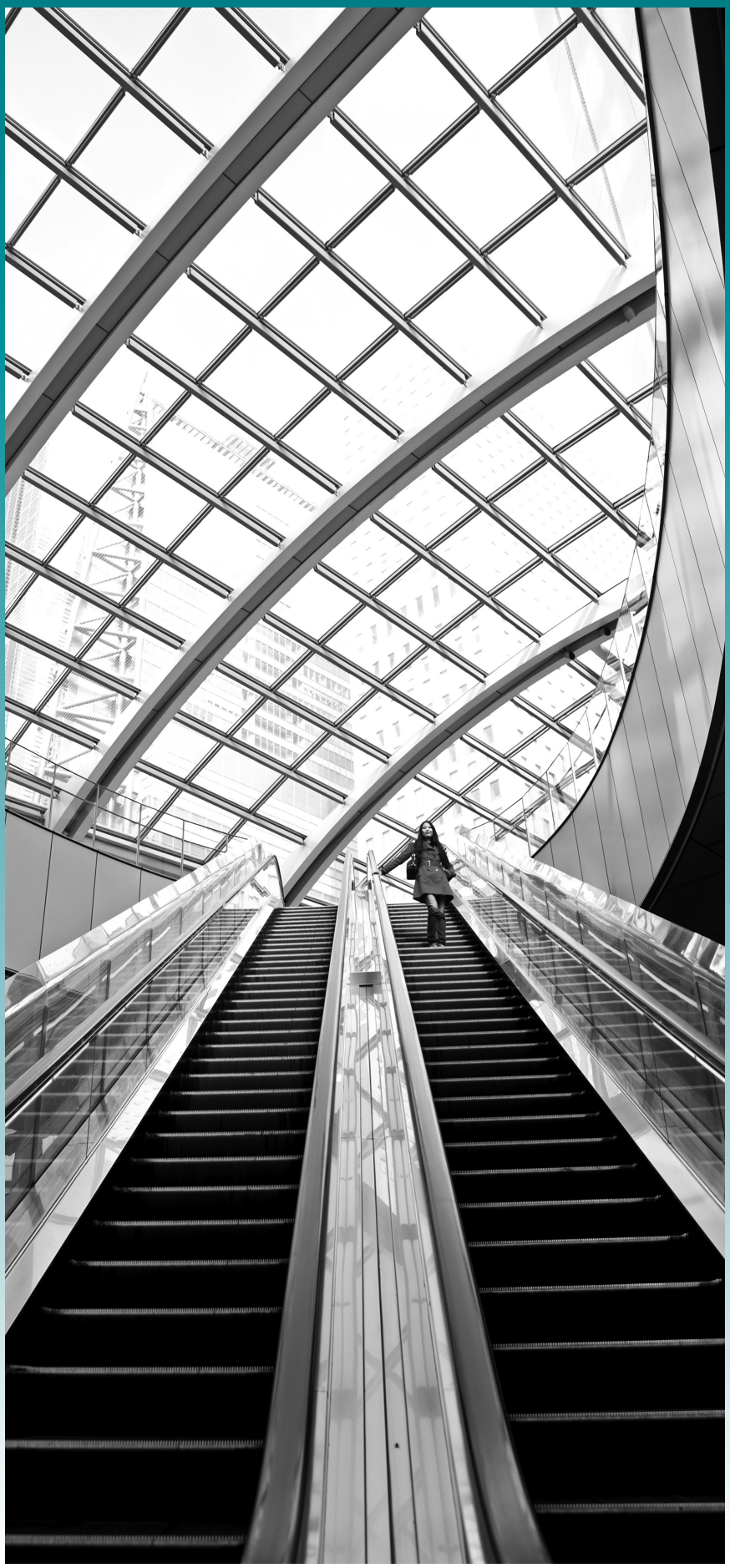

USING RETURN ON INVESTMENT (ROI) AND OTHER RELATED TOOLS:

Guidelines for Measuring Career and Technical Education (CTE) Internal Efficiency and External Effectiveness

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What Has Made ROI for CTE Difficult?

Career and technical education (CTE) is increasingly seen as a major potential contributor to the recovery of the U.S. economy. However, the effectiveness and impact of the current Carl D. Perkins Act (otherwise known as Perkins IV) that governs CTE are unclear. Is the federal investment in CTE paying off? To answer this, we need to establish the *internal efficiency* of CTE by comparing the costs and benefits of implementing CTE using Perkins funds at different enterprise levels.[1] A second question is whether CTE has a measurable impact beyond the enterprise level at which it is being implemented. This question focuses on *external effectiveness*. Answering these questions may put to rest the frequently held notion that CTE—and by association Perkins IV—has been largely ineffective in affecting U.S. education and workforce development (Duncan, 2011). As shorthand, this report will refer to the measurement of the internal efficiency and external effectiveness of Perkins IV and CTE as the return on investment (ROI) for CTE; the report will also describe other related tools that generally fall under the broader rubric of program evaluation (Priest, 2001).

Examining the ROI for CTE has been difficult for many reasons. To begin with, there is weak connectivity within CTE between the three elements that are needed to conduct ROI: data and measurement, accountability and evaluation, and research. CTE data and measurement are collected primarily to meet accountability requirements under Perkins IV. Systems for data and measurement concerning CTE are generally discussed at state and federal government levels to ensure compliance with federal Perkins accountability requirements. Much effort at both the national and state levels has gone into standardizing variable definitions and measurement approaches with the goal of developing a common set of CTE data (Schray, 2000). Although CTE has not achieved full standardization when it comes to data and measurement, much progress has been made over the last decade under the leadership of the Office of Vocational and Adult Education (OVAE) of the U.S. Department of Education. Such efforts include the extensive work of multiple national Data Quality Institutes (DQIs) as well as the Next Steps Working Group (NSWG), an OVAE-sponsored monthly electronic town-hall meeting on issues affecting Perkins and CTE accountability. Both the DQI and the NSWG meetings were initiated and led by OVAE to establish consistency across different data terms and measurement definitions.[2]

More recently, the NSWG has studied the inclusion of secondary CTE measures and their alignment with those available within the Education Data Exchange Network (EDEN). This group has discussed how Perkins data should be appropriately linked, connected, and incorporated within the EDEN database. The NSWG has reviewed, and is reviewing, the technical specifications used for Perkins secondary CTE,[3] with a particular emphasis on those

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[1] This report uses the word *enterprise* generically to refer to the activities, programs, and services that take place at the different levels at which CTE functions and operates. This includes functioning and operating at the state level, at sub-state levels such as school districts or postsecondary institutions, or at sub-system levels such as classrooms in a high school or sub-units at a community college (see *Connecting CTE to ROI Measures*).

[2] Full details related to the DQI and the NSWG efforts can be found at http://cte.ed.gov.

[3] EDEN contains a list of technical specifications that is available at http://www2.ed.gov/about/inits/ed/edfacts/index.html. See also http://cte.ed.gov for more information about the NSWG discussion regarding CTE-EDEN linking.

measures relating to achievement on academic proficiency tests, high school completion, and graduation. The hope for these increased interactions between the NSWG and EDEN is greater consistency in CTE accountability data across the nation and in academic comparisons of CTE and non-CTE students. Because of definitional, technical, and policy differences in the way CTE and EDEN define academic and technical achievement at the high school level, much work remains if the field is to achieve consistency in CTE data and align such data with other U.S. Department of Education initiatives on data gathering like EDFacts.[4]

The Postsecondary Common Data Dictionary project,[5] a National Research Center for Career and Technical Education (NRCCTE) project jointly led by staff from the NRCCTE and from MPR Associates, Inc., also sought to address the extent to which a common data dictionary would yield more consistent, valid, and reliable state and national postsecondary accountability measures (Kotamraju, Richards, Wu, & Klein, 2010). A critical finding of this project was that participating states were able to uniformly define many data elements that can be used to construct and report on postsecondary accountability measures required by Perkins. Guided by participating states, the NRCCTE Postsecondary Common Data Dictionary project team selected data elements that would become the foundation for building an accountability system when Perkins is reauthorized in the future. The project acknowledged differences in how states collect data, but a common data dictionary provides a standard goal to which all states can link their own data. Using a common data dictionary, and with sufficient support, many states should be able to generate substantially similar information for Perkins accountability.

Lack of a Uniform Global CTE Database for Accountability and Evaluation

Despite partial success at moving toward standardization of data and measurement, CTE has made little progress toward achieving the ideal of a uniform, global database for accountability and evaluation, a goal first discussed in the early 1990s when the Perkins II legislation was enacted. However, CTE is not alone in this regard. An ideal framework for accountability and evaluation within the education sector has been difficult to achieve, although many have tried to establish one (Ewell & L'Orange, 2009). Even today, education data for accountability and evaluation are obtained from three disparate and generally unconnected sources: (1) state-based unit-record data systems, (2) national data systems such as EDEN and the Integrated Postsecondary Education Database System (IPEDS), and (3) National Center for Education Statistics (NCES) Sample Survey Data. Each of the above data sub-systems requires considerable technical expertise; each is also limited in the extent to which it could serve as a common accountability and evaluation system. A key point about existing national databases (particularly NCES and IPEDS) and state-level education databases (secondary and postsecondary) is that in the development, maintenance, and usage of such databases, CTE has not been a key focal point and as yet has had limited participation.

Should the data contained in the above three data sub-systems be merged into a single, national database, they would need to be housed in a nationally agreed-upon central location—an unlikely

[4] See the following two websites for more details: EDFacts at http://www.ed.gov/open/plan/edfacts and EDEN at http://www2.ed.gov/about/inits/ed/edfacts/overview.html.
[5] See http://136.165.122.102/mambo/content/view/53/.

scenario given current tight budgets. Also, states and the sub-systems within them (e.g., postsecondary institutions and school districts) have not been in favor of submitting unit-record data to a national system. Additionally, state data privacy and Family Educational Rights and Privacy Act (FERPA) regulations make a central database problematic for most state and local education agencies (see Kanstoroom & Osberg, 2008, who devote several chapters to FERPA). Further, large, longitudinal national and state educational databases have not been without controversy. Nevertheless, the U.S. Department of Education funding of the State Longitudinal Education Data Systems (SLDS) is one such effort to help states better manage and use student educational data (Data Quality Campaign, 2009). CTE's contribution to developing the SLDS—or a P-20 database system, which many states are developing in conjunction with SLDS—is still an open question.

Those working in the field of CTE accountability and evaluation have grappled with the need for uniform, global information—a national database—to meet CTE's multiple needs, including career guidance, accountability and evaluation, and program improvement. At present, the United States has no national, comprehensive database that meets the accountability requirements prescribed in the Perkins IV legislation. Individual state-level databases that collect CTE accountability information do exist, but these generally have been built to serve state-specific purposes and requirements. Most have little or no connection either to other databases within the state (most states keep their secondary and postsecondary CTE data separate) or to those of other states, let alone to a national system. For example, the United States currently has at least 54 different state-based CTE data systems[6] (or at least 108, given the states' separate secondary and postsecondary CTE data systems), a less than optimal situation for a common accountability framework (Kotamraju, 2012).

Other Difficulties Facing ROI for CTE

Too often, CTE treats accountability and evaluation synonymously. Accountability usually means the achievement of a set target, whereas evaluation implies testing how well the achievement of the target meets overall purposes and goals (e.g., meeting the targets outlined in Perkins IV). Evaluation is generally tied to research, and research is usually conducted at universities and research and policy organizations. These institutions' limited access to linked education and workforce datasets housed within state and local agencies makes conducting ROI studies difficult. Moreover, for many research-focused organizations other than the NRCCTE, the systematic evaluation of how well CTE is doing is still a very small portion of their overall work, further limiting the scope for ROI for CTE.

Another difficulty related to conducting ROI for CTE is that institutional research (IR) capability within CTE often lacks the degree of sophistication necessary for undertaking ROI studies. Seymour, Kelly, and Jasinki (2004) offered the following definition of institutional research that can be modified for CTE. "Institutional research involves the collection of data or the making of studies useful or necessary in (a) understanding and interpreting of the institution; (b) making intelligent decisions about current operations or plans for the future; and (c) improving the

[6] This number includes the four U.S. territories—the District of Columbia, the U.S. Virgin Islands, Puerto Rico, and Guam—to which Perkins funds are distributed.

efficiency and effectiveness of the institution" (p. 54). This definition describes the skills necessary for conducting ROI studies, and these skills are in short supply within the CTE field.

Frequently, the process of building the intricate connections between inputs, process measures, outputs, and outcomes—a prerequisite for conducting ROI—is difficult (Peterson & Augustine, 2000; Yorke, 2004). Further, these connections are generally missing as an IR function (Seymour et al., 2004). This is particularly true for CTE. Most of the time, IR expertise at CTE offices within local eligible agencies (LEAs) and state eligible agencies (SEAs) is assigned to meeting immediate and short-term accountability requirements rather than medium- and long-term evaluation studies of how well CTE is doing. In other words, IR in CTE is perceived simply as data collection and reporting. This issue is not exclusive to CTE, but applies to much of education as well (Ewell, 2002; Ewell & Boeke, 2007; Serban, 2002; Volkwein, 1999, 2008).

ROI for CTE, and maybe even for all of education, has remained limited because of the general perception among educators, particularly in CTE, that ROI is a business-like technique primarily concerned with money and finances that is not relevant to teaching and learning. Teaching and learning are considered the core of academics,[7] whereas services outside of teaching and learning are deemed the periphery (Toma, 2007). As a result, ROI for education is conducted only on the periphery because the periphery contains items that can be measured, such as tuition and fee revenues, revenues from specialized and targeted services, expenditures on student services, and infrastructure expenditures. The key to education's success—teaching and learning—is often excluded from ROI because it is considered non-measurable. Full development of the frameworks, processes, and procedures for conducting CTE for ROI must include the core of CTE—teaching and learning—and indicate how well this core is doing. More importantly, if ROI for CTE is to be optimally conducted, the CTE core must be linked to student, program, and state performance.

An Overview of This Report

After scanning the literature on ROI approaches and methods and their application to CTE, the NRCCTE developed a report (Stone, Kotamraju, Aliaga, & Blackman, 2010) that clearly indicated that a full-fledged ROI for CTE study is both cost prohibitive and challenging for the reasons already outlined. Nevertheless, there remains a need to inform the CTE community about the building blocks that are needed for conducting ROI for CTE. As a result, the development of this report became a sub-project within the NRCCTE's overarching *CTE Accountability and Evaluation: a Comprehensive Strategy for Technical Assistance* project.

This report takes a global approach to conducting ROI for CTE. It provides a broad primer of what ingredients need to be taken into consideration in ROI studies. *The Building Blocks for ROI Studies* outlines the building blocks for conducting ROI studies. *Connecting CTE to ROI*

[7] *Academic* here refers to the traditional educational structural elements and practices—like curricula, syllabi, coursework, methods, testing, and grading—that take place within secondary and postsecondary institutions. This definition is different from what sometimes is used in CTE, where the use of the term *academic* refers to the set of core courses (e.g., English, Math, Science, Social Studies) that high school students must take to meet high school graduation requirements (Nord et al., 2011).

Measures shows how these building blocks are connected to CTE. *Setting the Stage for Measuring ROI for CTE* discusses different approaches for measuring ROI for CTE and provides a basic protocol that CTE might adopt when undertaking ROI for CTE. Appendix A provides abstracts of ROI studies across the nation. These studies are organized state by state; for each state, Appendix A identifies which ROI for CTE approach was used and at what level within the state the study was undertaken. Other appendices provide additional information the field might consider when choosing to follow the common protocol in conducting ROI for CTE.

The Building Blocks for ROI Studies

ROI studies have many shapes, sizes, and forms. Regardless, all have one thing in common—the relationship between a set of benefits and a set of costs that are associated with any enterprise (Phillips & Phillips, 2008). This section of the report addresses how these benefits and costs are counted and accounted for, in what context benefits and costs are juxtaposed, and what is obtained when benefits and costs are connected in particular ways to one another. First, this section discusses the raw materials of an ROI study. Second, it outlines different approaches to an ROI study. Third, it discusses the steps required for developing an integrated logic model that forms the rationale for an ROI study.

ROI Terminology

Developing ROI for any enterprise begins with identifying indicators. An indicator is the basic raw material used in program evaluation, of which ROI is just one method (Priest, 2001). Indicators include inputs, process measures, outputs, and outcomes (Burke & Minassians, 2002, 2004). *Inputs* involve the human, financial, and physical resources received to support programs, activities, and services, examples of which include funding, enrollments, and staffing indicators. *Process measures* are the means used to deliver programs, activities, and services—means such as assessment of student learning, use of technology, and teacher training. *Outputs* reflect the quantity of products actually produced, such as the number of degrees awarded, the number of majors in a program, the number of students who have transferred to other institutions, and the number of students who have graduated. *Outcomes* cover the quality of programs, activities, and services, and their benefits to students, states, or society. Common outcome measures in postsecondary CTE include retention, graduation, and transfer rates, time to degree, test scores, and job placements.

Inputs and outputs, not process measures and outcomes, dominate the attention of the education community. With their emphasis on quantity, inputs and outputs are easy to count, measurable, and easy to compare. On the surface, they are easier to assess and understand, are often taken for granted, generate less controversy within the education community, and, most important, are within the community's direct control. They are contextual because they can be defined as outputs at one level (e.g., the high school level), but as inputs at another level (e.g., the college level).

Process measures and outcomes flow out of inputs and outputs, creating an integrated system (see below). For instance, Volkwein (1999) has argued that inputs matter because the "number of extremely important outcomes are highly predictable from the inputs. We can predict about one-third of the variance in student academic performance and two-thirds of the variance in persistence to graduation by knowing the high school rank in class and SAT scores of freshmen" (p. 13). Here high school rank in class and the SAT scores of freshman can be viewed as inputs with college graduation as the output; on the other hand, the same high school rank in class and the SAT scores of freshman are outputs at the high school level that could be related to inputs such as high school GPA or the number of days absent from high school.

Though well understood within the education community, process measures are harder to comprehend by constituencies outside education. They are generally the means by which educators conduct their business. But because they generally reflect non-measurable qualitative elements in an enterprise, external authorities have a harder time understanding them and as a result may decry them because of their vagueness and lack of comparability across various (quantitative) units of measurement (Burke & Minassians, 2002). However, within an ROI framework, as indicators, process measures are critical because they provide a context for "quantifying" what generally is non-measurable.

Outcomes represent policy values, which are both elusive and subjective (Hubbell, 2007). They are usually expressed as questions: Are students learning well? Are clients in a training program getting jobs? Are faculty members responsive to students? Is the institution serving the community appropriately? Outcomes are sometimes subsumed under the heading of outputs, but distinguishing the two as separate measures is critical when policy values (e.g., efficiency, equity, choice, or quality) are being discussed. Speaking broadly, *efficiency* represents the value added; *equity* addresses the issues of access and affordability; *choice* reflects targeting a specific range of options; and *quality* implies exceeding or attaining a prescribed performance standard (Burke & Minassians, 2004). Although measuring outcomes is difficult, it is necessary because outcomes are the only true measure of ROI.

