

STUDENT ASSESSMENT IN CAREER AND TECHNICAL EDUCATION

NOVEMBER 2012



1585 Route 146
Rexford, NY 12148
Phone: 518-723-2137
Fax: 518-723-2140
ctetac@spnet.us

CTE Technical Assistance Center of New York: Mission and Purpose

The Career and Technical Education Technical Assistance Center (CTE TAC) of New York assists the New York State Education Department (NYSED) in carrying out its mission of improving the quality, access, and delivery of Career and Technical Education (CTE) through research-based methods and strategies resulting in broader CTE opportunities for all students.

The CTE TAC operates as part of the Successful Practices Network (SPN) under a contract with the NYSED. The CTE TAC increases the capacity of the NYSED to serve, support, and expand CTE across the state.

CTE TAC services are provided to teachers and students in:

- Local education agencies
- BOCES
- High needs school districts
- CTE professional organizations
- CTE student leadership organizations

CTE TAC Work Plan

- CTE data collection and communications
- Networking to strengthen CTE
- Integration of the Common Core State Standards
- CTE program and student leadership expansion
- CTE program approval process
- Best practices in CTE

The Career and Technical Education Technical Assistance Center of NY has made every effort to ensure the accuracy and reliability of the information contained in this white paper. The views expressed are theirs alone and do not necessarily represent the position of the NYS Board of Regents or the NYS Department of Education.

Student Assessment in Career and Technical Education

Student assessment in Career and Technical Education (CTE), and in all disciplines, serves many important purposes. While rooted in demonstrating student proficiency, assessments are also used to measure the effectiveness of curricula, teaching practices, targeted supports, program design, and other aspects of the educational system. A thoughtfully-designed assessment system can be transformative to a teacher's instructional practices (Wiggins & McTighe, 2005; Popham, 2008). CTE educators can include a system of formative and summative assessments throughout their curriculum that focuses on students' ability to demonstrate an understanding of technical — as well as academic — knowledge and skills.

The CTE Technical Assistance Center of New York (CTE TAC) proposes that teachers and instructional leaders use a system of student assessment in CTE programs that:

- reflects a variety of real-world, relevant activities requiring knowledge, skill, and values from all aspects of industry aligned to industry-standard assessments
- prepares students for the next generation assessments, i.e., assessments from the Partnership for the Assessment of Readiness for College and Careers (PARCC) consortium that will assess student proficiency in the Common Core Learning Standards
- focuses on complex and rigorous tasks requiring technical skill and literacy
- includes frequent formative assessments, embedded in instruction, to identify student strengths and needs, thereby informing curricular and instructional differentiation such as remediation, enrichment, and multiple learning modalities
- enhances effectiveness and provides opportunities to review current curriculum, instruction, and assessment through interdisciplinary collaboration and professional development.

An example of an assessment strategy that can be used throughout a course to benchmark and assess growth in a student’s technical and literacy abilities is provided at the end of this paper.

All Aspects of Industry and Industry-Standard Assessments

The Harvard Graduate School of Education’s *Pathways to Prosperity Project* clearly found that our students are best served by a rich, rigorous, and relevant high school program with direct links to multiple career pathways and postsecondary education options (Symonds, Schwartz, & Ferguson, 2011). All job growth in the past 30 years has been in careers requiring some form of postsecondary education. However, this trend does not mean that these jobs all require four-year college degrees. Careers requiring postsecondary credentials other than four-year degrees are often very rewarding career choices with high earning potential. Educational leaders must consider the importance of preparing students for a wide variety of postsecondary opportunities that lead to industry-standard degrees, credentials, and certificates. Apprenticeships are an example. As the *Pathways to Prosperity Project* states, an educational goal “that does not include a much stronger focus on career-oriented programs that lead to occupational credentials — seems doomed to fail” (Symonds et al., p. 7).

