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Career and Technical Education, Accountability, and Program Quality Indicators Under Perkins V

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SUMMARY

How should education agencies support, measure, track, and incentivize change in the quality of career and technical education (CTE)? States and the U.S. Department of Education are wrestling with this question as they re-envision CTE resources and accountability under the 2018 Strengthening Career and Technical Education for the 21st Century Act, commonly known as Perkins V.\(^1\)

The Perkins Act provides funding to states for CTE programs, primarily in public high schools and colleges. As with any federal funding stream, Perkins obligates recipient states to meet reporting and accountability requirements to help ensure that funds are used well.

Perkins V sought (1) to give states more flexibility in how they administered CTE, and (2) to have states strategically connect the outcomes of CTE programs to the “education and skill needs of employers.” One component of Perkins V that speaks to both of these aims has recipient states select an indicator of high school CTE program quality from a list of three options, each of which potentially says something about how attuned students are with workforce and college skills before they graduate from high school. The three options are\(^2\)

- the fraction of CTE concentrators earning a postsecondary credential by high school graduation,
- the fraction of CTE concentrators earning postsecondary credits by high school graduation, and
- the fraction of CTE concentrators engaging in work-based learning by high school graduation.

In this brief, I connect Tennessee’s CTE policy and practice to the Brookings Institution Hamilton Project framework for accountability design, and by way of example, I discuss how the \textit{postsecondary credential} program quality indicator (PQI) fares within that framework. Statistics and insights to follow were shared by request with the Tennessee Department of Education, but they do not reflect the official position of that department or any public agency.

As a measure of CTE student success, the postsecondary credential indicator has important logistical advantages over the other two, but nonetheless, it does not fare well as a candidate measure of CTE program quality in Tennessee. Fewer than 1 in 10 CTE students attain a college certificate, college degree, or industry certification prior to high school graduation, and access to these credentials appears to be very uneven across the state, across student subpopulations, and across CTE programs of study. More substantively, it is not clear if students reap returns to earning a postsecondary credential or certification “early,” in terms of their earnings or college enrollment after high school.

Unique to Tennessee, postsecondary credits, credentials, and industry certifications are already included in the state’s \textit{“Ready Graduate”} measure reported under the \textit{Every Student Succeeds Act} (ESSA). Incentivizing early credential attainment

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\(^1\) The 2018 Act is the fifth iteration of the 1984 Carl D. Perkins Act.

\(^2\) States must choose at least one program quality indicator from this list of three, and they are also required to report several other items describing CTE students: their graduation rate, their academic proficiency, the fraction going straight to college or the military, as well as any other indicators that states choose to designate. These are not “high stakes” quality measures; that is, Perkins funding is not a strict function of levels or growth in quantifications of program quality. Nevertheless, we can expect quality measures to resonate in state and district CTE evaluation and planning.
further through the state’s Perkins V plan could divert students toward postsecondary programs or certification courses that can be completed quickly, and away from coursework or opportunities with more lasting benefits or more transferable credits. As with any accountability measure, effective implementation and use of the quality indicators that states choose will depend on alignment between how quality is measured and how quality is produced.

THE HAMILTON PROJECT ACCOUNTABILITY FRAMEWORK APPLIED TO THE CREDENTIAL INDICATOR

Following the Every Student Succeeds Act of 2015, states re-invented the accountability frameworks they applied to public schools, shifting from the No Child Left Behind era’s unattained goal of universal student proficiency to broader measures of student success as well as more tailored, differentiated accountability plans across states. Foreshadowing elements of Perkins V, states selected their own indicator of student progress in addition to predefined, required measures such as graduation and achievement on standardized tests.

In 2016 and 2018 strategy papers by the Brookings Institution Hamilton Project, Bauer and co-authors outlined norms and goals for any accountability system, and they advocated for chronic absenteeism as an evidence-based measure that filled this framework well.3

Here, I apply the four-piece Hamilton Project framework for accountability design to the credential PQI.

1. **What gets measured gets done.**

Implicit in this stylized fact of accountability systems is that any effective indicator needs to be measurable. The credential PQI can be accurately measured given the current capabilities of Tennessee’s administrative data linkages. The postsecondary credit PQI is also straightforward to measure, whereas state data on work-based learning relies to some degree on student self-reporting.4

We would expect CTE students to attain more credentials and certifications if regulatory stakes were attached to this measure. Do we want postsecondary credentials to “get done” before students leave high school? This would surely support the state’s “Drive to 55” effort to raise the postsecondary attainment rate of the working-age population. I return to this question below.