ROI as a Numerical Value[8]

ROI usually takes a balance-sheet approach, chalking up benefits and costs that follow a particular protocol, as shown in Figure 1.[9] Benefits and costs themselves are divided into private (internal to the enterprise) and social (external to the enterprise) categories. Benefits and costs must include the monetized values of all non-monetary benefits and costs to fully measure the internal efficiency and external effectiveness of an enterprise.

[8] The information presented in this sub-section has been simplified for ease of understanding. For a more technical understanding, readers are referred to Hollenbeck (2011), Johnstone (2008), Shively and Galopin (n.d.), and World Bank (2007).

[9] The common protocol for ROI for CTE is discussed in more detail in *Setting the Stage for Measuring ROI for CTE*..

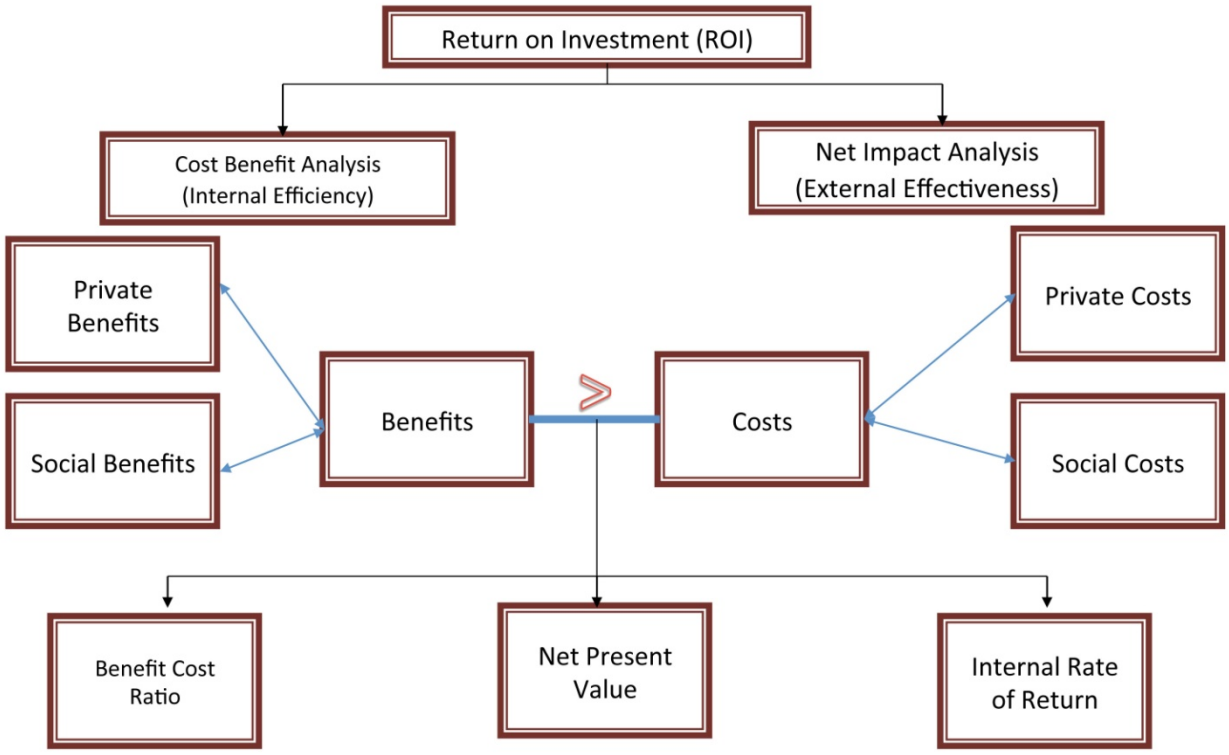


Figure 1. ROI terminology: How does it all connect?

The different items, and the way they connect to each other, listed in Figure 1, leads to the calculation of five things: (a) the *opportunity cost*—a measure of what is being given up in order to undertake the activity, used by quantifying costs and benefits, (b) the *time horizon*—or how long the enterprise will be in place, when benefits will begin to be observed and fully realized, and when costs will begin to appear and accrue, (c) the *discount rate*—the appropriate rate that needs to be applied to convert the value of future costs and benefits to the present time, (d) *monetization*—the translation of all non-monetary benefits and costs into monetary values, and (e) *externalities*—the measurement of the negative and positive impacts of all monetary and non-monetary benefits and costs that result from having the enterprise in place. When any or all of these calculations are omitted, the result is invariably the under- or over-estimation of costs and benefits, which in turn skew the assessment by skewing the measures that are described next.

Broadly speaking, ROI is reflected by numbers: these include the *benefit cost ratio* (B/C; a number greater than one implies that the enterprise is justified on both internal efficiency and external effectiveness grounds); the *net present value* (NPV; a number greater than zero implies that building the enterprise today instead of waiting for the future is justified); and the *internal rate of return* (IRR; when the rate of return obtained from enterprise implementation exceeds the market interest rate,[10] thereby making it worthwhile).

[10] Strictly speaking, the rate to which the IRR is compared is called the *discount rate*, the choice of which can vary depending on the particulars of the project that is being considered for implementation (Shively & Galopin, n.d.)

An Integrated Logic Model for ROI

At one level, ROI is easy to understand. As indicated, once all measurable and non-measurable benefits and costs are counted and accounted for, ROI is expressed as a numerical value that indicates the worthiness of an enterprise. At the same time, assessing ROI is difficult because it is contextual and subjective. It comes at the logical end of a series of steps that are undertaken as part of a fully integrated program evaluation model (Priest, 2001). ROI can be placed within an integrated logical model that connects the five focal points, answering each question sequentially, and collects information on the four key indicators—inputs, process measures, outputs, and outcomes—from which costs and benefits are derived and a corresponding program evaluation metric is obtained. Underlying the entire logic model are scientifically based research methods, which when implemented properly generate a comprehensive program evaluation. A well-known program evaluation handbook (W. K. Kellogg Foundation, 2004) summarized the connection between focal points, key indicators, and metrics: "A program logic model is a picture of how your program works—the theory and assumptions underlying the program… This model provides a road map of your program, highlighting how it is expected to work, what activities need to come before others, and how desired outcomes are achieved" (p. 35). Figure 2 shows this program logic model for ROI.

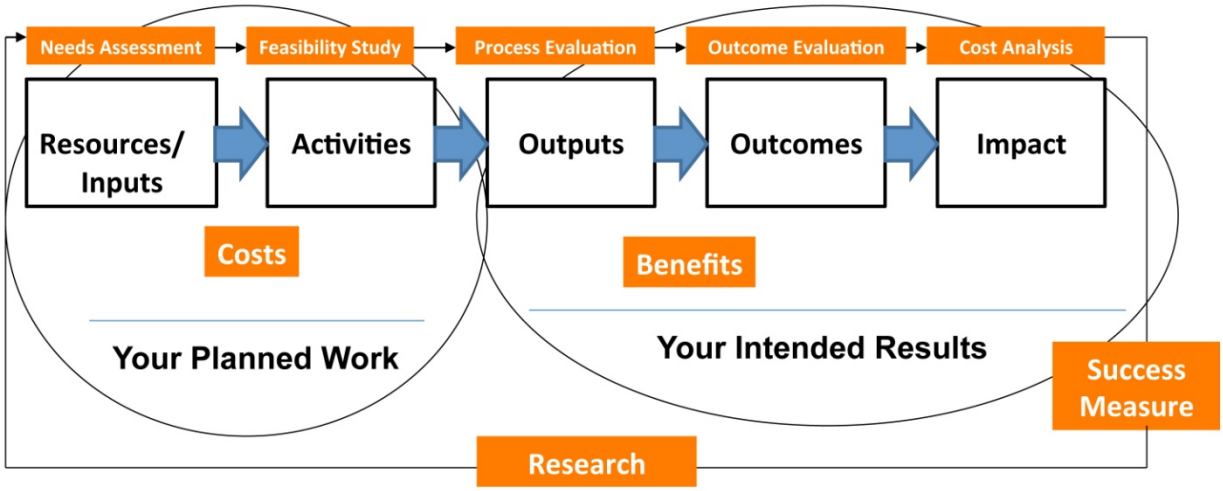


Figure 2. Program logic model for ROI.

In modifying the original table found in Priest (2001), and by adding information from Phillips and Phillips (2008), Table 1 provides a framework for different aspects of program evaluation. The five focal points that are summarized in the table are taken from Priest (2001). Each of the five focal points addresses a primary question:

Table 1
Comparison of the Five Kinds of Program Evaluation

	Needs Assessment (Focal Point 1)	Feasibility Study (Focal Point 2)	Process Evaluation (Focal Point 3)	Outcome Evaluation (Focal Point 4)	Cost Analysis (Focal Point 5)
Measures	Gap between what is and what should be	Alternative approaches help/hinder factors	Gap between program plan and execution	Satisfaction levels, objectives attainment	Comparative merit/worth
Questions Asked	What are objectives, priorities, and needs?	Which strategies and program procedures?	Are strategies and procedures working?	Are objectives met? Are people satisfied?	Should program be continued?
Get Input From	Clients, customers, and community	Staff, supplier, clients, and customers	Staff, supplier, clients, and customers	Clients, customers, and community	Staff, supplier, and profession
Answers Used To	Understand context and direct planning	Gauge viability and best use of resources	Monitor and modify program (midcourse)	Improve/justify effectiveness	Decide on future offerings
Results Used By	Staff and supplier	Staff, supplier, and customer	Staff and supplier	Staff, supplier, clients, and customers	Staff, supplier, and customer
Conducted By	Describing context and comparing actual circumstances with intended change state	Inventorying any resources or barriers and by examining all realistic possibilities	Comparing arising with anticipated need and content or format with intended design	Comparing actual result or product with expected outcome or standard benchmark	Comparing cost ($) with benefit, effect, utility, and efficiency
Other Considerations	Goals vs. objectives, unused opportunities, underlying problems, and unrealized needs	Identify legal, moral, political, and fiscal restrictions, support, constraints, or limits	Identify weaknesses and strengths, remain flexible, and suggest quick adjustments	Baselines measures may need to be taken if trying to measure change over time	Compare with other programs, repetition ease, subjective value
Related Forms of Evaluation (Also Known As)	Context evaluation, objectives evaluation, demand evaluation, discrepancy evaluation	Input evaluation, planning evaluation, practicality evaluation, comparative evaluation	Formative evaluation, progress evaluation, implemented evaluation, transactional evaluation	Summative evaluation, impact evaluation, product evaluation, performance evaluation	Cost-benefit analysis, cost effectiveness, cost minimization-utility maximization, cost efficiency
Program Evaluation Metric	Reaction and perceived value	Learning and confidence	Application and implementation	ROI: Impact and Consequences	
				External Effectiveness	Internal Efficiency

Source. Phillips and Phillips (2008); Priest (2001).

- *Needs Assessment*: What are some of the gaps the program will fill?
- *Feasibility Study*: Given certain constraints, can the program succeed?
- *Process Evaluation*: How is the implemented program progressing?
- *Outcome Evaluation*: Were program goals and objectives achieved?
- *Cost Analysis*: Was the program financially worthwhile or valuable?

Moreover, ROI is just one piece of available information that is used in conjunction with other types of information obtained at the different focal points at which program evaluation takes place. These may include reaction and perceived value (Focal Point 1), learning and confidence (Focal Point 2), application and implementation (Focal Point 3), ROI (Focal Point 4), and impact and consequences (Focal Point 5).[11] The five focal points are similar to, if not the same as, the five kinds of program evaluation identified by Priest (2001; see Table 1).

Program logic models are developed to show the work that is planned and the results are intended or expected. The logic model identifies appropriate and relevant success measure should the planned work be completed and the intended results actualized. The success measure identified in Figure 2 may be any of those indicated in the last row of Table 1. In essence, to implement the program logic model fully, the process needs to be repeated for each focal point identified in Table 1. Answering all items related to each row in Table 1 for each focal point leads to a specific success measure for that focal point. Because this report focuses on ROI, the relevant success measures are under Focal Points 4 and 5. Note that the success measures for each focal point shown in Table 1 are not discrete but are instead continuous and comprehensive. The various success measures flow into each other, and if one is used separately with no reference to the others, it will provide only partial and perhaps even misleading information. When taken together, the program evaluation metrics provide information regarding internal efficiency and external effectiveness.

Balancing Internal Efficiency and External Effectiveness When Conducting ROI

ROI frameworks, processes, procedures, and tools are not developed in a vacuum. Often the choice of frameworks, processes, procedures, and tools depends on the balance that is struck between internal processes of the enterprise and the external pressures placed upon it (Alfred, 2008). Internal processes of the enterprise relate to measuring internal efficiency; correspondingly, measuring external effectiveness relates to external pressures placed on the enterprise. Internal efficiency is driven by cost considerations, whereas underlying external effectiveness is a notion of quality (Fretwell, 2003; Hummel-Rossi & Ashdown, 2002). Sometimes quality gets confused with efficiency, although it is to effectiveness that quality relates most (Hubbell, 2007; Volkwein, 1999).

So ROI is essentially a quantitative measure that represents something of value. But what is this something of value? Hubbell (2007) defined it as *quality*, related to two other concepts, *efficiency* and *accountability*. In Hubbell's words, efficiency "is the barometer of the *how* of

[11] Added into this mix are intangibles that create context and subjectivity and that need to be included as part of the comprehensive program evaluation (Phillips & Phillips, 2008).

operations (and) looks inward and asks if we are doing the right work, crisply and well—strategic outcomes, effectively delivered, at appropriate quality levels. Efficiency requires that the work be maximally cost-justified. Accountability is tied to stewardship with responsibility for creation and use of resources and a public reckoning of how they are used" (Hubbell, 2007). In this report the term *internal efficiency* is equivalent to Hubbell's concept of efficiency. The term *external effectiveness*, as used in this report, is what Hubbell called accountability. Taken together, internal efficiency and external effectiveness jointly measure the value—as defined by the ROI—of any enterprise.

Ideally, an enterprise should undertake both internal efficiency and external effectiveness in calculating an ROI. However, in some situations and circumstances, one is emphasized more than the other. Regardless, both internal efficiency and external effectiveness require ensuring that Focal Points 1, 2, and 3 (see Table 1) are completed first. Only then will there be a need to address Focal Points 4 and 5, as well as the balance that needs to be struck between these two focal points. Further, the choice of emphasis between Focal Point 4 and Focal Point 5 depends on the enterprise level at which the ROI is conducted. We look at this more deeply within the context of CTE in *Connecting CTE to ROI Measures*.

Connecting CTE to ROI Measures

So far, our discussion has centered on how ROI is implemented. However, CTE is undertaken on at least three different enterprise levels: at the overall state level; in subsystems such as the secondary (e.g., high school or school district) or postsecondary (e.g., two-year college) levels; and at the specific program level within high schools, school districts, or postsecondary institutions. Figure 3, below, shows how these three levels connect within CTE.

A key question arising from Figure 3 is how the information available within CTE can be used to develop the building blocks of ROI (the left-hand side of the graphic) so that measures of internal efficiency and external effectiveness can be determined. This section describes the three different techniques researchers and practitioners apply when conducting ROI studies. First, this section discusses the reasons for and purposes behind conducting ROI for CTE at the three different enterprise levels.

Reasons for Conducting ROI for CTE

Typical reasons for conducting ROI are (a) meeting accountability requirements, (b) program improvement, and (c) marketing. *Meeting accountability requirements* implies the need to meeting program objectives; making better planning decisions regarding programs; authorizing fiscal payments; meeting grant obligations; and allocating resources correctly. *Program improvement* means identifying strengths and weaknesses, creating safer practices, increasing educational value, enhancing competence, testing innovative ideas, reducing planning problems, decreasing operating costs, reducing staff concerns, and establishing quality benchmark and assurance standards. *Marketing* involves advertising past program effectiveness, indicating successful program track records, promoting public relations, and advocating and lobbying for maintaining and sustaining policy (National Association of State Directors of Career Technical Education Consortium [NASDCTEc], 2010). As will be explained below, this definition of marketing fails to taken into the social good (Kotler & Zaltman, 1971), which is the basis for conducting ROI in the first place.

Different enterprise levels (states, schools, colleges, and programs) regularly provide information on meeting accountability requirements, program improvement, and marketing. Information on meeting accountability requirements and program improvement is available in the Consolidated Annual Report (CAR) submitted by each state to OVAE at the end of each year.[12] Of the three, meeting accountability requirements takes precedence in the CAR, followed by program improvement, and, if at all considered, marketing. Also, OVAE submits an annual Report to Congress in which individual state information from the CAR is aggregated to provide a national picture of the extent to which accountability requirements under the Perkins legislation are being met (U.S. Department of Education, Office of Vocational and Adult Education, 2010). However, neither the individual state CAR information nor the national Report to Congress makes direct references to ROI for CTE measures. However, with some additional analysis using the information in the CAR (particularly around program improvement and financial data),

[12] See http://cte.ed.gov.

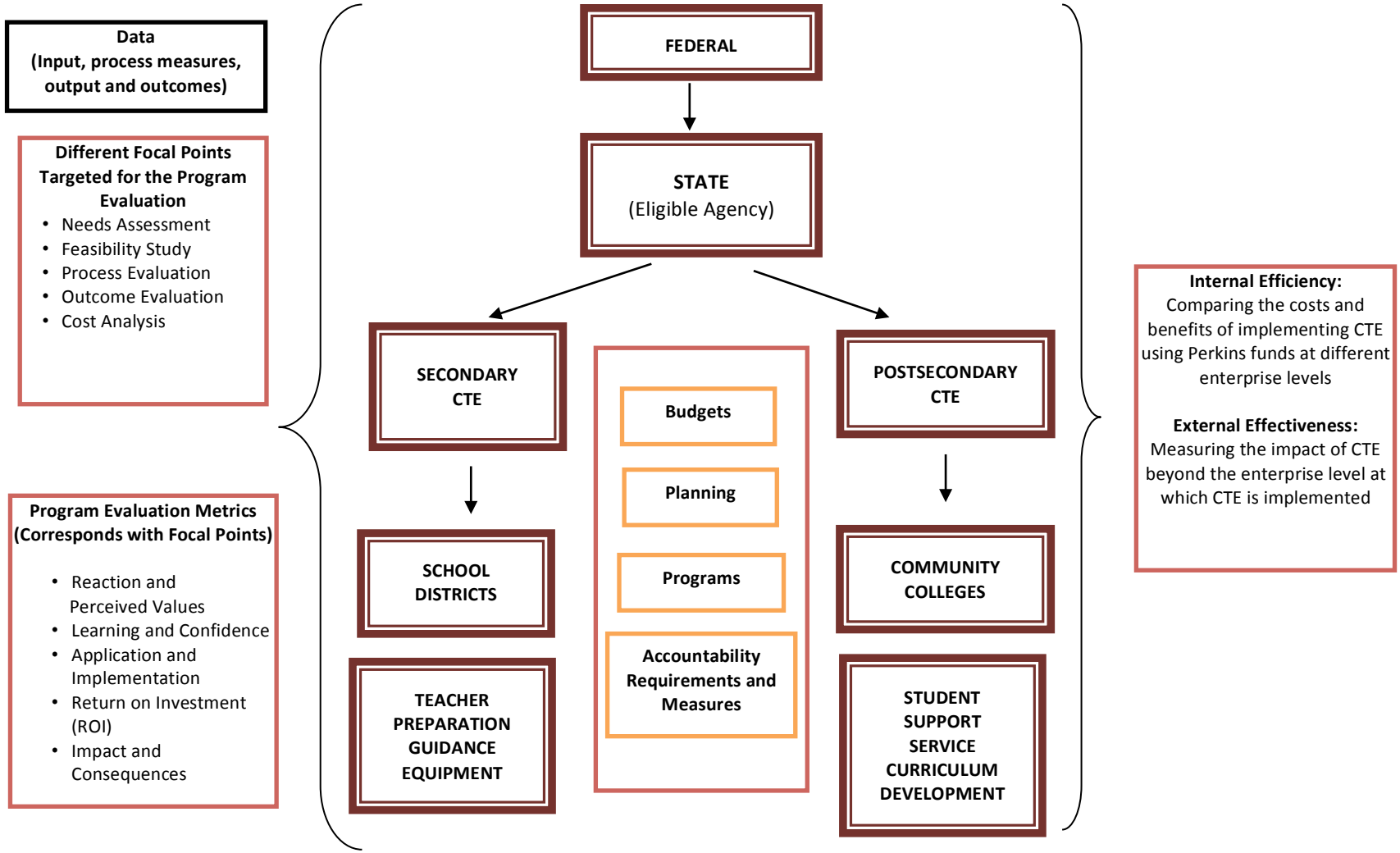


Figure 3. Connecting CTE plans, programs, budgets, and accountability to ROI measures.

