to strengthen and sustain CTE programs in Virginia's school divisions.

Chavez, 1997; Career Readiness Partner Council, 2012; Holian & Mokher, 2011; Jonas et al., 2012; McCormick, 1999).

- ***Career readiness*** means having developed the knowledge, skills, abilities, and dispositions needed for upward movement within an industry or field, including acquiring the academic, industry-specific, and critical-thinking skills needed to be successful; being able to apply these skills to solve problems; and developing a commitment to lifelong learning (Association for Career and Technical Education, 2010; Career Readiness Partner Council, 2012). As such, career readiness is far more than the skills needed to acquire a basic, entry-level job.

Identifying the fundamental elements of a high-quality CTE program

Research and experts point to a number of promising practices that are effective in supporting a high-quality CTE program. The following four "fundamental elements" synthesize those practices—that is, they identify the building blocks of a high-quality CTE program. They also help define overarching goals that can help guide program development and improvement.

All CTE programs should include these fundamental elements in their programs of study:

1. **Academic, technical, and workplace content.** Providing students with core content throughout their high school career that combines college-preparatory academic content with foundational workplace knowledge and technical skills. These combine into a comprehensive program of study that can be applied to many postsecondary pathways as a student's interests evolve.

2. **Career development.** Providing career development to support students' choices in and beyond their K–12 studies. School counselors often coordinate career development activities. However, it is a shared responsibility to ensure that all students have access to appropriate experts and are guided towards the necessary opportunities to graduate college and career ready. Career development involves mentors, teachers, volunteers, and families to help students understand the academic programs that fit their interests. The career development process should help students become more focused on their career choices as they enter and progress through the secondary grades.

3. **Outcome measures.** Using appropriate outcome measures for the purposes of program improvement, staff professional development, and student growth and achievement.

4. **Partnerships.** Establishing partnerships with postsecondary education, business, and community stakeholders so that their expertise is integrated into the CTE program and they provide learning opportunities for students.

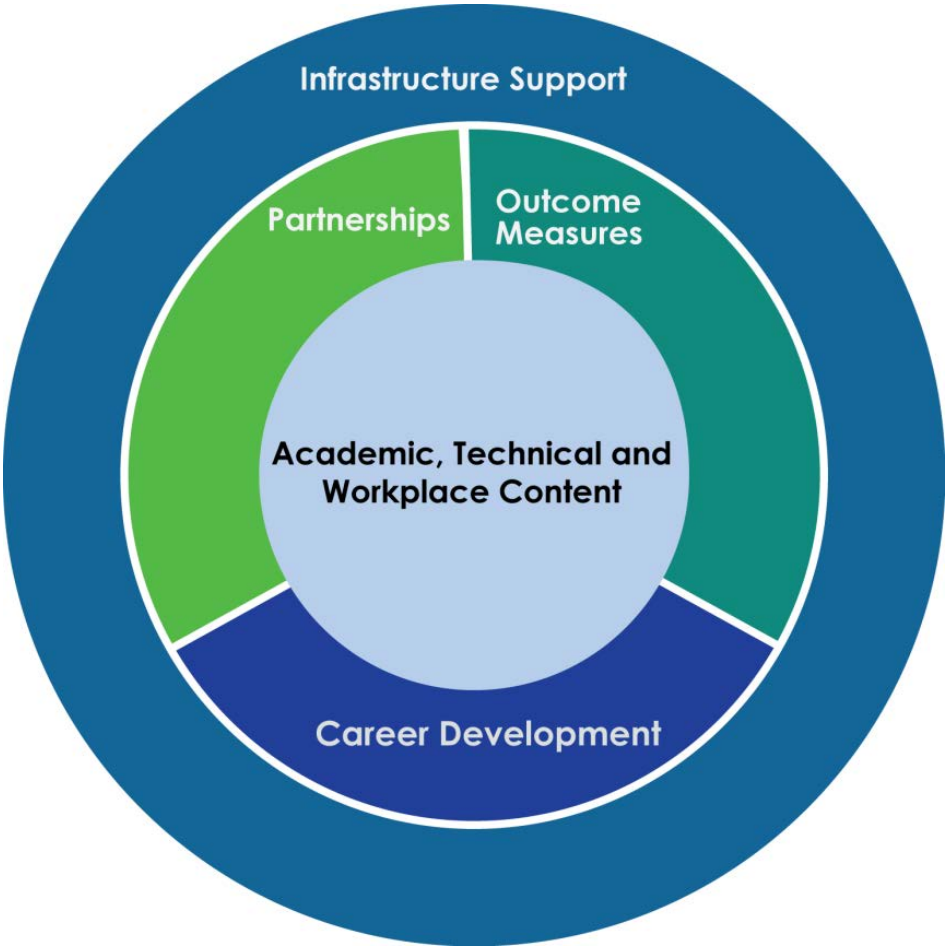
The Self-Assessment Tool itself is organized by these four program elements, and it guides users in determining how well their programs incorporate each element.

The tool also guides users in assessing whether another key factor is present: Consistent and purposeful **infrastructure support**. Infrastructure support is critical to high-quality programs of

study because it ensures that staff remain current in their fields, students and staff have access to needed materials, and facilities are up-to-date.

Figure 1 shows the relationships among these fundamental elements. The core of any CTE program is the content covering academic, technical, and workplace knowledge and skills. Students are supported by CTE programs that include career development, outcome measures, and partnerships. Finally, infrastructure support wraps around the whole program, helping the program sustain itself and continuously improve.

Figure 1. Components of a high-quality college and career ready CTE program



Using the Self-Assessment Tool

This tool helps CTE program leaders look for the fundamental elements of CTE programs that support students in graduating from high school prepared for college and careers. It does this by guiding leaders through a systematic evidence-gathering process to identify program strengths and gaps in providing students with instructional opportunities based on these elements.

Program leaders who complete the tool's self-assessment process come away with the information they need to identify areas for improvement and to support local conversations about improvement. They also can use the information to develop action plans for incorporating any elements of a high-quality CTE program that their program may be missing.

Contents of the tool

The Self-Assessment Tool profiles each of the four fundamental elements of a high-quality CTE program (Content, Career Development, Outcome Measures, Partnerships), including an element-specific set of "guiding questions." An accompanying workbook (Appendix A) contains worksheets to aid users in their evidence collecting and synthesis.

Fundamental elements

Each profile describes the following about that fundamental element:

- **Importance.** Briefly explains the element and why it is important to the success of a CTE program.
- **Promising practices.** Describes the promising practices that CTE programs across the country are using to support students' college and career readiness before graduation.
- **Infrastructure support.** Describes important aspects of support, such as financial and human capital and equipment updates, necessary to build and sustain that element of the CTE program over time.

Guiding questions about promising practices

For each of the fundamental elements, the Self-Assessment Tool provides a table of "guiding questions" for users to consider and answer in order to determine how well their program incorporates that element.

- **Collecting evidence.** The guiding questions ask about each element and the infrastructure supports needed to develop and sustain it. These questions relate to evidence-based and promising practices associated with each element. They are listed at the program, staff, and student levels, all of which are critical to offering a high-quality CTE program.
- **Tailoring the questions.** Users may tailor the self-assessment to their local context by adding questions that are important to them and will become part of their individual process, or eliminating a few that are not relevant.

Workbook

The accompanying Self-Assessment Workbook (Appendix A) contains worksheets to guide users in collecting and synthesizing the evidence required to answer each guiding question.

- **Describing your program of study now.** These worksheets help program leaders compile evidence of each element, assess the program's strengths and gaps in that area, and develop short- and long-term goals for the program to undertake to fill the gaps identified. These worksheets are provided in Appendix A to give users a workbook where they can document relevant information and complete the self-assessment.

Self-assessment is a process

In the first step in the self-assessment, program leaders review information about each of the fundamental elements, including a set of "guiding questions." This step will help identify sources of evidence they will need to review and collect.

Answering the guiding questions may require collecting evidence from a variety of documents, data, and resources. For example, evidence needed to answer the guiding questions may be found in local policy manuals, program descriptions and other program-specific documentation (e.g., curriculum documents, career pathways), program and school- or division-specific strategic plans, joint agreements (e.g., with colleges or business partners), and in databases or published data reports (e.g., student course-taking patterns, assessment results, teacher credentials).

Sometimes reliable data sources needed to answer important questions may not exist. In such cases, leaders must determine whether it is possible to collect new data or sufficiently improve existing data such that they can be included in the self-assessment process at some later point. One possible result of the self-assessment process could be a definitive need to systematically collect reliable data to support certain efforts.

As well, users should keep in mind that this Self-Assessment Tool is intended to facilitate a cycle of continuous improvement. It is not just a checklist of questions to answer. During the process, users might identify additional questions to ask themselves relevant to their specific program, or perhaps choose to focus on particular questions as a priority area.

To gather evidence and complete the self-assessment, program leaders might consider creating a team that includes local CTE staff. (Some partners outside of the school division might also be part of the self-assessment team.)

Once the initial cycle of self-assessment is complete, program and other division leaders should engage with broader stakeholder groups, such as higher education, business, civic organizations, parents, and other community members. As a group they should discuss and reflect on the process and findings, and finalize a first round of improvement plans.

The self-assessment is not intended to be a one-time event. Leaders should set a regular schedule for reflecting on the progress made within the program and re-evaluating improvement plans for the future.

Planning for self-assessment

Schools and divisions should embed the self-assessment process into existing activities to the extent possible. For example, the self-assessment process could become part of division- or school-wide strategic planning, or inform school improvement plans. The specifics of implementation are likely to vary depending on a variety of factors, such as school division size, diversity of CTE programs, and available resources.

