Using Unemployment Insurance Wage Data to Improve Program Employment Outcomes:

A Technical Assistance Guide for Community and Technical Colleges

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I Introduction

This guide is a product of the National Science Foundation (NSF) Advanced Technological Education (ATE) Program Graduate Employment Outcomes Study. The three major goals of the study were to: (1) to utilize UI wage records and supplemental data to demonstrate the employment outcomes of graduates of ATE programs in two STEM fields and assess the quality, productivity, and effectiveness of the programs; (2) to develop partnerships and design survey instruments to demonstrate the feasibility of obtaining quality follow-up data on ATE graduates, particularly UI wage records, in both a multi-state region and single-state setting, and (3) to provide community colleges with information for replication to obtain quality follow-up data on graduates for data-driven decision making, planning, and program improvement purposes.

The research component of the project addressed two main questions:

- What are the employment outcomes (retention, earnings, and wage gains) for graduates of select biomanufacturing/biotechnology or process technology education programs, and does this differ by demographics (e.g., race, ethnicity, gender, and age) and time (i.e. one, two, and three years' post-program)?

- Does participation and completion of biomanufacturing/biotechnology or process technology education programs lead to short and long term labor market success (e.g., job placement, higher earnings, promotions, and sustained employment)?

In order to address these questions, the project team worked with participating ATE colleges and the appropriate agencies or clearinghouse entities in their respective states to obtain employment outcome results for program graduates. These employment outcomes were based on a match between program graduate data and quarterly earnings records from the Unemployment Insurance covered earnings databases in each state (also referred to as the UI wage data). While the UI wage data has been used to examine post-program employment outcomes in other programs such as the Workforce Investment Act, the Trade Act and the Carl D. Perkins Vocational and Technical Education Act, it is not as widely used as a tool for general program evaluation within the community college system.

While the guide is primarily focused on the acquisition and use of the UI wage data, this information is presented within the context of a broader set of steps about program analysis and improvement, with a focus on employment results. It is our assertion that the analysis of employment and earnings results, while critical to program improvement, should not be done outside of a broader program analysis context that includes an understanding of program goals, student characteristics and needs, and labor market conditions.

II   Overview of the Guide:

One of the planned products from the NSF ATE Employment Outcome Study was a guide for college practitioners who are interested in acquiring and using the UI wage data to examine employment and earnings outcomes for students. The guide is intended to draw from the experiences gained in conducting the project and provide practical suggestions for action steps that colleges could take to negotiate their own data sharing agreements, acquire and analyze the data, and interpret the results.

The guide provides a discussion of the overall accountability context for community colleges, which is under significant transition, particularly as it relates to the question of post-program employment and earnings outcomes. The potential benefits and limitations of using the UI wage data to observe these outcomes are summarized. Most of the guide presents a discussion of six recommended action steps that colleges can take to analyze and potentially improve employment outcomes for graduates:

1. Form a college leadership team to guide the project;
2. Define program goals, evaluation questions, and related measures;
3. Define the data requirements for calculating each of the measures;
4. Establish data access procedures and negotiate data sharing agreements;
5. Obtain, process and analyze the data; and
6. Develop a strategy for using the data as part of a continuous improvement process.

Worksheets, figures and lists of questions are provided to help colleges organize their analysis and define the necessary tasks to be undertaken for each of these steps. Finally, the guide includes several appendices, including measure definitions, example summary results tables, and example data sharing agreements (Memoranda of Understanding).

III The Accountability Context for Community Colleges

Postsecondary educational institutions are under unprecedented pressure to improve completion and post-completion results for students. Community colleges in particular are the focus of an effort to produce better results, as these colleges are increasingly seen as playing a central role in the preparation of workers for a changing economy. It is widely recognized that assuming this role will require community colleges to improve completion results, and several major foundation-funded initiatives are focused on this college completion agenda.

In addition to improving completion rates, colleges must also focus on the post-completion employment and earnings of graduates, as completion in and of itself is not enough. These post-completion labor market outcomes have received less attention in the overall national accountability discussion. Part of the reason that employment outcomes have received less attention may be the greater difficulty of accessing accurate placement and earnings information. In addition, there has not always been agreement about the appropriateness of holding colleges responsible for the employment outcomes of their students. Much of the national focus on post-graduation employment has been on students in for-profit programs and certificate programs at nonprofit and public institutions, via tightened "gainful employment" regulations governing qualification to receive Federal student financial aid.

Community colleges are now recognizing the changing accountability environment and the need to ensure students obtain a high quality education that provide skills, competencies, and credentials that have labor market value to successfully compete for jobs in the 21st century global economy. In response to a recent survey of College Chief Academic Officers (CAOs), 75.7 percent of CAOs from public Associate degree-granting institutions rated as "very important" the challenge of "making sure that our academic offerings prepare students for jobs," while 54.9 percent rated their institutions as "very effective" in "preparing students for future employment" (Green, Jaschik, & Lederman, 2012). This suggests that CAOs recognize some gap exists between the importance of college programs preparing students for employment and the effectiveness of their colleges in accomplishing this objective.

The role of postsecondary education in preparing students for employment is increasingly taking a central place in the national economic policy debates. The

"Much of the national focus on post-graduation employment has been on students in for-profit programs and certificate programs at nonprofit and public institutions, via tightened "gainful employment" regulations governing qualification to receive Federal student financial aid."

Obama administration has called on community colleges to become key players in the preparation of students for high-demand, well-paying jobs that are becoming available in advanced manufacturing and other high-technology fields as the economy recovers. One significant manifestation of this effort by the administration is the Trade Adjustment Act Community College and Career Training Grant (TAACCCT) program. This program represents a $2 billion investment in community colleges and college-based consortia to: "… expand and improve their ability to deliver education and career training programs that can be completed in two years or less, are suited for workers who are eligible for training under the TAA for Workers program, and prepare program participants for employment in high-wage, high-skill occupations." A focus on employment and earnings for graduates, including the use of UI-wage data to measure these results, is a required component of these grants.

On February 9, 2012, Senator Roy Wyden introduced the Student Right to Know Before You Go Act. The bill calls for the development of statewide individual-level integrated postsecondary education data systems in order to "…ensure future students and their families can make well-informed decisions by having access to information on:

1. Their expected average annual earnings after graduation;
2. Rates of remedial enrollment, credit accumulation, and graduation;
3. The average cost, both before and after financial aid, of the program and average debt upon graduation; and
4. The effects of remedial education and financial aid on credential attainment and a greater understanding of what student success can mean" (Wyden, 2012).

The legislation, if enacted, would require data on students to be matched with UI earnings data to provide expected employment and earnings for colleges, programs, and industry sectors.

Background of the UI wage data

The Social Security Act of 1935 (Public Law 74-271) created the Federal-State Unemployment Compensation (UC) Program.[1] The program has two main objectives: (1) to provide temporary and partial wage replacement to involuntarily unemployed workers who were recently employed; and (2) to help stabilize the economy during recessions. The U.S. Department of Labor oversees the system, but each State administers its own program. The Federal Unemployment Tax Act (FUTA) of 1939 (Public Law 76- 379) and titles III, IX, and XII of the Social Security Act form the framework of the system. FUTA generally determines covered employment. FUTA also imposes certain requirements on the State programs, but the States generally determine individual qualification requirements, disqualification provisions, eligibility, weekly benefit amounts, potential weeks of benefits, and the State tax structure used to finance all of the regular State benefits and half of the extended benefits.

States may cover certain employment not covered by FUTA, but most States have chosen not to expand FUTA coverage significantly. The following employment is therefore generally not covered: (1) self-employment; (2) certain agricultural labor and domestic service; (3) service for relatives; (4) service of patients in hospitals; (5) certain student interns; (6) certain alien farm workers; (7) certain seasonal camp workers; and (8) railroad workers (who have their own unemployment program).

FUTA taxes are collected from all employers with covered employees on a quarterly basis. Since the tax is based on the quarterly earnings of covered employees, employers are required to submit data on individual employees and their earnings in each quarter. This information is also used to create a database of earnings for each covered employee that is used to verify the earnings of employees filing a claim for Unemployment Insurance (UI) benefits in the event of a layoff or termination of employment.

"FUTA taxes are collected from all employers with covered employees on a quarterly basis. "

[1]This discussion is adapted from the United States Congress Committee on Ways and Means, 2011 Green Book.

Benefits of using UI wage data.

There are several potential benefits to using the UI wage data to measure employment and earnings for graduates of advanced technology education programs:

- **COST EFFECTIVENESS.** The cost of accessing the UI wage data is generally substantially less than alternative means of collecting employment and earnings data. Gathering data on employment outcomes directly from students can be very difficult. Student follow-up surveys usually have low response rates, unless extraordinary measures are taken to track down respondents. Employers are usually even more reluctant than students to answer survey inquiries, and often object to verification of employment on confidentiality grounds.

- **BROAD COVERAGE.** According to the Ways and Means Committee of the U.S. Congress, the UI system and its associated data collection cover 99.7 percent of all wage and salary workers and 89 percent of the civilian labor force (self-employed persons largely account for this difference).

- **ACCURACY OF THE EARNINGS DATA.** Since employers are providing the data in conjunction with the payment of the quarterly FUTA tax, they generally have systems in place that link these reports directly to their existing payroll systems, and manage the report generation and submission along with their regular payroll withholding to the federal and state governments. These data are, therefore, more likely to provide an accurate measurement of an individual's total covered earnings, including overtime and bonus pay, than self-reported data collection such as graduate surveys.

- **LONGITUDINALITY.** A history of UI covered quarterly earnings for each reported employee is maintained by each state UI agency. States must maintain the most recent two years of these data in the on-line environment in order to support administration of UI claims, and most have access to longer employment history information. As a result, quarterly UI data can be linked to create a longitudinal record of earnings.

Limitations of UI wage data.

Although the use of wage record data will be an invaluable resource for tracking students' experiences and success in the labor market, it is not without its limitations:

- **COVERAGE LIMITATIONS.** The UI data do not include all people in the labor force, omitting some in agricultural employment, military and federal civilian employment, railroad employment and self-employment. Some states link their UI wage databases to other databases such as the U.S. Department of Defense (DoD), U.S. Office of Personnel Management (OPM), U.S. Postal Service, and Wage Record

Interchange System (WRIS) to resolve this issue. The non-presence of earnings in the covered employment database is not the same thing as non-employment.

- **START DATE.** UI wage data do not include the exact date an employee starts at a company. This, in turn, causes difficulties when comparing two different employees, one who was hired at the beginning of a quarter and a second, who is hired later, well into a quarter.

- **NO HOURS WORKED.** Generally, only total wages paid to the employee in the quarter are reported. Although some states require reporting of hours worked during each quarter, most do not. This presents a dilemma regarding the appropriate handling of two different workers, both working across the full duration of a quarter, but one of whom only works part time and a second who works full time. Without data on hours, the first worker will appear to have been paid at a much higher rate than the second.

- **OUT-OF-STATE MIGRANTS.** Since the UI covered earnings databases are maintained by each state, it will usually not be possible to observe earnings for graduates who migrate out-of-state. Some states (e.g., Maryland among the NSF/ATE study states) have multi-state agreements to access UI wage data, so that information can be developed for labor markets that cross state lines. Colleges evaluating programs where a substantial percentage of graduates are expected to leave the state should take this limitation into account, and may wish to seek access to UI data from neighboring states.

- **OCCUPATION.** The UI covered earnings data generally do not contain information on the occupations of employees. The quarterly earnings records do contain information on the employer's North American Industrial Classification System (NAICS) code, which is helpful, but there are many different occupations that may be employed within a given industry. For example, UI wage data cannot distinguish whether an ATE graduate in a firm with an appropriate NAICS code is working in biomanufacturing as a vehicle driver or as a lab technician.

Colleges should consider these benefits and limitations of the UI wage data when considering their options for collecting employment and earnings data for graduates. On balance, the UI data can be a very cost-effective and powerful tool for measuring employment and earnings of graduates, provided its limitations are properly appreciated and certain steps are taken in the analysis to account for these limitations, as will be discussed below. UI wage data, together with qualitative data from student follow up surveys and phone calls, could not only provide a more robust understanding of the value of the program for students related to employment opportunities, wages, and advancement, but also could help inform the program for continuous improvements purposes.

V Suggested Action Steps

This section covers six steps that colleges can take to analyze and improve employment outcomes for graduates (Harmon, 2011):

1. Form a college leadership team to guide the project;
2. Define program goals, evaluation questions, and related measures;
3. Define the data requirements for calculating each of the measures;
4. Establish data access procedures and negotiate data sharing agreements;
5. Obtain, process and analyze the data; and
6. Develop a strategy to use the data for improving results.

STEP 1
Form a College Leadership and Core Partners Team

The first step in the process should be to assemble a team to provide leadership to the effort. The team will be responsible for determining the goals of the improvement project, defining the measures that will be examined, and identifying the needed data elements. It will also decide on the strategy that will be used to acquire the records that contain this information, and will manage the process for gathering and analyzing the data. Finally, the team will be responsible for communicating the results to the larger community, and will help guide the development of an ongoing improvement process.

Given these responsibilities, it is very important that the team includes members that can help accomplish each of these objectives. The team should include program stakeholders and partners with access to data and knowledge about its potential uses. In particular, it is important that the team includes representatives of the organizations whose approval will be required for accessing student, employee and employer data.

Organizational functions and personnel that the college should include on its leadership team include:

- Faculty for the program or programs being analyzed;
- Chair or dean for the program or programs being analyzed;
- Chief Academic Officer (CAO) or equivalent administrative representative;

- College institutional research officer or equivalent staff;
- Data analyst (the person or office responsible for analyzing the data);
- Perkins Career and Technical Education (CTE) coordinator;
- Employers who typically hire graduates, or employer representatives;
- Local workforce partner representatives, esp. Workforce Investment Act Title I administrator;
- State UI agency representative; and
- Representatives from any other state agencies from which data will be sought, such as the state higher education agency.

