

OVAE Customized Technical Assistance to States

An Assessment of CTE Data Needs for the Pennsylvania
Information Management System (PIMS)



Prepared under contract to
U.S. Department of Education

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RTI International is a trade name of Research Triangle Institute.

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Background

In fall 2012, the Office of Vocational and Adult Education (OVAE), U.S. Department of Education, invited states and discretionary grantees to submit requests for individualized technical assistance to improve the quality of their *Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV)* accountability systems. The Pennsylvania Department of Education (PDOE), Bureau of Career and Technical Education (BCTE), requested technical assistance to conduct a gap analysis related to PDOE's ongoing development of a statewide longitudinal data system (SLDS)—the Pennsylvania Information Management System (PIMS).

During the past year, staff members from PDOE offices and bureaus have participated in facilitated discussions to identify the data needed for a comprehensive education information system in Pennsylvania. The PIMS development team asked staff members to describe their reporting and research needs for understanding and improving student outcomes, serving stakeholder interests, meeting program and system planning needs, and satisfying state and federal reporting requirements. As part of this effort, the SLDS team sought to engage BCTE and relevant staff from the Office of Postsecondary Education (OPHE) in a process to identify key CTE-related research and policy questions. This information would then inform a gap analysis to identify any additional data that PIMS would need to collect to meet BCTE's information needs.

Sandra Staklis, a Senior Research Associate at RTI International, provided consultation services to BCTE. RTI communicated via e-mail, telephone, and conference calls with BCTE staff members from February through April 2013. After two initial planning meetings to define Pennsylvania's technical assistance needs, RTI worked with BCTE to develop and implement a process to engage staff members working with CTE data and programs in the PIMS data planning process. The materials and tools created to assist in this work, including this report, were developed in cooperation with PDOE; RTI shared initial drafts of all materials developed with BCTE and PIMS staff, and the final versions reflect the Pennsylvania staffs' comments and input.

The Gap Analysis Process

PIMS is designed to support the administration of programs and institutions and facilitate the research and analyses that will lead to enhanced student learning and success. Ensuring that PIMS meets the needs of CTE requires understanding the data needs of CTE programs in the state and ensuring that these data are collected and made available to policymakers, educators, and other stakeholders. A data gap analysis compares the data currently available with current and anticipated information needs. Once a set of relevant CTE-related research and policy questions are identified, the gap analysis outlines the data needs for each and indicates whether current data systems collect this information.

The first step in the technical assistance work was to identify relevant CTE-related research and policy questions. Although a number of states offer examples of similar data planning work, each state's questions must also reflect state-specific policies and programs.¹ Moreover, although a number of states have worked on data system planning for K–12 or postsecondary data, work specifically focused on the information needs of the CTE community has been less common.

The process began with two initial meetings of the project team to develop a strategy for engaging CTE program and data staff. The project team agreed that it was important for staff members asked to participate in the meeting to understand the need for their participation in the development of an effective and useful data system, how their feedback would be collected, and the way that their input would be incorporated into the PIMS development process. To prepare BCCTE staff members, PIMS project managers shared information about the process and materials that were used in other education areas at PDOE. The project team decided to start with an in-person meeting for all PDOE staff involved in CTE programs, with RTI staff participating by conference call. PIMS managers designed the meeting around a discussion about the most relevant CTE-related policy and research issues and questions, allowing group members to quickly consider a range of CTE-related topics, learn from and build upon each others' responses, and reach a common understanding of the most essential questions.

In preparation for the meeting, the project team met to develop a meeting agenda and a list of CTE-related discussion questions and topics to guide participants' input. The discussion topics included CTE participant and teacher characteristics; CTE students' secondary,

¹ See, for example, information on Texas' ongoing data system planning work at <http://www.tea.state.tx.us/tsds2/> and Washington State's work to identify K–12 data needs at http://www.k12.wa.us/K12DataGovernance/pubdocs/Data_Gap_Analysis_Final_Report.pdf.

postsecondary, and workforce outcomes; CTE program characteristics; and program cost-effectiveness.² The project team developed a guide for meeting participants that described the efforts underway to enhance the collection of education data in Pennsylvania, the importance of CTE staff members' input for data system development, and a meeting agenda that included the list of discussion questions and topics. This guide was sent to the meeting invitees in advance and also included examples of research and policy questions so that participants could familiarize themselves with the types of questions that data systems might address.