In order to prepare our CTE students for college and career readiness, student assessments must be aligned to standards that cross all aspects of industry. These standards lie at the core of industry-standard assessments and include those relating to universal precautions, health and safety practices, industry practices, certification exam blueprints, academic standards, workplace readiness skills, digital literacy, and technological applications. In order to prioritize — and align curriculum to — these standards, teachers should rely on feedback from advisory committees, curriculum maps, resources provided by professional associations, and instructional materials developed by publishers and other content providers, as well as their own expertise. Specific industry-standard curricula and assessments are not officially endorsed by the New York State Education Department, the Board of

Regents, or the CTE Technical Assistance Center; however, many options are supported. The examples used in this paper are among many options and do not represent an exhaustive or exclusive list.

Curricula and assessments such as ServSafe, OSHA 10, The American Red Cross, and CareerSafe Online can provide valuable resources and assessments relating to universal precautions and workplace safety. Industry standards are often set by professional organizations and their educational affiliates and foundations. Examples of industry standards used in CTE include the National Automotive Technicians Education Foundation (NATEF), the American Welding Society (AWS), the National Institute for Metalworking Skills (NIMS), the National Center for Construction Education and Research (NCCER), and HVAC (Heating, Ventilation, and Air Conditioning) Excellence. State licenses are often used as assessments for CTE programs, especially in programs such as law enforcement, cosmetology, and health occupations. Other curricula and assessments, such as *Engineering by Design* from the International Technology and Engineering Educators Association (ITEEA), are provided by professional educator associations. The assessment blueprints for these industry-standard assessments should be considered when developing curriculum and classroom assessments.

Workforce and postsecondary partners have validated the importance of integrated academic knowledge and skills for college and career readiness. CTE assessments should have explicit correlations related to the Common Core Learning Standards and other state academic standards where appropriate. The Successful Practices Network, the parent organization of the CTE TAC, offers a variety of tools and resources that promote the integration of academic and career-related knowledge and skills. Workplace readiness skills can be formally assessed through work-based learning opportunities as well as assessments such as WorkKeys or the National Work Readiness Credential. The International Society for Technology in Education (ISTE) publishes a list of its National Educational Technology Standards for Students (NETS•S) that can be a resource to consider when teaching technological

knowledge and skills. The NETS•S standards include many 21st century skills linked to specific technological applications.

In New York State, every approved CTE program must culminate in industry-standard written and performance-based assessments. Completion of a rigorous CTE program of study and success on the industry-standard assessments provide added value to the high school experience. Such a program of study allows students to earn a Regents Diploma with Advanced Designation and a Technical Endorsement. These students can also earn certifications that are the same as — or stepping stones to — certifications earned in related postsecondary education programs. The technical endorsement, industry-standard certification, and preparation for assessments used in postsecondary education all align to the NY Board of Regents' goal that all students graduate from high school both college and career ready.

Alignment to Academic and Other Assessments

The previous section discussed the importance of aligning student assessments to all aspects of industry, especially industry-standard assessments. Students also take numerous academic assessments throughout their schooling, including standardized, high-stakes exams. Currently, New York students must pass five Regents exams as a requirement of earning a high school diploma. The landscape of these exams may be changing, however, considering conversations by the Board of Regents about flexibility for CTE and STEM (Science, Technology, Engineering, and Mathematics) pathways and other proposals. Also, the English language arts (ELA) and math Regents exams are being aligned to the Common Core Learning Standards, with an eye on replacing these tests in the next few years by the next generation assessments that are being designed by the multi-state PARCC consortium.

The PARCC assessments will be radically different from the Regents exams in ELA and math. PARCC has identified six priorities that will drive the development and implementation of this new assessment system:

1. Determine whether students are college and career ready or on track
2. Assess the full range of the Common Core Standards, including standards that are difficult to measure
3. Measure the full range of student performance, including high- and low-performing students
4. Provide data during the academic year to inform instruction, interventions, and professional development
5. Provide data for accountability, including measures of growth
6. Incorporate innovative approaches throughout the assessment system (Achieve, 2012a, p. 1).