In addition to the above representatives, colleges may wish to include one or more of the following on its leadership team, depending on the scope of the improvement effort:

- Students;
- Student career services or student placement office staff;
- Recruitment, admissions or counseling staff; and
- Information services/technology staff.

Representatives of the state UI agency or other state agencies from which data is being sought should be included, even though these staff may not be able to attend regular meetings of the group. Since the approval of these agencies is required to obtain the UI wage data and other data held at the state level, they should be invited to meetings of the leadership team, and kept in the loop on the group's activities. These state staff can help the team to develop its requests for information from the appropriate agencies, and can also help the team navigate the approval process, including the negotiation of data sharing agreement or Memoranda of Understanding (MOU), as described in Step 4.

"… state staff can help the team to develop its requests for information from the appropriate agencies, and can also help the team navigate the approval process…"

It is also important for colleges to form partnerships with the workforce system in their local area, and especially the local administrators under Title I of the Workforce Investment Act (WIA). Many community colleges are already members of the Local Workforce Investment Boards (LWIBs) that provide governance and oversight of the WIA Title I programs. Day-to-day management of the programs is generally provided by a local administrative staff that reports to the Chief Elected Official (CEO) of the municipality, county or regional consortium that receives the WIA Title I grant from each state, although in some jurisdictions, LWIBs have incorporated and directly administer the program, and in some cases community colleges administer the program under the direction of the LWIB.

Partnering with the WIA program can advance the objective of improving employment results for college programs in several ways, including:

- Many of the college's students may already be enrolled in a local WIA program and be receiving some form of assistance, including tuition reimbursement, reimbursement of transportation costs or child care costs, job search assistance and job matching assistance.

- WIA programs have performance measures (entered employment rate, employment retention rate and average earnings) that require access to UI wage data from the state UI agency, so they may be able to assist in making these contacts for the college team.

- WIA managers are familiar with the strengths and weaknesses of the UI wage data in the local context, such as major employers who may not be included in the data, as well as typical patterns of out-of-state migration that may affect accuracy of the wage data.

- The WIA program accountability context is comparatively rigorous, with multiple measures, high goals and a low tolerance for failure. This has the benefit of encouraging WIA program managers to be "employment-centric" in their thinking, which is usually reflected in a sharp focus on demand occupations, employer relationships and client management. On the downside, the WIA programs can also be very risk-averse, which affects their approach to client and program selection, and can create disincentives to enroll students in longer-term programs.

- While the quality and intensity of WIA programs vary significantly, well-run programs pay close attention to the employment goals of their clients and the job opportunities in the local labor market. They have high expectations of clients and work hard to foster good case management relationships. They also work hard to foster employer relationships.

Worksheet A can be used to identify and track recruitment of prospective members for the college leadership team. Worksheet B can be used to help identify tasks, responsible parties and target completion dates for the college leadership team as it begins to assemble its plan.

WORKSHEET A.
College Leadership Team Members and Roles

Team Member	Organization	Role(s)/Function(s)	Contact Information

WORKSHEET B.
College Leadership Team Work Plan

Goal/Task	Primary Person Assigned	Others Assigned	Target Completion Date

STEP 2
Define Program Goals, Evaluation Questions and Measures

One of the early agenda items for the leadership team should be about the goals of the program(s), and how these relate to the goals for using data, including a discussion about the questions that the team would like to be able to answer. What are appropriate goals for each program, and how should these be measured? For instance, is the team primarily interested in the post-program employment outcomes for graduates, or is it also interested in the ability of students to complete the program and obtain the credential?

The goals that the team identifies for the program should lead to the evaluation questions that the team intends to answer with its data analysis. For example, the goal of increasing student earnings potential implies an interest in graduate post-program earnings. This could be framed in several ways, such as increased earnings, meeting or exceeding labor market averages for starting salary, or even helping dislocated workers recover as much of their prior earnings as possible. The team will want to be aware of trends in the local and regional labor markets, including occupational growth, job openings, and earnings levels for various occupations. It might also want to gather some information on the characteristics of its students, especially their pre-program employment histories, since these histories have a bearing on post-program earnings. Finally, it would be good to know what the students think should be the goals for the program so that their satisfaction with their experience can also be assessed. Why are students enrolling in the program? What outcomes are they seeking to obtain?

Colleges also need to understand other sources of labor market information. The Aspen Institute has developed A Guide to Labor Market Data's Power to Improve Student Success (2012, Aspen Institute) that details other sources of labor market data and explains how colleges can use employment data.

Some examples of questions that a team might want to answer include:

- What is our market for this program, i.e., what students are we trying to recruit into the program, and why?
- What is it about the program that students value, and why?
- What can be done to increase the likelihood of successful completion and employment for students?
- What happens to students after they complete the program? Do they enter employment?
- Are graduates employed in an industry or occupation that is related to the program?

- Do students remain employed after obtaining employment? If not, do they quickly regain employment, or do they have extended spells of non-employment?
- How much do students earn after graduation, and to what factors is this related?
- Do students who completed internships while in the program have higher wages?
- How does our program compare on these questions to other similar programs in the college?
- How does our program compare to similar programs in other colleges, in terms of employment and earnings results?

Once the team has defined its overall goals, and the evaluation questions it would like to answer, it can have a discussion about the measures that should be used to assess the results of the program. In broad aspect, these measures fall into four groups (Harmon, 2011 and Illinois Community College Board, 2012):

- Measures of student characteristics and other "contextual" measures,
- Measures of student progress in the program,
- Measures of student completion of the program, and
- Measures of post-program outcomes, including employment and earnings.

A comprehensive plan for evaluating program results should probably include measures from each of the above categories. However, the focus of this guide is on measures of the employment outcomes for students, so most of the discussion will focus on these employment and earnings measures. Employment outcomes include measures of whether or not the student is working immediately following the program (placement) and whether the student continues to work (employment retention). It also may be possible to measure whether the student is employed in an occupation or industry related to the training program (industry-related employment). Earnings measures include quarterly earnings, annual earnings, and earnings change.

Examples of UI-based employment outcome measures (Harmon, 2011 and Illinois Community College Board, 2012) include:

- Percent of graduates (or program completers) obtaining employment. This could be defined as the presence of Unemployment Insurance covered earnings data for the student in the quarter following the quarter the student graduated from (or completed) the program.

- Percent of graduates obtaining employment in an industry or occupation related to the program. This measure can use the UI wage data as well, because the UI data includes the industry code for the employer. Calculating this measure requires a decision regarding the industry categories that will be treated as

related to the program. This measure could also be calculated based on the occupation of the student, if occupation of placement data is collected from the student at the time the student begins employment. In most cases, this would require additional student data collection.

- Percent of graduates retaining employment. This could be defined as the presence of UI covered earnings in the second and third quarters following the quarter the student completed the program. With the UI wage data, it is also possible to measure employment retention over longer time periods.

- Average earnings (or earnings gain) for graduates obtaining employment. This measure usually is calculated for those graduates who had UI covered earnings in one or more of the quarters following the quarter the student completed the program. The average earnings measure is simply an average across these post-program quarters, for all students with earnings. The earnings gain is more complicated to produce but may provide more useful information on the impact of the program. It is calculated for each student by subtracting the earnings for at least two quarters prior to entering the program from the earnings for the same number of quarters following the quarter the student completed the program. The average pre- to post-program earnings gain for all students is computed from these individual values.

Under the NSF/ATE study, seven UI-based employment outcome measures were examined:

1. Job holding, the number of jobs held and the percentage of time since ATE program graduation holding jobs, separately identified for spells of employment in-and spells of employment out-of advanced technology relevant industries;
2. Waiting time between ATE program completion and first new post-program job, separately identifying waiting time for entry to any industry, vs. waiting time for relevant industry employment (with those already employed during the program broken out separately);
3. Starting wage (initial earnings), produced for students with employment in any industry and separately for students with employment in an industry related to the ATE program;
4. Numbers of employers post-completion of program;
5. Numbers of periods of non-employment post-program completion;
6. Duration of average non-employment spell; and
7. Average annualized rate of wage growth from beginning of work experience (pre-program) to post-program completion to last job experience.

Appendix A provides a detailed description of these measures and their sub-components.

As part of its discussion of measures, the college leadership team should decide what students to include in each measure. Post-program employment and earnings measures are generally calculated for graduates of the program, but it might also be helpful to look at these results for all students who enter the program, or students who complete a certain number of credits in the program, but who leave the program prior to completion. Widening the group for which the measures are calculated can help the team examine the benefits of program completion by comparing the different groups. It can also allow the college to look at the prospects for students who accept employment in the relevant industry and leave the program before receiving the credential.

STEP 3
Define Data Requirements for the Measures

Once the leadership team has defined its goals and measures, it can identify the data that will need to be collected for each measure, the students and programs for which the data will be collected, and the sources that will need to be accessed for each data element. Once there is agreement on the data that are needed, the team can develop its strategy for accessing the data and producing the measures.

Producing the outcome measures will require data to be collected about the students participating in the college program. While the individual data elements required will depend on the specific outcome measures the team has chosen, these data elements will fall into one of several categories: identifying data, demographic data, program and course-level data, credential attainment data, and employment data. Each of these types of data is described below, along with suggested data elements.

Student Identifying Data
It may be necessary to collect data that identifies the student, if:

1. The student record is going to be matched with an external data source, such as the UI wage data. At least one data element that identifies the student in the external data source must be provided, in order to perform the match with the external data. In the case of UI wage records, this is the Social Security Number (SSN), since the SSN is the employee identifier used in the UI covered earnings databases maintained by each state. Obviously, for colleges that do not collect or maintain the student's SSN, linkage of students records to the UI wage records will not be feasible.

2. Multiple record types are being collected for the student that must be connected to create a composite record in a dataset. For instance, a student may have a single demographic record, and separate records for each course taken, and for each credential received. These different record types must be linked with a common identifier, so that they can be connected to create the composite record used for the analysis. This common identifier does not have to actually identify the student outside of the dataset; it just has to be a value that is the same for all instances of a student in each record type.

3. Additional data will be collected from students specifically for the project (such as follow-up surveys) and the analysis needs to connect these data to the other data that have been collected for the student. This is similar to (2), except that the additional data comes from outside the college's regularly-collected student data, and will therefore probably contain a common-purpose identifier such as name, address, student ID, etc.

4. An external researcher needs to be able to check with the college or other data provider on questions that may occur about specific records, such as missing values or possible data errors. Again, this identifier does not have to actually identify the student to the external researcher; it just needs to be a value that identifies the record to the college or other data provider.

5. Data for multiple colleges will be combined into a single dataset. In this case the student record also must identify the college, so that these entities can be disaggregated for the analysis. A student may have enrollment in more than one college, and would therefore have multiple records in such a dataset. Strictly speaking, this is not student identifying information, but if needed it would usually be included in this part of the student record.

It is important to recognize that the issues of how student records are identified, deciding who is able to see records with identifying information, and planning for how these records will be managed and how student confidentiality will be protected must be addressed as part of the data access and matching arrangements. This will be discussed in detail under Step Four, *Establish data access procedures*.

Examples of student identifying data elements include:

- Student Name
- Student SSN
- Other student record identifier
- College or other provider

Student Characteristics Data

These data elements describe characteristics of the student that the leadership team feels may be relevant to the analysis of results. Demographic data are needed to disaggregate the outcome measures for these student characteristics. Do traditional-aged students have lower employment prospects than non-traditional-aged students? Do we have a gender gap in post-program earnings? What do the results for minority students suggest about equity issues we may need to address in the program? How do results relate to student placement scores at entry? In order to be able to answer questions like these, the student records assembled for the analysis must contain the appropriate student characteristics data elements.

Examples of student characteristics elements include:

- Age at entry, age at graduation (birth date)
- Gender
- Hispanic/Latino/Latina
- Race (African American, American Indian, Alaskan Native, Asian, Pacific Islander, and Caucasian. Some of these categories may be collapsed in some systems, or combined with Hispanic in a single set of Race/Ethnicity categories. Most student data systems now allow students to associate themselves with more than one racial category.)
- Single head of household (yes, no)
- Financial aid status (applied, qualified, receiving, and type of financial aid)
- Prior education level (Last year of school completed, or major level of education completed)
- College placement assessment scores (e.g., COMPASS)
- Family income level (various income level categories are collected by different systems)
- Employment status at program entry (employed full-time, employed part-time, unemployed, not in labor force)
- Number of hours working per week if employed

Student Program and Course Data

These data elements are needed to identify the program in which the student was enrolled, and the date when the student first enrolled in the program. In order to examine the pre-program earnings for students, it is necessary to define the date on which enrollment in the program occurred. This may be defined on the basis of enrollment in a particular course, or one of a set of courses associated with a program. Additional elements may also be needed if the leadership team wants to be able to examine the results in terms of what courses students took in the program, or the grades that students obtained in various courses.

Examples of student program and course data elements include:

- Course code
- Enrollment date (or term)
- Course completion (yes, no, pending)
- Course grade

Related data elements about the course:

- Course name, description
- Classification of Instructional Program (CIP) code
- Credit or non-credit
- Course hours/credits available

Student Completion and Credential Attainment Data

These data elements are needed to identify any credentials (certificates, degrees) obtained by students as a result of their participation in the program. The date on which the credential was awarded is also needed to identify the beginning of the post-program period for measuring employment and earnings results.

Examples of student completion and credential data include:

- Obtained a credential? (Yes/no. This is useful to have if non-graduates are to be included in the analysis of results.)
- Credential name
- Credential type (certificate, degree)
- Date or term the credential was granted
- CIP code of program in which the credential was awarded
- Grade point average for all courses
- Grade point average for courses in the program
- Credits earned in the program
- Credits earned of all types

Student Employment and Earnings Data

The data elements from the UI covered earnings database will be obtained via the matching process as described in the next section. These are the primary elements that will be used to measure the employment outcomes, and to describe the pre-program employment and earnings patterns for students. If it is feasible, colleges can supplement this data by collecting data directly from students about their pre-program work history, and the job(s) they hold during and following the program.

