Perkins V and Continuous Improvement

By Michael Herrera & Todd Luke

THE STRENGTHENING CAREER AND TECHNICAL EDUCATION FOR THE 21ST CENTURY ACT (PERKINS V) reauthorization requires a continuous improvement process within programs of study as well as defines explicit professional development guidelines that provide all levels of support in working toward providing the best possible delivery of programs in career and technical education (CTE) across the country. Pennsylvania, in compliance with Perkins IV, adopted the programs of study for CTE. Programs of Study (POS) are designed to provide students with the recommended academic and technical competencies needed for employment in Pennsylvania. These competencies were also aligned with Workforce Investment Boards (WIB) high-priority occupations (HPO), which are high-wage and high-demand careers within the region of the WIB. At the same time, the Pennsylvania Department of Education required that all CTE finishing participants within a program of study complete an end-of-course examination that measures competency within the program of study. The two approved assessments in Pennsylvania were the National Occupational Competency Testing Institute (NOCTI) and the National Institute for Metalworking Skills (NIMS). The NOCTI is administered in Pennsylvania, utilizing the pretest and post-test design model. The pretest is given at the beginning of the senior year in the fall to assess students' competence and readiness for graduation. The post-test is administered at the completion of the POS or the end of the school year. The pretest allows

for diagnosis of the data to increase students' level of competence when measured by the post-test just prior to graduation. It is essential for CTE schools to document that they are helping all students improve and achieve in their CTE programs. A large number of career and technical students entering high school will need additional support if they are to be successful in their highly specialized and technical areas of study.

Research shows that instructors are the single greatest indicator of success in the classroom

(Hattie, 2009). This data allows teachers to reflect and, in some instances, be willing to improve their current instructional practices by incorporating proven content literacy-based strategies. Upper Bucks County Technical School (UBCTS) believes professional development should be ongoing, job-embedded and sustainable for it to be successful, which provides the ability to strategically plan, act, reflect and adjust accordingly. "This approach allows me the opportunity to work closely and collaboratively with a group of dedicated and professional staff members for the purpose of preparing our students for success in the workplace," said Michael Herrera.

Pennsylvania has developed some comprehensive data-analysis methods as well as a professional data network that foster teacher collaboration around a common method of data analysis whereby solutions and improvements can be developed and shared locally, regionally and statewide to improve curriculum delivery to all career technical students.

UBCTS is a regional career and technical center located in scenic Bedminster Township in Perkasie, Pennsylvania. UBCTS proudly serves more than 750 students in grades nine through 12 from the Palisades, Pennridge, and Quakertown school districts in a newly renovated state-of-the-art facility. Students receive career and technical training in 21 program areas while earning industry-recognized certifications and college credits through articulation agreements with area colleges. UBCTS has received recognition for a high percentage of students scoring at the advanced level on the NOCTI and NIMS assessments. To recognize outstanding achievement on these assessments, the Pennsylvania Department of Education (PDE) annually recognizes CTE centers in which at least 75 percent of students in all of the school's approved CTE programs achieve the performance level of "advanced" on the NOCTI or NIMS assessment.

Perkins V reauthorization and the need for a data-driven continuous-improvement model prompted the UBCTS leadership team to examine the NOCTI data over a three-year period and analyze that data for trends that could be improved within a program of study. There were several methods utilized for data analysis. NOCTI provides extensive reports that provide competency-level data. Each program of study is broken down by competency, allowing for a multi-year comparison (See Table 1). Each competency shows how many questions are asked during the assessment and the mean score of the group tested. This provides an opportunity to examine a three-year average for each competency to identify low performance trends within the data. The key shows the green levels set at a level over 80% mean score, which would be the lowest level set for mastery learning. This would be considered *distinguished* within the Pennsylvania model of teacher effectiveness. The yellow levels denote a class mean of 51% to 79%, which would be considered *proficient*. The final levels are the areas identified in red, which contain mean scores below 50% and would be identified as *needing improvement*. As the table shows, there are six areas within this program of study that have low mean scores based on a three-year mean.