For example, larger school divisions with multiple high schools might complete the self-assessment by grouping schools based on locally defined characteristics (e.g., CTE programs offered, student outcomes, geographic region). In that implementation model, central office leadership might facilitate meetings, help gather data, and upon completion, synthesize results across the division. This type of central coordination with distributed implementation can help local leaders identify common challenges and needs, and advocate for and deliver critical resources throughout the division.

By contrast, smaller divisions, with only one or two high schools, might determine that central office personnel will lead the effort, working closely with local high school leaders and external stakeholders to complete the process.

Caveat

The College and Career Ready Self-Assessment Tool offers local leaders a guided approach to assessing their CTE program in order to support local planning and improvement. The tool is not meant to be a checklist for CTE program development.

The tool provides an important set of questions that encourage *answers along a continuum*—more like a grading scale than a checklist. That is, the questions regarding CTE program elements let users determine the *degree* to which their program provides college and career ready opportunities, as well as to identify and prioritize areas for improvement even when the program is doing relatively well.

1. Academic, Technical, and Workplace Content

Why is academic, technical, and workplace content important?

The core of a successful CTE program lies in the course content and instruction that students experience. The other aspects of a program (career development, outcome measures, external partnerships, and infrastructure supports) are anchored in and should support rigorous, integrated learning opportunities for all students.

Research consistently shows that the strength of students' high school curriculum is one of the strongest predictors of their positive future success in both college and careers. There are two keys to being prepared academically for entry-level college courses and workforce training—taking the right courses in high school and mastering their content in measurable ways (e.g., reaching college-ready benchmarks on achievement tests; Adelman, 2006; Allen & Sconing, 2005; Jonas et al., 2012).

Recent research suggests that advanced CTE coursework is associated with better workplace outcomes such as higher earnings and employment status (Bishop & Mane, 2003), and that passing advanced mathematics and science classes is associated with higher occupation-specific and workplace-readiness exam scores (Staklis & Klein, 2010). Further, a rigorous high school curriculum sets the foundation for lifelong learning, as students transition through careers and further education throughout their lifetimes.

In order to graduate from high school with the knowledge and skills necessary for success in postsecondary education and careers, students need access to and mastery of three kinds of course content:

- **Academic** content includes traditional knowledge and skills in language, mathematics, and science.
- **Technical** content varies by career cluster,[2] but generally includes the specific expertise needed to succeed in an industry or field (e.g., computer information systems), as well as real-world applications of academic content to a career pathway.

[2] VDOE defines a *career cluster* as a grouping of occupations and broad industries based on commonalities. Within each career cluster, there are multiple *career pathways*. These pathways represent a common set of skills and knowledge, both academic and technical, necessary to pursue a full range of career opportunities within that pathway—opportunities ranging from entry level to management, including technical and professional career specialties. Appendix B shows the 16 career clusters and 79 pathways defined in Virginia. For more information, visit http://www.doe.virginia.gov/instruction/career_technical/career_clusters/index.shtml.

- **Workplace/employability** content is broader in nature and relates to abilities, behavior, and dispositions such as positive attitude, initiative, teamwork, and independent thinking (Carrier & Gunter, 2010; Conference Board, 2006).

The core of a strong CTE program is having all three content areas integrated into students' high school curriculum. That is, the strongest CTE programs purposefully embed and integrate academic, technical, and workplace content into coursework and other instructional experiences (e.g., internships) to ensure that students learn and use rigorous content in the context of a real-world environment. For example, in a high-quality program, content from a traditional Algebra II course might be integrated within a CTE course to ensure that students not only learn the academic content but also understand how it applies to their career interests.[3]

Other important skills that students need to develop through CTE programs of study, such as the skills they need to transition out of high school and into postsecondary life (Cobb & Alwell, 2009; Conley, 2012; National Secondary Technical Assistance Center, 2013; Tierney et al., 2009), are addressed in the three other sections of the self-assessment.

How do you know whether your content will prepare students for college and careers?

Several key features of academic, technical, and workplace content are necessary in order for students to graduate prepared for college and careers. These features span program, staff, and student levels. The sections that follow describe these features separately for academic, technical, and workplace content, as well as integrated across the content areas.

Academic content

Content from the following courses is generally agreed by national experts to be the minimum curriculum necessary to prepare students academically for entry-level courses in college and workforce training programs:[4]

- Four years of English, aligned to college and career ready standards
- At least three years of mathematics, including success in Algebra II
- At least three years of science, including laboratory science
- At least three years of history and social science

Some research also supports the inclusion of foreign language study, although recommendations vary. Also, most experts recommend that students have access to college-level courses while in high school. Therefore, high school CTE programs should also provide students with opportunities to:

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[3] We used Algebra II as an example because both colleges and employers agree that successful completion of Algebra II is necessary for graduates to succeed in entry-level jobs and credit-bearing college courses (Adelman, 2006; Jonas et al., 2012).

[4] All of these are incorporated into Virginia's Advanced Studies diploma graduation requirements.

- Take at least two foreign language courses
- Earn college credit

Experts further recommend that, to the extent possible, academic content be delivered *inside* CTE courses. Integrating academic content into CTE courses helps students understand the connections between the two and may reduce some of the scheduling challenges students and programs face when academic content and CTE content are delivered separately. For example, a CTE course on architecture and construction geometry would incorporate academic content such as algebraic thinking, geometry, and measurement into an applied course for students interested in entering the construction or architectural field.

It also is important to align academic curriculum with postsecondary programs. In Virginia, the Department of Education has started this. Specifically, the VDOE, State Council of Higher Education for Virginia, Virginia Community College System, and community stakeholders have jointly identified performance expectations in English and mathematics.[5] These expectations define the content and level of achievement students must reach to be academically prepared for success in entry-level, credit-bearing courses in college or career training.[6]

This minimum academic curriculum satisfies requirements for many career clusters; however, some pathways, such as those in STEM-related clusters, may require higher level courses. Whatever the minimum for a career cluster, academic content in mathematics and English lay a foundation for many applied or workplace skills, such as communicating, thinking critically, and using logic.

Technical content

Experts agree that students should receive instructional content that focuses on the specific knowledge, skills, and abilities they will need to be successful within a career cluster. Importantly, while technical content needed for success in a particular career cluster or career pathway varies by industry, much of it spans multiple industries and professions. CTE programs should not focus students on a single job within one industry. Instead, program leaders need to consider how to incorporate technical content within a career pathway in a way that broadly develops students' technical skills so they have options after graduating as industry needs or their interests change.[7]

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[5] For more about English, see http://www.doe.virginia.gov/instruction/college_career_readiness/expectations/perf_expectations_english.pdf.

For math, see http://www.doe.virginia.gov/instruction/mathematics/capstone_course/perf_expectations_math.pdf.

[6] More information about the expectations, including links to applied course content that Virginia's institutions of higher education are preparing in order to support high schools, is available at http://www.doe.virginia.gov/instruction/college_career_readiness/index.shtml#expectations.

[7] Information about 16 different career clusters is available at http://www.doe.virginia.gov/instruction/career_technical/career_clusters/index.shtml. Information includes

As with academic content, the technical curriculum should be aligned with postsecondary programs, so students graduate high school able to meet entry requirements and then progress. These may include technical programs offered at community colleges, technical colleges, and other workforce training programs available locally.

In addition to the skills needed to pursue careers within one or more career pathways, technical content provides students with real-world applications of academic content. For example, bioscience courses related to becoming a nurse or laboratory technician provide hands-on learning of biology and chemistry concepts. Conversely, traditional chemistry and biology classes should include practical applications of underlying science concepts. This use of the technical curriculum is especially valuable for those students who struggle to understand material when taught in a less-contextualized setting.

Workplace/employability content

Workplace skills, abilities, and dispositions are those necessary for success in a work environment. Employers often rank these ahead of academic knowledge when describing the traits most important for new employees (Carrier & Gunter, 2010; National Association of Colleges and Employers, 2011; Society for Human Resource Management, 2008). These include the following:

- Work in teams
- Communicate orally and in writing
- Obtain information
- Solve problems and make decisions
- Plan, organize, and prioritize work
- Think creatively
- Use information technology and computers
- Exhibit a positive attitude and professional behavior

More recently, employers are adding ethical behavior to their list, and it could be integrated into course content, too. Course syllabi and school codes of conduct may provide evidence that CTE programs promote the workplace skills and attitudes desired by employers.

Although such skills and dispositions often outrank academic or technical knowledge on employer surveys, that doesn't mean such knowledge is less important. Most employers *assume* that individuals entering the workplace will be sufficiently literate in mathematics and English to communicate, think critically, and apply logic in the workplace. Specific requirements tend to vary by career choice or industry.

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sample plans of study within each cluster, common postsecondary career and college options, and descriptions of necessary foundational technical skills for career pathways within clusters.

Integrating academic, technical, and workplace content

All too often, CTE programs have developed separately from traditional academic or college-preparatory programs of study, and high schools have considered career readiness and college readiness as two separate goals. However, most employers and colleges agree that *all* high school graduates need access to a rigorous and appropriate mix of instruction that integrates academic, technical, and workplace content in order to be college *and* career ready.

Integrating academic and technical content can further enhance and extend students' understanding and mastery of abstract concepts and ideas. Experts increasingly recommend problem-based learning and some form of credit for experience outside of the classroom (e.g., work-based learning) as effective in developing students who are well prepared for any postsecondary choice. When students master academic, technical, and workplace content that is aligned to postsecondary education and training programs, they enjoy a variety of postsecondary options (e.g., college or further technical training, employment, or military enlistment), while also learning complementary skills.

When developing core content for a CTE program, it is also good to consider multiple exit points, including degrees, certificates, and licenses. Strong programs align their content with entrance and exit requirements of a range of career choices by considering entrance exam benchmarks. They also align their course standards with postsecondary content and offer dual-credit options.[8] Some programs set up students to earn "stackable" credentials, possibly beginning with a license and allowing easy transition to a certificate or degree program.