The UI covered earnings data elements include:

- Employer identifier (this should be a proxy ID assigned by the UI agency, so that job holding patterns over multiple quarters can be examined)
- Quarterly earnings
- Employer industry (North American Industrial Classification System (NAICS) code)

The UI covered earnings data are collected for each calendar quarter. If the pre-program employment and earnings of students is to be examined, then as many pre-program quarters should be obtained as possible, but at least four full quarters prior to the quarter of enrollment. For post-program quarters, the number obtained will probably depend on the availability of these quarters, but as many quarters should be obtained as are available. UI quarterly earnings data generally lag two quarters from the end of a quarter to its availability in the UI database.

The employment data collected from students directly could include:

- Pre-program wage (hourly wage or annual salary estimate)
- Placement occupation
- Hours per week of placement job

Under the NSF/ATE study, the participating community colleges or their higher education coordinating boards collected records on students graduating in 2006, 2007, and 2008 from process technology or biomanufacturing/ biotechnology education programs. The following data elements were collected for students:

- Social security number
- College of attendance
- Date of program start
- Date of graduation (if graduated) or certificate completion
- CIP code of program attending
- Date of birth or age at graduation
- Race
- Ethnicity
- Gender
- Pell Grant recipient

Worksheet C below can be used by the leadership team to create an inventory of data elements.

WORKSHEET C.
What data will be collected, and from what sources?[2]

Student Data Elements	Potential Data Sources				Notes
	College data system	Other partner data system	UI covered earnings data	Additional data collection from students	
Student Identifying Data					
Student Name					
Student SSN					
Other student record identifier					
College or other provider					
Age/ birth date					
Gender					
Hispanic/Latino/Latina					
Race					
Single head of household					
Financial aid status					
Prior education level					
College placement assessment scores					
Family income level					
Employment status					
Number of hours working per week					
Other:					
Program and course data					
Course code					
Enrollment date (or term)					
Course completion (yes, no, pending)					
Course grade					
Course name					
CIP code					

[2]Adapted from Harmon, 2011, *Measuring Progress and Outcomes for Bridge Programs*, unpublished paper prepared for the Office of Community College Research and Leadership, University of Illinois, 2011, and Creating a Successful Bridge Program: A "How To" Guide, Illinois Community College Board, Illinois Department of Commerce and Economic Opportunity, 2012.

WORKSHEET C.
What data will be collected, and from what sources?[2]

Student Data Elements	Potential Data Sources				Notes
	College data system	Other partner data system	UI covered earnings data	Additional data collection from students	
Credit or non-credit					
Course hours/credits available					
Other:					
Student completion and credential attainment data					
Obtained a credential?					
Credential name					
Credential type					
Date or term the credential was granted					
CIP code of program in which the credential was awarded					
Grade point average for all courses					
Grade point average for courses in the program					
Credits earned					
Other:					
Student Employment and Earnings Data					
Employer identifier					
Quarterly earnings					
Employer industry (NAICS code)					
Pre-program wage					
Placement occupation					
Hours per week of placement job					
Other:					

STEP 4
Establish Data Access Procedures

Once the college leadership team has identified the data elements that it needs, it can work with data partners (e.g., the institutional research office, the state labor agency) to put in place an agreement for accessing the UI wage data, and any other data sources, including the college student-level data that are needed to produce the analysis. This should include a detailed understanding and agreement on the processes that will be used to obtain the data, including who will do what tasks. This section includes a discussion of four general models for accessing data, suggestions for creating a successful data sharing partnership, and recommended questions for colleges to consider prior to beginning the negotiation of a data sharing agreement.

Ensuring student confidentiality and compliance with FERPA

The college leadership team should ensure that its process for collecting, sharing and utilizing any data it collects on students is fully compliant with the requirements of the Family Educational Rights and Privacy Act (FERPA). FERPA provides that:

"Generally, schools must have written permission from the parent or eligible student in order to release any information from a student's education record. However, FERPA allows schools to disclose those records, without consent, to the following parties or under the following conditions (34 CFR § 99.31):

- School officials with legitimate educational interest;
- Other schools to which a student is transferring;
- Specified officials for audit or evaluation purposes;
- Appropriate parties in connection with financial aid to a student;
- Organizations conducting certain studies for or on behalf of the school;
- Accrediting organizations;
- To comply with a judicial order or lawfully issued subpoena;
- Appropriate officials in cases of health and safety emergencies; and
- State and local authorities, within a juvenile justice system, pursuant to specific State law." (USDOE, 2011)

The third and fifth of these exceptions would probably be the ones that would apply for the college leadership team's use of the data. The FERPA regulations provide specific procedures for the use, storage and subsequent destruction of records obtained for program evaluation purposes.

Institutional Review Board

The college leadership team should also ensure that its process for collecting, sharing and utilizing any data it collects on students is fully compliant with the requirements of its own Institutional Review Board (IRB) procedures. These procedures govern the conduct of research involving human subjects. This IRB approval is legally required for any research this is supported in whole or part with federal funds, but colleges generally apply these requirements to all research involving humans.

Data access models

There are as many arrangements for accessing the UI data and matching these data with student records as there are colleges and state UI agencies. No guide can provide a comprehensive description of the various arrangements that have been implemented to support the use of UI wage data for measuring student employment outcomes. However, record matching approaches and data access processes can be categorized into four general models:

1. College creates composite student level records;
2. UI agency creates composite student level records;
3. UI agency creates summary data; and
4. Clearinghouse model.

The balance of this section describes each of these models. Included in this description are the following criteria for assessing the advantages and disadvantages of each data sharing model:

- **LEVEL OF EFFORT FOR THE COLLEGE:** How much effort does the data sharing model require of the college? What data access and manipulation steps need to be done in order for the data to be exchanged? What is the anticipated time commitment for the college, and whose help within the college is required?

- **LEVEL OF EFFORT FOR THE STATE UI AGENCY OR STATE WORKFORCE AGENCY:** Basically the same questions as above, except asked for the state UI or workforce agency.

- **FLEXIBILITY IN ANALYZING THE DATA:** How much flexibility does the data access model provide to whoever is going to analyze the data?

- **CONFIDENTIALITY EXPOSURE:** What are the main risks for breach of student or employer confidentiality, and what steps are needed to mitigate these risks?

- **COMPLEXITY OF THE DATA MATCHING PROCESS:** How many steps are needed to complete the overall process? How many different entities must coordinate their actions in order for the overall process to be completed successfully?

MODEL ONE
College creates composite student level records.

In this model, the community college first creates a file containing the Social Security Numbers of each student to be included in the analysis of post-program results. In addition to the SSN, this file may also contain the program start date and graduation date, if applicable. These dates would be needed if the college is seeking different UI earnings quarters for each student depending on program entry or graduation dates. If all the same UI earnings quarters will be provided for all students, regardless of entry or graduation dates, then it is not necessary to provide these dates.

The student records are sent to the UI agency, which matches them against the UI covered earnings database and creates a dataset with the results. The structure of this file should be agreed to in advance, but ideally the match file would contain a record for each unique combination of SSN, calendar quarter, and employer with reported earnings for the SSN. The UI agency will probably need to assign a proxy identifier to the employer-level data, rather than the employer's UI account code, so that the confidentiality of the employer is protected. If possible, these proxy identifiers should be the same for all appearances of the employer in the match file, so that employer retention and employment mobility can be observed, in addition to having the wage data needed to calculate the basic employment measures. Including the NAICS code of the industry for the employer will be needed to examine the relatedness of the earnings to the program of instruction. The file should also contain the returned records for those students without covered earnings in the timeframe subject to matching.

Once the UI earnings match dataset is returned to the college, the college will link this data to its own data on the student to create a composite dataset. This linkage is done on the basis of the SSN, since this is the identifier used by the UI agency to match the student records with the UI covered earnings data. The structure of the student file will be different than the structure of the UI earnings file. Generally, the student file would contain a student record for each unique combination of college, student SSN, and program of instruction in which the student was enrolled (although students in multiple programs could be handled with multiple data elements in a single record). In addition, the student file may contain other types of student records with different structures, such as course detail records, assessment result records, and records of student services, all of which could have multiple records for each student. These structural differences mean that the overall dataset will have to be normalized (i.e., "flattened") in order to support the analysis. The implication is that if multiple record types are incorporated in

the student dataset, each of them must include the appropriate identifying information, including the student proxy identifier, so that they can be linked in the dataset used for analysis. Alternatively, the college can create a normalized dataset prior to sharing these records with the data analyst. In either case, whoever in the college is authorized to view the UI earnings data for students should keep a secure copy of a table linking the SSN to the assigned student proxy identifier, so that any questions that may arise about specific records can be addressed.

The college then sends the composite records to the data analyst. This could be an external evaluator or a data analyst employed by the college. The data analyst prepares the dataset and uses it to calculate the results for the agreed measures. These records are also used to create the requested disaggregation of the results across student cohort and demographic categories, based on the data elements provided in the student records. The summary data produced by the data analyst is shared with the college leadership team, along with a draft of the analysis of the results for discussion. Final release of the summary results would follow an internal review and comment period, with opportunity to address any concerns as to results, and confirmation that none of the summary data proposed for publication could indirectly identify any student.

A schematic of this data access model is presented in Figure 1. Table 1 summarizes the key advantages and disadvantages of this model.

FIGURE 1.
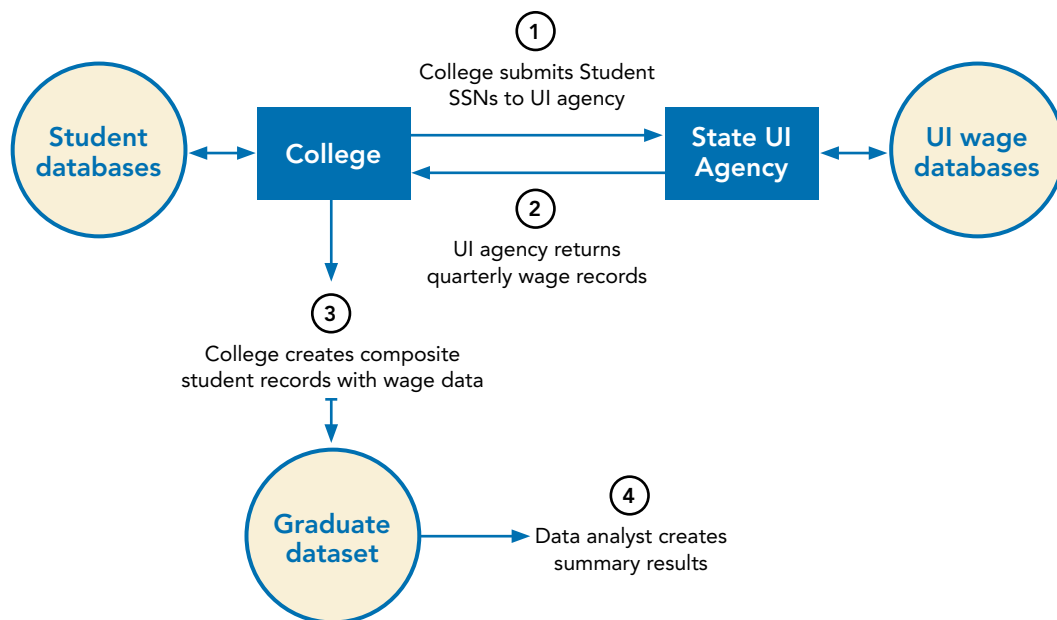### College creates composite student–level records

TABLE 1.
College creates composite student level record (Figure 1)

Data access criteria	Characteristics of this model
Level of effort for the college	**MEDIUM.** The college has primary responsibility for creation of the composite student dataset.
Level of effort for the state UI agency/SWA	**LOW.** The UI agency's role is focused on conducting the match against the earnings records and returning the match file to the college.
Flexibility in analyzing the data	**GREATEST.** The data analyst receives a student-level dataset that includes both the student data elements and the earnings data. In addition to the agreed upon summary data, the data analyst can produce additional summary data suggested by the initial results. In addition, the data analyst can interact with the college regarding issues with specific records without needing to know the identities of students.
Confidentiality exposure	**SOME.** The college receives a file with SSN-level earnings data that must be kept secure from unauthorized access. The college also assigns the proxy student identifier, so it must understand how to do this in a manner that cannot be reverse-engineered to extract the SSN.
Complexity of the data matching process	**MEDIUM.** Two passes of the data are required: college to UI agency, and UI agency to college.

MODEL TWO
UI agency creates composite student level record.
In this model, the community college creates a file containing the Social Security Numbers of each student to be included in the analysis of post-program results, and transmits this file to the state Unemployment Insurance agency, as in the previous model. However, in addition to the SSNs for the students, this file will contain all of the student-level information that will be needed for the analysis of results, including student demographics, and program information. These may be separate files if there are different record types, but if so, each file must contain the student SSN as the record identifier.

The UI agency matches the student SSNs against the covered earnings database and creates a composite student dataset including both the original student data from the college and the UI earnings data for the requested calendar quarters. This linkage of student records to UI earnings data is done on the basis of the student's SSN, as in

the first model. However, under this model, the UI agency assigns the proxy student identifier, and removes the SSNs from the dataset prior to transmitting this information to the college. The UI agency should retain a secure copy of the table (key) showing the proxy identifier for each SSN, so that any questions that may arise about specific records can be addressed. As in the first model, if multiple record types are incorporated in the student dataset, each of them must include the appropriate identifying information, including the student proxy identifier, so that they can be linked in the dataset used for analysis.

The college's role in this model is essentially the same as in the first model: preparation of the dataset, calculation of the outcome measures, disaggregation of the results to the requested categories, and analysis of the data.

A schematic of this data access model is presented in Figure 2. Table 2 summarizes the key advantages and disadvantages of this model.

