CTE | Career & Technical Education RESEARCH NETWORK

CTE Research Network Practitioner Training Modules

Companion Glossary: Key Terms for Understanding CTE Data and Research

Authors:
Steve Klein
Cherise Moore
Catherine Imperatore

July 2021

Career and technical education (CTE) prepares middle school, high school, and postsecondary learners around the nation with technical, academic, and employability knowledge and skills for credentials, further education, and high-skill, high-wage, and in-demand careers. CTE research and evaluation have demonstrated positive outcomes for students and employers. However, more rigorous research—such as causal studies designed to show whether and how CTE programming has changed learners' educational and workforce outcomes—is needed to better inform educators, policy makers, and the public about the effectiveness of CTE programs and program components.

The CTE Research Network seeks to meet this need by increasing the number of CTE impact studies and strengthening the capacity of the field to conduct and use rigorous CTE research. The Network has developed a series of six practitioner training modules to support CTE educators and state and local agency staff to better access, conduct, understand, and use CTE research. These self-guided, interactive modules include processes, activities, and tools that educators can use to drive change locally.

This companion glossary defines key terminology from each module that can help CTE practitioners to better leverage data and research. Each section of the glossary also links to the presentation slide deck for each module. You do not need to complete the practitioner training modules to find value in this glossary; however, we encourage you to access the free modules, which include slides and additional activities, to build your capacity for using research and data to understand and improve the effectiveness of CTE. To learn more about the network, visit https://cteresearchnetwork.org.

Module 1: Understanding CTE Data and Why It Matters

This module provides an introduction for practitioners who are new to CTE data and research or just need a refresher.

Causal research: Studies that allow for prediction and establish cause and effect by demonstrating whether one variable causes an outcome. Examples are measuring whether enrollment in a career academy impacts high school completion and postsecondary enrollment, or whether participation in a work-based learning program changes future employment and earnings.

Correlational research: Studies that express a relationship between two variables in numeric terms and allow for prediction but cannot be used to establish cause and effect. These relationships are rated as positive if both variables change in the same direction, negative if they change in opposite directions, and zero if there appears to be no connection. Examples are measuring whether a student's gender is associated with scores in career and technical student organization competitions, or whether the number of work-based learning hours completed relates to later career satisfaction.

Descriptive program-level data: Information about how CTE is offered, such as the number and type of programs, expenditures on equipment, or percentage of programs offering dual credit or work-based learning opportunities.

Descriptive research: Studies that describe current conditions but are not intended for predictive purposes. Examples are measuring the percentage of students of different races/ethnicities who participate in different CTE program areas or describing the implementation of discrete components of a career pathways initiative.

Descriptive student-level data: Information about individuals served by CTE programs or interventions, such as the number of participants, concentrators, and completers or student demographic characteristics.

Qualitative research: Studies using data that are expressed in descriptive (non-numeric) terms. Common methods include interviews, focus groups, and observations.

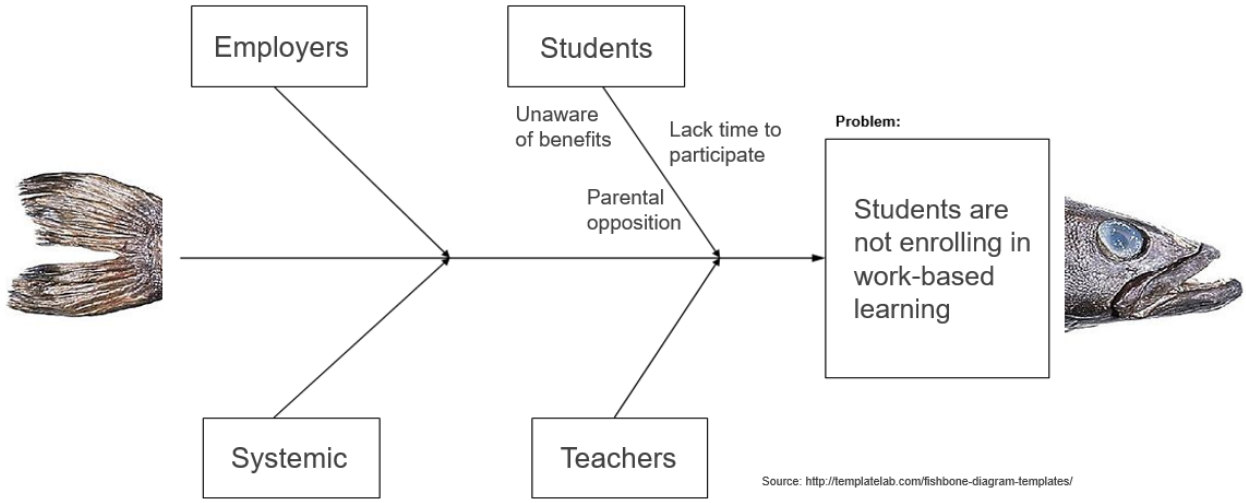
Quantitative research: Studies using data that are expressed in numeric terms. Common methods include statistical analyses of survey results or of administrative datasets that compile large amounts of student data.