2. **The goal has to be within reach.**

This was one lesson from the 2002-2015 No Child Left Behind era of school accountability, which was centered on a goal of reaching 100-percent nationwide student proficiency within 12 years. NCLB and its “moonshot” goal improved student achievement (Dee and Jacob, 2011), but by 2013, the regulatory consequences of failing to attain the unattainable were so threatening, that almost every state was given a waiver.

The goal for a hypothetical credential PQI under Perkins V, moonshot or not, has not been articulated for Tennessee. Regardless, progress toward any

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3 Ultimately, 36 states as well as Washington, D.C. and Puerto Rico chose chronic absenteeism as their state-selected ESSA accountability indicator.

4 Work-based learning for high school credit is recorded in course enrollment records. Information on the type and quality of work (industry, intensity, alignment with a student’s CTE program of study) is currently reported by students, although that reporting is not included in formal indicators for work-based learning.
credential goal would start from a very low and uneven figure. Early postsecondary credential attainment is uncommon among Tennessee students. Just 2.7 percent of CTE concentrators in the class of 2016-17 attained a postsecondary certificate prior to leaving high school, almost none attained an associate degree, 4.0 percent attained an industry certification, and 6.6 percent attained at least one of these three credentials.

As shown in Figure 1, the prevalence of credential attainment is uneven across the state and concentrated outside of metro areas. The credential PQI is particularly uncommon among Black, Hispanic, and Native American students, and it is more common among students who live closer to a Tennessee Colleges of Applied Technology than a community college or four-year school (Table 1). Credential attainment also appears to be much more common in particular programs of study, which may owe to a natural alignment between those programs and available certificates or certifications. Concentrators in Electromechanical Manufacturing and Therapeutic Services, for example, attain credentials at 16 percent and 12 percent rates, respectively, whereas just 2 percent of concentrators attain credentials from Culinary Arts, Hospitality & Tourism Management, STEM Education, or Criminal Justice programs. If the credential PQI were adopted in Tennessee, uneven access would make it difficult to evaluate differences in levels and growth of this measure across districts, student subgroups, and CTE programs.

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**Figure 1. Few CTE Concentrators Meet the Credential PQI, and Access is Uneven Across the State**
Table 1. 2015-16 CTE Concentrator Summary Statistics, by Credential Receipt

<table>
<thead>
<tr>
<th>Postsecondary credential or industry certification before high school graduation?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>49%</td>
<td>58%</td>
</tr>
<tr>
<td>Black, Hispanic, or Native American</td>
<td>27%</td>
<td>14%</td>
</tr>
<tr>
<td>ACT composite score</td>
<td>19.1</td>
<td>19.5</td>
</tr>
<tr>
<td>English I end-of-course achievement¹</td>
<td>-0.05</td>
<td>-0.19</td>
</tr>
<tr>
<td>Algebra I end-of-course achievement¹</td>
<td>-0.15</td>
<td>-0.34</td>
</tr>
<tr>
<td>Miles to nearest postsecondary institution</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Miles to nearest TCAT</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Miles to nearest community college</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Miles to nearest public university</td>
<td>22</td>
<td>31</td>
</tr>
</tbody>
</table>

¹ English I and Algebra I end-of-course exam scale scores were normalized to have a mean of zero and standard deviation equal to one within each subject and school year. Average normalized scores can be interpreted as how CTE students typically scored on those exams relative to the mean, in units equal to standard deviations.

3. **Beware: goalposts can be moved.**

Some states responded to NCLB proficiency goals by lowering proficiency standards, leading Bauer and co-authors (2018) to warn that “if states permit schools to make progress by changing the rules, the rules are not motivating.”

Colleges and certification course vendors determine whether a student merits a credential or certificate, and these institutions have plenty of stakeholders and clients aside from K-12 education agencies. At the very least, the goalposts for a credential PQI are probably less portable than internally generated and validated measures such as work-based learning.