Compentency Number	Competency	Items Possible	1617 Mean	1718 Mean	1819 Mean	3 year Mean
1	Demonstrate knowledge of safety and environmental requirements in the collision repair industry	7	4.6	5	5.4	5.0
2	Demonstrate appropriate care and maintenance of shop tools and equipment	4	3.1	3.6	3	3.2
3	Identify proper safety techniques for the use of shop equipment, including PPE	10	8.7	7.2	8.7	8.2
4	Apply basic business practices within the collision repair industry, including estimating	11	7.7	5.2	8	7.0
5	Identify employability skills within the collision repair industry	4	3.4	2.8	3.3	3.2
6	Demonstrate vehicle protection procedures	4	2.6	2	2.7	2.4
7	Describe various cutting and weld removal processes	4	2.1	1.2	2.1	1.8
8	Describe and differentiate various types and uses of welding processes	12	7.1	3.2	7	5.8
9	Replace and/or repair structural components	4	2	2.4	2.4	2.3
10	Select, set up, and utilize manual measuring systems	3	1.4	1	0.7	1.0
11	Select, set up, and utilize computerized measuring systems	3	1.9	1	1.7	1.5
12	Demonstrate set-up and operation of various pulling systems	4	2.6	1.8	2.6	2.3
13	Diagnose primary and secondary structural damage	10	7.6	5.4	6.3	6.4
14	Demonstrate knowledge of working with high strength steel	4	3.1	2	3	2.7
15	Identify automotive plastics and proper repair procedures	8	6.3	5.6	6.1	6.0
16	Diagnose primary and secondary non-structural damage	5	3.7	2.4	4.3	3.5
17	Demonstrate knowledge of movable and stationary glass	5	2.6	1.6	2.1	2.1
18	Utilize basic corrosion protection procedures	4	2.3	3	2.4	2.6
19	Use adhesive bonding procedures	4	3.1	2	3.3	2.8
20	Remove and replace automotive trim	4	2.1	2	2.6	2.2
21	Remove, install, replace, align, or repair non-structural panels	10	6.7	5.2	6.9	6.3
22	Remove, install, and replace ancillary components (e.g., headlamps, under-hood fuse boxes)	3	2	0.8	1.7	1.5
23	Identify basic steering and suspension components (e.g., tie rod ends, ball joints, steering racks)	9	5.9	4.4	5.7	5.3
24	Identify how collision damage affects basic suspension geometry	6	3.9	3.2	3.4	3.5
25	Verify functions of electrical system and basic wiring repair (e.g., soldering, quick connectors)	8	4.3	3.4	5	4.2
26	Perform basic mechanical and electrical diagnostic operations	10	8	5.8	7.9	7.2
27	Identify painting and refinishing safety and environmental requirements	5	3.6	4	3.3	3.6
28	Identify and demonstrate surface preparation techniques	6	4.1	3.8	3.7	3.9
29	Identify and demonstrate paint materials preparation techniques	6	3.9	2.8	4	3.6
30	Identify causes and remedies for paint defects	5	4	3	3.3	3.4
31	Identify and demonstrate paint materials application techniques	6	4.7	3.6	5.3	4.5

LEGEND	
	Distinguished
	Proficient
	Needs Improvement

TABLE 1

SAMPLE 2018-19 NOCTI POST-TEST CUSTOM REPORT:

The last competencies we look for have a class average below 50 percent. These could be considered in the needs improvement or unsatisfactory category based on the Teacher Effectiveness Model.

[1] "Structural / 3 / Select, set up, and utilize manual measuring systems"

[2] "Non-Structural / 5 / Demonstrate knowledge of movable and stationary glass"

SAMPLE 2019-20 NOCTI PRETEST CUSTOM REPORT:

The last competencies we look for have a class average below 50 percent. These could be considered in the needs improvement or unsatisfactory category based on the Teacher Effectiveness Model.