FIGURE 2.
UI agency creates composite student–level record

1. College submits Student record with SSNs to UI agency

Student databases ↔ College → State UI Agency ↔ UI wage databases

3. Data analyst creates summary results

2. UI agency creates composite student records with wage data, and assigns proxy identifier
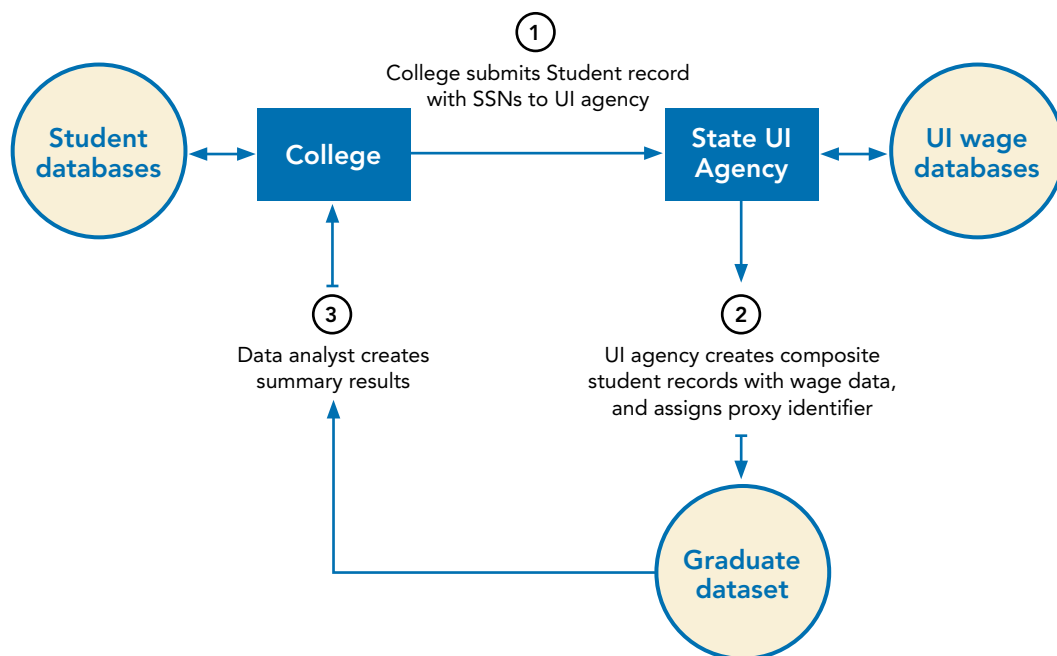
Graduate dataset

TABLE 2.
UI agency creates composite student level record (Figure 2)

Data access criteria	Characteristics of this model
Level of effort for the college	**LOW.** The college role is limited to preparation of the student records and transmission of the file to the state UI agency.
Level of effort for the state UI agency/SWA	**MEDIUM.** In addition to conducting the match with the earnings data, the UI agency also creates the composite student dataset, assigns the proxy student identifiers, and removes the SSNs.
Flexibility in analyzing the data	**HIGH.** The data analyst receives a student-level dataset with the student data elements and the earnings data. In addition to the agreed summary data, the data analyst can produce additional summary data suggested by the initial results. In addition, the data analyst can interact with the college regarding issues with specific records without needing to know the identities of students, but must do so via the UI agency.
Confidentiality exposure	**SOME.** The UI agency receives a file with SSN-level student demographic detail, which must be kept secure. Although detailed earnings data is released to the college, it is not associated with an SSN. The UI agency assigns the proxy student identifier, so it must understand how to do this in a manner that cannot be reverse-engineered to extract the SSN.
Complexity of the data matching process	**MEDIUM.** Two passes of the data are required: college to UI agency, and UI agency to college.

MODEL THREE
UI agency creates summary data.

This model is a variation on the second model, in that the UI agency assumes the responsibility for creating the summary results data, in addition to the other tasks performed under model two. All of the student level data is transferred between the college and the UI agency, and the college receives only summary data from the UI agency.

A schematic of this data access model is presented in Figure 3. Table 3 summarizes the key advantages and disadvantages of this model.

FIGURE 3.
UI agency creates summary data

Student databases ⟷ **College** → **State UI Agency** ⟷ **UI wage databases**

1 — College submits Student record with SSNs to UI agency

3 — Analyst prepares analysis of results

2 — UI agency creates composite student records with wage data and produces summary results
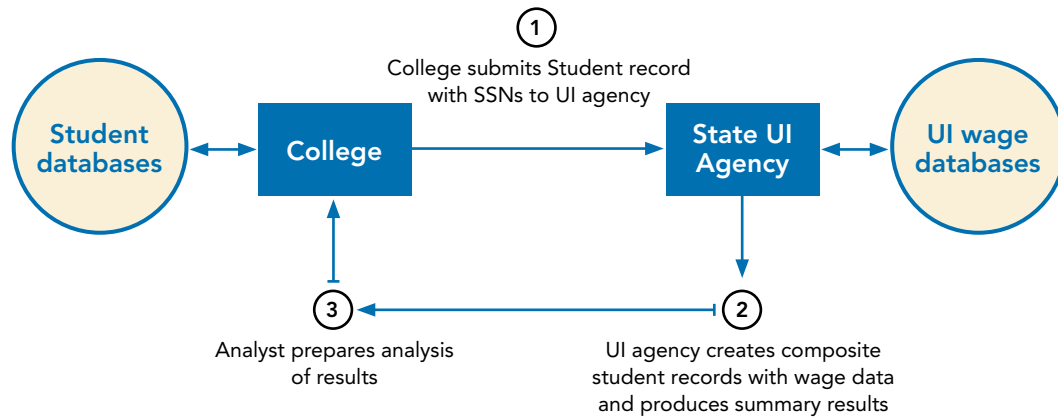
TABLE 3.
UI agency creates summary data (Figure 3)

Data access criteria	Characteristics of this model
Level of effort for the college	**LOW.** The college role is limited to preparation of the student records and transmission of the file to the state UI agency.
Level of effort for the state UI agency/SWA	**HIGHEST.** In addition to conducting the match with the earnings data, the UI agency also creates the composite student dataset, and generates the summary results, including disaggregation of results.
Flexibility in analyzing the data	**LOWEST.** The data analyst will not be able to produce additional summary data suggested by the initial results.
Confidentiality exposure	**LOW.** Only the UI agency has individual wage data with SSNs, but will have the student detail records.
Complexity of the data matching process	**LOW.** One pass of the data is required: college to state UI agency.

MODEL FOUR
Clearinghouse model

The clearinghouse model is a variation on the above models. Under this model, a separate clearinghouse entity functions as an intermediary between the college and the UI agency. In this intermediary role, the clearinghouse performs some or all of the data access functions, including gathering the student data, matching the student records with the UI earnings database, creating the composite dataset and producing the summary results. The clearinghouse entity could be another state agency, such as a state educational agency, or a university research center.

In the NSF/ATE Employment Outcomes Study, two states (Texas and Maryland) used a clearinghouse model for accessing the student and UI earnings data. The Texas Higher Education Coordinating Board (THECB) functions as a clearinghouse for accessing both postsecondary student data and has access to the Texas UI wage files. Since THECB maintains student records for postsecondary students from across the state, in addition to examining the employment outcomes for graduates of a program for a specific college, it is able to access data on subsequent postsecondary enrollments for these students in other Texas colleges and universities. THECB provided summary data from the data match for three Texas community colleges.

The Maryland UI data was obtained for Montgomery College through an agreement with the Jacob France Institute (JFI) of the University of Maryland. JFI maintains UI wage data files under agreements with the state of Maryland and several other neighboring states and the District of Columbia. As a result, it was able to observe UI earnings across an entire regional labor market. JFI provided student-level data from the UI earnings match for the Montgomery College students, as well as the student-level detail records.

A schematic of this data access model is presented in Figure 4. Table 4 summarizes the key advantages and disadvantages of this model.

FIGURE 4.
Clearinghouse Model

1. College submits student record with SSNs to clearinghouse, or clearinghouse accesses existing student databases

2. Clearinghouse accessing UI wage database, creates composite student records with wage data, and assigns proxy identifier
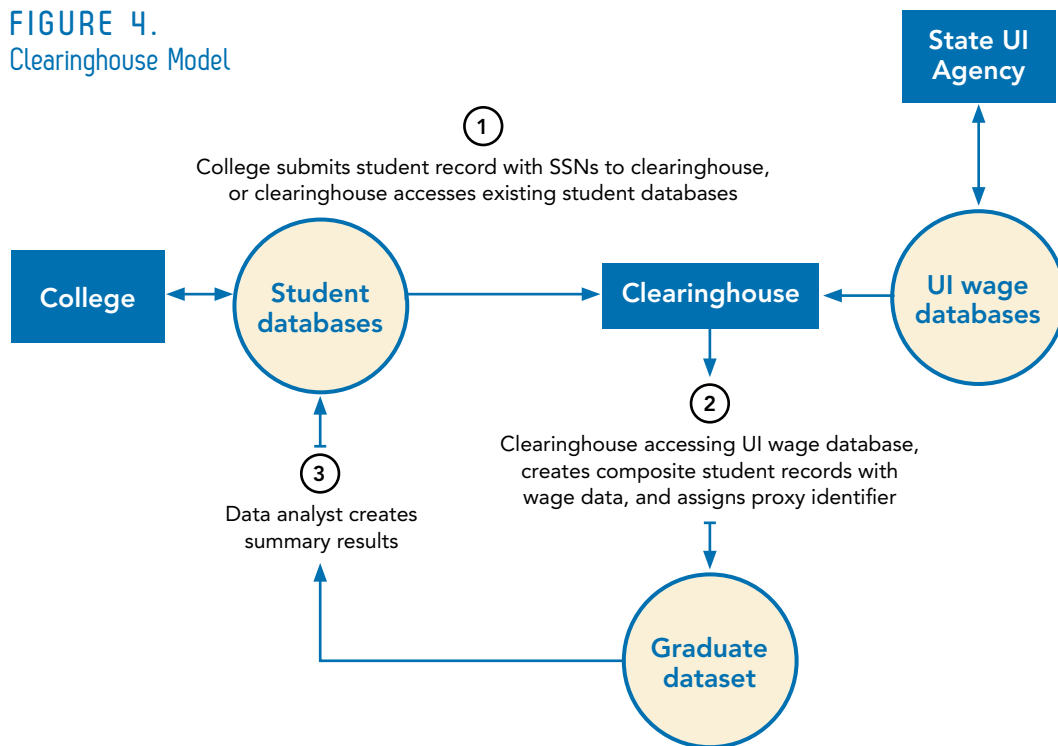
3. Data analyst creates summary results

TABLE 4.
Clearinghouse Model (Figure 4)

Data access criteria	Characteristics of this model
Level of effort for the college	**LOWEST.** The college role is limited to preparation of the student records and transmission of the file to the clearinghouse. If data submission procedures are already in place, the clearinghouse may already have the required student data.
Level of effort for the state UI agency/SWA	**LOWEST.** If the clearinghouse has direct access to the wage files, the state UI agency does not need to be engaged in the matching process directly.
Flexibility in analyzing the data	**DEPENDS.** If the clearinghouse is providing student-level detail from the student records and matching with the UI wage file, then the data analyst will have the maximum flexibility to produce additional summary data suggested by the initial results. If the clearinghouse will be providing aggregate data only, then the data analyst will not be able to produce additional data, unless this service is available through the clearinghouse.
Confidentiality exposure	**SOME,** depending on the level of detail provided to the college
Complexity of the data matching process	**LOWEST,** since the clearinghouse will presumably have established data access and matching processes in place.

Adapting the data sharing models for use with an external evaluator

Each of the above models for accessing the UI wage data are presented for the situation in which the college is doing its own analysis of the data and producing its own results for review by the college leadership team or other audiences. However, these models can easily be adapted to a situation in which the college is working with an external evaluator. A key question to answer prior to selecting a data access model for use with an external evaluator is whether or not the evaluator will need to be authorized to see the UI earnings details for an identified student. This may or may not be permitted under the terms of the data sharing agreement with the UI agency or clearinghouse, or the college itself may have limitations on the types of student data it is willing to release to external entities. This is in contrast to a data analyst within the college who is authorized to work with the identified earnings records.

Under model one, if the external evaluator is not authorized to see identified student records, the college should assign a proxy student identifier to the composite student records and remove the SSN from the data, once the college makes the linkage between the student records and the UI wage data. The use of proxy identifiers prevents the accidental breach of student confidentiality that might occur if there is a failure of file security. Of course, this file should not contain any other data elements that could be used to directly identify a student, such as name, address, email, etc. This procedure would also be used in model two, except that it would be the UI agency assigning the proxy identifier rather than the college; and under model four, if the clearinghouse is sending the composite student records to the evaluator. Under model three, the UI agency is producing summary data, so proxy identifiers are not an issue. Also, under model four if the clearinghouse is producing the summary data rather than the college, the issue of proxy identifiers is not relevant.

Finally, if there are staff persons within the college who will work with the student level records but who are not authorized to see identified data, they can be provided with de-identified student level data in the same manner as an external evaluator might be.