The one and one-half hour meeting was held on February 4, 2013, and all 13 of the participants invited from PDOE attended. The project team facilitated the meeting and took notes. Six of the participants worked with CTE-related data and seven worked with secondary, postsecondary, and adult education programs. At the start of the meeting, participants were advised to expand their ideas beyond the CTE data currently collected and to allow their work experiences and imaginations to guide the discussion. The facilitators asked participants to ignore the data collection concerns that often dominate discussions of education data, such as whether the data are currently available or would be too burdensome to collect. Following this guidance, the group then discussed each of the topic areas in turn. The facilitators assisted the group in developing questions from the ideas shared by the group and ensured that each participant had a chance to share their thoughts.

Following the meeting, the project team refined the resulting 55 research and policy questions and organized them into five topic areas: secondary CTE, CTE postsecondary transitions, postsecondary workforce transitions, adult CTE, and CTE teachers. The question list was then e-mailed to the meeting participants for their edits and comments, and an edited and refined list of questions (some questions were combined) was then sent to the group for their final approval. As a final step to determine which of the many questions should be included in the gap analysis, meeting participants were asked to rate the importance of the final question list for their work and the broader CTE community. Participants submitted their ratings by survey using a 5-point scale, where 5=*Absolutely critical* and 1=*Not at all important*. Based on the survey results, the gap analysis includes questions that the respondents rated as important or higher. In addition to the highest ranked research and policy questions, the analysis of these questions is followed by a consideration of additional suggestions that were submitted by key CTE personnel.

² All of the materials developed for this work are included in appendix A.

The Policy and Research Questions

The 18 policy-related questions developed from input from CTE secondary, postsecondary, and adult education staff members reflect stakeholder interests, issues pertinent to Pennsylvania education, and national trends and issues.

The gap analysis for each question reflects several features of the data currently available in PIMS:

- **State-level data collection and analysis:** Several individuals who participated in the meeting expressed concern about whether the questions might require local schools and institutions to provide and analyze the data. The policy question gap analysis considers data reported to PIMS by school districts and educational institutions in accordance with state and federal requirements. Access and analysis of these data would occur at the state level. In most cases, the data are already collected by PIMS or are under consideration for collection in the next few years.
- **Unique student identification numbers:** PIMS assigns each student a unique student identifier (the PAsecureID) that is used consistently across all levels of education. For questions that require data from multiple levels, the data from each level would be matched using this identifier.
- **Links to other Pennsylvania data systems:** Collecting information from other systems, such as postsecondary education data from the National Student Clearinghouse (NSC) and the employment records maintained by the Pennsylvania Department of Labor and Industry (PDLI), will likely vary in feasibility and accuracy. The NSC, for example, matches student records using names, birthdates, and a number of other elements. Access to labor force data generally requires social security numbers, but the PIMS development team is currently exploring other options.
- **CTE student definitions:** CTE students at the secondary and adult education levels are students who meet the state definition for a CTE concentrator at each level. Postsecondary CTE students have earned 12 or more credits in a CTE field.

Each question is followed by a table that lists the type of data needed to conduct an analysis that would answer the question, the specific information needed, the name of available data elements, and the source (or possible source) of the data. In some cases, questions addressing similar issues have been combined and analyzed together. Notes explaining the information

follow each table, as well as any assumptions that were made to select the data described. For example, CTE students in each of the tables are assumed to be concentrators, following the Pennsylvania state concentrator definition.

It should be noted that the following assessments of available data are based on the most recent (2011–13) PIMS user manuals for reporting CTE and other education data. Since the manuals reflect only data reported by local and higher education agencies, it does not include information that PIMS may access from other data systems, data collected directly by PIMS, or data elements derived centrally by state analysts.

Adult Education Questions

Adult CTE students, in accordance with Pennsylvania’s definition of an adult CTE concentrator, are defined as students that have successfully completed at least 50 percent of an adult CTE program’s technical content.

1. What is the effect of adult CTE students’ prior education level on their program outcomes, such as credential attainment?

Data gaps: None

Data description	Data item/field name	Availability
Adult CTE student identifier	CIP CODE	Would need to be derived using list of CTE programs; PIMS, secondary and adult education, CTE student fact
High school graduation status	GRADUATION STATUS CODE	PIMS, secondary and adult CTE, student snapshot
Postsecondary credits earned	CUMULATIVE CREDITS COMPLETED	PIMS, postsecondary student enrollment
Postsecondary degree awarded	AWARD CODE	PIMS, postsecondary student award
Industry credential awarded	INDUSTRY CREDENTIAL CODE	PIMS, secondary and adult CTE, CTE student industry credential

Notes:

- The prior education levels of adult education students who have attended secondary and postsecondary programs in Pennsylvania can be accessed using their PAsecureID numbers. The National Student Clearinghouse could provide information on the prior postsecondary experiences of students educated in other states.
- *Prior education level* generally means the highest level of education completed (credentials). For students who have not earned a secondary or postsecondary credential, education level might be measured by the highest grade completed or the numbers of credits earned. In the absence of education credentials information, analysts might look to students’ proficiency levels on placement assessments or their adult basic education levels.
- *Program outcomes* might include any credentials earned, including industry credentials.