[1] "Business Fundamentals / 6 / Demonstrate knowledge of estimating terminology"

[2] "Metal Inert Gas (MIG)/Gas Metal Arc Welding (GMAW), and Squeeze-Type Resistance Spot Welding (STRSW) / 4 / Demonstrate understanding of welder set-up and maintenance"

[3] "Metal Inert Gas (MIG)/Gas Metal Arc Welding (GMAW), and Squeeze-Type Resistance Spot Welding (STRSW) / 6 / Describe and differentiate various types and uses of welding processes"

[4] "Structural Repairs / 3 / Select, set up, and utilize manual measuring systems"

[5] "Structural Repairs / 3 / Explain and identify computerized 3-D measuring systems"

[6] "Structural Repairs / 3 / Demonstrate knowledge of working with various strengths of metals"

[7] "Non-Structural Repairs / 3 / Identify automotive plastics and proper repair procedures"

[8] "Non-Structural Repairs / 5 / Demonstrate knowledge of movable and stationary glass"

[9] "Non-Structural Repairs / 7 / Remove, install, replace, align, or repair non-structural panels"

[10] "Mechanical and Electrical Systems / 3 / Identify a basic safety restraint system (SRS)"

These six areas identified should become the focus of continuous improvement with a student-learning objective (SLO) process or just a program-improvement process looking at curriculum, assessment and projects that help transfer these competencies to the student.

Another method to examine the data is through the use of a customized report that is created for each POS. The report breaks down each NOCTI test, showing areas with mastery learning: *distinguished* above 80%; *competent* 51% to 79%; and *needs improvement* below 50%.

An excerpt from the 2018—2019 school year post-test report is shown in Table 2. The report shows that there were two specific competencies where students scored below a 50% class mean. The first is within the standard of "structural" where there are three questions in regard to "select, set up, and utilize manual measuring systems" and under the standard of "non-structural" where there are five questions in regard to "demonstrate knowledge of movable and stationary glass."

The next step is a comparison of the 2018-2019 post-test data to the 2019-2020 pretest data. The students who were assessed in the 2018-2019 post-test have graduated having two areas of deficiency. Next, examine the 2019-2020 pretest. Notice there are 10 areas below 50% mean, and the two areas from the previous year are on both lists. The students change, but those areas remain constant.

If the curriculum is delivered in the same manner as the previous year, it is highly probable that these two areas will remain deficient.

It is also highly probable that all the other competencies will be corrected just as in the previous assessment. These are the types of trends the teacher will identify with a deeper dive into the data.

A final method of data analysis involves the creation of a dashboard. The dashboard shows all standards or units of instruction assessed by the NOCTI, and the number in each standard denotes the percentage of questions the students answered correctly as a group.

These three methods allow for a complete examination of the curriculum and

Collision Repair 1617		Collision Repair 1718		Collision Repair 1819	
Safety	78	Safety	75	Safety	82
Business	74	Business	53	Business	75
MIG/GMAW	58	MIG/GMAW	37	MIG/GMAW	60
Structural	69	Structural	47	Structural	60
Non-Struc.	67	Non-Struc.	53	Non-Struc.	68
Mechanical	67	Mechanical	51	Mechanical	67
Painting	72	Painting	61	Painting	70

TABLE 2

instruction within the POS. The teacher can now utilize this data in a laser-focused diagnostic and prescriptive manner to improve the POS and the achievement of the students as determined by the NOCTI assessment. The process involves a two-step change whereby the teacher can perform what we refer to as "polishing" the seniors to prepare them for the post-test using the data that identifies challenges for each student. In addition, the teacher can create and teach the lessons differently during the initial instruction to improve pretest assessment scores. This creates a systemic change in the curriculum.

Once all areas below 50% mean scores have been improved for all standards, the 50% mean will be elevated to a 60% and the process will continue. Once 60% has been improved, we adjust to a 70% mean and continue. This creates a true continuous improvement model that can be customized to each POS to meet the needs of the students.

The potential to replicate this process is paramount to the system in Pennsylvania whereby hundreds of sites that deliver a POS and measure with a NOCTI can use their data regionally and statewide to help improve curriculum and instruction across all programs of study in Pennsylvania. This model could be replicated between various programs of study across the nation if schools have the commonality of assessing with the NOCTI exam.

> Data is a powerful tool and, if used properly, can create high levels of achievement

elevating CTE in the United States to an entirely new continuous improvement level.

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Todd Luke is currently president of MAX Teaching, Inc., a position that allows him to share his passion for the art and science of teaching. His 35 years in CTE include service as a teacher, administrator and board member.

For more information on how you can implement a continuous improvement model or establish a PLN, contact mherrera@ubtech.org or todd@maxteaching.com.

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