Suggestions for forming a successful data sharing partnership

The nine states that have participated in the Administrative Data Research and Evaluation (ADARE) project have formed state-level partnerships to access administrative data, including UI wage data to create longitudinal databases that enable the partners to understand workforce program performance and examine critical policy questions (Stevens, 2004). The nine ADARE states include California, Florida, Georgia, Illinois, Maryland, Missouri, Ohio, Texas, and Washington, and encompass two of the three states (Maryland and Texas) participating in the NSF/ATE Employment Outcomes Study. David Stevens of the Jacob France Institute at the University of Baltimore examined the formation of these successful partnerships and offered fourteen suggestions for creating

and maintaining a successful data sharing partnership. While the focus of the suggestions is on the development of a longer-term research partnership, many of these suggestions are equally applicable to the development of a short-term data exchange relationship for accessing UI wage data:

1. Do your homework on the reasons for the request and the specific type of authority under which the data are being requested before initial communication with a potential partner.
2. Engage in informal communication first to determine how a formal attempt to award or receive data sharing access might be acted upon.
3. Submit the formal proposal for partnership only when affirmative responses by all proposed partners can be expected.
4. Pursue each step along the way with people you are confident will handle that step in the desired way.
5. Begin the process with at least one compelling reason justifying approval of the proposed data sharing partnership.
6. Include direct reference to and elaboration of the other partner's potential benefit from the proposed partnership.
7. Acknowledge and respond to concerns the other partner might have about voluntary commitment to the proposed partnership, which demonstrates awareness of the other party's situation.
8. Be specific about proposed security arrangements, including reference to federal and state laws and administrative regulations pertaining to confidentiality of administrative records that will be shared.
9. Express a willingness to learn from the expertise of the other partners, and to reciprocate.
10. Ensure that a draft data sharing agreement includes specific reference to the databases that will be used and the authorized studies that will be undertaken.
11. Each time approval of a new proposed use of the shared data is granted, prepare an amendment to the original data sharing agreement.
12. Provide pre-release copies of research findings to the state agency partners whenever possible (this may be required), pointing out particular findings that might be of interest, or concern, to the partners. Handle this step in a one-on-one manner with each state agency partner. Agencies do not necessarily want other agencies to have pre-release access to new findings.
13. Be prepared to brief new political appointees and senior staff members, and keep continuing staff members informed about key activities and accomplishments.
14. Never allow partners to be blind-sided when you could have provided advance notice of a pending action based on research findings from the shared data.

Although circumstances may not always permit each of these suggestions to be followed, the college leadership team can set the stage for a successful project by embracing the "no surprises" ethic of these suggestions, in particular by reaching out to the UI agency and any other data-holding partners at the earliest stages of the project. This will be especially important in states where these types of administrative data sharing arrangements have not been developed.

Negotiating a data sharing agreement

Colleges contemplating the negotiation of a data sharing agreement with the state UI agency or other data partner should be prepared to answer the following questions:

Data sharing objectives:

- What are the overall objectives of the data sharing agreement?
- What are the anticipated benefits to each party to the agreement?
- What are the anticipated benefits to students, employers and other partners, and the public?
- Who should be contacted at the state level, and how should these contacts be made?
- Who should be involved in agreement negotiations at the college level?

Data access model:
- Will individual level data be sought or only aggregate data?
- Who will create the composite student record?
- Is there an existing data access model in place, such as a clearinghouse entity?
- Have other colleges in our state entered into data sharing agreements for accessing UI wage data? If so, what was the nature of these agreements, and what advice can these colleges offer?

Scope of the data to be accessed:

- What timeframe will be observed for the presence of UI-covered earnings?
- Will pre-program quarters be included in this period, as well as post-program quarters? If so, how will the beginning of the program be defined in the student record?

If individual-level data will be provided:

- What data elements will be included in the match file?
- Will the match file include total quarterly earnings or earnings for each employer in the quarter?

- How will this file be structured? How will it be linked to the student record?
- Who will have access to the file? Will this be a person employed by the college, or an external evaluator?
- What procedures need to be implemented to protect the file from unauthorized disclosure?
- What cell-level disclosure rules will apply?
- What expectations are in place for pre-release review of results?

If only aggregate data will be produced:

- Who will be responsible for producing the aggregate data?
- Who will be responsible for defining the instructions for calculating the measures, and defining categories for disaggregation of results?
- What cell-level disclosure rules will apply?

Appendix B contains example Memoranda of Understanding (MOU) negotiated for the NSF/ATE Employment Outcomes Study. Each of these agreements specify the purpose of the agreement, the roles and responsibilities of each party, provisions on handling the data, and appendices specifying the record types and data elements to be included.

STEP 5
Obtain, Process and Analyze the Data

Once the college leadership team and the UI agency have reached agreement on the process for accessing the data, the parties can implement the data access agreement and provide the required data. The data analyst (who may be either an internal staff person or an external evaluator) will then process the data to produce results for each of the measures identified by the team, and generate whatever disaggregation of these results is of interest to the team.

Assembling the data
The college leadership team will need to assemble all of the data it will be using in the analysis of results. In addition to the data obtained through the data sharing agreement with the state UI agency or state clearinghouse discussed in Step 4, the leadership team may be drawing on data from its own college student data system(s), data from other partners, and data collected from students or employers specifically for the project.

Depending on the scope of the college leadership team's evaluation effort, it may be helpful to obtain data from one or more partners outside the college, such as another college, National Student Clearinghouse data, Local Workforce Investment Board, adult education provider or community based organization. Some of these partners may have provided services to the students who were enrolled in the program or programs being evaluated, and they may have collected data that can be helpful in gaining insights into student results. For data elements to be acquired from one of the partners, the college leadership team should approach the partner with a request for data, and enter into a data sharing agreement. Since many of the same data access and confidentiality issues as exist for the UI wage data will also pertain to these agreements, the suggestions in Step 4 may be useful for negotiating these agreements as well.

Based on the scope of the evaluation effort as determined in Steps 2 and 3, the college leadership team may have decided to collect additional information about students beyond what is currently available from the college information systems or other partners. Some examples of types of data elements where new data collection may be required include:

- Pre-assessment and post-assessment results. Gathering reliable data on student learning gains.
- Services and interventions. Gathering data on what happens in the program and to the students, e.g., services that students actually use, contacts w/ staff such as career counselors, participation in internships, etc.
- Credential attainment. Existing data collection systems may not be configured to capture data on intermediate or stackable credentials.

For data elements that require new data collection, the college leadership team must develop a process for data collection, as well as a means to link these data elements for each student to the other data elements about the students obtained from other sources. The data collection procedure needs to include at least the following components:

- Definitions for each of the new data elements to be collected;
- Forms for manual data collection;
- Spreadsheet or database application, with codebook, for creating student data records based on the new data;
- Training for the staff who will collect the data;
- A method for linking these records to other data that the team has acquired about the students, and
- Procedures for secure storage, access and eventual disposal of student data.

Processing the data

Once the data from all of the sources have been acquired or collected, outcomes can be calculated for each of the measures selected by the college leadership team. This will include the following steps:

- Assemble a composite student record from data collected from all sources. This requires using a common student record identifier such as the proxy identifier to link together each of the various record types for each student.
- Define calculation instructions for each measure in terms of the data elements included in the student records. Appendix C, Table 6 contains instructions for calculating the measures used in the NSF/ATE study.
- Use database or spreadsheet software to calculate the measure results. For large or complex datasets it will be worth the investment to use statistical database software such as SAS or SPSS.
- Manually check a sample set of records to ensure that the calculations are being performed correctly. This can save a lot of frustration later.
- Run the calculations against the full student population.
- Develop selection logic to support disaggregation for each of the sub-groups that the team wants to be able to examine. Of course, this disaggregation can only be done on the basis of data elements contained in the composite student record.
- Run the calculations for the subpopulations.

Suppressing summary results to protect student confidentiality

Summary results can disclose data for specific students if too few students are included in the summary calculations. For instance, if average earnings data are disaggregated on the basis of a student characteristic whose value for each student is known to other students and faculty (e.g., gender), and there is only one female graduate from the program, the "summary" data for that category is the detailed data for that student. As a result, the US Department of Education has advised state education agencies and researchers that:

"…if cell size or other information would make a student's identity "easily traceable," that information would be considered "personally identifiable," as defined in 34 CFR § 99.3. "The educational agency or institution should use generally accepted statistical principles and methods to ensure that the data are reported in a manner that fully prevents the identification of students. If that cannot be done, the data must not be reported."

While no specific cell size standard has been provided by USDOE, it generally is considered risky to release summary data for cells containing data for fewer than four students. Therefore, prior to release of the data it will be necessary to identify the cells

for which release of results might disclose results for an individual. These results will have to be removed from any data that are released, or sub-group breakouts may need to be combined in order to bring the number of students above the cell suppression standard. For instance, detailed racial categories may need to be combined to provide a "minority/non-minority" breakdown.

Partners from whom data are obtained may have more rigorous (higher) cell suppression rules than what is suggested here. It is important to recognize the difference between cell suppression rules to prevent inadvertent disclosure of data on students, and recommended cell sizes that may be desired to promote statistical reliability or stability of results over time, which may be much higher.

It is important to note that all of the above discussion of data assembly steps, data collection, data processing and cell suppression is based on the assumption that a data analyst with the college or an external evaluator is performing these functions. If one of the data access models has been adopted in which only aggregate data is provided to the college, these steps will be completed internally by the agency providing the data so the data analyst does not need to implement any cell size restrictions.

Analyzing the data

Once the summary results have been produced, the college leadership team should examine the results to consider what they imply for the team's original evaluation questions. This analysis could include comparison to any external goals, or comparison to internal goals set by the leadership team. The team may also want to look at the trends over time, explore any equity concerns suggested by the results, and other aspects of interest to the team. The team should develop a report that summarizes the results and places them in the context of the team's overall goals.

Worksheet D provides a tool for the college leadership team to organize its evaluation questions and the results of its data analysis. The following elements should be addressed in the analysis:

EVALUATION QUESTIONS: These are the original evaluation questions identified by the college leadership team in Step 2, Define the Goals and Measures. The focus of the analysis is to suggest possible answers to these questions.

RELATED MEASURES: For each evaluation question, the team should have identified one or more measures for which data will be generated. The team should identify these measures and summarize the results for each measure. For instance, if a team wants to know if program completers remain employed over time, it should include at least

"The team should develop a report that summarizes the results and places them in the context of the team's overall goals."

one measure of employment retention in its list of results measures, and summarize the observed outcomes here.

RELATED SUB-GROUP BREAKOUTS: In addition to the measures, the team may need to include examination of one or more sub-group breakouts in order to address the evaluation question. For instance, if the team is concerned about the differences in employment retention results for students with prior experience in the targeted industry vs. those without such prior experience, it will need to include this characteristic as a sub-group breakout, and examine the results disaggregated to these categories.

IMPLICATIONS OF THE RESULTS: The team should summarize its impressions of what the results imply for the evaluation question.

ADDITIONAL QUESTIONS: Usually the team's discussion of these results will lead to additional questions for further research or discussion, and these should be documented here. The analysis step is meant to be an iterative process, in that the initial review of results will almost certainly lead to further questions and additional inquiries against the composite student dataset.

Appendix C contains examples of the table formats used for the NSF/ATE Employment Outcomes Study.

WORKSHEET D.
Analysis of Results

Evaluation Question:

Related Measures:	Summary of Results:

Related sub-group breakouts:	Summary of Results:

Implications of the Results:

Additional Questions:

STEP 6
Develop and Implement an Improvement Strategy

The college leadership team will most likely want to build on its successful efforts in evaluating program results by considering how it can promote sustained improvements in its programs. In order to do this it will need to develop and implement an improvement strategy that addresses the ongoing process for using data and evaluation results. Such an improvement strategy will enable the team to move beyond a one-time evaluation project toward a true continuous improvement model.

Under the NSF/ATE Employment Outcomes Study, the participating colleges anticipated potential actions and program modifications that might arise from the analysis of the data, including the results of the UI wage data matching, as well as student and employer survey results. These included:

- upgrading of programs,
- providing more career and employer information to strengthen job placement,
- integrating work-based learning opportunities to increase job placement and earnings,
- requesting increased funding for expansion due to evidence of positive impact,
- changing program policies to meet the needs of industry and students, and
- phasing out of certain ineffective components of a program.[3]

Adopting a continuous improvement process

The college leadership team should consider adopting a process to guide its continuous improvement efforts. A continuous improvement process provides an overall structure for the work of the college leadership team, and helps keep the team focused on student results. In addition, a structured process should provide the team with a method for identifying and implementing improvements in the way the programs are designed and operated. Finally, a continuous improvement process can provide a means of broadening the scope of the partnership by engaging additional stakeholders in efforts to improve student results generally.

Some suggestions for action steps the college leadership team could take include:

- Review the members of the college leadership team recruited under Step 1, and consider involvement of additional college partners and stakeholders such as major employers, community organizations and others.

[3]NSF/ATE Project Proposal

- Provide a structured method for reviewing data on student outcomes. This could include the use of standard benchmark reports, balanced scorecard approaches, or tools such as Worksheet D under Step 5.

- Include a focus on the results for underrepresented students and students requiring academic skills development.

- Facilitate discussion about the processes that the partners use to serve students, and how they could be improved. This could include focus groups to identify current processes that are deemed critical to student success, such as recruitment, admissions, curriculum development, instructional management, advising, placement and student services.

- Support the development of policy changes and plans to address these improvements. This could include process analysis teams to identify and create plans for improvements to critical functions.

- Create a means for the leadership team to reflect on what has been learned in order to apply this knowledge to the next iteration of the improvement process.

- Include a plan for periodic (annual) analysis of student outcome data to begin the next iteration of the improvement process.

Davis Jenkins (2011) has provided recommendations for how colleges can redesign programs and services to increase positive transition results. These recommendations draw on research findings from the practices of high-performing organizations. Some of the most frequently cited practices of these organizations include:

- Leadership with a strong focus on student success;
- Well coordinated, proactive student support services;
- Innovation in teaching and methods for improving student success;
- Use of data analysis to monitor student progress and guide program improvements; and
- Targeted programs that provide advising and academic support specially designed for at risk students.

Jenkins offers several recommendations for community college reformers that seem especially relevant to colleges considering the development of an ongoing process for improving results for students:

- Cultivate leadership for improved student success throughout the college.
- Empower faculty to establish common learning outcomes and assessments for academic programs.
- Rethink college policies to help students better negotiate the pathways they take through the institution.
- Engage student service staff in developing protocols of recommended practice.
- Partner with high schools (and adult basic skills programs) to align curricula and ensure students are motivated and prepared to succeed in college.