Module 2: Using Data and Research to Improve CTE Programs

This module is designed to support school district and college CTE program administrators in understanding CTE data and how best to use data.

Continuous improvement: A structured, iterative process for using data and research to improve educational programming. Many frameworks for continuous improvement exist, but the process generally includes framing a problem, designing a response grounded in research, collecting data to assess results, and using those findings to improve implementation.

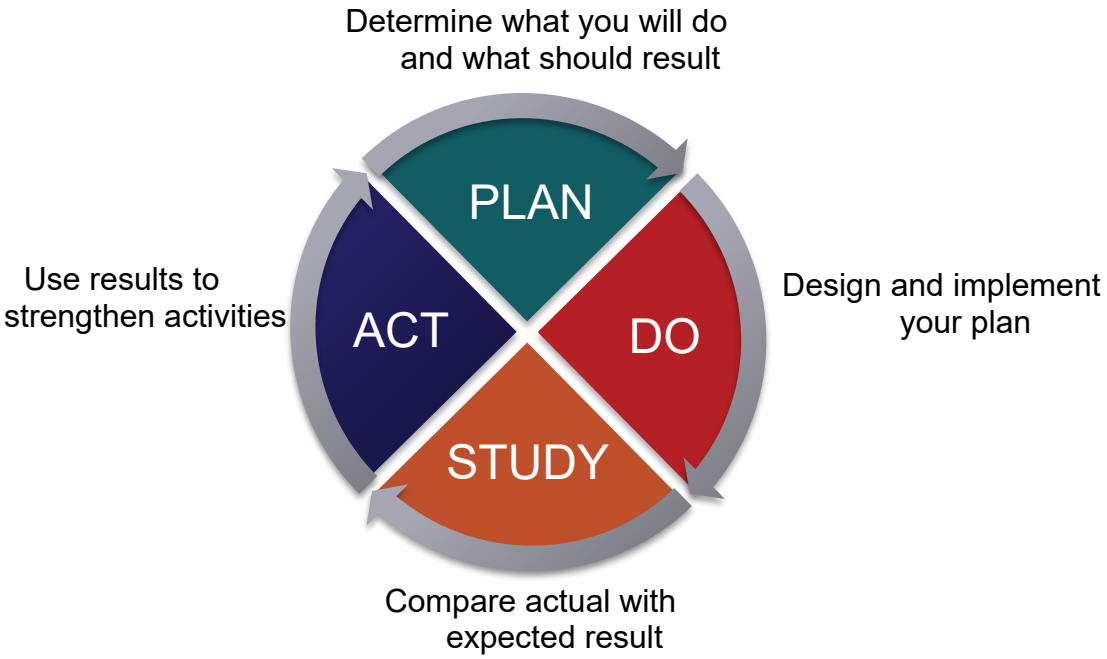
Fishbone technique: A tool for conducting root cause analysis. The head of the fish is used to state the problem, with the ribs serving as factors, or broad components of the problem, and the bones as issues, or explanations underlying each factor.



Interim outcomes: Information used to assess early successes, which may be related to a longer term goal. Examples are measuring the number of 10th-grade students on track to graduate as part of an overall goal of decreasing dropout rates or measuring work-based learning participation as part of an overall goal of increasing post-program employment rates.

Middle- and long-term outcomes: Information used to assess achievement of the overall goal.

Plan/do/study/act: A framework for continuous improvement with the following steps:



Process indicators: Information used to track implementation activities, which provide formative feedback to help shape the program or intervention. Examples are the number of meetings with employer partners or the number of participants enrolled in the program.

Root cause analysis: A method of problem-solving that tries to identify the underlying factors that contribute to problems or patterns found in data. Once identified, these factors can guide a review of research and evidence-based practices that could be adapted to address these problems or patterns.