ROI for CTE measures could be imputed at the state level.[13]

Marketing has only infrequently been used as a reason for conducting ROI for CTE. This is primarily because the restrictions on using state and federal funds for advocacy are stringent, and particularly given the fuzzy line between marketing and advocacy. However, there is a broader reason why marketing a social good like CTE has been limited, and that is because it is seen by many as crassly commercial. In the context of ROI for CTE, commercial marketing has not been clearly distinguished from social marketing. The former is discussed mainly in terms of advertising, whereas the latter is connected more closely to strategic planning (MacFadyen, Stead, & Hastings, 1999). In their seminal article, Kotler and Zaltman (1971) defined social marketing as "the design, implementation and control of programs calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution and marketing research" (p. 5). This definition relates directly back to different kinds of program evaluation, including ROI (see Table 1 and associated discussion). In other words, with both the internal efficiency and external effectiveness of CTE increasingly coming under question, using social marketing principles as a basis for conducting ROI for CTE would be appropriate, particularly for the purposes of highlighting past program effectiveness and substantiating successful program track records.

Purposes of Conducting ROI for CTE

An ROI for CTE study has three purposes (see Table 2). The first is to make rational decisions, such as determining whether investing in a specific CTE enterprise is worthwhile—that is, determining whether its benefits exceed its costs. A second purpose is to make informed choices, such as choosing from among an array of similar CTE enterprises—at the school district or community college level—that provide varying benefits for more or less the same cost. A third purpose is the validation of strategic planning at the state level; for example, assessing the direct and indirect economic and social impact of allocating an annual amount for CTE in the overall state budget. Table 2 uses three examples to distinguish the three purposes of ROI for CTE and lists typical questions that must be answered if the various steps in the process (as outlined in Table 1 and Figure 3) are to be followed accurately.

The information presented in Table 2 should be regarded as a starting point in building an ROI for CTE process. Readers of this report are encouraged to develop additional questions that supplement those listed in Table 2. How these questions might be developed may be gleaned from the abstracts of ROI studies of different types presented in Appendix A, which describes in summary form how different states have approached conducting ROI for CTE.

Working from right to left in Table 2 reveals an instructive point. Focusing on the third purpose (validating strategic planning) includes the second (informed choice) and the first (rational decision making) purposes as part of the overall ROI for CTE effort; similarly, when focusing on the second (informed choice) purpose, the first (rational decision-making) is included as well.

[13] As explained in the introduction, the Perkins accountability system is not a national system. Therefore, imputing national ROI for CTE measures is problematic (Kotamraju, 2012).

Table 2
Purposes for Conducting ROI: A Progressive Questioning Approach

Purposes		
Program Level: Rational Decision-Making	Sub-System Level: Informed Choice	State Level: Validating Strategic Planning
A local CTE administrator in a state called Anywhere is in charge of running several CTE allied health programs within a newly constructed Healthcare Simulation Center. The CTE administrator receives $10,000 to buy state-of-the-art hospital simulation beds. Anywhere's State CTE director asks the local CTE administrator to detail the program evaluation methodology used in justifying the purchase. Typical questions include: 1. How will the program evaluation be conducted and the corresponding metrics be developed? 2. If the purchase is yet to be made, how will the program evaluation change? 3. If, on assessment, the full impact of the purchase is limited, how would you modify your program evaluation?	In your role as the State CTE Director in the state of Anywhere, you must choose among three innovative ideas that rose to the top when local consortia submitted different ideas through a competitive grant program for $50,000 in Perkins Leadership Funds. The three choices are: A. A statewide Healthcare Simulation Center that uses state-of-art technologies for all of the state's allied health care programs. B. A statewide innovative curriculum strategy that builds communities of practice among academic and CTE teachers, and which infuses academics into the teaching of CTE courses and programs. C. A statewide effort to build capacity that places CTE measurement, accountability, and evaluation within the larger statewide data system. The focus of the grant involves aligning different policy frameworks, developing managerial oversight and administrative knowledge, connecting different data systems, and expanding institutional research expertise. Typical questions include: 1. What program evaluation strategies were conducted and what corresponding metrics were developed to make the final choice? 2. Under what conditions does Anywhere's State CTE Director need to go beyond quantitative information to consider qualitative	The state of Anywhere is currently running a budget deficit. The Governor of Anywhere has requested a thorough review of all programs including CTE. Specifically, Anywhere's Governor was interested in examining the economic impact of secondary and postsecondary CTE on the individual and on the economy in the state of Anywhere. He requested the University of Anywhere to develop various program evaluation metrics, but specifically asked them to focus on cost-benefit and net impact analyses. The primary research questions addressed by this study include: 1. How many program completers and graduates from secondary school programs, technology centers, and community college career and technical programs were employed in Anywhere in the quarters after graduation? 2. What are the economic impacts of dual enrollment and articulation on the individual and the state? 3. What are the earnings of

	factors?	program completers and graduates from secondary school programs, technology centers, and community college career and technical programs who were employed in Anywhere in the quarters after graduation? 4. In what industries are graduates employed? 5. What is the economic impact of those earnings? 6. What is the economic impact of institutional operating expenses and employment in secondary and postsecondary career and technical education programs in schools, technology centers, and community college career and technical programs? 7. What is the return on investment in secondary and postsecondary CTE programs in schools, technology centers, and community college CTE programs? Describe the analysis the University of Anywhere undertook to complete the study, remembering that it had to be designed to provide simple, straightforward answers to a set of questions frequently asked by policymakers, state legislatures, local boards of education, and other governing bodies about secondary and postsecondary CTE.

Furthermore, note that each of these purposes apply equally to the different operational levels—state, school district or college, and program.

The Many Different Ways to Conduct ROI for CTE

The list below links each of the three operational levels—state, school district or college, and program to the three purposes—rational decision-making, informed choice, and validating strategic planning. In theory, ROI for CTE may be undertaken in nine different ways, moving from the most simple to the most complex:

1. The most simple way is when the operation level is a program and the purpose is rational decision-making.
2. Less simple is when the operation level is still a program, but the purpose is now informed choice.
3. Even less simple is when the operation level is still a program, but the purpose now becomes an effort to validate a strategic plan.
4. The intermediate way is when the operational level is at the sub-state level and the purpose is rational decision-making.
5. The more intermediate way is when the operational level is at the sub-state level but the purpose now is making informed choices.
6. The most intermediate way is when the operational level is at the sub-state level and the purpose becomes validating a strategic plan.
7. More complex is when the operation level is at the state level but the purpose is rational decision-making.
8. Even more complex is when the operation level is at the state level, but the purpose now becomes making an informed choice.
9. The most complex involves operating at the state level with the purpose of validating the strategic plan.

In reviewing the above list, it is clear that from among the nine, a lesser number actually are applicable in practice. For example, 1, 5, 6 and 9 are the ways in which the three different operational levels—state, school district or college, and program—typically apply ROI.

At the program level, rational decision-making is relevant because operationally SEAs and LEAs need to know if a particular program is internally efficient (in terms of cost) and externally effective (in terms of meeting the desired goal). On the other hand, if the focus is a single program, then 2 and 3 are not relevant. At the sub-state level (school district or community college), 5 and 6 are applicable because here the thrust is either to make an internally efficient and externally effective choice or to conduct an ROI study to validate a strategic plan. Sub-state levels are less interested in judging the internal efficiency and external effectiveness of a single program, although at times this may be required if a program is sufficiently large. Finally, at the state level, the relevant way in which ROI for CTE can be operationalized is represented by 9. By so doing, 7 and 8 are also covered in terms of internal efficiency and external effectiveness. Appendix A provides examples of each of the above various ways in which the different levels—state, school district or college, and program—operationalize ROI by engaging in a process that

either leads to making a rational decision, making an informed choice, or validating a strategic plan.

The first section of this report discussed why ROI for CTE has been difficult. There it was argued, broadly speaking, that CTE faces budgetary, cultural, and institutional constraints when it tries to conduct ROI for CTE. *The Building Blocks for ROI Studies* laid out the building blocks for how to conduct ROI for CTE, placed ROI within the broader framework of program evaluation, and indicated the importance of why internal efficiency needs to be separated from external efficiency. *Connecting CTE to ROI Measures* discussed the reasons, purposes, and ways in which ROI for CTE can be conducted. *Setting the Stage for Measuring ROI for CTE*, the next section of this report, takes information from each of these previous sections to set the stage for measuring ROI for CTE using a common protocol.

Setting the Stage for Measuring ROI for CTE

Stone and his colleagues (Stone et al., 2010) reviewed the education ROI literature and identified three strands of discussion regarding the various approaches to and methods of measuring ROI. The first focuses on the theoretical foundations for developing ROI approaches and methods. Much of this discussion is complex and requires an advanced knowledge of the mathematical application of concepts in finance and economics. A good general review of these theoretical foundations can be found in Pscharapolous (2006), which also provides a policy context for ROI in education and presents evidence for why education has value.

Second, as highlighted in the Stone et al. report, many studies have produced ROI for education measures, some more specific than others. In general, these studies have applied many of the ingredients, tools, and building blocks described in the first section of this paper, *The Building Blocks for ROI Studies.* Some of these studies are highlighted in Appendix A. A key point is that education ROI analyses "have been applied using different goals, techniques, settings, and data" (Stone et al., 2010, p. 8). Consequently, we recommend that CTE ROI studies follow a common protocol. Following the recommendations for all of education made by Hummel-Rossi and Ashdown (2002), a framework for this common protocol for CTE ROI analyses is provided at the end of this section.

A third strand in the education ROI literature identifies the different approaches that have been used to conduct ROI. The remainder of this section focuses on the three most common approaches employed in ROI in education studies.

ROI Can Be Conducted Using Different Techniques

Thus far, this report has discussed the challenges faced when conducting ROI for CTE and described reasons for undertaking ROI for CTE. No matter the challenges or the reasons for doing so, the building blocks for conducting ROI for CTE are the same, whichever of the following techniques are used.

Education ROI analyses are generally conducted using three different techniques. They are:

- The *common framework technique* must meet the following four preconditions: It must include (a) well-developed, integrated conceptual frameworks, (b) advanced institutional research and evaluation expertise, (c) highly connected data systems, and (d) sound data administration and superior management knowledge and oversight. This technique requires, at a minimum, explicit linking of education and workforce databases to measure the impact of a particular investment on both direct and indirect beneficiaries.
- The *social benefits technique* measures the total benefits that accrue from initiating a specific programmatic action (e.g., reducing the number of CTE dropouts). The programmatic action has both direct and indirect impacts. The direct impact is quantified as that which immediately benefits the program's target population. The indirect impact is generally quantified as a measure of the gain to the community. For example, an indirect impact might be: By moving "X" number of CTE students from dropout to

graduation status, a "Y" increase in tax collections would result. Matching these direct and indirect benefits against program costs provides a social benefit-cost ratio for the action.

- The *case study technique* identifies the factors that influence the success of selected CTE programs and whether such programs are achieving a reasonable ROI compared to similar programs. A program may be a school, a specific occupational program within a school, a particular pedagogy, or an administrative structure that leads to improved student performance.

Recently, the NRCCTE produced a CTE ROI study that provided a primer for conducting ROI under the four preconditions required by the *common framework technique* (Hollenbeck, 2011). The Hollenbeck study found that participants in CTE programs reaped substantial returns—positive earnings—with almost nil or negative costs associated with secondary CTE. At the postsecondary level, any associated participation costs (e.g., tuition, foregone earnings) were more than outweighed, even over the short term, by the economic payoffs of participating in CTE. The common framework technique used by Hollenbeck has been applied to CTE only infrequently, however, because most states and districts find it difficult to meet all four of the preconditions. Therefore, the field needs to find less stringent alternatives without sacrificing rigor when the common framework technique is too difficult to conduct.

A typical alternative approach is to cull data on benefits and costs from a variety of different studies (such as those presented in Appendix A) and apply the social benefits technique. What distinguishes the social benefits technique from the case study technique is a matter of scale: The social benefits technique is generally used when ROI calculations involve both direct and indirect effects, and the latter usually outnumbers the former. The case study technique focuses more on direct impacts.

Consider this example. An Alliance for Excellent Education study (AEE, 2010) calculated that about $260,000 per dropout would be saved over a student's lifetime if the current dropout rate (30 out of 100 students) were reduced to zero. This study also noted that graduating from high school generates approximately $10,000 in additional annual income. The case study technique might focus on this last number. About 1.3 million high school students drop out every year. AEE estimated that the lifetime economic gain reaped by eliminating high school dropout would be about $335 billion, a number that would be provided when applying the social benefits technique. The NRCCTE has been conducting detailed analyses of NCES Sample Survey data and developed a new typology of CTE credit-taking (Kotamraju, Aliaga, & Dickinson, 2011). Using this typology, the authors estimated that nearly half of all high school graduates take at least three or more CTE credits. NRCCTE researchers have also established that high school students completing three or more CTE Carnegie credits are less likely to drop out than those taking between zero and one CTE credits (Aliaga, Stone, Kotamraju, & Dickinson, 2011). We can thus argue that approximately $168 billion of the lifetime gain from reducing the dropout rate to zero can be attributed to intensive CTE courses. Such ROI calculations were made possible by using different studies that each applied unique assumptions and specific methodologies. In such conditions, care must be taken to state and describe these differences clearly, addressing any inconsistencies and how they have been handled.

A Protocol for Guiding Future ROI for CTE

In reviewing ROI for education, Hummel-Rossi and Ashdown (2002) suggested the use of a common protocol to guide future analysis, arguing that the lack of a general and uniform protocol has limited the field's ability to evaluate ROI in education studies. More recently, however, studies have applied a single protocol to judge different ROI in education approaches and methods (Ross, Barkaoui, & Scott, 2007; Yeh, 2010). Hummel-Rossi and Ashdown (2002), for example, developed a common protocol for educational ROI that has nine components: (a) perspective, (b) cost analysis, (c) comparators, (d) program effects, (e) outcome measures, (f) distributional consequences, (g) time-effect analysis, (h) sensitivity analysis, and (i) decision rule. In addition, they suggested that a full-fledged ROI should be developed and used as a reference case for future, similar educational ROI studies. Hummel-Rossi and Ashdown (2002) then took each component and provided an educational context in which the application for the protocol would be optimal. In the sections that follow, the context in which ROI for CTE can be applied is discussed for each of the nine components of the Hummel-Rossi and Ashdown protocol.[14]

Perspective refers to the "goals of the evaluation that are clearly articulated and for which there is consensus" (Hummel-Rossi & Ashdown, 2002, p. 20). Identifying appropriate goals for ROI for CTE has been problematic because CTE involves many definitional, technical, and policy issues (Kotamraju, 2012) that make development of a common protocol for ROI for CTE more difficult. As this report has highlighted, the reasons for evaluating ROI for CTE—such as accountability requirements, program improvement, and marketing—at least provide the context around which the goals for ROI for CTE can be developed. Additionally, knowing the operational constraints at the state, sub-system, or project level can help delineate the contours of an ROI study.

A major missing ingredient for CTE is the need for a common perspective. That common perspective can be found in recent non-regulatory guidance provided by OVAE with regard to rigorous programs of study (RPOS). RPOS are those programs of study (POS) that adhere to a basic framework that includes 10 components (see Appendix B). The 10 RPOS components expand and refine the original four elements (of which only three are actually required) of POS laid out in the Perkins IV legislation, which also mandated that all states must implement at least one POS in order to receive funds. National adoption of these 10 components would provide a common perspective when ROI for CTE is undertaken at the state, sub-system, or program levels. However, how to convert these components into actions and measures remains a challenge. Moreover, the question of whether all or some of the 10 components need addressing is yet to be determined.

In *The Building Blocks for ROI Studies*, five items—(a) the opportunity cost, (b) the time horizon, (c) the discount rate, (d) monetization, and (e) externalities—were identified as building blocks in any ROI study. These five items are connected to five of the nine components in the

[14] The protocol developed by Hummel-Rossi and Ashdown (2002) was specifically for measuring cost effectiveness. The protocol would not differ very much if it were generalized to all of ROI, as defined in this report.

common protocol—cost analysis, distributional consequences, outcome measures, time-effect analysis, and decision rule. Cost analysis requires identifying all costs, including opportunity costs. Opportunity costs are generally defined as costing out all alternative actions and decisions that are no longer possible; when the ROI is undertaken, it generates specific and particular associated costs, some of which maybe implicit. Those costs that are implicit in nature need to be monetized using particular decision rules like the discount rate. Distributional consequences imply taking into account the different externalities (positive and negative) that result from conducting the ROI. The distributional consequences also give rise to indirect outcomes, over and above the direct impact, that result from conducting the ROI. Which outcomes get included in the process depends on the time horizon; the time-effect analysis varies depending on the time horizon. Once again, the choice of a discount rate becomes crucial. Taken as a whole, one could argue that the five protocol components, which are subjective in nature, get translated objectively into the five items (building blocks), so that some quantification within the ROI can be attained and a (numerical) decision rule can be applied.