Infrastructure support

High-quality CTE programs create strategies for sustaining themselves over many years. To maintain a curriculum whose content is relevant and up-to-date, programs of study should:

- **Provide pedagogical support and professional development for staff,** upon their entering the profession and throughout their careers. Many times teachers in a CTE program come directly from industry (rather than education). They, in particular, need pedagogical support to develop the skills needed to be successful in the classroom, such as constructing a lesson plan or managing a classroom.
- **Maintain technical expertise of program staff.** Because practice in many industries changes rapidly, it is important that staff receive regular support to stay current in their particular field of expertise.
- **Have a strong plan to maintain up-to-date technology, equipment, and facilities** so students' instructional experiences are always relevant in current workplace environments. This may require significant resources, and such maintenance can be an

[8] Dual-credit options let students earn high school and college credits simultaneously while still in school. Mechanisms include dual enrollment at local colleges (e.g., Virginia's community colleges) and high school Advanced Placement, Cambridge, or International Baccalaureate courses. Virginia's high schools are required to offer at least three college-level courses (see 8VAC20-131-100).

important part of commitments by business and industry stakeholders to the CTE's program quality.[9]

Self-Assessment: Academic, technical, and workplace content

The information on the next few pages is designed to guide users in collecting and examining evidence of their program's current status in providing core content—one of the four fundamental elements of a high-quality CTE program. From that evidence users will identify strengths and gaps in their program, and develop an action plan, as the first step in a cycle of continuous improvement.

The self-assessment materials comprise several parts:

- **Guiding questions about promising practices.** Beginning on the next page is a table of "guiding questions" for users to consider and answer in order to determine how well their program incorporates core content at the programmatic, staff, and student levels. Users may want to tailor the questions by adding some that are important in their local context and may become part of their individual process, or eliminating a few that are not relevant.
- **Self-Assessment Workbook.** The worksheets that users need to complete the self-assessment are provided in Appendix A:
    - **Evidence worksheet.** Helps users synthesize and summarize the evidence collected in response to the guiding questions.
    - **Strengths/gaps worksheet.** The summary from the evidence worksheet leads users to determine their program's strengths and gaps.
    - **Action plan.** Here users identify and prioritize next steps for the program, which should facilitate conversations about program improvement.
- **Data source documentation form.** While collecting evidence, users may want to document the data sources used to complete the assessment, which will save time the next year. The template at the end of Appendix A shows one possible approach.

[9] See the Partnerships section for more information.

Table 1: Guiding questions to consider while collecting evidence of high-quality academic, technical, and workplace content[10]

Promising practice	Implementation level		
	Program	Staff	Student
Academic content	• Is the school curriculum structured such that CTE students typically participate in courses that include content from mathematics, English, science, and history and social science that is associated with college readiness, including Algebra II and laboratory sciences? • To what degree is the CTE course schedule aligned with the foreign language course schedule to ensure that students can take both course types before graduating? • How well does the progression of CTE courses within the program align with the timing/sequence with which students typically take the various mathematics or science	• What level of expertise do teachers have in their content area? • How often do teachers participate in professional development courses and experiences to stay up-to-date in their field? • How often do teachers participate in courses and experiences that strengthen classroom pedagogy? • How often do CTE courses integrate academic content? • How well prepared are CTE teachers to provide instruction on academic content? • To what extent do CTE teachers and academic content teachers work	• How many and what percentage of CTE students graduate from high school having completed college-ready coursework (e.g., graduate with an Advanced Studies diploma) and a CTE completion credential, such as an industry certification or state license? • What opportunities are available for students to develop and demonstrate critical-reading and analysis skills about career-specific topics? • How many and what percentage of graduates complete CTE programs ready to directly enter CTE programs at the postsecondary level?[11]

[10] These examples are based on information collected from published literature and expert interviews. This likely is not a comprehensive list. Evidence is still being developed to define these practices.

[11] VDOE provides information about college enrollment at the student level, including CTE completers, in the secure online Single Sign-on for Web Systems (SSWS) application entitled Postsecondary Education Reports. For help accessing this report, school divisions can contact resultshelp@doe.virginia.gov.

Promising practice	Implementation level		
	Program	Staff	Student
	courses that are needed to succeed in the CTE course? • To what extent does the master calendar allow teachers and students to participate in courses that provide access to academic and technical content? • What dual-credit courses are available to students to pursue academic interests at the postsecondary level? • What professional development opportunities does the division or school offer CTE teachers to strengthen their ability to successfully integrate and deliver academic content in CTE courses?	together to strengthen academic instruction within CTE courses?	• How many and what percentage of students in CTE programs take at least two foreign language courses? • How many and what percentage of CTE graduates earn Advanced Studies diplomas? • How many and what percentage of CTE graduates earn more than one industry certification or technical credential during high school? • How many and what percentage of CTE graduates have earned college credit through dual credit courses before leaving high school? • On average, how many college credits do CTE students earn before graduating from high school? What is the distribution of college credits earned?
Technical content	• What professional development opportunities does the division or school offer to teachers to facilitate embedding up-to-date technical content into	• How often do staff work with experts and/or participate in professional development to update their technical content knowledge and expertise?	• How many and what percentage of students earn industry certifications or licenses? • How many and what

Promising practice	Implementation level		
	Program	Staff	Student
	instruction? • How often are programs of study updated? • What postsecondary dual-credit technical courses are available to high school students? • How frequently does the program of study and certification qualify for Virginia's Pathways to Industry Certification program? • To what degree do technical content offerings align to current community and/or industry needs?	• To what extent do curricula and lesson plans show evidence that students regularly have opportunities to use their technical skills in a real-world context?	percentage of students use CTE course completion and assessment outcomes towards verified credits needed for high school graduation? • How many and what percentage of students have work-based learning experiences that are related to their career cluster of interest during high school? • How many and what percentage of CTE graduates have earned college credit through dual credit courses before leaving high school?
Workplace content	• What professional development opportunities does the division or school offer to teachers to facilitate embedding workplace content into instruction? • To what extent does the CTE program offer content or require students to take courses that develop their workplace or professional skills? • What agreements are in place to ensure that students have opportunities to demonstrate	• To what extent do teachers participate in professional development opportunities to incorporate workplace content into courses? • How and how often do teachers model the dispositions and abilities needed in a professional workplace? • How frequently do learning objectives and lesson plans include a focus on workplace	• What types of assignments allow students to demonstrate a mastery of workplace skills throughout the secondary grades? • How often does feedback from employers and colleges suggest that students graduate with workplace skills and traits (professionalism) that meet or exceed expectations? • How many and what

Promising practice	Implementation level		
	Program	**Staff**	**Student**
	workplace skills? Examples include agreements from outside organizations to provide paid or unpaid internships, volunteer opportunities, and other real-world experiences (e.g., team-based challenges).	content?	percentage of CTE graduates have passed a workplace readiness skills assessment, such as the Workplace Readiness Skills (WRS) for the Commonwealth?
Cross-content integration	• Do curricular resources incorporate practical applications of academic knowledge? Academic fundamentals supporting technical skills? • What professional development opportunities does the division or school offer to support cross-content integration?	• How often do teachers collaborate to develop curricula that support cross-content teaching in courses? • How many and which CTE courses embed academic content that is consistent with college and career ready standards? Workplace content? How is it embedded?	• How many and what percentage of CTE graduates have taken and passed courses that integrated academic, technical, and workplace skills?
Infrastructure support			
• Are resources (including staff, funds, and supplies) dedicated to maintaining and updating curricula, lesson plans, and other materials needed to deliver academic, technical, and workplace content that is up-to-date for CTE programs of study?			
• How often do staff have access to professional development opportunities through appropriate sources such as the school division, employers, colleges, and technical training courses?			
• What examples document how school-wide schedules are developed to ensure that CTE students have access to academic, technical, and workplace content they need to be prepared for college and careers?			
• Are policies and agreements in place to ensure that students can participate in real-world opportunities that support hands-on learning and skills application?			

2. Career Development

Why is career development important?

Career development can help students explore the range of postsecondary options that are available to them. Career development also helps ensure that students are in appropriate academic, elective, and CTE courses to support their interests and postsecondary goals.

Starting before sixth grade, it is important that students receive support for broad career exploration and development. This includes leading students through an exploration of various professions and industries and the diverse opportunities within them. This type of exploration, supported by knowledgeable adults and career planning tools,[12] exposes students to information they can then build on throughout their high school careers. In high school, students should receive active support to help them focus their interests—through a progression of coursework and technical skills development—and identify career clusters and programs of study to pursue.

Career development also plays an important role in students' transition out of high school. The transition to postsecondary life, whether into a postsecondary education or training program or directly to the workplace, involves many skills and activities that are not always obvious to students or addressed in the traditional academic curriculum. These activities include searching for jobs or colleges, building resumes, submitting applications, and applying for financial aid, all of which may benefit from experienced, adult guidance (Conley, 2012; Lebow et al., 2012; Tierney et al., 2009). Therefore, students need purposeful and consistent support throughout their middle and high school careers to help them develop the skills and abilities needed to effectively navigate the transition to life after high school graduation.

How do you know you have high-quality career development?

Several key features are associated with providing students with high-quality support and facilitation for postsecondary choices and career opportunities. These features span program, staff, and student levels. High-quality career development in the context of supporting students' preparation for college and careers:

- **Starts early.** Career development and exploration begin in the elementary grades. An early start allows students to progress through career content and concepts related to various career options over time. Career development would then continue through students' transition to postsecondary education and training, and ideally throughout their careers (e.g., through formal and informal mentoring).

[12] In Virginia, students are required to begin developing an academic and career plan in seventh grade and complete the plan in the fall of eighth grade. At minimum, the plan is required to be reviewed and updated as needed in high school.