Module 3: CTE Program Evaluation: Why It Matters to Practitioners

This module is designed to support school district and college CTE program administrators in understanding program evaluation.

Activities: Actions taken to effect change, such as teaching a particular curriculum or recruiting employer partners to provide work-based learning.

Causality: A cause-and-effect relationship that demonstrates that the results of a program or intervention can be directly attributed to the actions taken.

Control/comparison group: A group of people who have similar characteristics to program participants, but who do not participate in the program or intervention being studied.

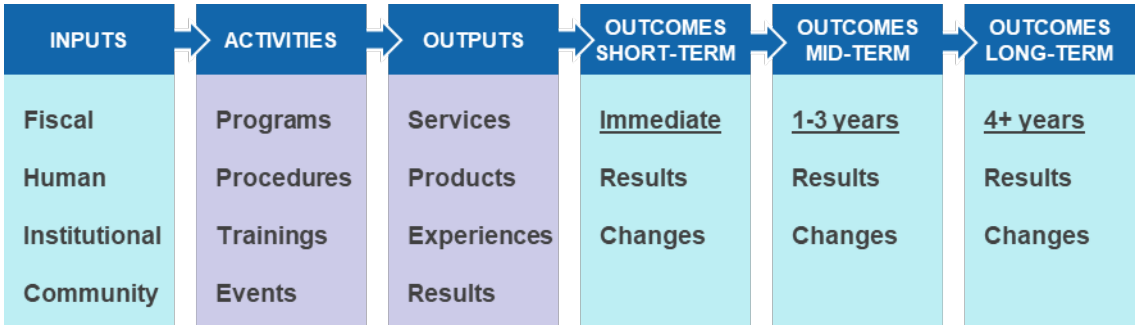
Experimental/intervention/treatment group: A group of people who participate in a program or intervention being studied.

Impact: The effectiveness of a program or intervention in achieving a desired result.

Impact evaluation: A type of program evaluation analyzing the longer term results associated with a program or intervention that allows for a causal link between actions and results. These evaluations use an experimental group and a control group to ensure that outcomes are due to the program and not to other factors, and to compare outcomes with an estimate of what would have happened without the program.

Inputs: Resources invested in offering a program or intervention, such as funding, staffing, or support services.

Logic model: A visual representation that lays out a theory of action driving a program or intervention. It includes the steps to launch and deliver services and assess results, such as inputs; activities; outputs; and short-term, mid-term, and long-term outcomes as well as external factors that could affect a program or intervention and its participants.



Outcome evaluation: A type of program evaluation that analyzes the results associated with a program or intervention without attributing a cause-and-effect relationship.

Outcomes: Information on the short-, middle-, or long-term gains achieved, such as changes in the knowledge, skills, and behaviors of program participants as well as benefits like credential attainment, employment, or higher earnings.

Outputs: Immediate results that lay the groundwork for achieving program goals, such as the number of CTE concentrators or the number of instructors participating in professional development.

Performance measures: Information on a program or intervention's ongoing progress in meeting identified goals, using discrete indicators that are quantifiable, typically expressed as a number or percentage, and follow clearly defined collection methodologies to produce accurate data. These measures generally fall into one of four categories: activities, inputs, outputs, and outcomes.

Posttest: A measurement taken after a program or intervention and compared to the pretest measurement.

Pretest: A measurement taken before a program or intervention.

Process evaluation: A type of program evaluation that examines implementation efforts to assess whether a program or intervention is operating as intended.

Program evaluation: A systematic approach to collecting and analyzing data to make informed conclusions. Program evaluation includes a logic model outlining how the program or intervention operates, processes and methods guiding data collection and analysis, and a description of how the program is achieving or falling short of its intended objectives. There are three main types of program evaluation: process evaluation, outcome evaluation, and impact evaluation.

Quasi-experimental design: An impact evaluation similar to a randomized controlled trial. However, participants may self-select into experimental and control groups. Researchers attempt to control statistically for systematic differences that may exist between groups. One example is a comparison of students who score just above the admission cutoff to a CTE high school to those who score just below the admission cutoff.

Randomized controlled trial: An impact evaluation in which participants are randomly assigned to an experimental group or to a control group. The program or intervention is typically preceded by a pretest and followed by a posttest. Researchers control statistically for systematic differences that may exist between groups. One example is a lottery system that randomly places some learners in a CTE program and others in an education program with no CTE instruction.

Module 4: Using State Data to Partner With Researchers

This module is designed to support education agency administrators in partnering with researchers to analyze statewide secondary and postsecondary CTE data.