Several additional points, however, need to be made. First, Perkins funds that are allocated toward and spent on CTE-related activities at the program, sub-system, and state levels can be used as the overt (explicit) costs in a cost analysis. States include such information (in the aggregate) as part of their CAR submission. Nevertheless, "hidden" costs need to be acknowledged because CTE (or, for that matter, any other programmatic effort) is typically embedded within the larger educational cost structures at the state, sub-system, and program levels (Boser, 2011). Federal funding is actually a very small portion of the overall investment any state makes in CTE. The example of one state—Minnesota—illustrates this fact.

Perkins provides approximately $20 million annually to Minnesota to support CTE programs at the secondary and postsecondary levels. This is a relatively small investment when compared to education spending as a whole for the state. The state's K-12 annual education budget is approximately $15.1 billion, with the higher education budget approximately $3.2 billion (Smith & Kotamraju, 2008). The percentage of the federal investment in CTE is therefore only a fraction of overall state spending on education. Although the Minnesota investment in CTE is much smaller than in other states (e.g., Oklahoma, Pennsylvania, Kentucky), nevertheless, the federal investment does much to provide the catalyst for how state and local funds are allocated towards CTE.

Second, each particular costing approach entails distributional consequences. If only Perkins funds are used in the costing method, then the ROI for CTE analysis actually measures the efficiency of Perkins operations at different levels. In other words, the analysis is restricted to measuring internal efficiency and leads toward an answer to the first question: Is the federal investment of Perkins dollars paying off? However, a larger question involves the measurable impact of CTE beyond the level at which Perkins funds are applied. In other words, the question focuses on external effectiveness—the worthiness of CTE to overall education and workforce development efforts at the state, sub-system, and program levels. One way to address this question is to build a set of interactions among and between the 10 POS components and to cost them out. These interactions are shown in Appendix C, which offers one way to identify and

determine what the appropriate distributional weights might be among myriad interactions and how they are included in the external effectiveness measure.

Third, as indicated in the introduction to this report, identifying standardized outcomes for use in a CTE analysis has proven difficult. The Perkins accountability indicators may serve as outcome measures. Table 3 displays the core accountability indicators that are required under Perkins IV.

Table 3
Perkins IV Core Accountability Indicators

Secondary Level	Postsecondary Level
1S1 - Academic Attainment in Reading/Language Arts	
1S2 - Academic Attainment in Mathematics	
2S1 - Technical Skill Attainment	1P1 - Technical Skill Attainment
3S1 - Secondary School Completion	2P1 - Credential, Certificate or Diploma
4S1 - Student Graduation Rate	3P1 - Student Retention or Transfer
5S1 - Placement in Postsecondary, Employment, or Military	4P1 - Student Placement in Employment
6S1 - Nontraditional Participation	5P1 - Nontraditional Participation
6S2 - Nontraditional Completion	5P2 - Nontraditional Completion

Note: Nontraditional in the CTE context refers to students enrolling in and completing programs that are nontraditional for their gender. Men in nursing or women in welding are considered prototypical examples of students enrolling and completing CTE programs that are nontraditional for their gender.

LEAs collect and report CTE and other data to SEAs, who then take this data to calculate the numerical values for each of these indicators, which they then report these as part of their annual submission of the CAR. The current Perkins accountability system has separate indicators for secondary and postsecondary and, notably, the two sets of indicators cannot be connected to one another. This is because, for each set, measurement definitions are unique, data collection methods vary, and reporting procedures are different. The same holds true for indicators within each set. The need to connect the different secondary and postsecondary Perkins indicators has become crucial given the heightened interest in finding appropriate outcome measures for POS. Some have argued that the ultimate test for students successfully enrolling and completing a POS is finding and keeping employment that is closely related to the POS in which they enroll and complete. In ROI studies, successful placement in employment is seen as benefit, and therefore has the potential of increasing the internal efficiency and external effectiveness of the enterprise. Therefore, when conducting ROI for CTE, secondary and postsecondary indicators must be connected to one another, as well as the indicators within the secondary set and within the postsecondary set.

As discussed below, the ideal data system for conducting ROI for CTE is a longitudinal data system in which a cohort of students enroll in, for example, a POS. Success is defined when students in the cohort complete their educational program and are placed in employment. The

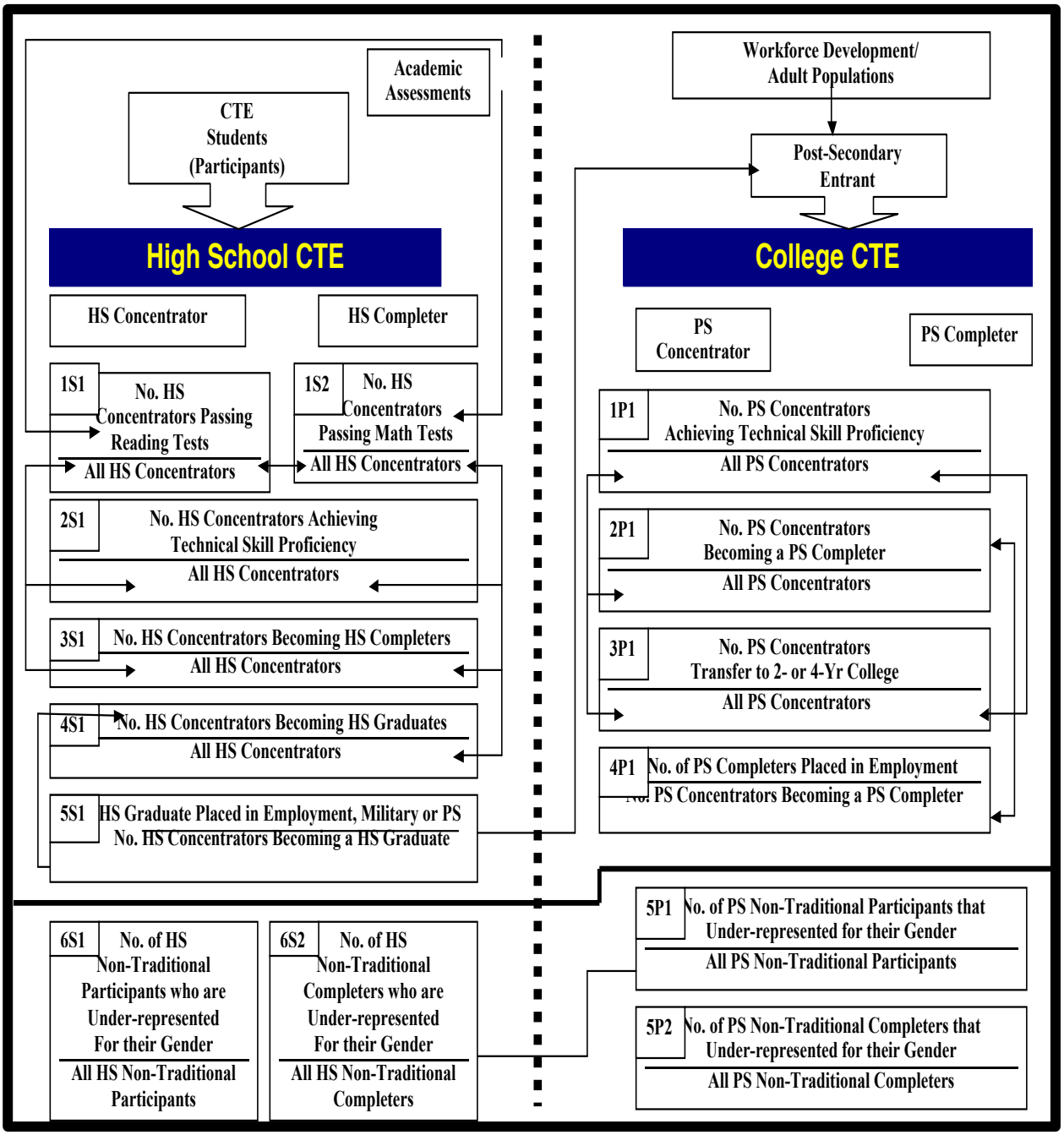


Figure 4. Linking secondary and postsecondary Perkins accountability indicators: A schematic representation.

advantage with using a cohort is that it reduces to a minimum any variations in measurement definitions, data collection methods, and reporting procedures, a basic pre-condition when using longitudinal data systems. Figure 4 uses current secondary and postsecondary Perkins accountability indicators to outline a process wherein the numerator in one indicator is the denominator in the subsequent indicator, and the denominator in the same indicator is the

numerator in the previous indicator. In the context of this report, one could view the numerator as benefits and the denominator as costs, adjusting each as students within the cohort progress from enrollment in high school to eventually being placed in employment. Cohort analyses can also be adjusted to include those students whose progression within the education system is not linear. The state of Minnesota employs a cohort analysis when it reports its Perkins accountability information at the postsecondary level (Minnesota State Colleges and Universities and the Minnesota Department of Education, 2011). Recently, keeping the goal of a well-designed accountability system in mind, CTE has begun exploring ways to remake the Perkins accountability system through the State Perkins Accountability Congress (SPAC).[15] More generally, as states begin developing and implementing longitudinal data systems across the nation, moving toward a cohort-based analysis should become the preferred way for conducting ROI for CTE.

Fourth, in any ROI analysis, careful consideration must be given to reconciling the nature of multi-year programming within education and the annual budgeting processes that states, sub-systems, and programs have to put in place. CTE is no different. The Perkins legislation usually runs over a period of six years, but funding is generally restricted to annual allocations. Benefits and costs must therefore be annualized, adjusted for inflation, and discounted accordingly.

Fifth, the decision rule applied within any ROI analysis is typically a number (e.g., cost-benefit ratio, net present value, or internal rate of return). Hummel-Rossi and Ashdown (2002) suggested that such numbers are the starting point in any ROI analysis. Other decision-making tools, contextual in nature, should be given equal, if not more, weight. As Hummel-Rossi and Ashdown (2002) stated, "Societal values, such as equal opportunity for learning and developing… may not be consistent with economic efficiency, and, consequently, these values must be weighed against [the purely numerical information]" (p. 22). CTE would do well to strike this balance, particularly when it has been repeatedly suggested that CTE has ignored the data needed to determine internal efficiency and external effectiveness (Duncan, 2011)

If CTE is to include the three remaining components of the Hummel-Rossi and Ashdown (2002) protocol—*program effects* (use of rigorous statistical techniques), *comparators* (finding reasonable alternatives for comparing), and *sensitivity analysis* (checking the robustness of the analysis)—then the only appropriate applicable technique is the *common framework technique* (Hollenbeck, 2011). For CTE, technical, analytical, and budgetary constraints make this particular technique difficult. Nevertheless, an analyst intending to measure the ROI for CTE can employ one or more of the following approaches to develop the kind of studies that have been outlined in Appendix A.

The place for the CTE field to start would be to use the *case study technique*. Such studies would be mostly done at the classroom or program level. This would permit the analyst to develop the necessary basic skills, learn the different terminology, and apply the simple tools that have been discussed in this report. It would also enable the analyst to identify the limits of the case study technique, particularly when it comes to measuring indirect impacts. To continue perfecting his

[15] Further detail regarding this effort can be found on the Perkins Collaborative Resource Network website: http://cte.ed.gov/index.cfm.

or her skills, the analyst can apply the case study technique to several situations, be these at the classroom or the program level. Well-crafted case studies can prove useful for making the case for program improvement. If the *social benefits technique* is to be used, usually at the sub-state or state levels, the focus of the ROI study is social marketing, in which in addition to the four "Ps" of commercial marketing—product, price, place, and promotion, additional "Ps"—publics, partnerships, policies, and purse strings, can be included as well (Weinreich, 2006). The main difference between the case study technique and the *social benefits technique* is the scale at which the ROI is conducted. The social benefits technique is typically used on projects and programs that have impacts beyond themselves (hence the term *social*). Also, by applying the social benefits technique to various broad programs and projects, the analyst may develop a better sense and knowledge of the boundaries and limitations of doing ROI studies. This is extremely important because the use of the social benefits technique in conducting ROI studies has often resulted in grossly exaggerated claims (see McHenry, Sanderson, & Siegfried, 2011).

However, if an SLDS is in place, applying the *common framework technique* becomes easier. Moreover, an SLDS would make implementing the common protocol described in this report possible and permit a move toward standardization. It would allow for having a common perspective on goals (outcome measures) such as the four areas of focus within the U.S. Department of Education: (a) strengthening POS, (b) improving data and accountability, (c) increasing teacher effectiveness, and (d) turning around low-performing schools. Costs and benefits can be derived from the same data platform. Program effects can be based on a consistent set of comparators, with distributional consequences assessed uniformly, sensitivity analyses based on a common set of parameters, and decision rules applied using appropriate and well-defined rules. Finally, the time frame for conducting an ROI can be made to be the same no matter which strategy and what program is being assessed. In short, the *common framework technique* allows for all three purposes for ROI for CTE—program improvement, accountability and evaluation, and marketing—to be achieved simultaneously.

The CTE community needs to find ways to make the use of the *common framework technique* more widespread if it is to gather the hard evidence to challenge popular misperceptions the broader education and workforce communities might have regarding the internal efficiency and external effectiveness of CTE. It is noteworthy that the CTE community has recently been asked to participate, both at the state and national levels, in the growing discussion regarding developing, maintaining, and sustaining SLDS.[16] CTE has begun to make the first movements toward implementing ROI analyses that use the common framework technique by involving itself in the development of comprehensive SLDS. Using scientifically based research methods, a standardized data system such as SLDS, and the ROI building blocks, tools, and techniques described in this report, the CTE community could systematically develop several CTE ROI analyses.

[16] Recently, a group of CTE accountability specialists attended the SLDS P-20W Best Practice Conference in Arlington, VA (November 15-16, 2011). There was much interest in what CTE could contribute toward building a strong SLDS, both from an education and a workforce development perspective. Resulting from this participation was the formation of a CTE SLDS workgroup (comprised of an equal number of CTE and non-CTE accountability specialists). The group has the potential to address CTE data issues and influence CTE evaluation and research via SLDS (personal communication, Sharon Enright, Associate Director, CTE Performance and Accountability, Office of Career and Technical Education, Ohio Department of Education).

In the meantime, using the *case study approach*, SEAs and LEAs would do well to look inwards at the myriad CTE programs that have been, or currently are being, implemented across the country. There is a wealth of information present in those programs that can provide the ingredients necessary for conducting ROI for CTE. Aggregating case studies within a state community college system, for example, might offer a lower cost approach to a useful ROI for CTE if system cannot afford or have the necessary data to follow the *common framework technique.* It also would limit the use of the *social benefits technique*, which can be somewhat misleading approach because it can exaggerate benefits and underestimates costs by ascribing more to the results that what might actually be the case. This report recommends that the CTE community focus on the *case study approach* in the shorter term, and as it continues to push for the inclusion of CTE data and information within the SLDS framework in the longer term, which would make conducting ROI for CTE using the *common framework technique* that much easier.

References

Alfred, R. I., (2008). Governance in a strategic context. *New Directions for Community Colleges*, *141*(1), 79-89.

Alliance for Excellent Education. (2010). *Education and the economy: Boosting the nation's economy by improving high school graduation rates.* Washington, DC: Author.

Aliaga, O., Stone, J. R., III, Kotamraju, P., & Dickinson, E. (2011). *Engaging students in high school: An examination of the positive role of career and technical education.* Louisville, KY: National Research Center for Career and Technical Education, University of Louisville.

Boser, U. (2011). *Return on educational investment: A district-by-district evaluation of U.S. educational productivity.* Washington, DC: Center For American Progress.

Burke, J. C., & Minassians, H. P. (2002). Measuring down and up: the missing link. *New Directions for Institutional Research, 116*, 97-113.

Burke, J. C., & Minassians, H. P. (2004). Implications of state performance indicators for community college assessment. *New Directions for Community Colleges*, *126*(2), 53-64.

Data Quality Campaign. (2009). *Statewide longitudinal data systems grant applications summary of key findings.* Washington, DC: U.S. Department of Education, Office of Vocational and Adult Education. Retrieved from http://www.dataqualitycampaign.org/files/SLDS_Grant_Analysis_Summary.pdf.

Duncan, A. (2011, April 19.). *Remarks made at the NASDCTEc annual spring meeting*. Washington, DC: NASDCTEc. Retrieved from http://www.youtube.com/watch?v=qYn1an3v5Yc

Ewell, P. T. (2002). A delicate balance: The role of evaluation in management. *Quality in Higher Education*, *8*(2), 159-171. New York, NY: Taylor and Francis.

Ewell, P. T., & Boeke, M. (2007). *Critical connections: Linking states' unit record systems to track student progress.* Boulder, CO: National Center for Higher Education Management Systems.

Ewell, P., & L'Orange, H. (2009). *The ideal state postsecondary data system: 15 essential characteristics and required functionality*. Denver, CO: National Center for Higher Education Management Systems, State Higher Education Executive Officers. Retrieved from http://www.sheeo.org/datamgmt/unit%20record/ideal_data_system.pdf.

Fretwell, D. (2003). A framework for evaluating vocational education and training. *European Journal of Education, 38*(2), 177-190.

Hollenbeck, K. M. (2011). *Conducting return on investment analyses for secondary and postsecondary CTE: A framework.* Louisville, KY: National Research Center for Career and Technical Education, University of Louisville.

Hubbell, L., (2007). Quality, efficiency, and accountability: Definitions and applications. *New Directions for Higher Education*, *140*(2), 5-13.

Hummel-Rossi, B., & Ashdown, J. (2002). The state of cost-benefit and cost-effectiveness analyses in education. *Review of Educational Research, 72*(1), 1-29.

Johnstone, D. (2008). What does an IRR (or two) mean? *The Journal of Economic Education*, *39*(1), 78-87.

Kanstoroom, M., & Osberg, E. (Eds.). (2008). *A byte at the apple: Rethinking education.* Washington, DC: Thomas B. Fordham Press.

Kotamraju, P. (2012). Vocational education and training quality and evaluation: Its place in the U.S. community college. In A. Barabasch & F. Rauner (Eds.), *The art of integration: work and education in America* (pp. 195-211). New York, NY: Springer Verlag.

Kotamraju, P., Aliaga, O., & Dickinson, E., (2011, May). *Career and technical education measurement, accountability, and evaluation: The NRCCTE's comprehensive strategy for technical assistance.* Presentation made at the annual meeting of the National Association of Career and Technical Education Information, Philadelphia, PA.

Kotamraju, P., Richards, A., Wu, J., & Klein, S. (2010, April). *A common postsecondary data dictionary for Perkins accountability.* Louisville, KY: National Research Center for Career and Technical Education, University of Louisville.

Kotler, P., & Zaltman, G. (1971). Social marketing: An approach to planned social change. *Journal of Marketing*, *35*(3), 3-12.

MacFadyen, L., Stead, M., & Hastings G. (1999). *A synopsis of social marketing*. Stirling, Scotland: Institute of Social Marketing, University of Stirling. Retrieved from http://staff.stir.ac.uk/w.m.thompson/Social%2520Enterprise/Library/Synopsis%2520of%2520Social%2520Marketing.pdf.