4. **When a measure becomes a target, it sometimes ceases to be a good measure (Goodhart’s Law).**

In the Perkins V context, this adage warns against assigning too much importance to indicators that can be improved without changing the trajectory of core knowledge and skill development. Along with item 1, Goodhart’s Law raises the prospect that CTE program quality indicators will be gamed or manipulated in pursuit of Perkins or compliance, without affecting the quality or scope of CTE itself.

One recent and relevant example of Goodhart’s Law, potentially, is the way that a 2010 change in Tennessee’s higher education funding formula affected certificates awarded in the state’s community colleges. When the funding formula shifted to incentivize more college completion, the volume of short-term certificates grew immediately and rapidly. According to a 2017 Research for Action report, some viewed this as a constructive change, rewarding students for completing pieces of longer programs of study even if they did not persist further. Others questioned the labor market value of certificate awards that did not exist or were lightly used just a few years prior (Callahan et al., 2017).

One can easily imagine a credential PQI leading to a push for certificates and certifications that result from minimal changes to CTE programming and coursework.
DOES THE QUALITY INDICATOR INDICATE QUALITY?

College credentials and industry certifications are measurable, independently validated, and they directly support the state’s postsecondary attainment goals. The combination of these three advantages set the credential PQI apart from the alternatives: postsecondary credit attainment and work-based learning. Within the Hamilton Project framework, the biggest disadvantage of the credential PQI is its uneven availability across programs, places, and student populations. Even if disparities in access could be remedied, however, it is not clear that the credential PQI is a good measure to target for improvement.

Students and schools have limited time and resources, and we can expect any CTE indicator to shift how and where those resources are spent. The credential indicator would likely elevate the importance of postsecondary certificate and industry certification programs that can be completed within a short time, potentially at the expense of coursework, postsecondary credit opportunities, and work-based learning that culminates after high school in a more advanced college credential, recognized industry certification, or in-demand skill. Returns to college credentials tend to be higher for students who complete longer programs: multi-year certificates, associate’s degrees, and bachelor’s degrees.

Figures 2 and 3 illustrate the workforce and college outcomes of CTE concentrators meeting this PQI. Clearly, those attaining credentials are more likely to go straight to college: 69 percent versus 63 percent. Among those who do not go to college after high school, credential-holders are 5 percentage points more likely than other concentrators to have in-state earnings covered by Unemployment Insurance. Among earners, credential-holders made $405 more than other CTE students did, although average earnings in both groups are nevertheless below the $12,060 poverty line for a one-person household in 2017.

Table 1 shows that credential holders are observably different than other concentrators, and those observable features are known to be correlated with postsecondary and workforce outcomes. In order to get closer to an apples-to-apples comparison, I use regression analysis to condition Figure 2 and 3 outcomes on credential attainment as well as student race, gender, ACT and end-of-course achievement, and fixed characteristics of their schools. Results in Table 2 suggest that credential holders are conditionally 3 percentage points more likely to go to college than other CTE concentrators sharing similar characteristics and graduating from the same high school, and that among those who go to work instead of college, credential holders earn about the same as other concentrators the first year.
Figure 2. Class of 2016 CTE Concentrators Meeting this PQI were More Likely to Go on to College (69 versus 63%), Driven by a Much Higher Likelihood of Enrolling in a Technical College (TCAT)

Figure 3. Among Class of 2016 CTE Concentrators who did not Go on to College in 2016-17, Concentrators Meeting this PQI Earned More Than Other Concentrators
Conditional differences such as those in Table 2 are not, however, strong pieces of evidence that postsecondary credentials or certifications are responsible for credential-holding students having different outcomes after high school, or that today’s students would do just as well, or better, or worse, if they were given new opportunities to attain a credential while still in high school. Most importantly, we do not observe all of the student characteristics that lead some to attain a credential. Important features such as post-graduation college and work plans and family resources would drive some students to attain a credential and would later affect their college and work outcomes through channels other than the credential in-hand.