2. How many adult CTE students have a postsecondary credential but couldn't find a job in the area for which they prepared?

Data gaps: Workforce data

Data description	Data item/field name	Availability
Adult CTE student identifier	CIP CODE	Would need to be derived using list of CTE programs; PIMS, secondary and adult education, CTE student fact
Postsecondary degree awarded	AWARD CODE	PIMS, postsecondary student award
Program major field of study of transfer students	MAJOR CIP CODE	PIMS, postsecondary student enrollment
Industry credential awarded	INDUSTRY CREDENTIAL CODE	PIMS, secondary and adult CTE, CTE student industry credential
Industry in which the student was employed prior to enrollment		PDLI (Pennsylvania Department of Labor and Industry)

Notes:

- Information on students' past employment is often collected through surveys that ask former students to report their occupations. An analysis of postsecondary and workforce data, however, might offer insights into whether students were employed in an industry related to their prior credentials while avoiding the costs of additional data collection. However, it should be noted that industry classifications are broad categories that may or may not accurately reflect graduates' occupations. For example, the employment of a school nurse might be in education rather than in health care.

3. What are the goals of adult CTE students and how often are their goals achieved? These goals might include employment, promotions, salary increases, or progression up career ladder steps. What proportion of adult CTE students is employed but seeking to upgrade their qualifications?

Data gaps: Adult CTE students’ reasons for enrollment; workforce data

Data description	Data item/field name	Availability
Adult CTE student identifier	CIP CODE	Would need to be derived using list of CTE programs; PIMS, secondary and adult education, CTE student fact
Reasons for enrollment		
Employment status prior to and after enrollment		PDLI (Pennsylvania Department of Labor and Industry)
Salary prior to and after enrollment		PDLI (Pennsylvania Department of Labor and Industry)
Industry in which the student was employed prior to and after enrollment		PDLI (Pennsylvania Department of Labor and Industry)

Notes:

- The two questions in this section address students’ motivations and goals for enrolling in adult CTE programs. Determining students’ motivations generally requires the collection of survey data. For example, community colleges sometimes ask applicants to complete an enrollment survey that includes a question about their goals to better understand their students’ motivations.
- Once students’ goals or motivations are known, however, education and workforce records may help to determine whether at least some of the goals that students identified were met, such as employment, employment in particular industries, or salary increases.
- The PDOE conducts an annual follow-up survey of secondary, postsecondary, and adult CTE graduates. Response rates, however, are low and the information is self-reported by respondents.

Postsecondary Education Questions

The analyses that follow rely primarily on data available through PIMS. The information described, therefore, is limited to students who attended postsecondary education in Pennsylvania. For the final question, the information is available for those who attended secondary education in Pennsylvania as well. For students who attended postsecondary institutions located in other states, information on where they enrolled, the credentials earned, transfer experiences, and their college majors can be accessed through the NSC. Additional information on some students may also be available through regional data sharing agreements.

4. At what point in their postsecondary careers are CTE students most likely to transfer (i.e., after 30 credits, after graduating with an associate’s degree, etc.)?

Data gaps: None

Data description	Data item/field name	Availability
CTE student indicator	PROGRAM CODE	Would need to be derived using list of CTE programs; PIMS, student program fact
Postsecondary credits earned	CUMULATIVE CREDITS COMPLETED	PIMS, postsecondary student enrollment
Postsecondary credits earned for remedial education	CUMULATIVE REMEDIAL CREDITS EARNED	PIMS, postsecondary student enrollment
Transfer to another institution	EXIT REASON CODE	PIMS, postsecondary student enrollment
Postsecondary degree awarded	AWARD CODE	Student award

Notes:

- Credits earned for remedial courses cannot be applied to a postsecondary degree, but may be of interest to stakeholders.
- Information on cumulative credits earned is not currently available through the NSC for students attending institutions out of state, although the NSC may expand data offerings in the future.
- Analysts might also need information on when students’ transfers occurred to determine if transfers were before or after a postsecondary degree was awarded.