McHenry, P., Sanderson, A., & Siegfried J. (2011, September). *The local economic impact of colleges and universities*. Presentation made at the Universities as Economic Drivers: Measuring and Building Success Conference, Buffalo, NY.

Minnesota State Colleges and Universities and the Minnesota Department of Education. (2011). *The Minnesota state five-year plan*. St. Paul Minnesota: Authors. Retrieved from http://www.cte.mnscu.edu/perkinsIV/MN_State_Plan/index.html.

National Association of State Directors of Career Technical Education Consortium. (2010). *Return on investment in CTE: A webinar*. Washington DC: Author. Retrieved from http://www.careertech.org/resources/webinar-archive.html.

Nord, C., Roey, S., Perkins, R., Lyons, M., Lemanski, N., Brown, J., & Schuknecht, J. (2011). *The nation's report card: America's high school graduates* (NCES 2011-462). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Peterson, M. W., & Augustine, C. H. (2000). External and internal influences on institutional approaches to student assessment: Accountability or improvement? *Research in Higher Education, 41*, 443-479.

Phillips, J. J., & Phillips, P. P. (2008). Distinguishing ROI myths from reality. *Performance Improvement*, *47*(6), 12-17.

Priest, S. (2001). A program evaluation primer. *The Journal of Experiential Education, 24*(1), 34-40.

Pscharapolous, G. (2006). The value of investment in education: Theory, evidence and policy. *Journal of Education Finance, 32*(2), 113-136.

Ross, J. A., Barkaoui, K.,& Scott G. (2007). Evaluations that considers costs of educational programs: The contribution of high quality studies. *American Journal of Evaluation*, *28*, 477-492.

Serban, A. M. (2002). Knowledge management: The "fifth face" of institutional research. *New Directions of Institutional Research*, *113*(1), 105-111.

Seymour, D., Kelly, J. M., & Jasinki, J., (2004). Linking planning, quality improvement, and institutional research. *New Directions for Institutional Research*, *123*(3), 49-56.

Schray, V. (2000). *Core indicator framework*. Washington, DC: U.S. Department of Education, Office of Vocational and Adult Education.

Shively, G., & Galopin, M. (n.d.). *An overview of benefit cost analysis.* West Lafayette, IN: Department of Agricultural Economics, Purdue University. http://www.agecon.purdue.edu/staff/shively/COURSES/AGEC406/reviews/bca.htm.

Smith, D., & Kotamraju, P. (2008, January). *Developing a new state plan for career and technical education in Minnesota.* Presentation made to the Minnesota Perkins Career and Technical Education State Plan Advisory Task Force, St. Paul, MN.

Stone, J. R., III, Kotamraju, P., Aliaga, O., & Blackman, O. A (2010). *Return on investment research agenda.* Louisville, KY: National Research Center for Career and Technical Education, University of Louisville.

Toma, D. J. (2007) Expanding peripheral activities, increasing accountability demands and reconsidering governance in us higher education. *Higher Education Research & Development, 26*(1), 57–72.

U.S. Department of Education, Office of Vocational and Adult Education. (2010). *Carl D. Perkins Career and Technical Education Act of 2006, Report to Congress on State Performance, Program Year 2007–08*. Washington, DC: Author.

Volkwein, F. J. (1999). The four faces of institutional research. *New Directions for Institutional Research*, *104*(4), 1-19.

Volkwein, F. J. (2008). The foundations and evolution of institutional research. *New Directions for Higher Education*, *141*(1), 1-20.

Weinreich, N. K. (2006). What is social marketing. Los Angeles, CA: Weinreich Communications. Retrieved from http://www.social-marketing.com/Whatis.html.

W. K. Kellogg Foundation. (2004). *Using logic models to bring together planning, evaluation, and action: Logic model development guide.* Battle Creek, MI: Author.

World Bank. (2007). Cost-benefit analysis: Evaluation criteria (Or: Stay away from the IRR). (Knowledge Brief). Washington, DC: Author.

Yeh, S. S. (2010). The cost effectiveness of 22 approaches to raising student achievement. *Journal of Education Finance, 36*(1), 38-75.

Yorke, M. (2004). Institutional research and its relevance to the performance of higher education institutions. *Journal of Higher Education Policy and Management*, *26*, 141-152.

Appendix A
Examples of ROI Studies

Using materials obtained through standard literature review practices, we created individual summaries of major findings and key information relevant to ROI analysis for CTE. Each summary was then categorized as to its type of study and type of ROI analysis, using definitions and parameters for each as outlined in this report. Studies in which the type of analysis delineations were inconclusive or subjective were initially left undefined and then re-categorized so as to best represent the majority of the more objectively defined studies previously identified.

In the summaries that follow, these abbreviations are used: CF = Common Framework, SB = Social Benefit, and CS = Case Study.

State Studies

Alabama

(SB) Smith, D. W. (2006). *A return on investment study for an engineering company in Huntsville, Alabama using a community college web-based training program.* (Doctoral dissertation, Mississippi State University). Retrieved from ABI/INFORM Global. (Publication No. AAT 3211246).

http://proquest.umi.com/pqdlink?did=1126774311&Fmt=7&clientId=47297&RQT=309&VName=PQD

Dissertation, Project Level

This ROI analysis focused on the expansion of a joint private engineering company and community college web-based training program following an initial pilot study. Under the expansion of the program, all employees of the private company were afforded the opportunity to participate in the web-based training program. ROI per training participant was 1,755%, $17.55 per investment dollar, an increase from 121% in the original pilot study. ROI did not correlate with gender, age, ethnicity, level of education, or number of courses taken by the training participants. Positive financial results were attributed to the expansion of the program, participants were satisfied with the flexibility, accessibility, and convenience of online training.

Alaska

(CS) Phipps, R. (2008). *Making Alaska more competitive by preparing citizens for college and career*. Washington, DC: Institute for Higher Education Policy.

http://www.eed.alaska.gov/edsummit/pdf/MakingAKMoreCompetitive.pdf

Report Executive Summary, State Level

The Alaska Commission on Postsecondary Education, in partnership with the National College Access Network, surveyed the postsecondary access and success climate within the state of Alaska. As an underperforming educational state, the survey revealed that a college-going culture does not exist within Alaska and a causal link between Alaska's workforce needs and postsecondary education has not been publicized. The report offered five recommendations to improve educational performance in Alaska. These recommendations consisted of developing strategies that will create a statewide college-going culture, establishing a partnership environment among postsecondary, K-12, business, and community groups, creating a peer mentoring program to enhance college access, building Alaska Advantage programs to increase postsecondary opportunity awareness, and requesting cabinet-level attention and legislation to the postsecondary education access for Alaskans.

California

(SB) Belfield, C., & Levin, H. (2009). *The return on investment for improving California's high school graduation rate.* Santa Barbara, CA: California Dropout Research Project.

http://schoolfinance.org/resource_center/research/CADropout-Research2.pdf

Report Abstract, State Level

Educational investments and interventions are evaluated within this report as either evidence-based, high-efficacy interventions or promising but unsubstantiated educational interventions. Average applicable implementation costs and a per additional high school graduate figure were calculated for both types of educational investment before being compared to the economic and social benefits to taxpayers and the state of California. Specifically, California will obtain fiscal benefits of $53,600 per new high school graduate and will additionally accrue social benefits of up to $391,900 per student; the federal government will receive an additional $115,300. State and local funding initiatives were found to have a return of $53,600 while those initiatives funded through a combination of local, state, and federal funding were found to generate $189,000 per student. Of the educational interventions surveyed, most were justified on a cost-benefit basis, in that the average California K-12 education costs the public $170,420—a figure less than the graduate return of $189,000.

(SB) Gonzalez, R. G., & Kohli, A. (n.d.). *Getting a return on investment: The California DREAM Act*. Berkeley, CA: The Chief Justice Earl Warren Institute on Race, Ethnicity & Diversity.

http://www.law.berkeley.edu/files/CA_DREAM_Act_Return_on_Invstmnt_Final.pdf

Article, Project Level

This article provides return on investment information relative to the institution of the California DREAM Act (SB 1301) and Assembly Bill 2083 that would provide undocumented students the opportunity to compete for state financial aid for postsecondary education. Using information

from a recent RAND study, $15 million per year in net tax revenue could be generated by the estimated 1620 undocumented students currently enrolled in California's colleges, post-graduation. Bureau of Labor Statistics estimates found that the average bachelor's degree recipient earned $962 per week compared to $419 per week for non-high school diploma recipients. Another RAND study stated that a Mexican immigrant woman with a college degree will pay $5,300 more in taxes and cost $3,900 less in social support compared to a dropout. Related studies revealed that postsecondary enrollment of undocumented students increased ten-fold when eligibility was established for financial aid in Texas and that $2.5 million would be generated in Massachusetts over three years if undocumented students received in-state tuition.

(CS) Stange, K. (2005). *The economic impact of the Foothill-De Anza community college district and its students.* Berkeley, CA: University of California, Berkeley.

http://www-personal.umich.edu/~kstange/policy/FHDAEconImpact.pdf

Report Summary, Project Level

The Foothill-De Anza community college district consists of two two-year colleges within the Silicon Valley that collectively educate more than 60,000 students while employing 3,000 faculty and staff members. The ROI analysis revealed that Foothill-De Anza is directly accountable for $277 million of local economy expenditures, with an additional $186 million in indirect spending and a further $353 million in annual alumni earnings attributed to increases in productivity. A $3.67 local economic impact return on investment was calculated per property tax dollar, with $1.95 in direct district spending and $1.88 in indirect spending and additional alumni earnings.

(SB) Robinson, M. H., & Christophersen, K. A. (2008). *The economic contribution of the Los Angeles community college district.* Moscow, ID: Economic Modeling Specialists, Inc.

http://research.laccd.edu/eir/
http://research.laccd.edu/eir/LACCD_ES_Final%20v3.pdf

Executive Summary, Project Level

This study was based upon multiple economic growth and investment analyses pertaining to the Los Angeles Community College District (LACCD) relative to returns on investment for taxpayers, the state of California, and students themselves. Specific findings pertaining to students included a 24% annual return on investments, and a $7.60 return per dollar investment in LACCD in cumulative higher future income. The LACCD was found to provide a real money return of 10% for annual taxpayer investments, whereas the State of California has annual projected savings of $38.5 million for LACCD students within the workforce. Regionally, the LACCD accounted for 1.8% of Los Angeles County annual income—an annual impact of approximately $9.8 billion.

(SB) Heller, D.E. (2005). Public subsidies for higher education in California: An exploratory analysis of who pays and who benefits. *Educational Policy, 19*(2), 349-370. doi: 10.1177/0895904804273542

http://epx.sagepub.com/content/19/2/349

Abstract, State Level

This exploratory study analyzed the distribution of postsecondary education benefits obtained within the state of California on a racial group basis. Asian American students were found to receive proportionally higher amounts of state funding compared to Latino students despite their widely divergent total student populations. This funding and corresponding benefit difference was attributed to observed racial group differences in two- and four-year college attendance rates along with associated instructional costs and public subsidies. Policy implications for postsecondary education funding and participation rates were discussed in addition to areas of future research pertinent to this area.

Connecticut

(SB) Whipple, S. (2008, November 2). State getting return on community college investment. *The New Britain Herald*. Retrieved from http://www.newbritainherald.com/articles/2008/11/02/news/doc490e6e4e0197d973341354.prt.

http://www.newbritainherald.com/articles/2008/11/02/news/doc490e6e4e0197d973341354.prt

Article, State Level

This article details the findings of a 2008 economic impact study of Connecticut's community colleges, focusing upon return on investment from multiple analytical perspectives. Key findings of this study included $5 billion in annual economic input from two-year institutions and their students, amounting to 2.3% of total state annual income and a $16.40 return per tax dollar investment in cumulative student lifetime earnings. With enrollments at two-year Connecticut institutions at an all-time high, student returns on investment were also detailed, with a calculated $231 annual return per credit hour completed; lifetime earnings were also shown to have a $8.10 return per dollar invested amounting to an additional cumulative $600,000.

Florida

(CF) Florida Department of Education. (2005). *Return on investment/school efficiency measure (linking learning and costs)*. Tallahassee, FL: Florida Department of Education.

http://roi.fldoe.org/index.cfm?CFID=3236386&CFTOKEN=574bed5cd7fe2fc1-A52E639E-5056-8C3F-1664273891A9CFB1

Database, School (Project), District, and State Level

This Florida Department of Education database provides school, district, and state level measurements of ROI and school efficiency in an effort to improve the efficiency of delivering quality services within the state's public school system. Comprehensive student, staff, and finance data systems, maintained by the state's department of education, comprise the primary information sources for the database. The intent of this website was to enable users to be able to evaluate relative ROI based upon allocation of fiduciary resources and academic student performance on multiple levels of analysis.

(CS) Florida Department of Corrections, Bureau of Research and Data Analysis. (1999). *Return on investment for correctional education in Florida.* Tallahassee, FL: Florida Department of Corrections.

http://www.dc.state.fl.us/pub/taxwatch/index.html

Executive Summary, Sub-System Level

This ROI analysis focused upon a cost-consequences analysis of the per-dollar ROI of correctional education within the state of Florida. The Florida Department of Labor and Employment Security undertook this study in order to determine whether a "coarse-grain analysis" could be applied to Job Partnership Training Act programs to measure the translation of educational inputs into earnings. First and second year returns on investment by program area were provided with a general per-dollar ROI figure of $1.66 for the overall study; all subgroups of correctional education completers were found to have positive returns on investment. After the second year, ROI figures increased to an average of $3.20, with non-special education academic completers having the highest return at $3.53. It is noted that non-completers of the correctional education program were not factored into the ROI analysis.

Georgia

(SB) Tripp Umbach Consultants. (2008). *Expanding medical education in Georgia: Roadmap for Medical College of Georgia School of Medicine and statewide partners - Final report.* Pittsburgh, PA: Tripp Umbach Consultants.

http://www.usg.edu/health_workforce_center/documents/Expanding_Medical_Ed_in_GA_Final_Report.pdf

Report Abstract, State Level

Population growth and a lack of investment in medical education within the state of Georgia have resulted in a severe deficit of medical doctors that will approach crisis levels by 2020. As a result, the Medical College of Georgia School of Medicine must expand rapidly in multiple locations and in partnership with the University of Georgia. An independent consulting firm (Tripp Umbach) developed a plan that would generate an addition $1.6 billion annually while

providing an additional 10,000 jobs within the state of Georgia. The specific per-dollar ROI figure cited that for every $1.00 invested by the State of Georgia in medical education, $2.54 will be generated in state tax revenue.

Idaho

(SB) Midgley, J. S. (2011). *Return on postsecondary education investment: An analysis of professional and technical education degrees in Idaho.* (Unpublished doctoral dissertation, University of Idaho).

Dissertation, State Level

This dissertation approached the evaluation of professional technical postsecondary education in Idaho using a quantitative approach based upon human capital theory. ROI calculations were determined by analyzing entry career earnings relative to the costs of earning applied associates and baccalaureate degrees, respectively. ROI calculations were based on data obtained from postsecondary institutions, the Idaho Department of Labor, and the Division of Professional Technical Education of Idaho. Key variables within subsequent analyses included ROI relative to field of study, entry wages, and number of academic credits earned. Although baccalaureate degrees were categorically associated with higher wages, ROI calculations, which included tuition costs for applied associated degrees, were found to exceed those of baccalaureate degrees. Although wages and ROI were found to be highly correlated with specific occupational fields, when factoring in educational costs, postsecondary CTE associate's degrees provided greater financial benefits compared to bachelor's degrees on an ROI basis within this cohort.

Indiana

(CF) Hollenbeck, K. (2009). *Return on investment analysis of a selected set of workforce system programs in Indiana.* Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.

http://www.indianachamber.com/index.php/workforcesystems

Report Executive Summary, State Level

The Indiana Chamber of Commerce Foundation contracted with the Upjohn Institute to use Indiana Workforce Intelligence System (IWIS) data to conduct return on investment analyses of various workforce programs. The programs included within the analysis consisted of Workforce Investment Act (WIA) for Adults, Dislocated Workers, and Youth, Trade Adjustment Assistance (TAA), Sub-baccalaureate Postsecondary Education, and Work One. Fiscal year 2006 was used as the basis for all estimates with IWIS data from 2003-2008 providing estimate information. State and federal governments were found to benefit only over a working lifetime from WIA Dislocated Workers (1.50%), TAA (5.01%), and Postsecondary (1.82%). Individual rates of return were much more significant with WIA Adults (16.32%), WIA Dislocated Workers (2.64%), WIA Youth (13.27%), and Postsecondary (19.87%) all having positive returns. Benefits to society were also calculated, with primarily positive rates of return on investments.

(CS) Indiana Chamber (2009). *Indiana's best buys: An in-depth look at Hoosier high schools.* Indianapolis, IN: Indiana Chamber.

http://www.indianachamber.com/media/pdf/IndianaBestBuy092.pdf

Annual Report Purpose, State Level

This annual report summarizes Indiana high schools that have excelled academically based upon SAT participation and scores, AP participation and scores, ISTEP+ and ISTEP+ pass rates, and adjusted graduation rates aggregated into a Quality Index (QI) compared to each school's total revenues per pupil. A statewide public high school median was assessed at a QI of .0719 on revenues of $10,179 and an at-risk student population of 31.2%; specific findings were then reported for individual schools throughout the state with those exceeding the median QI of .0719 on revenues at or below $10,179 being named best buys. This annual report is currently available from 1999-2009.

Kansas

(CS) Barton County Community College (2003). *The economic impact of Barton County Community College on its Service Area, 2001-2002*. Overland Park, KS: Office of Institutional Research, Johnson County Community College.

http://bartonccc.net/ir/onlinereports/economic_impact_report_bartoncounty.pdf

Executive Summary, Project Level

This report summarizes the findings of an economic impact study of Barton County Community College on its seven-county service area over 2001-2002. Direct expenditures by the institution as well as its constituents amounted to approximately $22 million; indirect economic benefits contributed an additional $19.8 million for a total service area economic impact of approximately $41 million. On tax revenues of $12.2 million, Barton County Community College had a per-dollar tangible economic contribution ROI of $3.42.

Kentucky

(SB) Watts, A. L. (2001). *Education and the common good: Social benefits of higher education in Kentucky*. Frankfort, KY: Kentucky Long-Term Policy Research Center.

http://eric.ed.gov/ERICWebPortal/detail?accno=ED462572

Report Abstract, State Level

This report detailed both the financial returns and social benefits that the state of Kentucky can expect from its investments in higher education, specifically those associated with or derived

from earning a degree from a four-year college. Twelve statistical models using datasets from semiannual surveys conducted by the University of Kentucky Survey Research Center were used in generating this analysis. Benefits of receiving a four-year degree included higher earnings and state and federal tax revenues, reduced welfare dependency, lower crime, healthier lifestyles, associated social gains, and various other benefits. Four-year degree recipients' social benefits were valued in excess of $126,000 for men and $96,000 for women. Supporting datasets and figures are appended.