Table 2. Differences in Postsecondary Outcomes Between 2015-16 CTE Graduates With and Without Postsecondary Credentials

<table>
<thead>
<tr>
<th></th>
<th>College enrollment in the year after high school</th>
<th>Workforce outcomes, if not enrolled in college</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any college</td>
<td>TCAT</td>
</tr>
<tr>
<td>Difference between</td>
<td>Community College</td>
<td>4-year college or university</td>
</tr>
<tr>
<td>credential/certification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>recipients and other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015-16 CTE concentrators</td>
<td>0.05***</td>
<td>0.11***</td>
</tr>
<tr>
<td></td>
<td>-0.02</td>
<td>-0.04***</td>
</tr>
<tr>
<td>Difference</td>
<td>0.03**</td>
<td>0.12***</td>
</tr>
<tr>
<td>Conditional difference,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>controlling for student</td>
<td>-0.05***</td>
<td>-0.03**</td>
</tr>
<tr>
<td>achievement, demographics,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>exceptionalities, and</td>
<td>0.05**</td>
<td>-69.56</td>
</tr>
<tr>
<td>school</td>
<td>0.03**</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The top row of figures lists average differences in college and workforce outcomes between credential/certification recipients and other CTE concentrators. The bottom row lists those same differences, regression-adjusted to control for student demographics, achievement, and school fixed effects.

*** statistically significant at 99%, ** 95%, * 90%

Without the benefit of an experimental or quasi-experimental study of the any of the three candidate PQIs, we can look to research from other settings to assess their potential effects. A long-term experimental evaluation of Career Academies found that this model, which integrates a career theme and employer partnerships into small learning communities within comprehensive high schools, raised participant earnings 11 percent over eight years, had no significant effect on postsecondary enrollment, and raised the likelihood of family formation (Kemple and Snipes, 2000; Kemple, 2008). It is difficult to disentangle which pieces of the Career Academy model were more responsible for these positive developments or if the sum was greater than the parts, but Kemple (2008) offers suggestive evidence that the work-based learning component was important: “Career awareness and
development activities were associated with more substantial labor market impacts.”

Other studies have found benefits from credit-bearing early postsecondary opportunities, largely in terms of later college enrollment, persistence, or completion. See Smith et al. (2017) for evidence that Advanced Placement credit increases the likelihood of college completion, as well as a What Works Clearinghouse synthesis of findings for dual enrollment.

There is very little research on the postsecondary or career effects of earning a college credential prior to graduating high school. The closest model that has been studied may be early college high schools, which blend dual-credit college courses with college preparatory courses in a way that allows students to complete an associate’s degree, or two years of college credit prior to graduating high school. Many early colleges have lottery-based admission, and researchers have found that this quasi-experimental access to early colleges is causally linked to higher rates of high school graduation, college enrollment, and college attainment (Berger et al, 2013; Edmunds et al., 2017). Effects on earnings are not yet known, and much like Career Academies, it will be difficult to isolate the contribution of one piece—early attainment, here—from the broader effects of a holistic school model. We know from studies of adults in college that there can be labor market returns to technical and community college credentials, although returns from two-year certificates and associate degrees tend to be larger and more consistent than returns to short-term certificates that can be completed in less than a year (Belfield and Bailey, 2011, 2017).

More study is needed to understand the short-term and long-term effects of industry certification, about which we know very little. Certification data are sparsely collected, which was noted as a problem for CTE policy and research nearly 15 years ago (Castellano et al, 2005). Industry certification records were just recently integrated into education data systems in Tennessee and elsewhere, so research may begin to shed light on the benefits of attaining recognized industry knowledge, both during and after high school graduation.

CONCLUSIONS
As states develop Perkins V programmatic and accountability plans, they must choose at least one program quality indicator from a list of three options—postsecondary credential attainment (which may include industry certification), postsecondary credit attainment, or work-based learning—to help represent the college and career preparation of CTE concentrators.

The credential PQI has a few appealing features and not just in Tennessee. College credentials are reliably measured, they support state attainment goals, and credentials are awarded by entities that are independent from K-12 education agencies. In Tennessee, students in some districts and some CTE programs attain credentials or certifications at a fairly high rate. CTE concentrators who attain a postsecondary credential or industry certification before leaving high school typically have higher college enrollment rates or higher employment rates the year after graduation. On this last point, however, regression-adjusted differences in non-experimental student outcomes do not shed light on the causal effect of an early credential relative to the effect of the next-best use of a student’s time. Research from other settings and other student populations suggests that early credentials may

5 Forty-two states have attainment targets (Li et al., 2018).
benefit students, but it is not clear how those benefits would compare to the effects of early postsecondary opportunities more broadly (which include early credentials as a subset) or work-based learning.