- **Allows for and encourages broad exploration that progresses to more focused information.** Broad exploration allows students to learn about the full range of career opportunities within one or more career clusters. As students develop content knowledge and refine their interests, high-quality career development encourages them to migrate to a more focused program of studies that promotes the technical skills they will need to succeed in a specific career pathway.
- **Develops individual student growth plans.** These plans should use data to identify academic and technical courses that support each student's career interests and aspirations. Data may come from several sources, including assessments, course grades, career planning tools, and staff or employer feedback. Plans may also include out-of-school goals and activities, such as volunteer experiences, employment, or resume development. It is important to update the plans annually, revisit them on a regular basis, and incorporate them in decision-making activities.
- **Includes regular use of career inventories and/or assessments.** Many tools are available to help students identify career and college options that match their interests, as well as guide their course choices. Experts suggest using these tools starting in middle school. Virginia schools have the option to use the Virginia Education Wizard at no cost.
- **Assigns an adult mentor to each student.** The adult mentor may be a school counselor, teacher, business partner, or other volunteer, and a mentor may fill many roles. The mentor works closely with each student to help identify appropriate courses and experiences during high school. The mentor may also help the student complete the steps necessary to transition to postsecondary activities (e.g., conducting college/career training searches; completing applications, entry assessments, and financial aid forms; preparing resumes).
- **Supports adult mentors.** Adult mentors need support—in terms of both time to work with students and knowledge of career and college pathways. School counselors often have many responsibilities in addition to working individually with students, and they should not be expected to be the only adults supporting students' career development. Further, adults are often familiar with either career pathways or college pathways but not necessarily both. Experts have noted that even mature, high-quality programs of study sometimes struggle to support their adult mentors.

Infrastructure support

Beyond development and implementation, high-quality CTE programs create strategies for sustaining themselves over many years. To maintain high-quality career development over time, programs of study should:

- **Ensure that school counselors collaborate with teachers and school administrators** to understand CTE programs of study and help appropriately place students into them. School counselors can play a key role in advising students into career clusters and pathways, and making sure they fit into students' schedules.

Therefore, it is important that school counselors have up-to-date information about key components of the program and understand its overarching goals.

- **Build career development capacity outside of school counselors.** Students' career development should come from a variety of supportive adults, including parents, school counselors, college and career counselors, teachers, staff, the business community, and their peers. Therefore, it is important to emphasize and consistently develop the ability of all staff to provide students with insights and advice on careers throughout high school. In addition, career development can come from guest lecturers and volunteers, who can provide students additional information to help them understand career opportunities and the courses and experiences they will need for success.
- **Provide access to career and technical student organizations** that are integrated into the program of study and promote skills development. Developing strong ties to career and technical student organizations over time can provide students with the opportunity to explore career fields outside the classroom.

Self-Assessment: Career development

The information on the next few pages is designed to guide users in collecting and examining evidence of their program's current status in career development—one of the four fundamental elements of a high-quality CTE program. From that evidence users will identify strengths and gaps in their program, and develop an action plan, as the first step in a cycle of continuous improvement.

The self-assessment materials comprise several parts:

- **Guiding questions about promising practices.** The self-assessment contains a table of "guiding questions" for users to consider and answer in order to determine how well their program incorporates career development at the programmatic, staff, and student levels. Users may want to tailor the questions by adding some that are important in their local context and may become part of their individual process, or eliminating a few that are not relevant.
- **Self-Assessment Workbook.** The worksheets that users need to complete the self-assessment are provided in Appendix A:
    - **Evidence worksheet.** Helps users synthesize and summarize the evidence collected in response to the guiding questions.
    - **Strengths/gaps worksheet.** The summary from the evidence worksheet leads users to determine their program's strengths and gaps.
    - **Action plan.** Here users identify and prioritize next steps for the program, which should facilitate conversations about program improvement.
- **Data source documentation form.** While collecting evidence, users may want to document the data sources used to complete the assessment, which will save time the next year. The template at the end of Appendix A shows one possible approach.

Table 2: Guiding questions to consider while collecting evidence of policies and practices related to career development[13]

Promising practice	Implementation level		
	Program	Staff	Student
Career exploration and planning begins early.	• To what extent do local policies require or encourage schools to include career exploration activities before grade 6? • What tools and resources are available to counselors, teachers, parents, students, and others to enable students to align outcomes from career exploration activities with the academic, technical, and workplace content needed to succeed in students' chosen career cluster at any given time? • What policies and programs are in place to support career development activities as students transition into high school?	• How often do counselors at elementary, middle, and high schools collaborate? What topics are covered during these collaborative activities? • How often do counselors and school personnel collaborate with individuals from diverse careers to incorporate current practices into curriculum? What topics are covered during these collaborative activities?	• How often do students participate in programs and activities that allow them to engage with individuals who work in different careers, across and within career clusters? • How often do students participate in opportunities that allow them to explore diverse careers and the breadth of opportunities within career clusters? • What are the opportunities that students can participate in? • How many and what percentage of students participate in these early career exploration and planning opportunities?
Adults guide students through broad career	• What policies and expectations are in place to	• How often do adults assigned to this role get access to	• How frequently and at what grade levels do students

[13] NOTE: These examples are based on information collected from published literature and expert interviews. This likely is not a comprehensive list. Evidence is still being developed to define these practices.

Promising practice	Implementation level		
	Program	Staff	Student
exploration and focused studies.	ensure that all students have adult support? • To what extent do job descriptions and performance expectations embed teacher and staff roles in providing students with support for career development? • To what extent are agreements in place with outside organizations (e.g., employers, postsecondary institutions, student and youth organizations) that include specific responsibilities/ commitments to ensure that experts are available to guide and support students' career exploration?	professional development and support in order to stay up-to-date with current educational requirements for different careers, occupational outlooks, and earnings in the labor market? • To what extent do CTE courses integrate career exploration activities?	participate in broad career exploration opportunities, or in courses that include these opportunities? • How frequently and at what grade levels do students participate in career exploration opportunities that are narrow in scope (e.g., allow exploration within certain jobs in a career cluster)? In courses that specifically train students for a particular job in a career cluster (or aim to ensure students can earn a specific certification)?
Students develop individual academic and career plans.	• What policies are in place that support students' successful developing and updating of academic and career plans that integrate information available from career planning activities? In which grades? • Is time purposefully dedicated to career development, such as development of students' growth plans (e.g., is time	• What information/resources have staff received to support and guide students to use information from career exploration, assessments, and inventories to develop their academic and career plans? Which staff have received the information, and is it used? • How often do staff collaborate across roles and with other	• How often do students update their academic and career plans? • What percentage of students have course enrollments that reflect information documented in their growth plans? • How often do students receive guidance as they assess interests and

Promising practice	Implementation level		
	Program	**Staff**	**Student**
	allotted in specific courses)? In which grades? • To what extent are tools and data (e.g., career inventories, academic assessments, transcripts) available for inclusion in students' academic and career plans? • How accessible are the data and information from academic and career plans to those who support students' plan development, such as students, teachers and other staff, parents, and mentors?	stakeholders (e.g., parents, community members, employers, college counselors, special education providers) to inform students' growth plans?	develop their plans? Who is responsible for supporting students?
Career development includes career inventories and/or assessments.	• What financial resources are allocated to ensure that students can make use of career inventories and/or assessments? • How much and what type of training is available for staff and others to learn how to use career inventory/assessment tools?	• How often is training offered to counselors in the use of career exploration and planning tools? To all adult advocates who support students' career development? • What type of career inventory/assessment tool training do adult advocates participate in?	• How often do students access and complete a career inventory?[14] • How often do students use inventories to inform their decisions about course enrollment, internships, jobs, or volunteer opportunities?

[14] Virginia requires that all students begin the inventory process in seventh grade and complete it for the first time in the fall of their eighth-grade year. Students are also required to review and update these plans twice in high school. However, students may access these tools more often to explore careers on their own.

Promising practice	Implementation level		
	Program	**Staff**	**Student**
	• How often are career inventory results used to inform course offerings and guidance?	• How frequently do adult advocates report that they have adequate knowledge and resources to support students' career exploration and assessment?	
Adult mentors are assigned to individual students.	• What policies are in place to ensure that every student is assigned an adult mentor? • To what extent are adult mentors' responsibilities and expectations documented and clearly communicated to faculty, staff, and students (and volunteers, if applicable)? • To what extent are mentoring expectations embedded in staff job descriptions, performance expectations, and performance measures?	• How often do adult mentors document and review information about their interactions with students? • To what extent do mentors and other staff (e.g., counselors, teachers) have an opportunity to interact? • What are the mentor–student ratios? • How often do adult mentors report that they have sufficient time with students to provide meaningful career planning and development support? • How often do mentors meet or exceed expectations for supporting students' college and career planning?	• How many and what percentage of students have an adult mentor? • How often do students meet with their adult mentors? • How often do adult mentors impact students' career development plans in ways that can be documented (e.g., students changed their academic and career plans; course-taking patterns change; college applications and associated documents are completed)?
Adult mentors receive appropriate supports.	• What policies promote professional development for counselors and adult mentors, especially across	• How often do mentors access training, professional development, and support to build their knowledge of college	• How frequently do students report (e.g., via survey or other feedback) that mentors provide career

Promising practice	Implementation level		
	Program	**Staff**	**Student**
	postsecondary options? • What resources and time are allocated for staff or mentors to discuss necessary supports? • What tools are available to support advocates' work, such as career planning tools, current information about employer expectations and career pathways, etc.?	and career pathways within evolving career clusters? • How often do mentors, counselors, and others directly involved in career development meet to coordinate services across K–12 programs? • How often do mentors, counselors, and others directly involved in career development meet to coordinate services with employers and postsecondary personnel (e.g., college admissions counselors, industry human resources staff)? • In what ways do adult mentors have purposeful interactions with business and industry experts, so they develop rich understandings of employer expectations for students' skills and knowledge?	development that facilitates their career exploration and educational choices (e.g., course enrollment)? • How frequently is student feedback used to improve mentoring services?
Infrastructure support			
• What resources are available to ensure that all students have adults to provide career development services throughout their K–12 careers, and in CTE programs more specifically? • How does the school or school division support and facilitate student participation in organizations (e.g., 4-H; FIRST Robotics) that support and promote career exploration?			