(CS) Childress, M. (2008). *Reducing obstacles will yield even higher academic returns to educational investments.* Frankfort, KY: Kentucky Long-Term Policy Research Center.

http://kltprc.info/policynotes/pn0026_education_funding.pdf

Article, State Level

Kentucky's rate of return on investments in elementary and secondary education is among the best in the nation as assessed by the National Assessment of Educational Progress (NAEP) per $1,000 spent per student. Currently, Kentucky ranks 37th in the nation in terms of NAEP proficiency; however, the Commonwealth ranks 25th in the nation per $1,000 in per pupil spending at 3.6 NAEP proficiency points. Kentucky's NAEP Proficiency Purchasing Power, which measures the cost effectiveness of administering elementary and secondary education, ranks eighth nationally at 118% of the predicted value, indicating that in spite of significant obstacles in providing quality education, higher academic returns are generated compared to other states. Such obstacles as poverty, parental education, rates of obesity and disability, and large size of rural populations place Kentucky fourth nationally on an Index of Obstacles.

Maryland

(CS) Maryland State Department of Education. (2008). *Maryland adult education program quick facts FY '07.* Baltimore, MD: Author.

http://www.msde.maryland.gov/NR/rdonlyres/2707E579-0DA0-442B-8013-874CFAA74B00/17869/MDAEProgramQuickFacts07.pdf

Annual Report, Project Level

This quick facts sheet provides specifics of the Maryland Adult Education Program, Literacy Works, from the Maryland State Department of Education for the 2007 fiscal year. Specific returns on investment were reported earnings gains of $1,817 to $2,569 within six quarters following course completion and a $3 to $1 return on state educational investment. Additionally, the Maryland Adult Education program generated over $2.8 million in federal incentive funds for the fiscal year while meeting federal academic achievement performance targets for the past seven years. Specific funding sources included $9.2 million from Federal WIA Title II, $6.4 million of state funding, and $3.1 million of local funding.

(CS) Maryland State Department of Education. (2005). *Stepping up to the future: Adult literacy challenges at work, at home, and in the Maryland community. Findings and recommendations from the 2005 Superintendent's Panel on Excellence in Adult Education.* Baltimore, MD: Author.

http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED492907

Report Summary, State Level

The Maryland State Department of Education detailed various returns on investment for its affiliated adult education programs in reporting findings and recommendations from the 2005 Superintendent's Panel on Excellence in Adult Education. Maryland data reported included 64% of unemployed adult education students finding a job within one fiscal year, and a recidivism reduction of 19% for inmate adult education participants, generating savings of $27,000 per year per student. An associated study that analyzed economic outcomes for Maryland adult education students found annual wage gains of between $1,817 to $2,579, an 18% to 25% gain for minimum wage workers; 120-180 hour program participants had 42% higher wage gains than others; and Adult Basic Education and English as a Second Language students with at least 120 hours of instruction had earnings gains of 48% and 45%, respectively. ROI-specific information found a rate of return of $3.15 per dollar invested, with 16,503 high school diplomas awarded and the average recipient earning $7,216 more per year—from these data, a 20-year return of $2.3 billion could be projected.

Massachusetts

(CS) Bluestone, B. (1993). *UMASS/Boston: An economic impact analysis.* Boston, MA: University of Massachusetts, Chancellor's Office.

http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED356733

Report Executive Summary, Project Level

The economic impact of the University of Massachusetts at Boston on the Commonwealth of Massachusetts is detailed within this report focusing upon student generated revenues, additional state income and sales tax generated from student incomes, and the income and tax revenues generated from external revenue sources into the university and state. This conservative analysis concluded that UMass/Boston has produced a significant return on investment from multiple perspectives. Key report findings included the 1991 student cohort generating $1.05 billion in additional in-state income flows. Although educating this student cohort will cost the state $34.1 million, future income streams will yield state tax revenues of $53.5 million. The cumulative findings represent a $1.57 return on state per-dollar investments, and a related analysis found that eliminating state support for UMass/Boston would have negligible cost savings when lost revenues are taken into consideration.

Michigan

(SB) Michigan Works! Association. (2008). *Return on investment: A report on the public return on investment value of the Michigan Works! System.* Lansing, MI: Author.

http://michiganworks.org/media/ads/ROI_09_trifold_brochure.pdf

Pamphlet Calculations and Explanations, State Level

The Michigan Works! Association is a workforce development system designed to advance the economy of the state of Michigan through public-private partnerships aligning industry needs with human resources. This pamphlet provides basic statistics and ROI findings across numerous programs at the federal and state levels, focusing upon their impacts within Michigan. Major findings include Workforce Investment Act returns on per-dollar investments of $1.33 for WIA Adult, $1.37 for WIA Dislocated Worker, and $1.64 for Dislocated Worker with extension. The Jobs, Education, and Training program targeted toward welfare recipients was found to have a $4.13 return per dollar, whereas 31,000 people have entered training under the No Worker Left Behind initiative. Social returns on workforce development investment are also discussed through qualitative findings.

(SB) Greene, J.P. (2000). *The cost of remedial education: How much Michigan pays when students fail to learn basic skills. Estimates of the annual economic cost to businesses, colleges, and universities to counteract employees' and students' lack of basic reading, writing, and arithmetic skills.* Midland, MI: Mackinac Center for Public Policy.

http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED451288

Report Abstract, State Level

The purpose of this report was to assess the costs incurred by businesses and institutions of higher education within Michigan by having to provide remedial education. The methodology of this analysis focused on five different areas of expense: direct remedial education expenditures, direct costs to employers, costs for educating a successful high school graduate, using NAEP scores to determine the extent of deficits, and determining an ROI for remedial education expenses. Annual loss calculations for the state of Michigan ranged from $311 million to $1.5 billion with an average of $601 million across measures. The specific ROI calculation was based upon multiplying the number of dropouts in a given year (29,085) by the cost for educating a successful high school student ($6,552) by the average number of years a dropout misses (2.29), adding $89 million in higher education remedial expenditures and multiplying the result by 1.03^{30} (constant dollar with interest), yielding a $1.15 billion estimate of the cost to Michigan when high schools fail to teach students basic functional skills.

Minnesota

(CS) Anton, P. A., & Behling, N. (2006). *The economic impact of Minnesota state colleges and universities: Updated statewide estimates and local estimates for universities.* Saint Paul, MN: Wilder Research.

http://www.mnscu.edu/media/publications/pdf/statecollegereport_9-12-06.pdf

Report Executive Summary, Sub-System Level

The economic impact of colleges and universities within the state of Minnesota is detailed within this report, both on the state and local levels as well as with regard to postsecondary institutions' capital expenditures. A statewide per-dollar ROI figure for postsecondary education was estimated to be $10.87, with the enhanced productivity of Minnesota workers accounting for $2.4 billion of a total statewide estimate of $3.5 billion. Capital expenditures by colleges and universities over the four years preceding the report generated $243 million in economic activity, whereas the 2006 higher education budget of $191.4 million will generate returns in economic activity of $430 million statewide. Local impacts of public universities were also provided in terms of the direct economic impact upon their communities.

New Mexico

(CS) Rommel, H. L. (2011). *2011 New Mexico adult basic education fact sheet.* Santa Fe, NM: New Mexico Higher Education Department.

http://www.hed.state.nm.us/Adult_Basic_Education.aspx
www.hed.state.nm.us/uploads/files/abe%20fact%20sheet%2011.pdf

Annual Report, Project Level

The New Mexico Higher Education Department Adult Basic Education Division consists of 28 programs throughout the state designed to assist adult students in earning a GED high school diploma as well as career and college preparation. Although 23,000 individuals receive services through Adult Basic Education (ABE) programs, it is estimated that this represents only 5% of the target population; capacity issues within some areas are systemic, with extended waitlists for services. Annual ROI figures are provided, based upon annual state expenditures of $6,212,100. $20,913,360 in new income from job procurement and advancement was generated. $30,408,300 was generated in enhanced earning potential from program graduates. An estimated $767,000 was saved from students leaving public assistance. Cumulatively, these yielded an ROI of $45,876,560 for the ABE program at a cost of $267 per student.

New York

(CS) Iatarola, P., & Fruchter, N. (2004). District effectiveness: A study of investment strategies in New York City public schools and districts. *Educational Policy, 18*, 491-512. doi: 10.1177/0895904804265020

http://epx.sagepub.com/content/18/3/491

Abstract, Sub-System Level

This article focuses upon the impact of specific New York City Public School Districts upon their corresponding schools. Relative academic strength or weakness within the New York City school system correlated with differences in district educational goals, leadership and professional development, and teacher recruitment and retention. Policy implications are discussed in addition to previous studies and literature that support the major findings and conclusions arrived by this district-level analysis.

Oklahoma

(CS) Reynolds, E. J. (2005). *Oklahoma Department of Career and Technology Education existing industry training program: Economic impact, return on investment, and customer satisfaction.* (Doctoral dissertation, Oklahoma State University). Retrieved from ABI/INFORM Global. (Publication No. AAT 3181689).

http://proquest.umi.com/pqdlink?did=953999871&Fmt=7&clientId=47297&RQT=309&VName=PQD

Dissertation Findings and Conclusions, Sub-System Level

This dissertation was primarily an assessment of the Existing Industry Training program by CareerTech technology centers within the state of Oklahoma. ROI, economic impact, and customer satisfaction pertaining to the program were generated from surveys distributed to Oklahoma businesses that took part within the training program. The study found a positive rate of return within the survey cohort and found a per-dollar ROI by the Oklahoma Department of Career and Technical Education on the Existing Industry Training program of nearly 400% within local businesses.

(CS) Snead, M. C. (2004). *Moore-Norman Technology Center full-time programs: Income gains and economic impacts.* Stillwater, OK: Oklahoma State University, Center for Applied Economic Research.

http://www.crossroads.odl.state.ok.us/cdm4/item_viewer.php?CISOROOT=/stgovpub&CISOPTR=13957&CISOBOX=1&REC=5
http://spears.okstate.edu/files/documents/caer/Research/MNTC_04_FT_Wage_Model.doc

Study Highlights, Project Level

Using fiscal year 2003 data, this study provides an estimate of the economic impacts and income gains associated with completing a full-time program at the Moore-Norman Technology Center affiliated with Oklahoma's CareerTech system. From the 2,200 students completing full-time programs at MNTC, the average individual will add approximately $155,000 in current dollars to their lifetime earnings stream. Across the entire cohort, increased income amounts to a $95 million addition to future income streams with ancillary financial support of $46.2 million to other workers statewide. Over the work life of the average program completer, $4.3 million in sales and income taxes will be paid ($7,100 per completer), which supports an additional $3.5 million in indirect sales and income taxes from other Oklahoma workers.

(CS) Snead, M. C. (2006). *Completers of technology center full-time programs: Lifetime income gains and the impact on the Oklahoma economy.* Stillwater, OK: Oklahoma State University, Center for Applied Economic Research.

http://www.elevatingoklahoma.com/flash/snead_full.pdf
http://www.elevatingoklahoma.com/html/snead_summary.pdf

Study Highlights, Sub-System Level

Using fiscal year 2002 data, this study provides estimates of the economic impacts of completers of full-time CareerTech training programs on the Oklahoma economy. Based on Oklahoma Employment Security Commission employer-reported wage data and Census Bureau survey data, the economic impact of the state's 11,680 technology center program completers was assessed. The average program completer added approximately $371,000 ($152,500 in current dollars) to their lifetime earnings stream; across the entire 2002 cohort, this amounts to an estimated $4.3 billion ($1.8 billion in current dollars) of which $1.1 billion is expected to be earned within the Oklahoma. An additional $990 million is expected in future earnings through other workers via multiplier effects and lifetime direct sales and income taxes of $82.6 million over the cohort work life (approximately $7,000 per completer) will be generated along with multiplier effects of $74 million in current dollar tax revenue by other workers statewide.

South Carolina

(CS) University of South Carolina, The Darla Moore School of Business Division of Research. (2009). *The economic return on investment in South Carolina's higher education.* Columbia, SC: University of South Carolina.

http://www.che.sc.gov/InfoCntr/HESC_Files/EconReturnHigherEdAugust09.pdf

Executive Summary, State Level

The South Carolina Higher Education Study Committee (HESC) sponsored this research in order to more fully assess the benefits of higher education within the state and to determine the

associated costs of such. This study found that a bachelor's degree holder in South Carolina will earn an average of $2.5 million over his or her lifetime, not accounting for the cost of earning such a degree; this amounts to a $1.2 million increase over the average earnings of a high school degree recipient and a personal return on college investment of 820%, measured in additional lifetime income. The HESC Action Plan sets a target of 29% of the South Carolina workforce holding at least a bachelor's degree by 2030; by achieving this and associated goals, it is estimated that this higher education investment will yield a per-dollar annual return of $25.20 in economic activity, as measured by gross state product. Attaining HESC Action Plan objectives would yield $6.9 billion in new personal income, $7.8 billion in gross state product, and an estimated 44,514 additional permanent jobs per year with benefits across every region of South Carolina. Related study findings specific to South Carolina revealed that 90% of the prison population has no college degree; Black students graduate at a much lower rate (11.7%) than White students (26.8%) at the national level; 8.5% of college graduates versus 37.5% of high school graduates lack health insurance; and 5.7% of bachelor's degree and 33.3% of high school graduates receive Medicaid benefits.

Tennessee

(CS) Harrison, H. D., Earnest, D., Grehan, L., & Wallace, J. (2006). *The economic impact of secondary and post-secondary career and technical education in Tennessee*. Memphis, TN: The University of Memphis, Sparks Bureau of Business and Economic Research.

http://www.tn.gov/education/cte_council/doc/execsummary.pdf

Project Summary, Sub-System Level

Assessing the impact of secondary and postsecondary CTE on participants and the economy of Tennessee were the primary objectives of this project. The 2001-2002 CTE cohort consisted of 36,000 graduates and completers, total earnings were for the cohort were broken down by program type with 7,900 WIA Career Center graduates earning $117.5 million, 13,000 secondary CTE graduates earning $99.8 million, 11,000 technology center graduates earning $263 million, and 4,000 community college CTE graduates earning $98.4 million across several industries. Output, labor income, and tax impact figures were also estimated, with a total output impact of $851,668,009, a labor income impact of $230,290,266, and a total tax impact of $76,740,782. Together these yield an economic impact in excess of $1.1 billion. A specific return on investment ratio was also reported with secondary and postsecondary CTE yielding a 1:1.01 ROI for Tennessee. CTE expenditures were found to have a cost-benefit ratio of 1:1.99, and by combining CTE expenditures and earnings, a cost-benefit ratio of 1:5.37 was determined.

(CS) Martin, F. (2007). *Pellissippi State Technical Community College - A major partner in the economic vitality of the Knoxville metropolitan area: An analysis of the college's economic impact, 2002-2007*. Knoxville, TN: Pellissippi State Technical Community College.

http://www.pstcc.edu/departments/institutional_research/economic/eis_2002-2007.pdf

Executive Summary, Project Level

This report focused exclusively on the direct economic impact of Pellissippi State Technical Community College on Knox and Blount counties in Tennessee. Revenues over the five year 2002-2007 period totaled in excess of $275 million with external revenues comprising $182 million and local revenues comprising $93 million. College expenditures of institutional revenues within the service area resulted in business volume amounting to $314 million, and in excess of 22,000 jobs were either created or sustained by the college. The college's total economic impact within the Knoxville metropolitan area was calculated to be $636 million for a total ROI per local dollar of between $6.83 and $7.15.

Texas

(CS) Keaver, J. (2008, October 21). HCC highlights its economic impact to area: Leaders say the school contributes $4.1 billion yearly. *The Houston Chronicle*.

http://www.chron.com/disp/story.mpl/nb/alief/news/6071396.html

Article, Project Level

This article summarizes the findings of an economic impact study of the six-college Houston Community College (HCC) district. The timing of the study corresponded with an election where community members could vote whether to join the taxation district of the HCC or not. Annual economic impact of the HCC upon the Houston metropolitan area was calculated to be $4.1 billion, with degree completing students earning an additional $577,200 in lifetime earnings or $56,500 annually at their career midpoint.

(CS) King, C. T., & O'Shea, D. (2003). *Estimating return-on-investment (ROI) for Texas workforce development boards: Lessons learned and next steps.* Austin, TX: The University of Texas at Austin, Ray Marshall Center for the Study of Human Resources.

http://www.utexas.edu/research/cshr/pubs/pdf/roi_lessons.pdf

Report, Project Level

This 2003 report discusses the challenges associated with performing an ROI analysis for workforce services within Texas. Data-related problems were discussed as well as the inadequate resources budgeted for conducting the analysis, an economic impact estimation study is proposed for additional phases of the workforce service evaluation process.

(CS) King, C. T., O'Shea, D., Looney, S. E., Redman, C. A., & Holcombe, W. L. (2003). *Return-on investment (ROI) estimates for workforce services in Texas, state fiscal year 2000-2001: Composite workforce development board.* Austin, TX: The University of Texas at Austin, Ray Marshall Center for the Study of Human Resources.

http://www.utexas.edu/research/cshr/rmc1/index.php/publications/all-publications/50-about.html?catid=6%3Aabout

Report Executive Summary, State Level

ROI estimates were generated for workforce services delivered in 18 regions of Texas within this study, a preliminary attempt at estimating ROI across multiple workforce funding streams within the state. Five and 10-year reasonable first-approximations of net returns to taxpayers for major workforce investments in the Composite Workforce Development Board were estimated with a five-year return of 600% and a 10-year return of 800%. The per-dollar ROI figures for workforce services in 2000-2001 in Texas were calculated to be 6.0 after five years and 8.0 after 10 years. Several benefits such as returns for additional years of schooling and savings from reduced criminal activity as well as costs association with childcare and program transition were not included in the analysis, lending a conservative bias to the findings.

(CS) King, C. T., Yang, Y., Smith, T. C., & Schroeder, D. G. (2010). Texas workforce investments: returns for participants, taxpayers, and society. *The Free Library*. Austin, TX: University of Texas at Austin Bureau of Business Research.

http://www.thefreelibrary.com/Texas+workforce+investments%3A+returns+for+participants,+taxpayers,+and...-a0230416376

Article, State Level

This article summarizes ROI estimates for comprehensive workforce services delivered through local workforce boards in Texas under the Texas Workforce Commission. The state of Texas invested approximately $1.1 billion on workforce services in fiscal year 2005, with estimated five-year ROI figures of 12%, 29%, and 25% for taxpayers, participants, and society, respectively. Ten-year ROI estimates ranged from 25% for taxpayers, 38% for participants, and 35% for society. Per-dollar ROI in work services figures were detailed, with participant returns at $1.63 over five years and $2.74 over 10 with costs incurred of $5,007 per participant. Taxpayer returns were found to be $1.17 over five years and $2.08 over 10 with costs of $1.00 per participant. Societal returns were reported at $1.52 over five years and $2.58 over 10 with costs of $6,527. Methodological constraints and controls are discussed within the article as well as recommendations for improving ROI estimates and workforce services.