The PARCC assessment is expected to be delivered online, with students being assessed with a more performance task — and problem solving — based approach than the Regents exams or other similar standardized tests (Achieve, 2012b). Students will be required to produce original works such as brochures, letters, and written explanations of the computations used to, for example, solve a math problem.

Many students considering postsecondary options must take postsecondary-related assessments such as the SAT, ACT, Accuplacer, and Compass. Students who do not score high enough on these measures are often accepted into postsecondary institutions but are required to take additional developmental, non-credit-bearing courses. Students who are placed into such remedial courses face higher costs and run a higher risk of not completing their educational degree or certificate program (International Center for Leadership in Education, 2012). Therefore, CTE teachers should include assessment practices that embed, refresh, and reinforce academic knowledge and skill so that students are prepared to score well on those assessments.

Rigor and Literacy

Student assessments must be rigorous. Rigorous does not simply mean “harder” or more extensive in content; rather, the student must analyze, synthesize, and evaluate knowledge and skills in a variety of settings (Jones, 2012). Rigorous CTE assessments include industry-related as well as generic literacy skills. For example, literacy skills encourage and nurture students’ abilities to devise alternative solutions to solve problems. Literacy skills also provide opportunities for the student to explain and advocate for his or her own career-related solutions and ideas. Increasing the emphasis on literacy-based strategies encourages and helps students to process and communicate ideas in the context of their prior knowledge, opinions, and emotions; combine ideas from different sources; and find new and more effective ways to share information with others (Lewin, 2003).

Literacy is much more than just reading and writing. The breadth of information and communication technologies used every day (especially in the workplace) necessitates the development of literacy skills such as Internet research skills, ensuring the validity of information sources, information interpretation skills, and critical thinking (Thornburg, 2002; Harwell, 2011). Employers are looking for new hires with technological fluency and communication skills as basic employment considerations, even before career/technical skills (Thornburg, 2002). Studies of text complexity indicate that students need a high level of literacy and reading comprehension skills in order to make use of workplace-specific manuals, technical textbooks, documents, instructions, contracts, specifications, employee handbooks, and other forms of informational material (Daggett, 2003). No longer can education be thought of as knowing (academics) and doing (technical); literacy relating to both academic and technical knowledge and skills is required for college and career readiness (International Center for Leadership in Education, 2012).

One way to increase the rigor of assessments by addressing literacy skills is to have students select and evaluate relevant documents and sources - other than their textbook - that could be used to enrich the resources available for reference and learning (Braunger, Donahue, Evans, & Galguera, 2005). Students would be asked to explain how they determined that the each new source was sound, current, and applicable to their CTE course of study.

Formative Assessments

Formative assessments should be used alongside instruction to ensure student mastery of the content and a deep understanding of its application (McMillan, 2010). Frequent use of formative assessments throughout the curriculum allows teachers to adjust instructional practices as students grow in different aspects of the curriculum (Hargis, 1987; Organisation for Economic Co-Operation and Development (OECD), 2005; Popham, 2008; Solomon, 2009, McMillan, 2010; Gregory & Kuzmich, 2011). Formative assessments are “periodic check-ups” that give students feedback on their own achievement and performance. They also provide valuable data for teachers for planning, pacing, and adjusting instruction while identifying individual student needs. Teachers can use a variety of formative assessments to identify what their students know and are able to do, then adjust instructional strategies and learning opportunities accordingly. Students can use their own performance on formative assessments to take charge of their own learning, a practice which builds self-esteem (McMillan, 2010; Gregory & Chapman, 2011). Instead of teaching to an imaginary “average” student, teachers who effectively use information from formative assessments can challenge each student appropriately to meet and surpass his or her own ability and performance levels. Doing so helps to ensure that high-achieving students avoid boredom and that struggling students are not discouraged and disengaged by being pushed too hard (Glass, 2011; Gregory & Chapman, 2011).