Common Education Data Standards (CEDS): A voluntary national initiative to standardize data management across education levels and states, which includes common data elements and definitions, analytic tools to help educators understand and use data, metadata from other education data initiatives, and a community of stakeholders.

Researchers: People who partner with education programs to carry out academic or scientific research. They are often based at a university or state government agency.

State accountability systems: Data collected by school districts and colleges and reported to state education agencies. Information may include student engagement and outcomes, program administration, and financial recordkeeping.

Statewide Longitudinal Data Systems (SLDS): State databases that store and allow access to individual student data, which may include early learning, K–12 education, postsecondary education, and workforce data. SLDSs, sometimes referred to as P-20 or P-20W systems, store data in centralized or decentralized databases and use unique identifiers to follow students' progress across education levels and systems.

Module 5: Using Research to Design Your CTE Program for Equity

The module is designed to support school district and college CTE program administrators in using research to develop equitable CTE programs.

Concentrator: A student who achieves a threshold level of coursework in a single CTE program or program of study. In Perkins V, a secondary concentrator is defined as a student who completes at least two courses in the same CTE program or program of study. A postsecondary concentrator is defined as a student who earns at least 12 credits in the same CTE program or program of study or completes a program of fewer than 12 credits or its equivalent. States and local grantees are required to collect and report performance outcome data on CTE concentrators.

Cultural competence: The extent to which differences in the appearance, behavior, or culture of some groups of students is acknowledged and/or accepted. One example is when educators recognize that students face barriers, such as lack of broadband access or caregiving responsibilities, which impact their ability to attend remote classes.

Equitable access: When all students are offered options and supports that enable them to participate in CTE programming. Activities directed at equitable access include recruitment materials that are translated into multiple languages or facilities that are accessible to students with disabilities.

Equitable outcomes: When all students are offered supports that enable them to achieve a given CTE program outcome, such as credential attainment or employment. Activities directed at equitable outcomes include transportation and childcare supports for low-income adults or employing bilingual aides to help English learners better understand and apply program content.

Equity gap analysis: A process for analyzing data to identify differences in measures, such as program participation or performance outcomes, among student groups. It can be paired with the root cause analysis described in Module 2.

Implicit bias: Unconscious attitudes or stereotypes held by individuals that may lead to a preference or aversion to some groups of students. One example is a counselor who believes that female students are more suited to careers in health care than male students.

Institutional bias: Systemic policies or practices that give one group of students an advantage over another. One example is funding disparities that prevent schools in historically under-resourced communities from offering CTE programs that require expensive equipment.

Opportunity gap: Disparities and inequities in access to and participation in high-quality CTE programs among student groups by race/ethnicity, gender, income, or other special population status.

Special populations: Students from unique demographic groups that may require additional services or supports to succeed in an educational program. In Perkins V, nine groups are defined as special populations:

- Individuals with disabilities
- Individuals from economically disadvantaged families, including low-income youth and adults
- Individuals preparing for fields that are not traditional fields for their gender
- Single parents, including single pregnant women
- Out-of-workforce individuals
- English learners
- Youth who are in, or have aged out of, the foster care system
- Youth with parents on active duty in the armed forces
- Homeless individuals

Module 6: How to Communicate About Your CTE Program Using Research

This module is designed to support school district and college CTE program administrators in using research findings to strengthen communications about your CTE program's value.

Audiences: A range of stakeholders who may have differing interests and needs. Potential audiences may be those who are directly connected to a CTE program—such as participants and their families, site administrators and teachers, participating employers or community groups, or program funders—and those who are indirectly connected—such as state and local policy makers, other high school and postsecondary educators, local business owners and community members, or the media.

Data story: A nonstatic infographic that engages users by enabling them to view specific data in which they are interested through filtering and to learn more about data points through text and visual pop-ups that appear as they mouse over visualizations. These interactive infographics can be directly embedded into websites, dashboards, and applications to develop an immersive storytelling experience.

Data visualization: A graphical representation of complex data using a simple, easily understandable chart, graph, plot, or diagram to communicate a specific finding.

Infographic: A static document that combines data visualizations with additional information, such as text, icons, and/or illustrations, to tell a compelling, visually appealing story.