(CS) Norris, D. N., & King, C. T. (1997). *Return on investment: A cost-effectiveness measure for the Texas workforce system.* Austin, TX: The University of Texas at Austin, Center for the Study of Human Resources.

http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED415384

Report Abstract, State Level

This report focuses on the development of an ROI measure to assess the cost effectiveness of workforce programs within Texas. The report focuses on methodological challenges and measurement constraints specific to performing return on investment analysis at the level of the Local Workforce Development Board system in place in Texas. Best practices for performing ROI analysis at this level are identified particularly relative to the Job Training Partnership Act along with limitations and key issues.

(CS) Texas Comptroller of Public Accounts. (2008). The economic impact of Texas community colleges. In *Texas Works: Training and Education for all Texans* (pp. 53-59). Austin, TX: Texas Comptroller of Public Accounts Data Services Division.

http://www.window.state.tx.us/specialrpt/workforce/colleges.php

Report Chapter, Sub-System Level

This chapter of the Texas Comptroller of Accounts publication, *Texas Works: Training and Education for All Texans*, estimates measures of the economic impact of community and technical colleges on the total state economy. The two analyses measure different aspects of this economic impact by detaining the money brought into Texas from out of state and the resulting impact of earnings from all Texans with associate degrees as well as the specific returns for individual students. The 2008 economic output multiplier revealed a 95% return per external dollar of investment within Texas community colleges, with a total economic impact of $2.1 billion. Components of this economic impact associated with Texas community colleges included $836.5 million from federal grants and contracts, $223.6 million from tuition and books, and $1.06 billion total out of state money. The second analysis that focused on returns on investment for individuals who earn an associate's degree found that, over 2005-2007, there were an average of 57,596 two-year graduates, with 94.1% being in state. The average Texan with an associate's degree was calculated to earn $125,546 more over a career, as a cohort, associate's degree recipients were found to have an average employment rate of 75.7%, total lifetime earnings of approximately $5.2 billion, and a total impact on the Texas economy in excess of $10 billion. Career-specific ROI calculations were also provided in addition to a discussion regarding the associated social benefits of investing in two-year postsecondary institutions.

Utah

(CS) Brown, A., & Hoyt, J. E. (2000). *The economic impact of Utah Valley State College 1999-2000*. Orem, UT: Utah Valley State College, Department of Institutional Research and Management Studies.

http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED468139

Report Abstract, Project Level

Utah Valley State College (UVSC), located in Utah County, Utah, is a state college composed of both a two-year division and an upper baccalaureate degree-granting division. Using the Ryan-New Jersey model and a U.S. Department of Commerce multiplier for estimating economic impact, this report performs an estimate of the impact of UVSC on the surrounding district over 1999-2000. UVSC was associated with approximately $153 million of economic activity in Utah County, generating 884 full-time and 1,485 part-time jobs along with employment for 796 students. The calculated per-dollar ROI figure for state investment in UVSC over this period was $4.04 within the surrounding community. The report also estimates the economic impacts of UVSC-affiliated programs and centers individually.

(CS) EMSI. (2010). *The economic contribution of Salt Lake City College.* Moscow, ID: Economic Modeling Specialists, Inc.

http://active.slcc.edu/ir/docs/ec_exec_sum_0809.pdf
http://www.slcc.edu/ir/docs/ec_main_rpt_0809.pdf

Executive Summary, Project Level

Investment and economic growth analyses comprise the majority of this socioeconomic impacts study of Salt Lake City College (SLCC). Taxpayer rate of ROI was calculated to be 8.0% related to SLCC, with the state of Utah saving $3.5 million annually as a result of social benefits derived from students attending the two-year institution. Student investments have a $5.50 per-dollar ROI in higher future incomes over their working careers. The total economic impact of SLCC on Salt Lake County amounted to $113 million annually, with $90.4 million consisting of net added income from institutional operations.

Virginia

(CS) Bolipata, K. (2008, November 19). Germanna's impact is examined: Study finds that Germanna contributes $241 million to the Fredericksburg region each year. *The Free Lance-Star*.

http://fredericksburg.com/News/FLS/2008/112008/11192008/426221

Article, Project Level

This article summarizes the findings of an economic impact study of Germanna Community College upon its eight county service area including ROI figures specific to both students and taxpayers. The total economic impact of GCC was calculated to be $241.2 million annually, amounting to 2.1% of the service area's annual income. With 95% of GCC students remaining in Virginia, contributions to economic growth are further substantiated through decreased state costs of approximately $235,900 annually. Institutional per-dollar investment was calculated to generate a $3.70 return within the local economy, whereas student investments yielded annual income increases of $153 per credit hour completed and $385,200 in additional lifetime earnings per degree completed.

Washington

(CF) Hollenbeck, K. (2005). *On the use of administrative data for workforce development program evaluation.* Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.

http://research.upjohn.org/cgi/viewcontent.cgi?article=1027&context=externalpapers&sei-redir=1#search=%22Use%20Administrative%20Data%20Workforce%20Development%20Program%20Evaluation%22

Report Introduction, Methodology, State Level

This report attempts to determine whether performance monitoring data such as administrative information from the State of Washington can be effectively used within program evaluation, in this case adult services provided under the Workforce Investment Act (WIA) through a quasi-experimental method. A key objective of the report was to analyze econometric estimation techniques relative to program evaluation. Specific results presented are relative to WIA within Washington State over the program year July 2000 to June 2001; economic estimator methodology is detailed.

(CS) Career and Technical Education, Washington Workforce Training and Education Coordinating Board. *CTE: An investment in success*. Olympia, WA: Author.

http://www.wtb.wa.gov/Documents/CTESuccess.pdf

Report, Sub-System Level

This report by the Washington Workforce Training and Coordination board details the individual and public benefits associated with CTE programs. General return on investment figures are provided within the report, comparing the public costs associated with a student completing high school CTE or a Skills Center program ($920) with the additional taxes generated by CTE completers ($6,600) for an approximate 700% ROI figure. The benefits associated with CTE were also calculated at multiple levels from workforce training program data. High school CTE graduates were found to earn an average of $840 more annually compared to standard graduates, and were also employed at a 6.7% higher rate than standard high school graduates. Postsecondary CTE graduates were found to earn $7,700 more annually while being employed at

a 13% higher rate than standard high school graduates. Private CTE graduates were found to earn an average of $3,500 more annually at a 7.3% greater employment rate than standard high school graduates.

(CF) Hollenbeck, K. M., & Huang, W. J. (2006). *Net impact and benefit-cost estimates of the workforce development system in Washington state*. Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.

http://www.upjohninst.org/publications/tr/tr06-020.pdf

Report Abstract, State Level

This report details study estimates of economic impact for 11 workforce development programs within Washington State. These consisted of WIA Title I-B Adult programs, WIA Title I-B Dislocated Worker programs, Community and Technical College (CTC) Job Preparatory Training, CTC Worker Retraining, Private Career Schools, Apprenticeships, CTC Adult Basic Skills Education, Division of Vocational Rehabilitation programs, Department of Services for the Blind programs, WIA Title I-B Youth programs, and secondary career and technical education. Estimation techniques and analyses were based on administrative data from the various programs as well as the Unemployment Insurance wage record system and TANF. Short-term net impacts and earnings impacts for individuals are positive for 9 of the 11 programs, longer-term employment impacts are positive for all programs, and earning impacts are positive for 10. Benefit cost-analyses indicate that future benefits have a positive return on costs for both participants and society. ROI figures are program-specific and are provided in table format.

Wisconsin

(CS) Christopherson, K. A., & Robinson, M. H. (2001). *The socioeconomic benefits generated by the Wisconsin Technical College System.* Madison, WI: Wisconsin Technical College System Board.

http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED462091

Report Abstract, Sub-System Level

Using the Association for Community College Trustees' (ACCT) model for measuring the economic and social impacts of technical colleges, this report details estimates on the related effects of the Wisconsin Technical College System (WTCS). The ACCT model measures four types of technical college benefits, including income and job creation, improved graduate earnings, social benefits, and returns on investment for taxpayers. Results of the analysis revealed that WTCS is associated with $3.852 billion in annual earning for Wisconsin; students experience a 20% return on time and money investments. Associated state statistics indicate numerous social benefits and savings of $45.5 million, and taxpayers receive a 100% return on investments within 2.2 years.

National Studies

As was done with the state-level studies summarized above, national studies were also obtained through standard literature review practices, creating individual summaries of major findings and key information relevant to ROI analysis for CTE. As with the state studies, each summary was then categorized as to type of study and type of ROI analysis, using definitions and parameters for each as outlined in this report. Studies in which the type of analysis delineations was inconclusive or subjective were initially left undefined and then re-categorized so as to best represent the majority of the more objectively defined studies previously identified. It should be pointed out that the studies summarized below are listed as national because their focus is such. Nevertheless, many of the studies include state, system, and program information, and some use such information to draw conclusions on ROI from a national perspective.

In the summaries that follow, these abbreviations are used: CF = Common Framework, SB = Social Benefit, and CS = Case Study.

(SB) Kelly, P. J., & Jones, D. P. (2005). A New Look at the Institutional Component of Higher Education Finance: A Guide for Evaluation Performance Relative to Financial Resources. Boulder, CO: National Center for Higher Education Management Systems.

http://www.higheredinfo.org/analyses/Policy%20Guide%20Dec2005.pdf

This evaluation focused upon analyzing the ability of higher education institutions to improve levels of performance with existing or diminishing financial resources. Maintaining and improving access to postsecondary education was assessed using three principle components: affordability, a state's ability to pay, and determined adequacy of institutional finance. Developing methods for assessing institutional finance adequacy relative to institutional performance and mission attainment within various types of institutions was a primary objective of this report. State-specific institutional ROI information is provided in table format.

(SB) Karpowitz, D., & Kenner, M. (1995). *Education as crime prevention: The case for reinstating Pell grant eligibility for the incarcerated.* New York, NY: Bard College.

http://www.inpathways.net/ipcnlibrary/ViewBiblio.aspx?aid=276

This report cites several official U.S. government publications that support reinstating Pell grant eligibility to qualified incarcerated individuals as a means of both reducing recidivism and preventing crimes. Extrapolating findings from cost-benefit and ROI analyses yielded projected state savings in the millions of dollars as a result of reinstituting inmate Pell grant eligibility.

(SB) Cresswell, A. M., Burke, G. B., & Pardo, T. A. (2006). *Advancing return on investment analysis for government IT: A public value framework.* Albany, NY: University at Albany, SUNY, Center for Technology in Government.

http://www.ctg.albany.edu/publications/reports/advancing_roi

This paper proposes a public ROI assessment framework based upon public value generated from investments made in government IT. The public value framework attempts to connect actions within government to impacts on public domain stakeholders with subsequent reporting of findings and application of results.

(CS) Kemple, J. J., & Willner, C. J. (2008). *Career academies: Long-term impacts on labor Market outcomes, educational attainment, and transitions to adulthood*. New York, NY: MDRC.

http://www.mdrc.org/publications/482/overview.html

This report by MDRC assesses how career academies, as an educational reform concept, have the ability to influence student labor market returns and postsecondary educational attainment. The evaluation surveyed a diverse student population from nine high schools located throughout the United States through a randomized research design. Specific ROI findings include an 11% average annual earnings gain ($2,088) among students participating in career academies compared to a control group; this represents a $16,704 increase in total earnings over eight years. Labor market impacts were primarily among young men with real earnings increasing by 17% ($3,731) among this demographic; approximately $30,000 over eight years. Career academies did not appear to be more effective in encouraging participation in postsecondary education than traditional high schools; however, rates of independent living and marriage were higher among the career academy participants.

(CS) Anderson, M. C. (2004). *Case study on the return on investment of executive coaching.* Johnston, IA: Metrix Global LLC.

http://www.workplacecoaching.com/pdf/CasestudyonROI.pdf

This executive coaching program evaluation details the business benefits and overall ROI figures for financing executive coaching initiatives. A 529% ROI calculation was assessed along with significant ancillary benefits associated with the executive coaching program. Qualitative and quantitative evaluation data was obtained through the administration of a survey instrument to program participants. ROI calculations were based upon program costs and derived financial business benefits with the most significant returns being found among executives with client or human resource responsibilities.

(CS) Haley, D. (2006). *Investing in people: Measuring the economic impact of a job training program in an area with high structural unemployment through cost-benefit analysis.* (Doctoral dissertation, Nova Southeastern University). Retrieved from ABI/INFORM Global. (Publication No. AAT 3228634).

http://proquest.umi.com/pqdweb?did=1232424461&sid=2&Fmt=2&clientId=47297&RQT=309&VName=PQD

The McAllen Self-Sufficiency Project (MSSP) is a job training program within the Rio Grande Valley that is designed to assist residents within the City of McAllen, TX, in attaining the education and training necessary for employment and financial independence. A community partnership between a two-year college, education center, and workforce development team, MSSP has attained an 85.4% retention/graduation rate along with 88.9% employment in the greater McAllen area. Operating on a city investment of $2.451 million derived from sales tax, MSSP completers have shown average annualized wage increases from $7,296.24 to $29,503.36. The calculated program ROI, adjusted for earnings and emigration, was 111%, a $2.11 return per dollar invested in MSSP, for a total net benefit of $5.112 million for the area.

(CS) Dadayan, L. (2006). *Measuring return on government IT investments.* Albany, NY: University at Albany, SUNY, Center for Technology in Government.

http://www.ctg.albany.edu/publications/journals/ecite_2006_roi

Dadayan employs a comparative analysis approach to investigating the various models and methodologies developed for evaluating returns on investment in the public sector relative to information technology investments specifically. This paper focuses exclusively on information technology evaluation within the public sector, assesses several trends within the area, and qualitatively compares and contrasts seven different public return on investment models (Social Return on Investment Model SROI, Balanced E-Government Index BEGIX, Value Measuring Methodology VMM, Public Sector Value Model PSV, Performance Reference Model PRM, Interchange of Data between Administrations Value of Investment IDA VOI, and Demand and Value Assessment Methodology DAM/VAM).

(SB) Jacobson, L., & Mokher, C. (2009). *Pathways to boosting the earnings of low-income students by increasing their educational attainment.* Washington, DC: Hudson Institute Center for Employment Policy.

http://www.hudson.org/files/publications/Pathways%20to%20Boosting.pdf
http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED504078

The identification of educational pathways to high-paying careers that could in turn improve social mobility was a primary objective behind this study. Associated with the identification of pathways was an assessment of how much of an effect students' educational preparation and performance had upon making a successful transition. A cohort of 144,545 ninth-grade students from 1996 in Florida was analyzed using comprehensive high school, postsecondary, and workforce data. Major findings from this report included higher earnings being correlated with postsecondary degrees, particularly within professional and health-related fields. STEM academic concentrations were found to be the most lucrative; high school preparation and performance were found to be strong predictors of postsecondary persistence; and low-income students were determined to be underrepresented in all student populations. As a population, they earn approximately 10% less than other student groups, an effect attributed to postsecondary persistence and academic concentration selection.

(SB) Courtright, S. H., & Fry, C. G. (2007). Public rates of return on higher education investments, by state. *Journal of Teaching & Learning, 4*(8), 13-26.

http://journals.cluteonline.com/index.php/TLC/article/view/1553

Differential tax revenues collected from college-educated citizens versus high school-educated citizens were used as the basis for this return on public investments in higher education analysis. Courtright and Fry found that the majority of states had an appreciable rate of return on higher education investments based solely on differential tax revenue; the authors concluded that ancillary social benefits and other factors most likely influence state financing and public support for funding higher education systems. State-specific figures and calculations for differential tax revenues are provided in table format.

(CS) Erdogmus, H., Favaro, J., & Strigel, W. (2004). Guest editors' introduction: Return on investment. *IEEE Software, 21*(3), 18-22. Retrieved from ABI/INFORM Global. (Document ID: 1750758701).

http://proquest.umi.com/pqdlink?did=1750758701&Fmt=6&clientId=9580&RQT=309&VName=PQD

This article details ROI analysis as it pertains to the software industry with specific emphasis placed on applications within economic and strategic analysis. Erdogmus, Favaro, and Strigel divide ROI analysis relative to the software industry into four categories: business strategy, valuation, cost-benefit analysis, and metrics. Each category is explained in detail as different approaches toward analyzing and creating economic value in the software industry.

(CS) Glover, R. W., Long, D. W., Haas, C. T., & Alemany, C. (1999). *Return-on-investment (ROI) analysis of education and training in the construction industry.* Austin, TX: The University of Texas at Austin, Center for Construction Industry Studies.

http://www.utexas.edu/research/cshr/rmc1/index.php/publications/all-publications/237-return-on-investment.html?catid=10%3Aabout

This report conducts a comprehensive review of ROI analyses as they pertain to education and training; the authors make recommendations relative to applications within the construction industry and pertinent workforce development initiatives. Glover, Long, Haas, and Alemany identified two main approaches to ROI analysis: the business practitioner approach, rooted in logic, simplicity, transparency, and practicality; and an academic approach, emphasizing scientific rigor and replicability. Employer, trainee, and government or public/taxpayer perspectives for return in investment analysis are detailed as well as efficiency/effectiveness applications within construction industry workforce development.

(SB) National Association of State Directors of Career Technical Education Consortium. (2010). *Return on investment in CTE*. Silver Spring, MD: Author.

http://www.careertech.org/legislation/briefs-papers.html

The individual and societal benefits associated with CTE within three states are summarized within this document, highlighting positive returns on investment associated with funding and support for CTE programs. A 2006 study of Oklahoma CareerTech program graduates found individual benefits relative to high school graduates, including 20% increased wages and $4,100 annual income increases; state benefits totaled $2.4 billion both directly and indirectly with the majority attributed to increased tax revenues from wages. A 2006 report on Tennessee CTE initiatives found state benefits consisting of a cost/benefit ratio of 1:1.99, a fiscal turnover ratio of 1:1.01, and a total ROI ratio of 1:5.37 for state CTE investments. A 2006 report on Washington State CTE programs found state benefits in decreased TANF, food stamp, and Medicaid eligibility with individual benefits for CTE program completers including hourly wage increases with cumulative annual earnings impacts.

(SB) Alliance for Excellent Education. (2006). *Saving futures, saving dollars: The impact of education on crime reduction and earnings.* Washington, DC: Author.

http://www.all4ed.org/files/archive/publications/SavingFutures.pdf

This article focuses on the social benefits derived from improving high school completion rates, primarily reducing crime while increasing earnings. The Alliance for Excellent Education analyzed the impact of increasing educational attainment on crime reduction by calculating the annual crime-related savings attributed to decreased incarceration costs associated with a 5% increase in the male graduation rate. State specific savings would vary significantly but an estimated $2.8 billion in additional annual earnings would be generated by a 5% graduation rate increase. State-specific calculated annual crime-related savings, additional annual earnings, and total state economy benefit are provided in table format.