A continuous improvement model that may be relevant to the goals of a college leadership team seeking to improve program outcomes is the Pathways to Results (PTR) continuous improvement model (Bragg, 2011). "PTR is an inquiry-based and equity-guided process that is intended to help local partnerships improve student transition results. The process uses action research methods and tools to assess outcomes and redesign processes to close gaps in outcomes for diverse students in high demand career pathways."

"PTR capitalizes on partnerships between educational, industry and community partners to engage in a systematic problem-solving process that identifies sustainable solutions to improve student outcomes. A guiding principle of PTR is its focus on addressing performance gaps between different student groups in order to improve outcomes for all learners and scale up to implement and improve the program. PTR teams engage in the process by conducting the following:

- **PHASE 1: ENGAGEMENT AND COMMITMENT** – PTR team members and partners collaborate to focus on critical problems that need to be addressed to improve student outcomes and enhance program quality. Analysis of existing data on student outcomes feed into initial decisions about the PTR team's focus.

- **PHASE 2: OUTCOMES AND EQUITY ASSESSMENT** – The PTR team uses student-level data to examine outcomes and identify gaps in results between racial, ethnic, low income, and other critical groups and special populations. Using these data, teams identify areas where short- and long-term improvements are needed (and practices are linked to exemplary outcomes).

- **PHASE 3: PROCESS ASSESSMENT** – The PTR team analyzes core processes (e.g., recruiting, advising, teaching, learning, assessing) that relate to the problem the team has decided to address. Teams interrogate and probe existing processes to understand why desired results are not being produced.

- **PHASE 4: PROCESS IMPROVEMENT** – Teams reach consensus on solutions and determine implement strategies based on the solutions' potential to make change and improve student outcomes. The team develops implementation and evaluation plans to improve equitable student outcomes and Programs of Study quality over time.

- **PHASE 5: REVIEW AND REFLECTION** – Team members individually and collectively review and reflect on lessons learned from engaging in the PTR process. The team develops a plan to ensure that solutions are sustained and determine the feasibility of scaling up the PTR process to other Programs of Study."

The Illinois Community College Board (ICCB) has used the PTR process with numerous community colleges and partnerships for college and career success.

VI Conclusion

Community colleges are being asked to accomplish more for their students than ever before, including helping more students successfully complete their programs of study and obtain credentials with value in the labor market. Colleges have extended this completion agenda to include fostering successful employment outcomes for program graduates. The Advanced Technological Education (ATE) colleges working together on this project have embraced the idea that measurement of these employment and earnings results is an essential element of the evaluation of their programs.

One of the challenges for colleges that have decided to incorporate a focus on employment outcomes is finding cost effective and accurate methods for measuring employment and earnings following graduation. The use of quarterly Unemployment Insurance (UI) earnings data can provide an accurate, cost-effective and flexible source of data on the employment and earnings of community college students, and can therefore contribute in a significant way to the evaluation of community college programs of study.

For colleges to appreciate these benefits, they must develop the capacity to do so. This guide has been focused on the steps that colleges can take to build this capacity, including: (1) developing working relationships with state and local workforce boards that have access to the UI data and experience working with it; (2) understanding the strengths and limitations of the UI data; (3) agreeing on appropriate measures of employment and earnings based on the UI data; (4) negotiating a data sharing agreement with the UI agency or state clearinghouse agency for access to the data, (5) implementing safeguards to preserve student and employer confidentiality; and (6) developing a plan for accessing and analyzing the data to develop information that can shed light on the college's evaluation questions, and set the stage for continuous improvement.

A prerequisite step for any of these efforts is the formation of a college leadership team that will guide the evaluation and help secure the resources needed to pursue each of the steps outlined in this guide. Colleges that are contemplating using UI wage data to analyze employment results for one or more programs of study should begin with identifying this team and empowering it to implement an evaluation plan. The college leadership team can also set the stage for integration of this evaluation work with on-going program evaluation systems in the college, at the same time they can help to launch additional teams focused on the evaluation and improvement of other programs of study.

VII Appendices and Bibliography

Table A1. Measures of Labor Market Success for NSF ATE Study	
Measure	**Measure components and definitions**
1) Job holding, number of jobs held and percentage of time since graduation holding jobs, separately identified for spells of employment in- and spells of employment out-of advanced technology relevant industries.	**Graduation Date** = the date on which the student was granted the degree or certificate in the biotechnology or process technology program. **Post-program period** = the period beginning with the first full calendar quarter following graduation date, and ending with the last calendar quarter for which complete UI covered earnings data are available from the state UI agency. **Employment spell** = one or more consecutive quarters with earnings in the post-program period. **Job** = one or more consecutive post-program earnings quarters from a single employer code (UI account code or equivalent means of identification). **Industry employment spell** = one or more consecutive quarters with earnings from employer(s) within a single two-digit NAICS code (can include employment with multiple employers). **Related industry employment spell** = industry employment spell in a two-digit NAICS code related to the CIP code of the degree or certificate, as defined in Section 8 of this Appendix. **Non-related industry employment spell** = industry employment spell in a two-digit NAICS code not related to the CIP code of the degree or certificate, as defined in Section 8 of this Appendix. **Number of jobs held** = aggregate number of jobs held by the graduate during the post-program period. **Percentage of time holding jobs** = aggregate number of post program quarters during which the graduate held a job divided by the number of quarters in the post-program period, multiplied by 100.
2) Waiting time between technician education program completion and first new job post-program, separately identifying waiting time for entry to any industry, vs. waiting time for relevant industry employment (those already employed during program will be broken out separately).	**Employment waiting time** = number of non-employment quarters following the quarter of graduation, prior to the first post-program quarter with earnings. **Related industry employment waiting time** = number of quarters following the quarter of graduation, prior to the first quarter with earnings in a related industry, as defined in Section 8 of this Appendix. **Date of program entry** = the date on which the graduate met the college criteria to be considered as having entered the biotechnology or process technology program. This date is provided by the college on the student records submitted for matching. **Previously employed in a related industry** = students with one or more quarters of earnings in a related NAICS code (as defined in Section 8 of this Appendix) in the eight quarters prior to program entry, based on the date of program entry.

Table A1. Measures of Labor Market Success for NSF ATE Study	
Measure	**Measure components and definitions**
3) Wage at start, for employment, separately identified for any employing industry and for a relevant employing industry.	**Starting wage (earnings)** = Sum of all earnings in the second post-program quarter with earnings. **Related industry wage (earnings)** = Sum of all earnings in the second post-program quarter of the first related industry employment spell.
4) Number of employers post-completion of program.	**Number of post-program employers** = Number of unique employer codes with earnings in the post-program period.
5) Number of periods of non-employment post program completion.	**Non-employment spell** = one or more consecutive quarters with no earnings. **Number of non-employment spells** = Number of non-employment spells in the post-program period.
6) Duration of average non-employment spell.	**Average duration of non-employment spell** = Total number of quarters in all non-employment spells divided by the total number of non-employment spells, for all graduates.
7) Average annualized rate of wage growth from beginning of work experience to post program completion to last job experience.	**Pre-program annualized wages** = earnings in the four consecutive quarters immediately prior to the quarter of program entry. **Starting post-program annualized wage** = earnings in the four consecutive quarters beginning with the first post-program quarter with earnings. **Most recent annualized wage** = earnings in the four consecutive quarters ending with the last quarter for which the graduate had earnings in the post-program period. **Duration of post-program earnings comparison period** = number of quarters between the end of the starting post-program annualized wage period and the end of the most recent annualized wage period. **Percentage pre to post wage gain (loss)** = starting post-program annualized wage divided by pre-program annualized wage, times 100, minus 100; computed for students with both pre-program and post-program earnings. **Percentage starting to most recent wage gain (loss)** = most recent annualized wage divided by starting post-program annualized wage, times 100, minus 100; computed only for students with both starting post-program wages and most recent wages, and where the first post-program quarter with earnings is earlier than the first quarter of the most recent annualized wage period.

APPENDIX B.
Example Memoranda of Understanding

Example 1
This is an example of an agreement that provides for access to aggregate data only, through a state clearinghouse.

This Memorandum of Understanding ("MOU") is hereby entered into as of (date) by and among…each individually known as a "Party" and collectively as the "Parties."

A. **PURPOSE:** The purpose of this MOU is to identify the roles and responsibilities of the Parties as they relate to the collection of data for a…study funded by…The study will examine the employment outcomes of…program graduates who earn either a certificate or associate degree in…The study is designed to improve accountability, management, and ultimately, performance in these programs. The three major goals of the study are to: (1) utilize UI wage records and supplemental data to demonstrate the employment outcomes of graduates of…programs, assessing the quality, productivity, and effectiveness of the programs; (2) develop partnerships to demonstrate the feasibility of obtaining quality follow-up data on…graduates, particularly UI wage records, in both a multi-state region and a single-state setting, and (3) provide…with information for replication to obtain quality follow-up data on graduates for data-driven decision making, planning, and program improvement purposes.

The study will be conducted at…community colleges in…The study focuses on the…programs at each of these colleges, evaluating the…program completers' success in post-graduation job markets. The study will require participation of the…, which holds the data on graduates of these colleges, and maintains access to the required UI wage records. To support the goals of the study, the Parties will fulfill the role and responsibilities detailed herein and will respectively collect key data:

1. Selecting graduates of each college's energy process technology program;
2. Preparing a student record for these graduates and matching these student records to the State Unemployment Wage Record Data and other sources as defined to obtain employment and earnings information;
3. Matching these student records on program graduates with…student enrollment records to obtain information on subsequent post-secondary enrollments; and
4. Preparing data tables containing aggregate counts and percentages as described in the Technical Appendix, in order to provide summary labor market outcome information for program graduates.

B. ROLES AND RESPONSIBILITIES, APPLICABLE TO [STATE CLEARINGHOUSE]:
The [state clearinghouse] shall:

1. Identify graduates of…programs (i.e., those earning a degree or certificate in…) while enrolled at each of the…colleges identified above, within each of the following academic years…
2. Determine a semester and year on which each of these graduates was initially enrolled in the…program, and include this information on each student's record.
3. Review the Technical Appendix, in particular Section…on defining "related industries" and provide comments and suggested changes to the identified industries if appropriate.
4. The [state clearinghouse] will match the graduate data file with the [state] Unemployment Insurance Wage Record Data, Office of Personnel Management (OPM), and US Postal Services (USPS), for determining the employment status of the graduate, before and after the program.
5. The [state clearinghouse] will match all records of graduates to records in the higher education enrollment database to determine additional education undertaken by students at any [state] public or private higher education institution in the post-program period, including additional courses taken at the college from which the degree or certificate was obtained.
6. Prepare the summary data tables as described in the Technical Appendix, ensuring that no data is produced that could be used to identify a student, as required under Family Educational Rights and Privacy Act (FERPA) and Workforce Investment Act (WIA).
7. Return the aggregate reports and any supporting documentation to [evaluator] for analysis by [evaluator] as part of the findings of the study.

C. ROLES AND RESPONSIBILITIES, APPLICABLE TO [EVALUATOR]: [The evaluator] shall:

1. Take responsibility for the conduct of the study, producing analyses relevant to the project.
2. Analyze the summary data it receives from [state clearinghouse] to demonstrate the feasibility of using the UI wage data and other data matches to measure the employment outcomes for the …program completers, including how these outcomes vary by cohort, student demographics and other key characteristics.
3. Review findings with [state clearinghouse] and the participating colleges before finalizing the report.

D. OTHER PROVISIONS: The Parties enter into this MOU with the understanding that they will maintain their own separate and unique missions and mandates, and their own accountabilities. The cooperation among the Parties as described in this MOU shall

not be construed as creating a partnership or other type of legal entity or person. Nothing in this MOU shall be construed as superseding or interfering in any way with any other agreements or contracts entered into among the Parties, either prior to or subsequent to the signing of this MOU. The Parties specifically acknowledge that this MOU is not an obligation of funds. The MOU further constitutes no legally binding commitment by any Party and creates no rights for any third party. The Parties agree, however, that in order to achieve the goals set forth herein, they will work during the term of this MOU exclusively with the others on the subject matter described herein.

E. PAYMENT

[College/Evaluator] will reimburse [state clearinghouse] for reasonable costs incurred in the performance of tasks delineated in part (B) above. This reimbursement will be provided via a separate contact agreement.

F. CONFIDENTIALITY, INTELLECTUAL PROPERTY

Each Party shall maintain in the strictest confidence all confidential and proprietary materials and information shared under this MOU. Such confidential and proprietary materials and information shall not be disclosed to third parties without the prior written consent of the provider. No Party shall acquire any intellectual property rights under this MOU.

G. EFFECTIVE DATE, DURATION, AMENDMENTS, TERMINATION

This MOU is effective from the date first written above and shall continue for one (1) year from such effective date. However, the Parties may decide, in writing, to extend this period. This MOU may be modified or amended only if agreed to in writing by all Parties. Any Party may terminate this MOU at any time, but should endeavor to provide at least 30 days' written notice to the other Parties.

Appendix A: Variables to be collected by [state clearinghouse] for all students included in the study. For each student, the following data are required in order to complete the objectives of the study. These consist of the student's:

- Social security number
- Semester of first enrollment in the program (term and year)
- Graduate demographic information
  - Race
  - Age at graduation
  - Gender

- Pell grant recipient
- College exit variables:
  - CIP (certificate of instructional program) degree codes of any degrees/certificates awarded
  - Year degree or certificate was granted

Appendix B: Variables to be added by [state clearinghouse] for matching with data from Appendix A. Data will include the following from the [state clearinghouse] State UI wage record databases. Data will be reported for each quarter post [year.quarter] through the most recent available quarter, and for each reference quarter the number of records as a proxy for each employer that reported earnings for a designated individual.

- Student social security number.
- Year and quarter of match, coded yyyy.q.
- Number of earnings records for the individual in the quarter.
- Employer industry (4-digit) code (SIC/NAICS code) for each employer with reported earnings.
- Earnings from each employer with reported earnings.
- Sum of wages earned in the quarter.