3. Outcome Measures

Why are outcome measures important?

Appropriate outcome measures provide objective feedback that is critical to determine the strength of a CTE program. Outcome measures provide information about students' knowledge and skills, teachers' capabilities, and program-level activities. The information developed from outcome measures should be available to inform decisions about the other three fundamental elements of a program. Outcome information can both describe the program's current status and help establish future benchmarks.

How do you know you have high-quality outcome measures?

Several key features are associated with high-quality outcome measures. These features span programmatic, staff, and student levels. High-quality outcome measures in the context of supporting students' preparation for college and careers:

- **Incorporate multiple measures of student success.** College and career readiness both involve multiple skills and sets of knowledge. As such, any single test or test type may be too narrow to measure the various dimensions of readiness. Multiple types of assessments measure the diverse skills, content knowledge, abilities, and dispositions students need for success in college and the workplace. Experts suggest assessing students' mastery of academic standards in subjects other than reading, writing, and mathematics by use of additional assessments, possibly including recognized certification assessments.

  A combination of state assessments, technical assessments, and work skill assessments (sometimes accomplished through licensure) provides a more complete picture. Commonly available assessments include:

  - *Workplace Readiness Skills for the Commonwealth Examination* by Career and Technical Education Consortium of States (CTECS)
  - *Career Readiness Certificate (CRC)* by ACT, Inc.
  - Virginia Board of Education list of approved assessments for CTE[15]
  - Academic end-of-course tests
- **Identify appropriate assessment points.** It is important to use assessments at appropriate times during the instructional experience. As in many areas of education, the

15 http://www.doe.virginia.gov/instruction/career_technical/path_industry_certification/cte_credentials/industry_certifications_2012.pdf

measures can be either formative or summative,[16] depending on the goal. Regular formative assessment early in a program can provide valuable feedback to students, teachers, and program administrators alike. In contrast, summative assessments may occur toward the end of a program.

- **May include partners outside of the school.** Industry and higher education partners play a valuable role in evaluating the school program as a whole, including student performance. They provide an external perspective that is anchored in practical outcomes; that is, whether the program aligns with their expectations. Their feedback (e.g., through surveys, interviews, focus groups, quantitative data) can help inform course offerings, course content, and teacher preparation through feedback on student performance.
- **Inform program development.** CTE programs should continuously evolve to support students' needs and interests, meet new technical requirements, incorporate additional content standards, and satisfy labor market demands. Student assessment data serve as one benchmark to measure program changes over time. It is important to incorporate other information, too, such as postsecondary outcomes, local workforce data, and teacher credentials and training. Such data can provide information about what areas of a program need revision.

Infrastructure support

Beyond development and implementation, high-quality CTE programs create strategies for sustaining themselves over many years. To maintain outcome measures that provide high-quality feedback to students and the program, programs leaders should:

- **Ensure that data are collected** so they can be used as feedback. Data sources include those within and outside of the public school division. Examples of internal data sources are student assessments, course enrollment and grades, and teacher credential data. External sources can be postsecondary enrollment data,[17] labor market data, employer and college feedback, and student employment and military enlistment after high school. Program leaders should strive to have as much relevant data from a variety of sources as possible, recognizing that some data are more readily accessible than others.
- **Provide technology** to collect, interpret, and report data on a regular basis.

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[16] *Formative* assessment is an ongoing assessment process that enables regular adjustment to teaching and learning to improve students' achievement (Perie et al., 2007). Formative assessment can take many forms (e.g., knowledge and skills assessments, career inventories, or observation). *Summative* assessment establishes what students have and have not accomplished at the culmination of a specific unit of instruction, such as a curriculum unit or school year (Hamilton et al., 2009). Both types make use of various measurement methods, including observations, projects, computer based, or paper-and-pencil.

[17] The Virginia Department of Education provides authorized users in Virginia's school divisions with access to postsecondary enrollment data via the Single Sign-On for Web Systems (SSWS) tool. For more information, contact resultshelp@doe.virginia.gov.

- **Make data available in useable formats**. It is important to provide information about student outcomes and program status in useable formats (e.g., graphs, tables, charts) to multiple staff.

Self-Assessment: Outcome measures

The information on the next few pages is designed to guide users in collecting and examining evidence of their program's current status in using outcome measures—one of the four fundamental elements of a high-quality CTE program. From that evidence users will identify strengths and gaps in their program, and develop an action plan, as the first step in a cycle of continuous improvement.

The self-assessment materials comprise several parts:

- **Guiding questions about promising practices.** Beginning on the next page is a table of "guiding questions" for users to consider and answer in order to determine how well their program incorporates outcome measures at the programmatic, staff, and student levels. Users may want to tailor the questions by adding some that are important in their local context and may become part of their individual process, or eliminating a few that are not relevant.
- **Self-Assessment Workbook.** The worksheets that users need to complete the self-assessment are provided in Appendix A:
    - **Evidence worksheet.** Helps users synthesize and summarize the evidence collected in response to the guiding questions.
    - **Strengths/gaps worksheet.** The summary from the evidence worksheet leads users to determine their program's strengths and gaps.
    - **Action plan.** Here users identify and prioritize next steps for the program, which should facilitate conversations about program improvement.
- **Data source documentation form.** While collecting evidence, users may want to document the data sources used to complete the assessment, which will save time the next year. The template at the end of Appendix A shows one possible approach.

Table 3: Guiding questions to consider while collecting evidence of policies and practices related to outcome measures[18]

Promising practice	Implementation level		
	Program	Staff	Student
Incorporate multiple measures, including multiple types of assessments that measure the diverse skills, content knowledge, and dispositions students need for success in college and the workplace.	• What resources are provided to teachers to implement a variety of assessments? • Which courses include college- and career-related assessment? • How many different assessments are used across all courses in a career cluster? • To what extent does the school or division offer teachers and staff professional development focused on using multiple and diverse measures to assess student performance? To improve instruction? • How do job descriptions and performance evaluations incorporate expectations that teachers use multiple and diverse measures to assess student performance?	• What type and how frequent is the support available for teachers to administer, interpret, and plan based on a variety of assessments? • How often do staff who administer different types of assessments collaborate and share results to inform a broader discussion of college and career readiness for students? • To what extent do staff have the expertise to use data from multiple assessments to inform instruction for individual students? To improve classroom instruction overall? • How often do teachers participate in professional development aimed at supporting their successful inclusion of multiple measures in the instructional program?	• How often are students assessed with different assessment formats? • How often are students assessed with measures of academic, technical, and workplace content? • To what extent are students taught and expected to use the results of diverse measures to inform their school success? Curricular and other choices? • How many and what percentage of students participate in college- and career-related assessments?

[18] NOTE: These examples are based on information collected from published literature and expert interviews. This likely is not a comprehensive list. Evidence is still being developed to define these practices.

Promising practice	Implementation level		
	Program	Staff	Student
Identify appropriate measurement points.	• What types of assessment formats (e.g., computer-based skills tests, observation, project-based formats) are used? • How often does the program provide checkpoints to measure various student outcomes?	• How often do teachers assess students? • How often do teachers, program leaders, and other relevant staff (e.g., school counselors) meet to discuss data and update instructional approaches based on assessment outcomes? • How often do teachers collaborate to develop or refine observational, formative, or other measures?	• How often do students and parents receive results? • To what extent are students engaged in conversations to use assessment outcomes to choose next steps in their education? ("Next steps" could be tomorrow, next week, next year, or further in the future, depending on what is being measured and discussed.)
Include partners outside of the school.	• What mechanisms do community members have to provide feedback on student performance? How is this feedback used to improve programs, including curriculum or professional development? • How is feedback from industry and other outside organizations included in program and student outcome measures?	• How often do teachers receive feedback from industry partners and organizations that provide work-related experiences for students either as part of class projects or as internships? • How do teachers integrate feedback from partners, including employers, higher education institutions, and student organizations, to inform program improvement?	• How often do students receive feedback from external partners that provide internships or other work-related experiences? • How do students use feedback from external partners to inform their educational choices?
Identify outcomes for students after high school graduation.	• What measures are available to assess student outcomes after high school?	• How often do teachers and staff use program outcome data to inform curriculum,	• How does the program of study engage graduates to promote the program and

Promising practice	Implementation level		
	Program	Staff	Student
	• How often are data from these outcomes available and reported? (Provide examples to document how these data are connected to CTE program data)	planning, and guidance? • To what extent do staff update curriculum, materials, lesson plans, and related activities based on changes in the workplace?	learn about their postsecondary and employment outcomes? • How many and what percentage of CTE graduates enroll in postsecondary education programs? How many and what percentage require developmental education courses in postsecondary programs? How do CTE graduates compare on these measures with non-CTE graduates?
Inform program development.	• What measures are regularly collected? • How reliable are the measures used to assess students, staff, and programs? What evidence exists supporting measure validity? • What outcome measures are reported to stakeholders? How often? • How often are CTE program data used to update CTE program structure and content? Does the process involve specific data?	• How often do teachers use formative data to inform instruction? • Are (informal) assessments frequent enough to provide real-time feedback to teachers? • In what ways do teachers participate in the program development process? • How is information from program measures used collaboratively to inform instruction and alignment for teachers and counselors	• How often do students receive and review assessment results? How often do they use this information to inform their educational and workplace decisions? • How often do students use assessment results to inform updates to their academic and career plans?