5. What are the most common transfer programs among postsecondary CTE students?

Data gaps: None

Data description	Data item/field name	Availability
CTE student indicator	PROGRAM CODE	Would need to be derived using list of CTE programs; PIMS, student program fact
Transfer student indicator	TRANSFER DATE	PIMS, postsecondary student enrollment
Type of degree program that the student transferred into	DEGREE SEEKING TYPE CODE	PIMS, postsecondary student enrollment
Program major field of study of transfer students	MAJOR CIP CODE	PIMS, postsecondary student enrollment

6. What is the average number of credits that postsecondary CTE transfer students are able to transfer?

Data gaps: None

Data description	Data item/field name	Availability
CTE student indicator	PROGRAM CODE	Would need to be derived using list of CTE programs; PIMS, student program fact
The number of credits student transferred	TRANSFER CREDITS	PIMS, postsecondary student transfer

Notes:

- Information on the type of credits transferred (academic vs. occupational) does not appear to be available.
- Analysts should note that *transfer credits* records the number of credits transferred by a student that the transfer-to institution actually accepted. Students may have attempted to transfer additional credits that the transfer-to institution did not accept.
- With student major or CTE program (CIP CODE) data, the average number of credits transferred can also be analyzed by CTE program.

7. Does the postsecondary completion rate for CTE graduates vary by the number of articulated credits earned in high school?

Data gaps: None

Data description	Data item/field name	Availability
CTE student indicator	PROGRAM CODE	Would need to be derived using list of CTE programs; PIMS, student program fact
The number of articulated credits student earned in high school	CUMULATIVE POSTSECONDARY CREDITS EARNED	PIMS, secondary and adult, CTE student fact
Postsecondary degree awarded	AWARD CODE	PIMS, postsecondary student award
Date the student earned her or his postsecondary credential	AWARD DATE	PIMS, postsecondary student award

Notes:

- A related question of possible interest is whether students went on to apply the postsecondary credits they earned in high school to a postsecondary program, and how many of these credits students applied to their programs. An analysis of this type would require postsecondary transcript data.
- A data item not included in this table, AMOUNT (program of study articulated credits), might be used for analyses of CTE-related articulated credits. This data item only includes, however, those credits that apply to a postsecondary articulated program of study, which may not include all of the articulated credits in CTE that students have earned.

Secondary Education Questions

CTE staff members from the PDOE were interested in learning about the courses and grades of secondary CTE students prior to their joining the CTE program. Questions addressing courses and grades, however, revealed that local education agencies (LEAs) are not required to report data on individual students' course taking and the information therefore is generally not available for most students.

8. Prior to their CTE program, what courses had secondary students completed and what were their course grades? What were students' math skill levels prior to starting their CTE programs, as measured by courses taken, grades, and Keystone exam scores?

Data gaps: Student course and course grade information

Data description	Data item/field name	Availability
Secondary CTE student indicator	CIP CODE	PIMS, CTE student fact
Courses passed		
Course grades for each class		
Keystone exam scores		

Notes:

- The data needed to answer these questions would require complete information on courses taken and grades earned in those courses for each student, information that is reported by LEAs to the state on a voluntary basis.

9. Does CTE student achievement vary according to whether their CTE teacher has an alternative versus a traditional teacher certification? Do CTE student outcomes vary according to whether a CTE teacher holds an industry certification in their teaching field?

Data gaps: Students’ course and grade information and common course numbers

Data description	Data item/field name	Availability
CTE course identifier	CAREER AND TECHNICAL INDICATOR	PIMS, course template
Course taught	ALTERNATIVE COURSE CODE	PIMS, Pennsylvania’s Standardized Course Codes
Instructor for course	PRIMARY INSTRUCTOR ID	PIMS, course instructor
Year that course was taught	SCHOOL YEAR DATE	PIMS, course instructor
Teacher credentials—industry certifications		Teacher information management system
Teacher credentials—certification type		Teacher information management system
Teacher’s district	DISTRICT CODE	PIMS, course instructor
Teacher’s school	LOCATION CODE	PIMS, course instructor
Student’s grades in course		

Notes:

- This analysis requires the matching of student (course enrollment and grades) and teacher (credentials) information and a common course numbering system that allows the comparison of the same courses taught by instructors with different types of credentials.

10. How do secondary students select their CTE programs?

Data gaps: Data to answer this question directly are not available

Much like the questions addressing the motivations and goals of adult students in an earlier section, questions about program choice are often addressed through surveys. However, PIMS data might potentially include data that would aid in the exploration of issues around this question, such as at what point in their academic careers do students begin a CTE program and what proportion of CTE students take career exploration courses.