(SB) Institute for Higher Education Policy. (2005). *The investment payoff: A 50-state analysis of the public and private benefits of higher education.* Washington, DC: Author.

http://www.ihep.org/Publications/publications-detail.cfm?id=43
http://www.ihep.org/assets/files/publications/g-l/InvestmentPayoff.pdf

The Institute for Higher Education Policy established the articulation of higher education-associated benefits on a 50-state basis as the principle objective behind this report; benefits were placed into one of four categories: public economic, private economic, public social, or private social. Replicating previously researched national benefits of higher education on an individual state basis was deemed necessary in order to serve as a rationale for maintaining state funding for postsecondary education in the current difficult economic climate. Six measurable indicators were quantified within all states: private economic by higher personal income and lower unemployment, public economic by decreased reliance on public assistance, private social through better health, and public social through increased volunteerism and increased voting participation. The additional earning value associated with earning a college degree served as the

basis for many of the calculations and statistics with further derivations for partial completion. State-specific ROI statistics are provided in table format.

(SB) Wolfle, D., & Smith, J. G. (1956). The occupational value of education for superior high-school graduates. *The Journal of Higher Education, 27*(4), 201-212, 232.

http://www.jstor.org/stable/1977699

This study assessed the longitudinal difference in occupational distribution of similarly qualified high school graduates who chose to pursue postsecondary education versus those who did not. Wolfe and Smith, in association with the Commission on Human Resources and Advanced Training, administered surveys to a three-state cohort of high school graduates deemed prepared and qualified for college work from approximately 20 years prior. College graduates were found to earn an average of $1,100 to $2,500 more than those high school completers who were prepared for college but did not attend, controlling for both assessed intelligence and class rank. The authors identified the completion of postsecondary education as the primary factor influencing annual earnings over both class rank and intelligence scores in this cohort.

(SB) Harmon, C., Oosterbeek, H., & Walker, I. (2003). The returns to education: Microeconomics. *Journal of Economic Surveys, 17*(2), 115-155.

http://faculty.smu.edu/millimet/classes/eco7321/papers/harmon%20et%20al%202003.pdf
http://ideas.repec.org/a/bla/jecsur/v17y2003i2p115-156.html

Approaching education as an individual decision to invest in human capital, this article details the methodologies and processes associated with accurately estimating the rate of return on such investments. Harmon, Oosterbeek, and Walker conclude from multiple regression analyses across several datasets that personal education investments are almost unilaterally positive and outpace comparative investments as well. United Kingdom microdata provided rates of return of between 7% and 9% for men and 9% and 11% for women.

(SB) Sianesi, B., & Reenen, J. V. (2003). The returns to education: Macroeconomics. *Journal of Economic Surveys, 17*(2), 157-200.

http://onlinelibrary.wiley.com/doi/10.1111/1467-6419.00192/pdf
http://ideas.repec.org/a/bla/jecsur/v17y2003i2p157-200.html

This article is primarily a critical literature review focusing on human capital's impact on macroeconomic performance. Sianesi and Van Reenen found that existing literature supports the assertion that human capital increases productivity whereas applications and extensions to gross domestic product (GDP) are less supportive. Major literature findings include a one-year increase in average population education corresponding with an increase in output per capita of 3% to 6% amid 1% faster growth. Educational economic impact was found to be dependent upon a country's level of development; emphasis was placed on the role of tertiary education within Organisation for Economic Cooperation and Development (OECD) countries. Education was

found to make additional indirect contributions to both economic growth and development. Article-specific literature review ROI analysis figures are provided in addition to application analysis statistics.

(SB) Vawda, A. Y. (2003). Who benefits from public education expenditures? *Economic Affairs, 23,* 40-43. doi: 10.1111/1468-0270.00399

http://onlinelibrary.wiley.com/doi/10.1111/1468-0270.00399/abstract

Vawda assesses whether public expenditures on education have been both effective and equitable related to the socioeconomic statuses of populations described within this article. Analysis revealed systemic inequities regarding educational funding, with poor income groups being underrepresented in post-primary education. Across selected countries and drawing upon existing research, private rates of return to schooling by family background, public expenditure distribution by income, and enrollment in primary and tertiary public education systems were considered in assessing relative educational equity. Private rates of return to schooling by family background are provided in table format.

(CS) Holzer, H. J. (2009). Workforce development as an antipoverty strategy: What do we know? What should we do? *Focus, 26*(2), 62-68.

http://www.irp.wisc.edu/publications/focus/pdfs/foc262k.pdf
http://mitsloan.mit.edu/iwer/pdf/0809-holzer.pdf

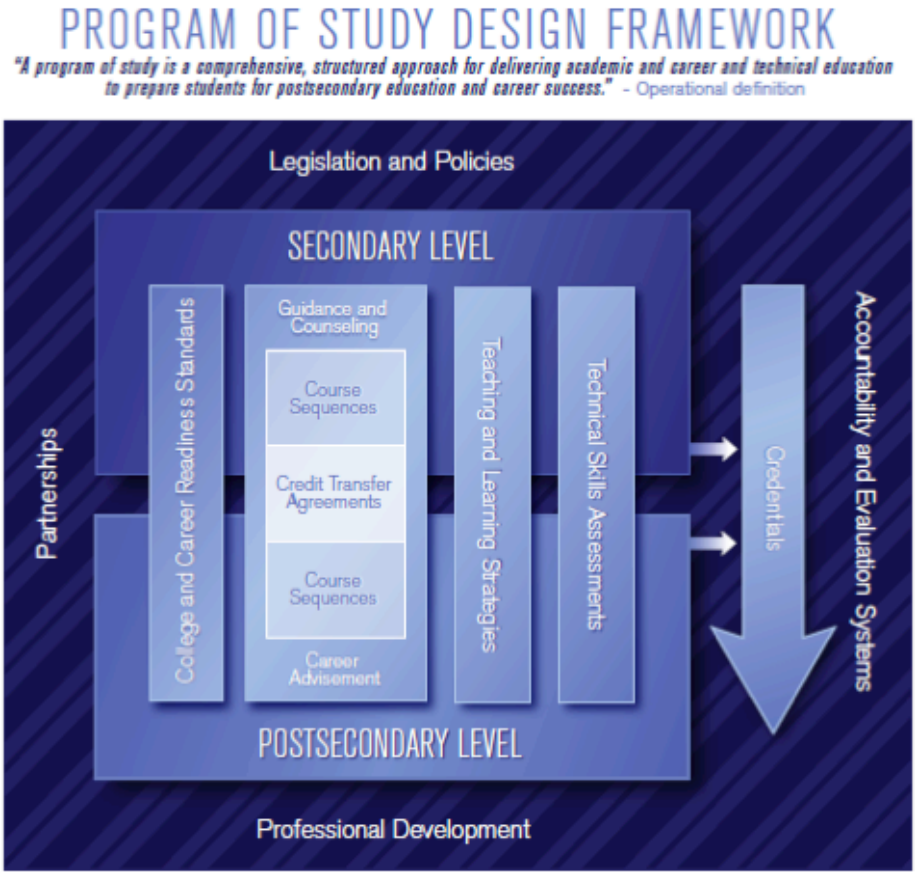
Holzer approaches systemic labor market problems for disadvantaged populations by highlighting the disconnect between the importance that is almost universally placed on developing workforce skills by economists and policy analysts and the lack of support associated with workforce development initiatives, particularly with regard to population economic outcomes. Trends in federal funding, the rapidly changing labor market, and political divisiveness related to workforce development were analyzed in developing the conclusion that substantive evidence for decreasing support of such initiatives simply does not exist. Cost-effectiveness rates of return specify the Earned Income Tax Credit (EITC) at $1:$1.25 while the Job Training Partnership Act (JTPA) exhibited a 200% return over a five year period. New training approaches are also highlighted, including regional sectoral training programs, career ladder programs, and incumbent worker programs. Participation rates are detailed; specific return on investment calculations are limited to EITC and JTPA.

(SB) Alliance for Excellent Education. (2010). *The economic benefits from halving the dropout rate.* Washington, DC: Author.

http://www.all4ed.org/files/NationalMSA_leb.pdf

This publication highlights the predicted economic and social benefits associated with halving the national high school dropout rate. Using a 2008 cohort of dropout students derived from 45 metropolitan areas, the economic benefits of 300,000 additional students graduating were calculated and quantified. Key projections included $4.1 billion in increased earnings; $2.8 billion in additional spending; increased home sales of $10.5 billion; 30,000 new jobs created; $536 million in additional tax revenue; increased human capital; and total economic growth of $5.3 billion.

Appendix B
Program of Study Design Framework and Components



THE 10 PROGRAM OF STUDY (POS) COMPONENTS

1. LEGISLATION AND POLICIES

Federal, state, and local legislation or administrative policies promote POS development and implementation.
Effective legislation and policies should:

- Provide for state and/or local funding and other resources, such as professional development and dedicated staff time, for POS development.
- Establish formal procedures for the design, implementation, and continuous improvement of POS.
- Ensure opportunities for any secondary student to participate in a POS.
- Require secondary students to develop an individual graduation or career plan.
- Provide resources for long-term sustainability of POS.

2. PARTNERSHIPS

Ongoing relationships among education, business, and other community stakeholders are central to POS design, implementation, and maintenance.
Collaborative partnerships should:

- Create written memoranda of understanding that elaborate the roles and responsibilities of partnership members.
- Conduct ongoing analyses of economic and workforce trends to identify statewide (or regional) POS to be created, expanded, or discontinued.
- Link into existing initiatives that promote workforce and economic development, such as sector strategies and other activities supported by the Workforce Investment Act.
- Identify, validate, and keep current the technical and workforce readiness skills that should be taught within a POS.

3. PROFESSIONAL DEVELOPMENT

Sustained, intensive, and focused opportunities for administrators, teachers, and faculty foster POS design, implementation, and maintenance.
Effective professional development should:

- Support the alignment of curriculum from grade to grade (9-12) and from secondary to postsecondary education (vertical curriculum alignment).
- Support the development of integrated academic and career and technical curriculum and instruction (horizontal curriculum alignment).
- Ensure that teachers and faculty have the content knowledge to align and integrate curriculum and instruction.
- Foster innovative teaching and learning strategies (see #9 below).

4. ACCOUNTABILITY AND EVALUATION SYSTEMS

Systems and strategies to gather quantitative and qualitative data on both POS components and student outcomes are crucial for ongoing efforts to development and implement POS.
Well-designed accountability and evaluation systems should:

- Include the "10 Essential Elements of A State Longitudinal Data System" identified by the Data Quality Campaign.[17]
- Provide for administrative record matching of student education and employment data (i.e., Unemployment Insurance (UI) wage records).
- Yield valid and reliable data on key student outcomes (indicators) referenced in Perkins and other relevant federal and state legislation.
- Provide timely data to evaluate and improve the effectiveness of POS.

[17] The 10 elements are: (1) statewide student identifier; (2) student-level enrollment data; (3) student-level test data; (4) information on untested students; (5) statewide teacher identifier with a teacher-student match; (6) student-level course completion (transcript) data; (7) student-level SAT, ACT, and Advanced Placement exam data; (8) student-level graduation and dropout data; (9) ability to match student-level P-12 and higher education data; and (10) a state data audit system.

5. COLLEGE AND CAREER READINESS STANDARDS

Content standards that define what students are expected to know and be able to do to enter and advance in college and/or their careers comprise the foundation of a POS.
Rigorous college and career readiness standards should:

- Be developed and continually validated in collaboration with secondary, postsecondary, and industry partners.
- Incorporate essential knowledge and skills (i.e., academic skills, communication, and problem-solving), which students must master regardless of their chosen career area or POS.
- Provide the same rigorous knowledge and skills in English and mathematics that employers and colleges expect of high school graduates.
- Incorporate industry-recognized technical standards that are valued in the workplace.
- To the extent practicable, be internationally benchmarked so that all students are prepared to succeed in a global economy.

6. COURSE SEQUENCES

Non-duplicative sequences of secondary and postsecondary courses within a POS ensure that students transition to postsecondary education without duplicating classes or requiring remedial coursework.
Well-developed course sequences should:

- Map out the recommended academic and career and technical courses in each POS.
- Begin with introductory courses at the secondary level that teach broad foundational knowledge and skills that are common across all POS.
- Progress to more occupationally-specific courses at the postsecondary level that provide knowledge and skills required for entry into and advancement in a chosen POS.
- Offer opportunities for students to earn postsecondary credit for coursework taken during high school.

7. CREDIT TRANSFER AGREEMENTS

Credit transfer agreements provide opportunities for secondary students to be awarded transcripted postsecondary credit, supported with formal agreements among secondary and postsecondary education systems.
Well-development agreements:

- Provide a systematic, seamless process for students to earn college credit for postsecondary courses taken in high school, transfer high school credit to any two- and four-year institution in the state that offers the POS, and transfer credit earned at a two-year college to any other two- or four-year institution in the state that offers the POS.
- College credit should be automatically transcripted at the college for high school students so that they can transfer seamlessly into the postsecondary portion of a POS without the need for additional paperwork or petitioning for credit.

- Describe the expectations and requirements for, at a minimum, teacher and faculty qualifications, course prerequisites, postsecondary entry requirements, location of courses, tuition reimbursement, and credit transfer process.

8. GUIDANCE COUNSELING AND ACADEMIC ADVISEMENT

Guidance counseling and academic advisement help students to make informed decisions about which POS to pursue.
Comprehensive guidance counseling and academic advisement systems:

- Are based on state and/or local guidance and counseling standards, such as the National Career Development Guidelines.[18]
- Ensure that guidance, counseling, and advisement professionals have access to up-to-date information about POS offerings to aid students in their decision making.
- Offer information and tools to help students learn about postsecondary education and career options, including prerequisites for particular POS.
- Offer resources for students to identify their career interests and aptitudes and to select appropriate POS.
- Provide information and resources for parents to help their children prepare for college and careers, including workshops on college and financial aid applications.
- Offer Web-based resources and tools for obtaining student financial assistance.

9. TEACHING AND LEARNING STRATEGIES

Innovative and creative instructional approaches enable teachers to integrate academic and technical instruction and students to apply academic and technical learning in their POS coursework.
Effective teaching and learning strategies should:

- Be jointly led by interdisciplinary teaching teams of academic and career and technical teachers or faculty.
- Employ contextualized work-based, project-based, and problem-based learning approaches.
- Incorporate team-building, critical thinking, problem-solving, communication skills, such as through the use of career and technical student organization (CTSO) activities.

10. TECHNICAL SKILLS ASSESSMENTS

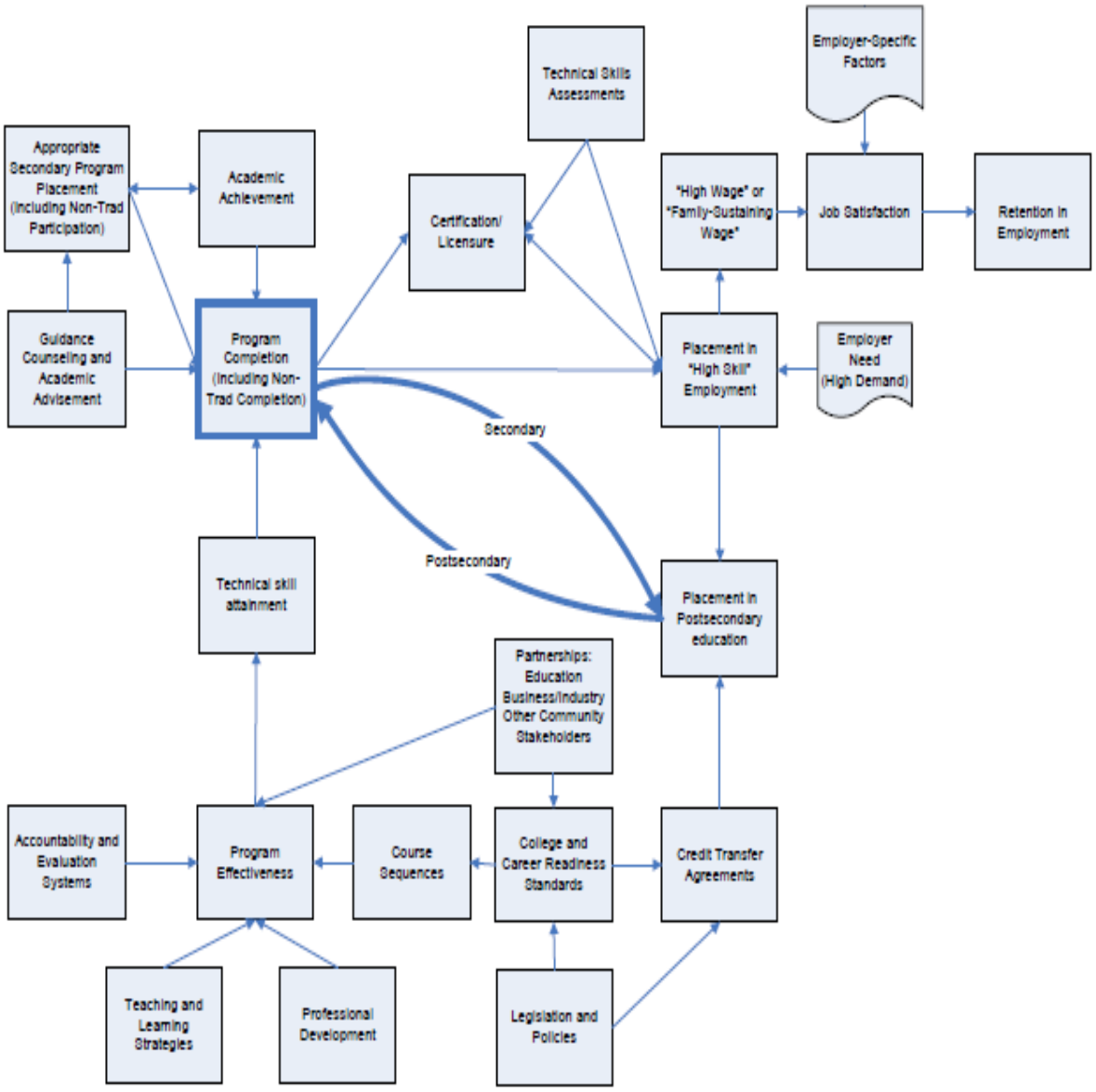
National, state, and/or local assessments provide ongoing information on the extent to which students are attaining the necessary knowledge and skills for entry into and advancement in postsecondary education and careers in their chosen POS.
Well-developed technical skills assessments:

- Measure student attainment of technical skill proficiencies at multiple points during a POS.

[18] See http://cte.ed.gov/acrn/ncdg/ncdg_what.htm.

- Employ industry-approved technical skill assessments based on industry standards, where available and appropriate.
- Employ State-developed and/or approved assessments where industry-approved assessments do not exist.
- Incorporate performance-based assessment items, to the greatest extent possible, where students must demonstrate the application of their knowledge and skills.

Appendix C
Connecting the 10 POS Components



Note. The above graphic was developed by Jill Kroll, Education Research Consultant, Office of Career and Technical Education, Michigan Department of Education. Email: KrollJ1@Michigan.gov.

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