Promising practice	Implementation level		
	Program	**Staff**	**Student**
	• What data sources contribute to reviews of the program? Assessment? Employment? Job openings? • What benchmarks are in place for program improvement? • How often is program content compared with assessment content to evaluate alignment? What are the results? (Provide examples of how results are used to inform changes in practice)	across K–12 (and beyond)?	

Infrastructure support

- Are resources committed to purchasing and/or developing valid assessments in a variety of formats to assess student outcomes?
- Has the school division committed resources to purchase and/or acquire data needed to understand CTE student outcomes after high school graduation, including enrollment in college and career training programs, employment, and the military?
- Are reports available to document program benchmarks in ways that are easy for stakeholders to review and interpret?
- What resources are committed to support teachers' and counselors' use of data to inform instruction?

4. Partnerships

Why are partnerships important?

Effective partnerships can link programs, staff, and students with a variety of real-world learning opportunities. From providing opportunities for students to earn college credit while in high school, to communicating employer needs and college expectations, effective partnerships are a key component of a high-quality CTE program. Without strong ties to business, higher education partners, civic organizations, and other community stakeholders (e.g., nonprofit organizations), a CTE program will struggle to be relevant to students, local employers, and postsecondary institutions.

Partnerships are distinct from advisory groups. Advisory groups provide information about the needs of career and technical education students and programs. In contrast, strong partners play an integral role in shaping—and in some ways implementing—programs. They may play active roles in students' education (e.g., through internships, mentoring), teachers' professional development (e.g., by providing workplace learning opportunities), curriculum development and materials acquisition, and program development.

Partnerships take time to develop and require support to maintain. Program leaders need to devote time, attention and resources to develop and sustain partnerships with a variety of organizations and institutions, as well as ensure that staff and students have quality interactions and experiences through these partnerships.

How do you know you have high-quality partnerships in a program?

Several key features are associated with developing and sustaining high-quality partnerships. These features span program, staff, and student levels. In the context of supporting students' preparation for college and careers, programs with strong partnerships:

- **Develop formal agreements** to help define the roles of the CTE program and the partner. Formal agreements that embed school and partner roles and responsibilities can help both parties set expectations and anticipated outcomes for the partnership from the beginning. In addition, formal agreements help programs maintain partnerships in the event of turnover at key staff positions.
- **Develop dynamic relationships with advisory committees** to get feedback on a program's courses and curricula; initiate and develop relationships with industry, postsecondary institutions, and relevant civic organizations; and regularly interact with program staff and students.
- **Understand that partnership building is an ongoing strategy for success.** Partnerships are vital to CTE programs. Successful programs ensure that an individual or group of individuals purposefully interact and engage partners to both gain feedback and sustain these relationships over time.

- **Have a strategy for engaging parents and the community.** It is important that parents, the community, and even the school at large know about the benefits of participating in a program. Therefore, programs need to engage the community in many different settings throughout the year.
- **Bring in local industry, postsecondary institutions, and civic organizations early** in the development of a program to examine the opportunities already available for entry into a field.

Infrastructure support

Beyond development and implementation, high-quality CTE programs create strategies for sustaining themselves over many years. To maintain strong and meaningful partnerships with business, postsecondary institutions, and the community, programs should:

- **Identify staff responsible for forming and maintaining partnerships**. Program partnerships take time to develop and effort to maintain. It is important that there be consistent support over time.

Self-Assessment: Partnerships

The information on the next few pages is designed to guide users in collecting and examining evidence of their program's current status in developing and sustaining partnerships—one of the four fundamental elements of a high-quality CTE program. From that evidence users will identify strengths and gaps in their program, and develop an action plan, as the first step in a cycle of continuous improvement.

The self-assessment materials comprise several parts:

- **Guiding questions about promising practices.** The self-assessment contains a table of "guiding questions" for users to consider and answer in order to determine how well their program incorporates partnerships at the programmatic, staff, and student levels. Users may want to tailor the questions by adding some that are important in their local context and may become part of their individual process, or eliminating a few that are not relevant.
- **Self-Assessment Workbook.** The worksheets that users need to complete the self-assessment are provided in Appendix A:
    - **Evidence worksheet.** Helps users synthesize and summarize the evidence collected in response to the guiding questions.
    - **Strengths/gaps worksheet.** The summary from the evidence worksheet leads users to determine their program's strengths and gaps.
    - **Action plan.** Here users identify and prioritize next steps for the program, which should facilitate conversations about program improvement.

- **Data source documentation form.** While collecting evidence, users may want to document the data sources used to complete the assessment, which will save time the next year. The template at the end of Appendix A shows one possible approach.

Table 4: Guiding questions to consider while collecting evidence of policies and practices related to program partnerships[19]

Promising practice	Implementation level		
	Program	Staff	Student
Develop formal agreements with partners.	• What are the various roles that business, industry, and civic partners play in the CTE program's development and maintenance? What documentation is in place to define school and partners' roles (e.g., are roles defined in formal agreements or letters of commitment)? • What are the various roles that higher education partners play in the CTE program's development and maintenance? What documentation is in place to define school and partners' roles (e.g., are roles defined in formal agreements or letters of commitment)? • What courses within the career pathway offer dual-credit or are articulated with a higher education institution? Can these college credits be	• How and how often do partners coordinate with staff to inform curriculum and assessment? • How often do staff participate in work-based learning or professional development programs (e.g., summer job opportunities, job shadowing, internships, or training)? • To what extent do job descriptions, professional development recommendations, and performance expectations include participation in partner organizations' work-based learning or professional development programs?	• What data are collected to assess whether partnerships with businesses are meeting or exceeding students' expectations? What are the results? • What data are collected to assess whether partnerships with higher education are meeting or exceeding students' expectations? What are the results? • How many and how often are students leveraging paid and unpaid internship opportunities? • How many and how often do students participate in opportunities for summer jobs, job shadowing, internships, or otherwise interacting with employers as part of their CTE program experiences? • What type of information and

[19] NOTE: These examples are based on information collected from published literature and expert interviews. This likely is not a comprehensive list. Evidence is still being developed to define these practices.

Promising practice	Implementation level		
	Program	Staff	Student
	easily transferred to other institutions?		advising do students receive from partners?
Develop a dynamic relationship with the advisory committee.	• What are the backgrounds of stakeholders on the advisory committee? • What percentage of the advisory committee represents secondary stakeholders? Higher education? Business and industry? Civic organizations? Other? • How often does the advisory committee provide feedback on the program's courses and curricula? With what methods? Is this information useful for improving programs? • How does the advisory committee inform decisions to pursue particular certifications or credentials for a program of study? • To what extent does the school or division engage the advisory committee in strengthening CTE programs and resolving challenges?	• How does the advisory committee gain feedback from the program's staff?	• How does the advisory committee gain feedback from the program's students? • How does the advisory committee facilitate interactions between partner organizations and students?

Promising practice	Implementation level		
	Program	Staff	Student
Partnership building is an ongoing strategy for success.	• What is the program's strategy for identifying, creating, and maintaining partnerships with business organizations, higher education, civic and other relevant organizations? • What dedicated staff time within the program exists to identify, cultivate, and maintain partnerships? Is it one person's responsibility or a collective responsibility? • To what extent are staff responsibilities for developing and maintaining partnerships written into staff job descriptions and performance expectations? • How are data shared within partnerships to help link students to their postsecondary or employment outcomes after graduation? (Give examples of this data sharing) • How is partner feedback about student performance used to strengthen programs?	• What role do program staff play in identifying potential partnerships with business? Higher education? Civic and other community organizations? • What kind of professional development opportunities are available through partnerships with business, higher education, civic organizations, and others?	• How and how often do students interact with partner organizations and institutions, both in and out of the classroom? • For those students who participated in internship, job shadowing, or other opportunities with partners, how often do partners provide feedback? What do they report about the quality of student preparation for the experience? • How frequently do students provide feedback about their internship, job shadowing, or other experiences working with partners? How is this feedback used to improve those experiences? • What do program graduates report was supportive of their postsecondary choices (e.g., employment, college/training, military)? What preparation gaps do they report?

Promising practice	Implementation level		
	Program	**Staff**	**Student**
Have a strategy for engaging parents and the community.	• Is there a strategy in place to promote the program of study to parents and the community? • What activities can help the CTE program promote and advocate for itself within the community?	• What opportunities exist for staff to present the work they do with students to various stakeholders? • How often do staff engage with parents and other community members to garner support for the program?	• How often does the program engage students who have graduated from the program?
Bring in local industry and postsecondary institutions early in the development of a program.	• What employment or postsecondary education data are available to the program to identify the industry needs within the community? • What partners assist in identifying experiences or courses needed at the high school level to ensure students' smooth transition to postsecondary education and training programs?	• To what extent do staff have the skills and technical background to teach courses in the proposed program? • How can community partners help staff stay current in their field? • What additional roles are needed to ensure all courses and supports are provided within the program, and how could partners fill those roles?	• How frequently are students' interests included in program development and improvement activities? • How and how frequently are students made aware of new program options?
Infrastructure support			
• What resources are committed to continuously engaging external partners in programs? • What resources do partners provide to develop and maintain high-quality CTE programs that support students' preparation for college and careers? (Resources might include such things as financial commitments, human capital, consulting services, work-based learning experiences, professional development opportunities, and more.) • How and how often are partners recognized for their contribution to student and program success?			

Resources

This section provides examples of initiatives in Virginia and other states working to develop CTE programs that promote college and career readiness.