Any of the three candidate PQIs, as well as other success measures that states are required to report under Perkins V, will depend critically on who is classified as a concentrator. This presents states, agencies, and schools an opportunity to improve quality indicators without changing program content or quality by discouraging low-performing students from concentrating in a CTE program or encouraging high-performing students to do so. The Perkins V guidelines for defining concentrators are quite broad, inclusive of all students who take at least two courses in a CTE program of study. States can tailor this definition to some extent. This definition could cover over half of graduating seniors in Tennessee, which will hinder anyone’s capacity to nudge students out of CTE but potentially make it easier to fold students in to CTE when they may have otherwise not taken the second course in a program sequence. The most recent evidence on the labor market effects of CTE suggests that there are individual returns to depth in particular CTE programs but not for students who attained that depth because they were required (Kreisman and Stange, 2017). In the Hamilton Project framework, manipulating the denominator of quality indicators is one way to fulfill Goodhart’s Law, improving quality measures more so than student learning. To counter this possibility, states could focus on CTE quality indicators that they would like to see grow for all students, and report overall growth in these measures, in addition to the percent of concentrators meeting any one PQI.

NEXT STEPS FOR PERKINS V PLANNING AND IMPLEMENTATION

States submitted their Perkins V transition plans midway through 2019 for the 2019-20 year. Transition plans did not need to include selected program quality indicators. Prior to submitting 2020-23 plans in April 2020, states are required to engage stakeholders, including the public. Some states have released draft plans for comment via surveys or public meetings, although others are still forthcoming. We can expect to see more details emerge about state plans in the coming months.

DATA AND DEFINITIONS

Statistics reviewed in this brief are derived from administrative data describing students and workers throughout Tennessee, focusing on the graduating high school classes of 2015-16 and their college and career outcomes in 2016-17. These data are provided by the Tennessee Department of Education, Tennessee Higher Education Commission, and Tennessee Department of Labor and Workforce Development, and linked within the “P20” Tennessee Student Longitudinal Data System. Postsecondary credential program quality indicator (PQI): I generate an indicator for each student who attained a postsecondary certificate, postsecondary degree, or recognized industry credential prior to graduating high school. Attainment records are limited to public Tennessee colleges and universities. Industry credential data are

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6 Researchers who wish to access these data should contact Jasmine Love, P20 Data Governance Coordinator (Jasmine.Love@tn.gov).
collected by TDOE from several organizations that administer certification coursework and exams and are filtered to include only those certifications that the department recognizes as contributing to CTE programming.

*High school graduate:* I limit the analysis to students who graduate with a regular diploma from a public Tennessee school in the 2016-17 academic year. This limitation more accurately identifies the PQI as defined in Perkins V, which includes CTE student graduation rates as a separately tracked measure of quality.

*CTE Concentrator:* TDOE retrospectively flags students as concentrators if they completed at least three credits in a CTE program of study. I use this flag to identify CTE concentrators in the 2016-17 graduating class.  

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7 Under Perkins V, Tennessee and other states will adopt a broader definition of CTE concentration, which will shift from three credits to two courses in a CTE program of study. A student’s completed courses typically align one-for-one with their accumulated high school credits, so the new definition will identify more students as CTE concentrators.
REFERENCES


ABOUT THE AUTHOR

Celeste K. Carruthers is an associate professor in the Haslam College of Business at the University of Tennessee with a joint appointment in the Department of Economics and the Boyd Center for Business and Economic Research. Her research centers on education policy with crossovers into public economics, labor economics, and economic history. Recent and ongoing projects examine the effect of financial aid on college choices, career and technical education, and the consequences of segregated schools in the early 20th-century United States. She teaches graduate and undergraduate courses in regulation and public expenditure analysis. Carruthers is a co-editor of Economics of Education Review, a former member of the Association for Education Finance and Policy Board of Directors, a member of the CTE Research Network at the American Institutes for Research, an affiliated researcher with the National Center for Analysis of Longitudinal Data in Education Research (CALDER), and she has served as a faculty advisor to several fellows in the Harvard Graduate School of Education Strategic Data Project. Before arriving at UT in 2009, Carruthers earned a Ph.D. in economics from the University of Florida, an M.A. in economics from the University of New Hampshire, and a bachelor’s degree in economics and accounting from Appalachian State University.

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