11. What is the impact of the 2015 graduation requirements on CTE students' graduation rates?

Data gaps: None

Data description	Data item/field name	Availability
Secondary CTE student identifier	CIP CODE	PIMS, CTE student fact
Student's high school exit status	GRADUATION STATUS CODE	PIMS, student template
Student's expected graduation date	EXPECTED GRADUATION TIME FRAME	PIMS, student template
Year student graduated	PIMS graduation information	

Notes:

- Answering this question requires comparing graduation rates before and after the 2015 graduation requirements were introduced.
- The data items indicated above reflect two approaches that might be taken to answering this question. First, the analysis might compare the graduation rates of CTE students before and after the change in graduation requirements, controlling for other factors that might impact graduation rates.
- Second, to explore the relationship between the on-time graduation rate of CTE students and the 2015 graduation requirements, analysts might explore whether the proportion of students who graduate within their expected graduation time frame changes.

Employment Outcome Questions

Workforce data questions apply to adult, postsecondary, and secondary education programs. The gap analysis for these questions, therefore, reflect the data needed for addressing workforce outcomes at all three of these education levels. The most comprehensive source of labor force information is unemployment insurance wage records, which in Pennsylvania are maintained by the Pennsylvania Department of Labor and Industry.

In addition to state unemployment insurance wage records, some states participate in regional data sharing agreements that provide information on graduates who find employment in neighboring states. Information on federal employment and graduates who enlist in the armed forces can be accessed through the Federal Employment Data Exchange System (FEDES).

12. For CTE programs with high unemployment or high out-of-field employment rates, what additional workforce training is needed to supplement the education those programs offer?

Data gaps: Data to answer this question directly are not available

Data description	Data item/field name	Availability
Program	PROGRAM or CIP CODE	Available at each level of education
CTE program identifier	PROGRAM or CIP CODE	Derived using list of CTE programs
Employment status		PDLI (Pennsylvania Department of Labor and Industry)

Notes:

- Much like the questions addressing the motivations and goals of adult students in an earlier section, questions about training needs are often addressed through employer surveys. By accessing PDLI data, however, PIMS might assist in identifying programs with relatively low employment rates.

13. What are CTE graduates’ average wages by program, and how do their wages compare to those of non-CTE graduates?

Data gaps: Salary data on CTE graduates

Data description	Data item/field name	Availability
Program	PROGRAM or CIP CODE	Available at each level of education
CTE program identifier	PROGRAM or CIP CODE	Derived using list of CTE programs
Wages		PDLI (Pennsylvania Department of Labor and Industry)

Notes:

- To be comparable across state regions, salaries will need to be adjusted for differences in cost of living. For example, if agriculture students are primarily employed in rural regions with a low cost of living, the average salary for this occupation should be adjusted before being compared with occupations concentrated in urban areas.

Summary of Data Gaps

Education level	Missing data items
Adult	Students' reasons for enrollment
Secondary	Student coursework and grade data; teacher credential information
Postsecondary	None
Cross-level outcomes	Workforce data (employment status, salary, and industry)

Additional Questions

This list shows the questions developed by the CTE data and program staff that were rated as not important during the ranking process. Although they did not make the cut for inclusion in the current gap analysis, they might provide information that will be valuable for future data system planning and development.

1. How are CTE students performing in their CTE and non-CTE courses?
2. Are students' CTE program placements appropriate?
3. Are students who complete a career plan more likely to complete a rigorous CTE program, graduate, or enroll in postsecondary education?
4. What is the impact of the 2015 graduation requirements on CTE graduates' college readiness?
5. How many CTE graduates enroll in non-*Perkins* or out-of-state postsecondary institutions?
6. What is the average number of articulated credits earned by CTE graduates, overall, and by program?
7. What proportion of CTE graduates who earned articulated credits apply them to a postsecondary degree?
8. On average, what proportion of CTE graduates' postsecondary program credits were covered through articulated credits?
9. How many secondary CTE graduates enroll in the same, related, or unrelated programs at the postsecondary level? Do these groups differ in terms of their average wages or time-to-degree?
10. To what extent are CTE programs meeting current and future state and regional workforce needs?
11. Are employment and wage rates higher among CTE graduates who earn industry-recognized certifications?
12. Are CTE programs preparing students for work in their chosen fields or industry, as measured by the number of students working in their field of study within a specified time after graduation?
13. What type of professional development for CTE teachers (district in-service vs. credit courses) is most effective for improving student performance?

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