Developing and refining content

- **Virginia's College and Career Ready English and Mathematics Performance Expectations** – In 2009 the Virginia Board of Education adopted revised Standards of Learning in mathematics and in 2010 in English. The revised standards reflect the substantial input and recommended changes provided by college faculty and other experts from the College Board, ACT, the American Diploma Project and the business community. These groups support Virginia's revisions and have validated the standards as college and career ready. Virginia has also developed Performance Expectations in mathematics and English that define the level of achievement students must reach to be academically prepared for success in entry-level credit-bearing college courses and career training. The expectations were developed through a process that involved faculty from Virginia's two- and four-year colleges and universities, members of the business community, and high school educators. The Performance Expectations are available online at www.doe.virginia.gov/instruction/college_career_readiness/expectations/perf_expectations_english.pdf and www.doe.virginia.gov/instruction/mathematics/capstone_course/perf_expectations_math.pdf.
- **Implementing the Performance Expectations** – As CTE program leaders assess and strengthen programs, they can use the English or Mathematics Performance Expectations to identify standards that students need to master before graduating to be ready for college and career training. It is critical that students be prepared to learn content associated with the Performance Expectations, and, that appropriate content aligned to these Performance Expectations is integrated into CTE courses. The Virginia Department of Education has partnered with the University of Virginia and Radford University to develop and share applied exploratory instructional units to support students' mastery of the Mathematics Performance Expectations. For more information, visit http://www.doe.virginia.gov/instruction/mathematics/capstone_course/index.shtml or http://www.doe.virginia.gov/instruction/english/capstone_course/index.shtml.
- **Math-in-CTE, Literacy-in-CTE** – The National Research Center on CTE prepared professional-development models for integrating math and literacy fundamentals into CTE courses. Within each of the programs, teachers integrated math or literacy concepts into coursework to both reinforce and enrich a student's understanding of the concepts. Research showed that students who had teachers who participated in these professional-development programs performed significantly better on standardized math tests, including college placement exams, as well as significantly improving their literacy

skills. Curriculum maps for career clusters and sample lesson plans for both Math-in-CTE and Literacy-in-CTE are available at http://www.nrccte.org/professional-development.

- **Transition to CTE Teaching: Supporting Beginning Teachers Entering Through Alternative Routes (National Research Center for Career and Technical Education)** – Many schools provide induction support for new teachers. However, some CTE educators come directly from the industries with little background in education and sometimes need additional supports to ensure they develop into effective teachers. This presentation provides a look at some of the supports needed to help new CTE teachers coming into the classroom under alternative certifications. The presentation is available at http://www.nrccte.org/resources/videos/transition-cte-teaching-supporting-beginning-teachers-entering-through-alternative.
- **Illinois CTE Curriculum Revitalization Project** – Illinois is in the process of developing and updating CTE curriculum materials. Within the update, the state is aligning lessons with its learning standards and the Common Core, industry-specific content standards, and workplace skills. Each lesson provides the specific state academic core standard that the lesson aims to address, sample assessments, and other reference materials for educators. Examples of these lessons are available at http://www.ilcte.org/ and http://www.isbe.net/career/html/cte_curriculum.htm.
- **Arizona's Career and Technical Education Program Template** – As a part of the U.S. Department of Education's Rigorous Programs of Study Initiative, Arizona developed a template for its CTE programs to assist in student guidance on course taking. It includes required courses for graduation, CTE courses, and elective courses for each grade, as well as when students take state assessments and receive academic and career development. The template provides programs of study a one-page summary of anticipated courses and helps students quickly see how the program of study fits into their overall course taking during high school. A copy of the template is available at www.azed.gov/career-technical-education/files/2011/06/programs-of-study-template.pdf.

Developing and refining career development support

- **Virginia Education Wizard (www.vawizard.org)** – Beginning with the 2013-14 school year, all Virginia students will need to have an Academic and Career Plan by the fall semester of the eighth grade. The Virginia Department of Education, in collaboration with the Virginia Community College System and State Council of Higher Education for Virginia, developed the Virginia Education Wizard as a comprehensive tool to support school personnel in creating an Academic and Career Plan for each student. The Wizard is an online tool designed to help students explore careers, assess skills, identify career interests, find college majors that align with career interests, develop a resume, apply for financial aid, and plan for college. As programs provide career development to students, the Wizard can assist in this process.
- **Georgia Individual Graduation Plans** – In 2010, Georgia passed a law designed to provide students with regular academic and career counseling starting in the sixth grade

and continuing through high school graduation. As a part of this counseling, all eighth grade students are required to develop an Individual Graduation Plan in consultation with parents, counselors, and teachers. The Georgia Department of Education developed a publication titled "School Counselors, Advisors and Educators: Helping Students Make Informed Decisions about Their Individual Graduation Plans" that provides examples of career development activities appropriate for each grade level. The publication is available at http://www.doe.k12.ga.us/Curriculum-Instruction-and-Assessment/CTAE/Documents/Combined-IGP-counselor-packet.pdf.

Developing and refining outcome measures

- **Virginia's Path to Industry Certification: High School Industry Credentialing** – In an effort to encourage more students to work towards an industry credential or state license, Virginia developed the Path to Industry Certification program to allow CTE programs that culminate in a certification or license to count as verified credits towards high school graduation. To meet state board of education requirements for a verified credit, the CTE course must be taught by an educator with an industry-recognized certification or license, in a CTE field that confers a credential from an industry, and the assessment be standardized and graded independent of the school in which the test is given. Students who complete the certification can earn up to two verified credits, and the certification is noted on the student's transcripts. For more information about the program and a list of state-approved industry assessments for the program, visit www.doe.virginia.gov/instruction/career_technical/path_industry_certification/index.shtml .

Developing and sustaining external partnerships

- **CTE Local Advisory Committees: The Key to Strong, Successful Business/Industry Partnerships (Virginia Department of Education)** – The Office of Career and Technical Education developed a brief designed to help identify the roles that CTE advisory committees can play within a program of study. The document identifies roles at both the local and state level, as well as additional resources as programs develop these partnerships. This resource is available at http://www.cteresource.org/verso/files/cte-local-advisory-committees-brochure-130/CTE%20Local%20Advisory%20Committees%20Brochure%202012.pdf.
- **Partnership Guide for Career Academies (Career Academy Support Network)** – In many ways, career academies have similar goals to CTE programs of study—to prepare students for a career and life after high school. This guide was developed to provide support to career academies in developing and maintaining industry and higher education partners on issues such as advisory committees and internships, among other topics. This resource is available at http://casn.berkeley.edu/resource_files/Partnership_Guide.pdf.
- **National Academy Foundation (NAF) Internship Toolkit** – A major part of the NAF Academy are internship opportunities for students. The Foundation believes that internship opportunities are an extension of classroom instruction and provide

experience solving real-world issues. The Foundation developed a toolkit that provides resources for students, programs, and business leaders as they develop internship opportunities for students. The toolkit also provides answers to common questions that students, programs, and business leaders have about internships. The toolkit is available at http://naf.org/files/Internship-Toolkit-2006-09.pdf.

- **Oregon Tech Partnership agreements** – The South Metro-Salem STEM Partnership is a collaboration of school districts, community colleges, universities, out-of-school programs and business and community partners that is focused on increasing student access and success in STEM fields. As part of the partnership development, partners have developed agreements that define the vision, mission, and goals of the partnership, and specific roles and responsibilities for each partner. While every CTE program will need to develop their own agreements, the SMS STEM partnership agreement can serve as a model for local communities to develop their unique agreements. The model agreement is available at http://www.oit.edu/office-of-strategic-partnerships/stem-partnership/resources.

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Appendix A. Self-Assessment Workbook

1. Academic, Technical, and Workplace Content
Evidence Worksheet

Describe Your Content Now

After examining your program, and based on the information collected in response to the guiding questions, summarize the evidence collected and documented that describes the current status of your CTE program in integrating academic, technical, and workplace content that supports college and career readiness. Consider your program's policies, staff skills, and student activities.

Summary: Evidence of available and integrated academic, technical, and workplace content at the programmatic and policy levels

[Enter text here]

Summary: Evidence of staff capacity to deliver such content

[Enter text here]

Summary: Evidence of student data to demonstrate access to such content

[Enter text here]

1. Academic, Technical, and Workplace Content
Strengths/Gaps Worksheet

Strengths

Based on the evidence, what are the strengths of your program in providing rigorous, integrated content? Consider strengths at the programmatic and policy levels, as well as strengths in staff skills and student activities.

[Enter text here]

Gaps

Based on the evidence, what gaps exist in your program in providing rigorous, integrated content? Consider gaps at the programmatic and policy levels, as well as gaps in staff skills and student activities.

[Enter text here]

Summary

Based on the evidence, how well overall does your program do in providing the rigorous, integrated academic, technical, and workplace content that students need in order to graduate ready for college and careers?

[Enter text here]

Evidence suggests that the CTE program has **few if any** components in place to support rigorous academic, technical, and workplace content.	Evidence suggests that the CTE program has **some** components in place to support rigorous academic, technical, and workplace content.	Evidence suggests that the CTE program has **many** components in place to support rigorous academic, technical, and workplace content.	Evidence suggests that the CTE program has **nearly all** components in place to support rigorous academic, technical, and workplace content.
☐	☐	☐	☐

1. Academic, Technical, and Workplace Content

Action Plan Worksheet

Actions Needed

What steps need to be taken to close any gaps that keep your program from being high quality and highly functioning? Closing those gaps requires prioritizing the steps on timelines for completion. Consider actions at all three levels: programmatic and policy, staff, and students. Include what resources you would need to complete each step.

What steps can you take in the next:

- Month?

- Six months?

- Year?

- Three years?

2. Career Development
Evidence Worksheet

Describe Your Career Development Now

After examining your program, and based on the information collected in response to the guiding questions, summarize the evidence collected and documented that describes the current status of your CTE program's career development. Consider your program's policies, staff skills, and student activities.