High-level formative assessments require “thinking about one’s knowledge and using knowledge for problem-solving, critical thinking, and reflection”; and that “thinking and reasoning become the focus of teaching, as contrasted with dispensing knowledge” (McMillan, 2010, p. 45). Each student’s instructional objectives must be determined with the student’s ability as the starting point (Hargis, 1987; Gregory & Chapman, 2011). From that mark, the teacher can drive the student to the next ability level. Such “stretch learning” requires “adaptive thinking, integration of knowledge, creativity, and cognitive complexity” (Kuzmich, 2010, p. 7), especially when embedded within interdisciplinary assessments. This kind of differentiation may seem like a daunting task, but Gregory and Chapman (2011) offer comfort and counsel to teachers by suggesting that teachers do not look at this process of having to come up with different tests and activities for each student. Instead, the process of differentiating and using formative assessments means “finding interesting, engaging, and appropriate ways of honoring diversity and helping students learn new concepts and skills” (p. 169). In this way, teachers work with each student to discover, learn, and grow rather than concerning themselves with trying to write tests and projects for myriad ability levels and backgrounds.

Ongoing formative assessment provides students with data and feedback on their individual performance, thereby encouraging them to target their own deficiencies while developing proficiency and building self-sufficiency (OECD, 2005; McMillan, 2010). In this way, the students not only learn more about the areas in which they need to improve, but this awareness can also help students discover links to knowledge and skill in which they are already proficient. Because formative assessments are not necessarily reflected in their course grades, students are encouraged to take risks with their understanding of knowledge and skill and learn from their successes and mistakes prior to the summative assessment. Also, by providing feedback and giving students the means to measure and monitor their own progress, teachers plant the seeds for students to continue to do such as lifelong learners (Solomon, 2009).

Data from formative assessments can also provide insight into student learning that should inform practices throughout the entire school and district (OECD, 2005). In support of the use of formative assessment as a measure of teacher effectiveness, Popham writes “because evidence of improved student learning is likely to be regarded as evidence of a teacher’s own instructional effectiveness, formative assessment has the happy effect of helping successful teachers be accurately regarded as successful” (2008, pp. 13-14).

Professional Development

All of the assessment strategies described in this paper must be supported by ongoing and interdisciplinary professional development. Teachers must be given the tools and time to review their own assessment practices, learn a variety of new assessment strategies, reflect on their students’ performance, review data, and evaluate their own practices and needs. Conversations about student achievement should cross disciplinary boundaries and include reviewing test scores as well as inquiry about student abilities, motivations, and practices (Braunger et al., 2005). Teachers who work together in interdisciplinary professional teams support each other, see student achievement as a shared responsibility, and better attend to the school’s mission (International Center for Leadership in Education, 2012). Much of the work of integrating rigorous literacy strategies into assessment can be challenging, especially when teachers from different programs, departments, and subject areas start to work together. However, if all teachers share a common vision of student achievement and success, the opportunity for teachers to work together reviewing data and engaging in collaborative reflection can become an enriching and rewarding activity.

For example, the previously described inclusion of literacy strategies in technical assessments must be rooted in research-based practices on literacy in the content areas. This can be a daunting task, as “there is no shortage of books of instructional strategies for content reading in secondary

classrooms” (Braunger et al., 2005, p. 97). Embedding literacy into student assessments does not have to start as a complex exercise, however. Assessments inclusive of literary strategies can begin simply then build and expand as teacher comfort and student ability levels grow: from basic journaling activities to complex formal writing assignments.

Finally, teachers must also develop their skillsets in data literacy and data-driven decision making to inform instruction. Data analysis includes assessment history, gap analysis, informal student observations, employability profiles, formative assessments, Response to Intervention (RtI), Academic Intervention Services (AIS), and progress on Individualized Education Programs (IEPs). Student learning opportunities informed by such data analysis will support a variety of learning strategies through targeted and differentiated instruction, which are in turn evaluated through rigorous and relevant assessments.