Appendix C: Variables to be added by the [state clearinghouse] from holdings of enrollment at other [state] public higher education institutions with individually identifying information (social security number) to allow the data to be merged with that from Appendices A and B. Data will include on a semester by semester basis:

- Student social security number
- Attendance at higher education institution in [state] at any time during the eight full quarters following graduation (yes/no)
  - Institution name
  - Year/Term of enrollment
  - Degrees and/or certifications earned

Example 2

An example of an agreement for access to student-level data, via a state-level clearinghouse

This Memorandum of Understanding ("MOU") is hereby entered into as of [date] by and among the [evaluator], [college], and [state clearinghouse], each individually known as a "Party" and collectively as the "Parties."

A. **PURPOSE.** The purpose of this MOU is to identify the roles and responsibilities of the Parties as they relate to the collection of data for a…study funded by…The study will examine the employment outcomes of …program graduates who earn either a certificate or associate degree in…The study is designed to improve accountability, management, and ultimately, performance in these programs. The three major goals of the study are to: (1) utilize UI wage records and supplemental data to demonstrate the employment outcomes of graduates of…programs, assessing the quality, productivity, and effectiveness of the programs; (2) develop partnerships to demonstrate the feasibility of obtaining quality follow-up data on…graduates, particularly UI wage records, in both a multi-state region and a single-state setting, and (3) provide…with information for replication to obtain quality follow-up data on graduates for data-driven decision making, planning, and program improvement purposes.

The study will be conducted at…community colleges in…The study focuses on the…programs at each of these colleges, evaluating the…program completers' success in post-graduation job markets. The study will require participation of the…, which holds the data on graduates of these colleges, and maintains access to the required UI wage records. To support the goals of the study, the Parties will fulfill the role and responsibilities detailed herein and will respectively collect key data:

1. Selecting two relevant groups of students: the "study group"—those majoring in [program] and whose success will either be evaluated under the study; and the "control group"—those taking the key beginning course in the [program] sequence but failing to complete the programs; and
2. Matching the relevant student records to workforce outcomes from State Unemployment Wage Record Data.

B. **ROLES AND RESPONSIBILITIES, APPLICABLE TO [COLLEGE].** [College] shall:
1. Determine which course constitutes the most basic course in the [program] sequence necessary for students earning a degree or certificate in [program] while enrolled at [college]. Typically said course is likely to be taken not more than five years before a student's year of graduation.

2. Select the two relevant groups of students: the "study group"—those majoring in [program] and whose success will either be evaluated under the study and the "control group"—those taking the key beginning course in the [program] sequence but failing to complete the programs.

3. Authorize for purposes of this study the [state clearinghouse] to match [college] students who took the determined basic course from academic year (AY) [year] through academic year (AY) [year], thus tracking at least the greatest part of three cohorts, which if graduating would typically have left [college] between [year] and [year].

4. Deliver the data fields defined in Appendix A to [state clearinghouse] for matching with UI wage record information maintained by or accessible through [state clearinghouse].

C. ROLES AND RESPONSIBILITIES, APPLICABLE TO [STATE CLEARINGHOUSE].

[State clearinghouse] shall:

1. Entrusted under separate memoranda of understanding (MOU) between [state clearinghouse], [State] and other States, hold and match the State's Unemployment Insurance Wage Record Data for those identified by activities itemized in B, above.

2. Retrieve UI wage data defined in Appendix B for all students whose SSN [state clearinghouse] receives from [college] pursuant to this agreement.

3. Return all individual original [college] and matched UI wage record data, replacing all SSNs with pseudoids (substitute SSNs) so as to not identify any student information it holds on students and employers to [evaluator].

D. ROLES AND RESPONSIBILITIES, APPLICABLE TO [EVALUATOR]. [Evaluator] shall:

1. Take responsibility for the conduct of the study handle the data to ensure the privacy and confidentiality required under Family Educational Rights and Privacy Act (FERPA) and Workforce Investment Act (WIA) restrictions.

2. Analyze the data it receives from [state clearinghouse] to evaluate the relative success of the [college] [program] program completers vs. those who did not complete (but took at least the determined basic course sometime between [year] and [year].

3. Ensure that the report on program success does not reveal any information on students or employers that is confidential, involving privacy and demonstrate the confidentiality of said results to [state clearinghouse] and [college].

4. Review findings with [state clearinghouse] and [college] before finalizing the report.

5. Evaluate all student records with incomplete UI wage matching to determine whether matching to [state] wage record data is warranted and allowed without abridging confidentiality.
6. Review above information (number 5) with [college] and jointly determine with [college] whether such matches are to be pursued.
7. Make a request of the National Student Clearinghouse (NSC) for a match of student records to NSC records to determine additional education undertaken by students post departure from [college] determining the extent of additional or alternative programs of study engendered by [college] experience.

E. OTHER PROVISIONS

The Parties enter into this MOU with the understanding that they will maintain their own separate and unique missions and mandates, and their own accountabilities. The cooperation among the Parties as described in this MOU shall not be construed as creating a partnership or other type of legal entity or person. Each Party shall accept full and sole responsibility for any and all expenses it incurs relating to this MOU, and no Party shall be responsible for the expenses of the other(s). Nothing in this MOU shall be construed as superseding or interfering in any way with any other agreements or contracts entered into among the Parties, either prior to or subsequent to the signing of this MOU. The Parties specifically acknowledge that this MOU is not an obligation of funds. The MOU further constitutes no legally binding commitment by any Party and creates no rights for any third party. The Parties agree, however, that in order to achieve the goals set forth herein, they will work during the term of this MOU exclusively with the others on the subject matter described herein.

F. CONFIDENTIALITY, INTELLECTUAL PROPERTY

Each Party shall maintain in the strictest confidence all confidential and proprietary materials and information shared under this MOU. Such confidential and proprietary materials and information shall not be disclosed to third parties without the prior written consent of the provider. No Party shall acquire any intellectual property rights under this MOU.

G. EFFECTIVE DATE, DURATION, AMENDMENTS, TERMINATION

This MOU is effective from the date first written above and shall continue for one (1) year from such effective date. However, the Parties may decide, in writing, to extend this period. This MOU may be modified or amended only if agreed to in writing by all Parties. Any Party may terminate this MOU at any time, but should endeavor to provide at least 30 days' written notice to the other Parties.

Appendix A: Variables to be collected and sent from [college] to [state clearinghouse] for all students included in the sample. For each student, there are two sets of data highly relevant to such an evaluation study. One set, immediately below, is required for completion of the study. These consist of the student's:

- Social security number
- Student name
- Start year and term in community college
- Year and term that course identified as beginning of student's program that is under study was taken
- Student's demographic information
  - race
  - age
  - gender

- Pell grant qualifier
- high school completion information
  - date of high school completion
  - completed with regular high school degree—yes/no
  - alternative GED completion?: if regular degree not earned—yes/no

- Exit variables if graduated, if not graduated, collected in last term available for evaluation
  - verification of enrollment/non-enrollment in last term for which historical data is available
  - student still enrolled
  - student not enrolled
  - GPA over all courses counting toward degree
  - GPA over all courses identified with program of study year and term of last courses of study taken by student
  - CIP (certificate of instructional program) degree codes of any degrees/ certificates awarded

For each student, the following data is optional. This data will substantially improve the statistical findings of study results if available. Such information includes the student's:

- Remedial math courses
- number attempted
- number passed
- Remedial English/language arts courses
- number courses attempted

- number courses passed
- Non-remedial math courses
- number courses attempted
- number courses passed
- Non-remedial science and engineering (non-math) courses
- number courses attempted
- number courses passed
- Total courses counting toward degree
- number courses attempted
- number courses passed

Appendix B: Variables to be added by [state clearinghouse] and sent to [evaluator] (with pseudoid but no individually identifying information such as name or social security number). Data will include all data fields except SSN and name from Appendix A and the following data from [state] and cooperating State UI wage record databases. Data will be reported for each quarter post [year.quarter] through current quarter, and for each reference quarter separate reporting for each employer that reported earnings for a designated individual.

- Student pseudoid number, unique to each student over time and coded by [state clearinghouse] so as to de-identify individual student record information (created by [state clearinghouse] for study identification only; cannot identify real person belonging to records).
- Year and quarter of match, coded yyyy.q.
- Number of employers having reported earnings for the designated former student in named quarter.
- For each employer, the employer pseudo id code—constant over time and students for computation of numbers of different employers employing [college] students.
- Employer industry (4-digit) code (SIC/NAICS code).
- Dollar amount of designated former [college] student's earnings reported by employer for quarter.
- If not employed in quarter, an indicator or student's draw of unemployment benefits in a quarter; otherwise no draw of unemployment benefits during a quarter {variable is measured as: 1—drawing unemployment benefits,0—not drawing unemployment benefits}

APPENDIX C.
Example Report Tables

The following summary tables are proposed for presenting the outcomes for each college and cohort. Each of the example tables provide information on the employment outcomes for graduates based on the matching of graduate data with the UI wage records, as described in this Guide. The individual tables each focus on a different disaggregation of the outcome data, including graduating cohort (Table 1), race and ethnicity (Table 2), and gender and age (Table 3). Tables 4 and 5 represent additional breakouts of special interest to the NSF/ATE project, in that they provide important additional context for reviewing the labor market results. Table 6 provides instructions for calculation of each row in the report tables. These are only examples, and the college leadership team and the data analysts may wish to produce additional breakouts of student characteristics, or other disaggregation of the data to address specific questions.

In general aggregate data should be produced for each college and for the summary results across all colleges in a multi-college analysis. In addition, if a set of related programs are being examined, it may be useful to produce data for each program, and also aggregate across the related programs. Depending on the disclosure restrictions imposed by the UI agency, it may prevent the release of cell totals containing fewer than five students. As a result, the data analyst should work with the leadership team and the UI agency to provide as much information as can be provided on these tables within these disclosure constraints.

Table C1. Report of Labor Market Outcomes by Student Cohort: Each graduate cohort is defined by the year of graduation. The total column should contain the summary results for all graduates from any of the three years.

Table C2. Report of Labor Market Outcomes by Race and Ethnicity: The listed column categories are preliminary. It is understood that the reported categories will vary based on the results. It may be necessary to collapse categories to allow for more reportable cells in the table. This table should report data for the combined totals of all graduating cohorts (combining the years).

Table C3. Report of Labor Market Outcomes by Gender and Age: The age breakdown is based on the age at graduation. Students under 24 at graduation should be included in the traditional-age student category; those 24 or greater, in the non-traditional category. This table should report data for the combined totals of all graduating cohorts (combining the years).

Table C4. Report of Labor Market Outcomes by Prior Related Industry Earnings: Graduates with greater than $300 earnings in a related industry in any of the eight quarters prior to the quarter of enrollment in the program should be counted in the "yes" column; all others should be counted in the "no" column. See section 8 for the definition of what industries are considered related. This table should report data for the combined totals of all graduating cohorts (combining the years).

Table C5. Report of Labor Market Outcomes by Subsequent Post-secondary Enrollment Status: Graduates with a record of enrollment in a community college, public or private college or university or other post-secondary institution (including from one of the participating colleges), in the two years following graduation should be counted in the "yes" column; all others should be counted in the "no" column. This table should report data for the combined totals of all graduating cohorts (combining the years).

Table C6. Calculation Instructions for Report of Labor Market Outcomes: This table documents the detailed instructions for calculation of each row in the Tables 1 through 5.

TABLE C1.
Report of Labor Market Outcomes by Student Cohort

College:				
Program:				
Measure	Cohort			
	Year 1	**Year 2**	**Year 3**	**Year 4**
Program graduates				
Program graduates with post program earnings				
Program graduates with post program earnings in a related industry				
Program graduates with at least one non-employment spell				
Program graduates with both pre and post earnings				
Program graduates with both post and most recent earnings				
Number of jobs held by all students				
Number of post program quarters with earnings				
Number of post program quarters available				
Percentage of time holding jobs				
Number of non-employment quarters following graduation				
Average employment waiting time				
Number of non-employment quarters prior to the first related industry employment				
Average related industry employment waiting time				
Aggregate starting wage for all graduates				
Average starting wage				
Aggregate starting wage for all graduates with employment in a related industry				
Average related industry starting wage				
Aggregate number of employers for all graduates				
Average number of employers				
Aggregate number of non-employment spells				
Average number of non-employment spells				
Aggregate number of quarters in all non-employment spells				
Average duration of non-employment spell				
Average pre to post wage gain				
Average starting to most recent wage gain				
Average duration of post-program earnings comparison period				
Aggregate pre to post wage gain (loss).				
Aggregate pre-program earnings.				
Average pre-program wage				
Aggregate pre to post wage gain percentage change				
Aggregate of starting to most recent wage gain (loss)				
Aggregate starting earnings				
Aggregate starting to most recent wage gain percentage change				

TABLE C2.
Report of Labor Market Outcomes by Race and Ethnicity

College:						
Program:						

Measure	Race and Ethnicity					
	African American	Asian and Pacific Islander	Hispanic	Native American	White	Other/ Unknown
Program graduates						
Program graduates with post program earnings						
Program graduates with post program earnings in a related industry						
Program graduates with at least one non-employment spell						
Program graduates with both pre and post earnings						
Program graduates with both post and most recent earnings						
Number of jobs held by all students						
Number of post program quarters with earnings						
Number of post program quarters available						
Percentage of time holding jobs						
Number of non-employment quarters following graduation						
Average employment waiting time						
Number of non-employment quarters prior to the first related industry employment						
Average related industry employment waiting time						
Aggregate starting wage for all graduates						
Average starting wage						
Aggregate starting wage for all graduates with employment in a related industry						
Average related industry starting wage						
Aggregate number of employers for all graduates						
Average number of employers						
Aggregate number of non-employment spells						
Average number of non-employment spells						
Aggregate number of quarters in all non-employment spells						
Average duration of non-employment spell						
Average pre to post wage gain						
Average starting to most recent wage gain						
Average duration of post-program earnings comparison period						
Aggregate pre to post wage gain (loss).						
Aggregate pre-program earnings.						
Average pre-program wage						
Aggregate pre to post wage gain percentage change						
Aggregate of starting to most recent wage gain (loss)						
Aggregate starting earnings						
Aggregate starting to most recent wage gain percentage change						