Summary: Evidence of high-quality career development practices at the policy and program levels

[Enter text here]

Summary: Evidence of staff and other adults available, knowledgeable, and skilled to provide career development

[Enter text here]

Summary: Evidence of student participation in high-quality career development and mentoring activities

[Enter text here]

2. Career Development
Strengths/Gaps Worksheet

Strengths

Based on the evidence, what are the strengths of your program in providing career development? Consider strengths at the programmatic and policy levels, as well as strengths in the availability and capacity of staff and other adults to support and mentor students through their career exploration activities.

[Enter text here]

Gaps

Based on the evidence, what gaps exist in your program in providing career development? Consider gaps at the programmatic and policy levels, as well as gaps in the availability and capacity of staff and other adults to support and mentor students through their career exploration activities.

[Enter text here]

Summary

Based on the evidence, how well overall does your program provide students with high-quality career development?
[Enter text here]

Evidence suggests that the CTE program has **few if any** components in place to guide and mentor students through career exploration and planning.	Evidence suggests that the CTE program has **some** components in place to guide and mentor students through career exploration and planning.	Evidence suggests that the CTE program has **many** components in place to guide and mentor students through career exploration and planning.	Evidence suggests that the CTE program has **nearly all** components in place to guide and mentor students through career exploration and planning.
☐	☐	☐	☐

2, Career Development
Action Plan Worksheet

Actions Needed

What steps need to be taken to close any gaps that keep your program from being high quality and highly functioning? Closing those gaps requires prioritizing the steps on timelines for completion. Consider actions at all three levels: programmatic and policy, staff, and students. Include what resources you would need to complete each step.

What steps can you take in the next:

- Month?

- Six months?

- Year?

- Three years?

3. Outcome Measures
Evidence Worksheet

Describe Your Use of Outcome Measures Now

After examining your program, and based on the information collected in response to the guiding questions, summarize the evidence collected and documented that describes the current status of your CTE program's outcome data available to inform program development. Consider policies, staff skills, and student activities.

Summary: Evidence of outcome measures available to inform policy and program improvement

[Enter text here]

Summary: Evidence of staff access to and use of assessment and other outcome measures and data to guide instruction and program improvement

[Enter text here]

Summary: Evidence of student participation in multiple types of assessments and use of data to inform their educational/workplace decisions and growth plans

[Enter text here]

3. Outcome Measures
Strengths/Gaps Worksheet

Strengths

Based on the evidence, what are the strengths of your program in using outcome measures? Consider strengths at the programmatic and policy levels, as well as strengths in staff assessment and data use practices and student participation in assessment and use of data.

[Enter text here]

Gaps

Based on the evidence, what gaps exist in your program in using outcome measures? Consider gaps at the programmatic and policy levels, as well as strengths in staff assessment and data use practices and student participation in assessment and use of data.

[Enter text here]

Summary

Based on the evidence, how well overall does your program provide students with high-quality assessment and use outcome measures for program improvement?

Evidence suggests that the CTE program has **few if any** components in place to use multiple assessments and outcome measures to inform practice.	Evidence suggests that the CTE program has **some** components in place to use multiple assessments and outcome measures to inform practice.	Evidence suggests that the CTE program has **many** components in place to use multiple assessments and outcome measures to inform practice.	Evidence suggests that the CTE program has **nearly all** components in place to use multiple assessments and outcome measures to inform practice.
☐	☐	☐	☐

3. Outcome Measures
Action Plan Worksheet

Actions Needed

What steps need to be taken to close the gaps that keep your program from being high quality and highly functioning? Closing those gaps requires prioritizing the steps on timelines for completion. Consider actions at all three levels: programmatic and policy, staff, and students. Include what resources you would need to complete each step.

What steps can you take in the next:

- Month?

- Six months?

- Year?

- Three years?

4. Partnerships
Evidence Worksheet

Describe Your Program Partnerships Now

After examining your program, and based on the information collected in response to the guiding questions, summarize the evidence collected and documented that describes the current status of your CTE program's partnerships. Consider their level of involvement and commitment, and whether these partners feel a sense of ownership or commitment to their work. Finally, summarize the level of partner integration into policy and program documents and staff and student engagement.

Summary: Evidence of partnerships in policy and program documents

[Enter text here]

Summary: Evidence of partners' engagement with staff to strengthen instructional programs

[Enter text here]

Summary: Evidence of partners' engagement with students

[Enter text here]

4. Partnerships
Strengths/Gaps Worksheet

Strengths

Based on the evidence, what strengths does your program have in developing and sustaining business and postsecondary education partners to inform and support CTE programs? Consider strengths at the programmatic and policy levels, as well as strengths in staff skills and student activities.

[Enter text here]

Gaps

Based on the evidence, what gaps exist in creating and maintaining strong and meaningful partnerships? Consider gaps at the programmatic and policy levels, as well as gaps in staff skills and student activities.

[Enter text here]

Summary

Based on the evidence, how well overall does your program develop and sustain high-quality external partnerships?

Evidence suggests that the CTE program has **few if any** components of strong and meaningful partnerships to support program improvement.	Evidence suggests that the CTE program has **some** components of strong and meaningful partnerships to support program improvement.	Evidence suggests that the CTE program has **many** components of strong and meaningful partnerships to support program improvement.	Evidence suggests that the CTE program has **nearly all** components of strong and meaningful partnerships to support program improvement.
☐	☐	☐	☐

4. Partnerships
Action Plan Worksheet

Actions Needed

What steps need to be taken to close any gaps that keep your program from being high quality and highly functioning? Closing those gaps requires prioritizing the steps on timelines for completion. Consider actions at all three levels: programmatic and policy, staff, and students. Include what resources you would need to complete each step.

What steps can you take in the next:

- Month?

- Six months?

- Year?

- Three years?

Data Source Documentation

The College and Career Ready Self-Assessment Tool for Virginia Career and Technical Education Programs is a self-assessment tool designed to facilitate continuous improvement in CTE programs. Major steps in the self-assessment process are to collect, document, and synthesize evidence from diverse sources in order to understand a CTE program's current status.

To facilitate continuous use of the tool (e.g., annual updates), users should document the data sources used each year. The template below shows one approach. Whether saved in an electronic spreadsheet or on paper, updating the list after each self-assessment cycle and consulting it before beginning the next avoids having to re-create the search. The first row shows an example filled in.

Fundamental element	Guiding question	Data source	Storage location	Responsible office	Responsible staff member/position	Timing of data updates	Notes
Outcome measures	How many and what percentage of CTE graduates enroll in postsecondary education programs?	Postsecondary enrollment documented by the National Student Clearinghouse	VDOE's SSWS tool, postsecondary enrollment reports	Information Management	Director, Information Management	Available annually, fall updates	Data are best estimates available. VDOE provides this information at no charge to school divisions.

Appendix B. CTE Career Clusters® and Pathways

The following career clusters and pathways are part of an organizational framework developed by the National Association of State Directors of Career and Technical Education Consortium (NASDCTEc) and used by the Virginia Department of Education. The clusters and pathways provide an organizational framework for educators that can help students explore different career options and better prepare for college and career. For more information, visit http://www.careertech.org/career-clusters/.

Agriculture, Food & Natural Resources

The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

Pathways

- Food Products & Processing Systems
- Plant Systems
- Animal Systems
- Power, Structural & Technical Systems
- Natural Resources Systems
- Environmental Service Systems
- Agribusiness Systems

Architecture & Construction

Careers in designing, planning, managing, building and maintaining the built environment.

Pathways

- Design/Pre-Construction
- Construction
- Maintenance/Operations

Arts, A/V Technology & Communications

Designing, producing, exhibiting, performing, writing, and publishing multimedia content including visual and performing arts and design, journalism, and entertainment services.

Pathways

- A/V Technology & Film
- Printing Technology
- Visual Arts
- Performing Arts
- Journalism & Broadcasting
- Telecommunications

Business Management & Administration

Careers in planning, organizing, directing and evaluating business functions essential to efficient and productive business operations.

Pathways

- General Management
- Business Information Management
- Human Resources Management
- Operations Management
- Administrative Support

Education & Training

Planning, managing and providing education and training services, and related learning support services.

Pathways

- Administration & Administrative Support
- Professional Support Services
- Teaching/Training

Finance

Planning, services for financial and investment planning, banking, insurance, and business financial management.

Pathways

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

Government & Public Administration

Planning and performing government functions at the local, state and federal levels, including governance, national security, foreign service, planning, revenue and taxation, and regulations.

Pathways

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

Health Science

Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.

Pathways

- Therapeutic Services
- Diagnostic Services
- Health Informatics
- Support Services
- Biotechnology Research & Development

Hospitality & Tourism

Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other food services, lodging, attractions, recreation events and travel related services.

Pathways

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

Human Services

Preparing individuals for employment in career pathways that relate to families and human needs such as counseling and mental health services, family and community services, personal care, and consumer services.

Pathways

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

Information Technology

Building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support and management of hardware, software, multimedia and systems integration services.

Pathways

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

Law, Public Safety, Corrections & Security

Planning, managing, and providing legal, public safety, protective services and homeland security, including professional and technical support services.

Pathways

- Correction Services

- Emergency & Fire Management Services
- Security & Protective Services
- Law Enforcement Services
- Legal Services

Manufacturing

Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

Pathways

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

Marketing

Planning, managing, and performing marketing activities to reach organizational objectives.

Pathways

- Marketing Management
- Professional Sales
- Merchandising
- Marketing Communications
- Marketing Research

Science, Technology, Engineering & Mathematics

Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.

Pathways

- Engineering & Technology
- Science & Math

Transportation, Distribution & Logistics

Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance.

Pathways

- Transportation Operations
- Logistics Planning & Management Services
- Warehousing & Distribution Center Operations

- Facility & Mobile Equipment Maintenance
- Transportation Systems/Infrastructure Planning, Management & Regulation
- Health, Safety & Environmental Management
- Sales & Service