A Practical Example

An assessment strategy that may be particularly useful is to have students read a block of text (or a brief series of readings) relating to their CTE program and targeted toward specific knowledge and skills. Students would then answer open-ended questions with short answers and/or journal entries. Writing complete, thoughtful, and accurate responses requires a combination of literacy skills and technical knowledge.

Such a strategy could be particularly appropriate as a measure of student growth if the assessment is repeated throughout the semester or school year. For example, at the beginning of the course, the students would be told that each week they will be required to read a short piece of technical literature (journal article, short story, procedural guide, manual, etc.) and write/blog/journal their responses to a set of questions that require both technical knowledge and application skills. During the first weeks of class, students are shown the process and are given the chance to practice their short-

answer writing abilities. In the first instance of the formative assessment itself, the student would be given a paragraph or two to read. The student would then answer a variety of open-ended questions from the reading, defending their responses. If the student does not have adequate knowledge of the subject matter, lacks appropriate literacy skills, or is not proficient in synthesizing information, his or her responses would indicate areas requiring attention and improvement. These first few readings and responses would serve as an indicator of the student's benchmark level of literacy, comprehension, application, and deep understanding — and specific areas needing growth.

Each administration of the formative assessment would be evaluated against a rubric based on learning criteria related to technical, literacy, comprehension, communication, and application skills (or other related criteria). Collaborative review of student work among academic and CTE teachers would provide students with feedback to help them further develop knowledge and skills. As the student grows in understanding the content and has practiced applying knowledge and skill in performance-based tasks, his or her responses should demonstrate increasing use of technical vocabulary, deeper understanding of the subject area, use of references outside of the article, and application of the information contained in a specific work to other contexts. The readings themselves could also grow in length and difficulty as the students' literacy and technical skill levels increase.

The final summative assessment at the end of the semester or school year could be presented by each student to a panel made up of advisory committee members, other teachers, parents, and even student peers. The assignment would take the same form as the prior activities, but could be made up of multiple written works requiring improved reading stamina from the one or two paragraphs started at the beginning of the year. The stakeholders/external assessors would provide the final grade based upon a mutually agreed-upon rubric containing the same criteria as the formative assessment. This culminating assessment should demonstrate a high level of the student's technical knowledge and skill as well as strong literacy, communication, problem-solving, and application skills in a well-rounded

measure of proficiency. The coordination and support required to involve external evaluators in this process may seem daunting; however, their involvement further prepares students for college and career readiness since the students will hear directly from potential future employers and postsecondary educators.

Through the use of such an assessment strategy, the students will demonstrate growth in technical and academic knowledge and skill as well as their ability to apply and demonstrate that proficiency in a much more rigorous, relevant, and meaningful way than a multiple-choice, matching, or other closed-response assessment. Students will also become familiar with a routine of continual, interdisciplinary formative assessments.

Conclusion

In order to prepare students for college and careers, CTE educators have historically provided a wealth of authentic and practical learning experiences to their students. Assessment systems should be developed that mirror the rigor, relevance, knowledge, and skill requirements of real-world problem solving:

- Because no on-the-job task can be properly completed without applying knowledge, skills, and values relating to safety, work ethic, and academics, these assessments must include aspects of industry-related practices and contexts.
- Since our CTE students face a variety of academic and technical assessments throughout their educational careers, CTE educators should align their classroom assessments to promote student success in these high-stakes evaluations.
- Real-world work and problem solving require high levels of literacy and technical knowledge and skill; therefore, classroom assessments should be rigorous and relevant in order to prepare students for college and careers.