References

The following sources were consulted in preparing this glossary:

Advance CTE and Association for Career and Technical Education. (2018). *Legislative summary & analysis - Strengthening Career and Technical Education for the 21st Century Act (Perkins V)*. Silver Spring, MD and Alexandria, VA: Authors. Retrieved from https://www.acteonline.org/wp-content/uploads/2018/08/AdvanceCTE_ACTE_P.L.115-224Summary_Updated080618.pdf

Best, J., & Dunlap, A. (n.d.). *Continuous improvement in schools and districts: Policy considerations*. Retrieved from https://files.eric.ed.gov/fulltext/ED557599.pdf

Bocala, C., Henry, S. F., Mundry, S., & Morgan, C. (2014). *Practitioner data use in schools: Workshop toolkit* (REL 2015–043). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory, Northeast & Islands. Retrieved from https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015043.pdf

Common Education Data Standards. (n.d.). Retrieved from https://ceds.ed.gov/

Dalporto, H., & Tessler, B. (2020). *Voices from the field: How community colleges are advancing equity in career and technical education*. New York, NY: MDRC. Retrieved from https://www.mdrc.org/sites/default/files/Equity_in_CTE_brief.pdf

Dynarski, M., & Kisker, E. (2014). *Going public: Writing about research in everyday language* (REL 2014–051). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Analytic Technical Assistance and Development. Retrieved from https://ies.ed.gov/ncee/pubs/REL2014051/pdf/REL_2014051.pdf

Institute of Education Sciences. (n.d.). *What Works Clearinghouse*. Retrieved from https://ies.ed.gov/ncee/wwc

Klein, S. (2016). *Data dissemination strategies for career and technical education in Nebraska*. RTI International. Retrieved from https://s3.amazonaws.com/PCRN/docs/TA_to_States_Nebraska_Report.pdf

National Alliance for Partnerships in Equity. (2018a). *Equity gap analysis - State*. Retrieved from https://napequity.org/wp-content/uploads/NAPE-Perkins-V-State-Equity-Gap-Analysis-At-A-Glance.pdf

National Alliance for Partnerships in Equity. (2018b). *Strengthening Career and Technical Education for the 21st Century Act (Perkins V) provisions related to equity in CTE*. Retrieved from https://napequity.org/wp-content/uploads/NAPE-Perkins-V-Equity-Provisions-Summary_Final_10-15-18_ml.pdf

National Forum on Education Statistics. (2016). *Forum guide to education data privacy* (NFES 2016-096). U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2016/NFES2016096.pdf

Park, S., Hironaka, S., Carver, P., & Nordstrum, L. (2013). *Continuous improvement in education*. Retrieved from https://www.carnegiefoundation.org/wp-content/uploads/2014/09/carnegie-foundation_continuous-improvement_2013.05.pdf

Privacy Technical Assistance Center, U.S. Department of Education. (2015). *Data governance checklist*. Retrieved from https://studentprivacy.ed.gov/sites/default/files/resource_document/file/Data%20Governance%20Checklist_0.pdf

Rosen, R., & Molina, F. (2019) *Practitioner perspectives on equity in career and technical education*. New York, NY: MDRC. Retrieved from https://www.mdrc.org/sites/default/files/CTE_Equity_Brief_2019.pdf

Shakman, K., & Rodriguez, S. M. (2015). *Logic models for program design, implementation, and evaluation: Workshop toolkit* (REL 2015–057). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands. Retrieved from https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015057.pdf

Strengthening Career and Technical Education for the 21st Century Act (Public Law 115-224). Retrieved from https://www.congress.gov/115/plaws/publ224/PLAW-115publ224.pdf

Substance Abuse and Mental Health Services Administration. (2012, July). *Non-researcher's guide to evidence-based program evaluation*. Retrieved from http://www.eblcprograms.org/docs/pdfs/NREPP_Non-researchers_guide_to_eval.pdf

Tatian, P. A. (2016, March). *Performance measurement to evaluation*. The Urban Institute. Retrieved from https://www.urban.org/sites/default/files/publication/78571/2000555-performance-measurement-to-evaluation-march-2016-update_2.pdf

U.S. Department of Health and Human Services. (2020). *Pathways to Work Evidence Clearinghouse*. Retrieved from https://pathwaystowork.acf.hhs.gov/

The work of the CTE Research Network Lead is supported by the Institute of Education Sciences (IES) at the U.S. Department of Education with funds provided under the Carl D. Perkins Career and Technical Education Act through Grant R305N180005 to the American Institutes for Research (AIR). The content of this publication and the opinions expressed are those of the authors and do not represent the views of the Institute or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.