TABLE C3.
Report of Labor Market Outcomes by Gender and Age

College:				
Program:				
Measure	**Gender**		**Age of Graduation**	
	Male	**Female**	**< 24**	**24 +**
Program graduates				
Program graduates with post program earnings				
Program graduates with post program earnings in a related industry				
Program graduates with at least one non-employment spell				
Program graduates with both pre and post earnings				
Program graduates with both post and most recent earnings				
Number of jobs held by all students				
Number of post program quarters with earnings				
Number of post program quarters available				
Percentage of time holding jobs				
Number of non-employment quarters following graduation				
Average employment waiting time				
Number of non-employment quarters prior to the first related industry employment				
Average related industry employment waiting time				
Aggregate starting wage for all graduates				
Average starting wage				
Aggregate starting wage for all graduates with employment in a related industry				
Average related industry starting wage				
Aggregate number of employers for all graduates				
Average number of employers				
Aggregate number of non-employment spells				
Average number of non-employment spells				
Aggregate number of quarters in all non-employment spells				
Average duration of non-employment spell				
Average pre to post wage gain				
Average starting to most recent wage gain				
Average duration of post-program earnings comparison period				
Aggregate pre to post wage gain (loss).				
Aggregate pre-program earnings.				
Average pre-program wage				
Aggregate pre to post wage gain percentage change				
Aggregate of starting to most recent wage gain (loss)				
Aggregate starting earnings				
Aggregate starting to most recent wage gain percentage change				

TABLE C4.
Report of Labor Market Outcomes by Prior Related Industry Earnings

College:		
Program:		
Measure	Related Industry Earnings in Pre-program Period?	
	Yes	No
Program graduates		
Program graduates with post program earnings		
Program graduates with post program earnings in a related industry		
Program graduates with at least one non-employment spell		
Program graduates with both pre and post earnings		
Program graduates with both post and most recent earnings		
Number of jobs held by all students		
Number of post program quarters with earnings		
Number of post program quarters available		
Percentage of time holding jobs		
Number of non-employment quarters following graduation		
Average employment waiting time		
Number of non-employment quarters prior to the first related industry employment		
Average related industry employment waiting time		
Aggregate starting wage for all graduates		
Average starting wage		
Aggregate starting wage for all graduates with employment in a related industry		
Average related industry starting wage		
Aggregate number of employers for all graduates		
Average number of employers		
Aggregate number of non-employment spells		
Average number of non-employment spells		
Aggregate number of quarters in all non-employment spells		
Average duration of non-employment spell		
Average pre to post wage gain		
Average starting to most recent wage gain		
Average duration of post-program earnings comparison period		
Aggregate pre to post wage gain (loss).		
Aggregate pre-program earnings.		
Average pre-program wage		
Aggregate pre to post wage gain percentage change		
Aggregate of starting to most recent wage gain (loss)		
Aggregate starting earnings		
Aggregate starting to most recent wage gain percentage change		

TABLE C5.
Report of Labor Market Outcomes by Subsequent Post–secondary Enrollment Status

College:		
Program:		
Measure	Post-secondary enrollment in post-program period? Yes	No
Program graduates		
Program graduates with post program earnings		
Program graduates with post program earnings in a related industry		
Program graduates with at least one non-employment spell		
Program graduates with both pre and post earnings		
Program graduates with both post and most recent earnings		
Number of jobs held by all students		
Number of post program quarters with earnings		
Number of post program quarters available		
Percentage of time holding jobs		
Number of non-employment quarters following graduation		
Average employment waiting time		
Number of non-employment quarters prior to the first related industry employment		
Average related industry employment waiting time		
Aggregate starting wage for all graduates		
Average starting wage		
Aggregate starting wage for all graduates with employment in a related industry		
Average related industry starting wage		
Aggregate number of employers for all graduates		
Average number of employers		
Aggregate number of non-employment spells		
Average number of non-employment spells		
Aggregate number of quarters in all non-employment spells		
Average duration of non-employment spell		
Average pre to post wage gain		
Average starting to most recent wage gain		
Average duration of post-program earnings comparison period		
Aggregate pre to post wage gain (loss).		
Aggregate pre-program earnings.		
Average pre-program wage		
Aggregate pre to post wage gain percentage change		
Aggregate of starting to most recent wage gain (loss)		
Aggregate starting earnings		
Aggregate starting to most recent wage gain percentage change		

TABLE C6.
Calculation Instructions for Report of Labor Market Outcomes

	Measure	Calculation Instructions
1	Program graduates	Aggregate number of graduates from the program.
2	Program graduates with post program earnings	Aggregate number of graduates with earnings in one or more of the first ten post-program quarters. *These ten quarters are the measurement period for all post-program employment and earnings measures.* Earnings of less than $300 in a quarter should be treated as zero earnings. Earnings of greater than $35,000 in a quarter should be set to $35,000.
3	Program graduates with post program earnings in a related industry	Aggregate number of graduates with earnings in one or more of the ten first post-program quarters in a two-digit NAICS code related to the CIP code of the degree or certificate, as defined in Section 8 of this Appendix.
4	Program graduates with at least one non-employment spell	Aggregate number of graduates with one or more consecutive quarters with no earnings in the first ten post-program quarters.
5	Program graduates with both pre and post earnings	Aggregate number of graduates with one or more quarters with earnings in the ten quarters prior to enrollment in the program, and earnings in the first ten post-program quarters.
6	Program graduates with both post and most recent earnings	Aggregate number of graduates with one or more quarters with earnings in the ten first post-program quarters, whose most recent earnings period began at a later quarter than the initial earnings period. The *initial earnings period* is the four consecutive quarters beginning with the first post-program quarter in which the graduate had earnings. The *most recent earnings period* is the four consecutive quarters ending with the last quarter of the initial ten post-program quarters in which the graduate had earnings.
7	Number of jobs held by all students	Aggregate number of jobs for all graduates. A job is defined as one or more consecutive post-program earnings quarters from a single employer code (UI account code or equivalent means of identification).
8	Number of post program quarters with earnings	Aggregate number of post-program quarters with earnings for all graduates.
9	Number of post program quarters available	Aggregate number of post-program quarters for all graduates.
10	Percentage of time holding jobs	Aggregate number of post-program quarters with earnings for all graduates (line 8), divided by the aggregate number of post-program quarters for all graduates (line 9), multiplied by 100.
11	Number of non-employment quarters following graduation	Aggregate quarters in the post-program period without earnings prior to the first quarter with earnings for all graduates with earnings in the post-program period (aggregate waiting time).
12	Average employment waiting time	Aggregate waiting time for all graduates (line 11) divided by the total number of graduates with post-program earnings (line 2).
13	Number of non-employment quarters prior to the first related industry employment	Aggregate quarters in the post-program period without earnings in a related industry prior to the first quarter with earnings in a related industry, for all graduates with earnings in a related industry (aggregate related industry waiting time).
14	Average related industry employment waiting time	Aggregate related industry waiting time for all graduates (line 13) divided by the total number of graduates with post-program employment in a related industry (line 3).
15	Aggregate starting wage for all graduates	Aggregate earnings in the four consecutive quarters beginning with the first post-program quarter with earnings, for all graduates with earnings in the post-program period.
16	Average starting wage	Aggregate starting wage for all graduates (line 15) divided by the total number of graduates with post-program earnings (line 2).

TABLE C6.
Calculation Instructions for Report of Labor Market Outcomes

	Measure	Calculation Instructions
17	Aggregate starting wage for all graduates with employment in a related industry	Aggregate earnings in the four consecutive quarters beginning with the first post-program quarter with earnings in a related industry, for all graduates with earnings in a related industry, as defined in Section 8.
18	Average related industry starting wage	Aggregate related industry starting wage (line 17) divided by the total number of graduates with related industry earnings (line 3).
19	Aggregate number of employers for all graduates	Aggregate number of unique employer codes (or equivalent denotation) with earnings in the post-program period, for all graduates with earnings in the post-program period.
20	Average number of employers	Aggregate number of post-program employers (line 19) divided by the total number of graduates with earnings (line 2).
21	Aggregate number of non-employment spells	Aggregate number of non-employment spells in the post program period, for all graduates. Non-employment spell is defined as one or more consecutive quarters with no earnings in the post-program period.
22	Average number of non-employment spells	Aggregate number of non-employment spells (line 21) divided by the total number of graduates with at least one non-employment spell (line 4).
23	Aggregate number of quarters in all non-employment spells	Aggregate number of quarters in all non-employment spells, for all graduates.
24	Average duration of non-employment spell	Total number of quarters in all non-employment spells (line 23) divided by the total number of non-employment spells, for all graduates (line 21).
25	Average pre to post wage gain percentage change	Sum of all percentage pre to post wage gains (losses) divided by total of all graduates with both pre and post program earnings (line 5).
26	Average starting to most recent wage gain percentage change	Sum of all percentage starting to most recent wage gains (losses) divided by the total of all graduates with both post and most recent earnings (line 6).
27	Average duration of post-program earnings comparison period	Aggregate number of quarters between the end of the starting post-program annualized wage period and the end of the most recent annualized wage period, divided by the total of all graduates for which a starting to most recent percentage change was computed (line 6).
28	Aggregate pre to post wage gain (loss).	Aggregate of pre to post wage gain (loss). Computed for of all graduates included in line 5.
29	Aggregate pre-program earnings.	Aggregate pre-program earnings. Computed for of all graduates included in line 5.
30	Average pre-program wage	Aggregate pre-program wage for all graduates (line 29) divided by the total number of graduates included in line 5.
31	Aggregate pre to post wage gain percentage change	Aggregate of pre to post wage gain (loss) (line 28) divided by the aggregate pre-program earnings (line 29), times 100, minus 100. Computed for of all graduates in line 5.
32	Aggregate of starting to most recent wage gain (loss)	Aggregate of starting to most recent wage gain (loss). Computed for all graduates in line 6.
33	Aggregate starting earnings	Aggregate starting earnings. Computed for all graduates in line 6.
34	Aggregate starting to most recent wage gain percentage change	Aggregate of starting to most recent wage gain (loss) (line 31) divided by the aggregate starting earnings (line 33), times 100, minus 100. Computed for all graduates in line 6.

APPENDIX D.
Defining "Related Industry:"

The first three labor market success measures require an operational definition of what constitutes a "related industry," i.e., an industry in which a graduate has earnings that is considered related to the program that the graduate completed. Earnings from employers within other industry codes will be included in these measures, but not in the "related industry" breakouts for the measures. Since the UI covered earnings data do not generally include the occupation(s) in which graduates have earnings, the industry (as described by the NAICS code of the employer) is used to proxy for relatedness. Use of the NAICS codes requires an identification of which of these codes is to be considered as related to the program. The national crosswalk service center has a crosswalk of SOC codes (occupations) to NAICS (industry), and CIP (programs) to SOC. Given the CIP codes of the programs being examined, these crosswalks have been used to identify the candidate NAICS codes that would be considered related to these programs. The results are shown in the following tables. The participating colleges should review and approve these selections.

TABLE D1.
Identifying Related SOC Titles for Programs Analyzed under the NSF/ATE Employment Outcomes Study

Program Name and Notes from Proposal	CIP Codes and Titles	Related SOC Codes	Related SOC Titles
Process Technology: process technician, refinery operator, chemical plant operator, process operator and offshore operator in the chemical, pulp and paper, pharmaceutical and food industries.	41.0301 Chemical Process Technology	19-4031	Chemical Technicians
		51-8091	Chemical Plant and System Operators
		51-9011	Chemical Equipment Operators and Tenders
Biomanufacturing/ Biotechnology: process development associates, manufacturing technicians, facilities technicians, validation specialists, and quality control technicians.	41.0101 Biology Technician/ Biotechnology Laboratory Technician.	19-4021	Biological Technicians

Based on the data presented in tables D1 and D2, it appears that the most directly related industries to the Chemical Process Technology program will be Manufacturing (NAICS codes in the 31-33 series); Professional, Scientific and Technical Services (NAICS codes in the 54 series), and Educational Services (NAICS codes in the 61 series). For the Biomanufacturing/ Biotechnology program, in addition to these industries, Federal State and Local Government (NAICS codes in the 99 series) are also related industries. Using this definition of what constitutes a related industry; graduates with earnings from employers with NAICS codes in any of these series would be considered to have employment and earnings in a related industry. Graduates with earnings from other employers would be considered to have employment and earnings from a non-related industry.

TABLE D2.
Identifying Related Industries for SOC Titles

CIP Codes and Program Names:	Program: 41.0303 Chemical Process Technology			Program: 41.0101 Biotechnology Laboratory Technician
Related SOC Codes:	19-4031	51-8091	51-9011	19-4021
Related SOC Titles:	Chemical Technicians	Chemical Plant and System Operators	Chemical Equipment Operators and Tenders	Biological Technicians
Related NAICS Codes and Titles:	**2010 OES Employment Levels**			
21 Mining, Quarrying, and Oil and Gas Extraction	1060	90	*	*
22 Utilities	970	40	*	*
31-33 Manufacturing	27290	42070	43210	7370
42 Wholesale Trade	1760	250	1860	120
54 Professional, Scientific, and Technical Services	19580	300	470	24060
55 Management of Companies and Enterprises	890	*	*	*
56 Administrative and Support and Waste Management and Remediation Services	2140	140	*	580
61 Educational Services	2920	*	*	20120
62 Health Care and Social Assistance	460	*	*	4980
99 Federal, State, and Local Government (OES Designation)	1910	*	*	15450

APPENDIX E.
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