- Assessments should not focus primarily or exclusively on demonstrating proficiency in knowledge and skills or only at the end of a lesson. Instead, the use of formative and periodic summative assessments should help the CTE teacher to modify instruction to meet students “where they are” and encourage them to take control of their own learning.
- Extensive professional development, including reflection and reviewing data, is required in order to ensure that CTE teachers effectively and efficiently design, assess, and evaluate student progress within such a complete system of assessments.

By stretching learning opportunities and assessments to build technical and literacy knowledge and skill, teachers help to ensure that their students are ready for college and career choices that prepare them for success in an emerging and converging workforce. Teachers will also demonstrate their own instructional effectiveness by providing learning opportunities that meet their students where they are, allocating time and resources to build student proficiency efficiently. Finally, students will play an active role in monitoring and growing their own successes.

Our students, our workforce, and our country rely on our students being this well prepared.

Lead the way!

References

- Achieve, Inc. (2012a). PARCC assessment design. Downloaded from <http://parconline.org/parcc-assessment-design>
- Achieve, Inc. (2012b). High school assessments. Downloaded from <http://parconline.org/high-school-assessments>
- Braunger, J., Donahue, D., Evans, K., & Galguera, T. (2005). Rethinking preparation for content area teaching: The reading apprenticeship approach. San Francisco, CA: Josey-Bass.
- Daggett, W. (2003). Achieving reading proficiency for all. International Center for Leadership in Education. Downloaded from <http://www.leadered.com/pdf/Reading%20White%20Paper.pdf>
- Glass, K. T. (2011). Differentiated instruction and strategies. In G. Gregory (Ed.), *Differentiated Instruction*. (pp. 87-109). Thousand Oaks, CA: Corwin.
- Gregory, G., & Chapman, C. (2011). Creating a climate for learning. In G. Gregory (Ed.), *Differentiated Instruction*. (pp. 1-12). Thousand Oaks, CA: Corwin.
- Gregory, G. & Kuzmich, L. (2011). Curriculum approaches for data-driven instruction. In G. Gregory (Ed.), *Differentiated Instruction*. (pp. 49-86). Thousand Oaks, CA: Corwin.
- Hargis, C. (1987). Curriculum based assessment. Springfield, IL: Thomas Books.
- Harwell, S. (2011). Career and technical education for college and career readiness – Convergence of academics and CTE. Rexford, NY: International Center for Leadership in Education.
- International Center for Leadership in Education. (2012). Convergence of academics and career and technical education. Rexford, NY: International Center for Leadership in Education.
- Jones, R. (2012). Using rigor and relevance to create effective instruction. Rexford, NY: International Center for Leadership in Education.

Kuzmich, L. (2010). *Stretch learning: Rigor and relevance for an unpredictable world*. Rexford, NY: International Center for Leadership in Education.

Lewin, L. (2003). *Paving the way in reading and writing: Strategies and activities to support struggling students in grades 6-12*. San Francisco, CA; Josey-Bass.

McMillan, J. H. (2010). The practical implications of educational aims and contexts for formative assessment. In H. L. Andrade & G. J. Cizek (Eds.), *Handbook of formative assessment*. New York, NY: Routledge.

Organisation for Economic Co-Operation and Development (OECD). (2005). *Formative assessment: Improving learning in secondary classrooms*. Paris, France: OECD.

Popham, W. J. (2008). *Transformative assessment*. Alexandria, VA: Association for Supervision and Curriculum Development.

Solomon, P. G. (2009). *The curriculum bridge: From standards to actual classroom practice*. Thousand Oaks, CA: Corwin

Symonds, W. C., Schwartz, R. B., & Ferguson, R. (2011). *Pathways to prosperity: Meeting the challenge of preparing young Americans for the 21st century*. Cambridge, MA: Harvard Graduate School of Education

Thornburg, D. (2002). *The new basics: Education and the future of work in the telematic age*. Alexandria, VA: Association for Supervision of Curriculum and Development.

Wiggins, G. & McTighe, J. (2005). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.