

# Career and Technical Education (CTE) Transfer Research Project: Improving Transfer Pathways for California Community College Students in CTE Programs

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*Despite the current economic downturn, workforce projections indicate that California will experience shortages in its supply of baccalaureate-trained workers in the decades to come, particularly engineers, accountants, nurses, teachers and law enforcement professionals. Students often start their journey toward these occupations in community college career and technical education (CTE) programs. This paper presents findings from Phase I of a multi-year study conducted by the Research & Planning Group for California Community Colleges (RP Group) to investigate how California can begin to build these pathways. The report of Phase I findings presented here includes: (1) a description of the infrastructure of CTE courses and programs currently available to facilitate transfer from California's community colleges, (2) an analysis of student engagement with that infrastructure, and (3) preliminary findings on student and educator perspectives regarding factors that support and compromise transfer in career-oriented disciplines. The article concludes with a preview of Phase II research currently underway.*

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## Introduction

Anthony Sanchez<sup>1</sup> enrolled in an engineering technology program at one of California's 112 community colleges a few years after high school with the hope of getting a technician job at a local manufacturer. While working toward his associate's degree, one of his instructors commented on his strong aptitude for both science and math and suggested he pursue a baccalaureate degree in engineering. According to Anthony, he never thought of himself as transfer material and no one had ever pointed out that he was actually good with these subjects. He was energized by the possibility of going further with his education and earning more.

Yet, Anthony's excitement was tempered when he discovered that the road toward transfer is anything but smooth. During initial visits with one of his college's academic counselors, Anthony received a laundry list of math and science courses necessary for transfer to any institution, many of which differed from the courses he already completed for his engineering technology degree. Moreover, the requirements for transfer varied significantly from one university to the next. Completing them would require a considerable investment of time and money without the promise of a guaranteed spot in a related

four-year program. With continued encouragement from his instructor, Anthony forged ahead with plans to enroll in the additional coursework in Fall 2009, only to find that many of the classes needed for transfer preparation were unavailable at his college—a result of limited departmental capacity and growing cuts to education budgets. With a full-time job and family commitments, driving around the region to complete these courses seemed impossible. Anthony says that he felt like the odds were against him.

While Anthony struggles to use his community college experience as a launch pad for achieving his bachelor's degree, California projects a shortfall of 40,000 engineers by 2014 (Office of the Governor of CA, 2007). One viable solution to addressing this demand includes increasing the number of students who transfer from community colleges to pursue a related degree. However, data generated by the Research and Planning Group for California Community Colleges (RP Group) in partnership with the California Partnership for Achieving Student Success (Cal-PASS) show that transfer pathways between these segments are less than efficient. Based on a study of more than 4,200 transfer students who obtained baccalaureate degrees in engineering between 1998 and 2009, the time to baccalaureate degree in engineering from the first term of postsecondary enrollment in California community colleges is six years or more for 60% of transfer students; and 26% of transfer students require eight years or longer to complete this process.

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<sup>1</sup>Anthony's story represents a composite of student narratives gathered through the CTE Transfer Research Project.

How can California make transfer to baccalaureate-level institutions more efficient for students enrolled in community college career and technical education (CTE) programs like engineering? What factors currently facilitate or inhibit this transition? What pathways are already in place to support students who want to take advantage of the open access and lower cost afforded by the community college system and use it as a stepping stone to transfer in a high-demand occupational major? Is it possible to improve these linkages so that more students can use the considerably more affordable community college system to complete their general education and lower-division coursework prior to transfer—an arrangement that has the potential to benefit both students and the cash-strapped state of California?

Limited research exists to answer questions like these as practitioners, policymakers, and researchers alike have historically tied CTE programs to the terminal function of the community college system. However, in recent decades, researchers have begun to examine if, how, and why CTE students make this transition to baccalaureate programming and what other states and institutions do to encourage it. The CTE Transfer Research Project<sup>2</sup>, led by the RP Group, seeks to expand this base of information with a particular focus on occupational transfer in California.

The RP Group ([www.rpgroup.org](http://www.rpgroup.org)) is a nonprofit organization founded by community college researchers, planners and evaluators to increase the capacity of California's 112 community colleges to collect, analyze, and act on data and other information that can strengthen decision making and increase student opportunities and success. The RP Group's goal is to collaborate with faculty, administrators and student support professionals to grow a culture where, at all levels, decision making is driven by evidence-based inquiry. To achieve this goal, the RP Group provides professional development, technical assistance, and research and evaluation services to practitioners, colleges and the system at large.

## Background

The CTE Transfer Research Project offers an opportunity to advance the RP Group's interest in supporting institutional and system-wide enhancement efforts related to workforce development and transfer. This investigation is a two-part, multi-year study focused on how transfer opportunities can be increased and strengthened for career and technical education students enrolled in California's community colleges. Anthony's story offers a small illustration of demographic and workforce trends that challenge the traditional view that CTE programming ends with community college degrees and certificates and that these learners are not also transfer students.

## Changing Student Demographics

Data on postsecondary enrollments show that an expanding majority of students enter higher education through the community college system (NCES, 2008). California leads the nation in this trend with researchers citing that more than three quarters of all postsecondary learners start out in the state's community college system (Wassmer, Moore, & Shulock, 2003; Shulock & Moore, 2007). National research indicates that a significant number of these students enter career-oriented programs and often express interest in transfer (Cohen & Brawer, 1996; Townsend, 2001; Hudson & Shafer, 2004); however, minimal data exists to track CTE student achievement of this goal.

## Workforce Demands

Recent workforce studies agree that California will confront potentially debilitating shortages in the availability of workers with bachelor's degrees in the next decade unless baccalaureate attainment rates are increased, particularly in CTE disciplines ranging from accounting, nursing, engineering and teacher education to emerging programs such as logistics, biotechnology and green technologies (Fountain and Cosgrove, 2006; Johnson & Reed, 2007; Reed, 2008; Johnson, 2009). As mentioned above, these workforce studies conclude that one part of the solution to these projected shortages is increased transfer from community colleges to four-year institutions, chiefly in high-demand occupational disciplines (Johnson, 2009). Economic forecasters specifically point out the need to address shortages, and thus transfer rates, in science, technology, engineering, and math (STEM) disciplines (Offenstein & Shulock, 2009).

These demographic and workforce trends have compelled many community colleges to rethink the traditional silos between their vocational and transfer functions, considering ways to extend CTE beyond certificates and associate degrees and promoting transfer as an opportunity for students enrolled in occupational programs. These efforts include forming pathways that encourage educational and career advancement from entry to the professional level and integrating CTE and academic instruction (Bragg, 2001). California's 2005-06 *Governor's Initiative on Improving and Strengthening Career Technical Education* passed through Senate Bill 70 (SB70) and the 2008-12 *State Plan for Career Technical Education* produced in response to the 2006 Carl D. Perkins Career Technical Education Act reauthorization reflect the state's efforts to move occupational education in this direction.

Phase I of the CTE Transfer Research Project began with support from the California Community Colleges State Chancellor's Office through the SB70 initiative. This

<sup>2</sup>The CTE Transfer Research Project is now called the Student Transfer in Professional Pathways Project.

part of the study focused on examining the current CTE transfer system and its output; identifying factors that CTE faculty, instructors and administrators believe support and compromise CTE transfer; and analyzing CTE student characteristics and transfer patterns. We summarize the findings generated by this part of the research, which concluded in Fall 2009, in the following article.

The RP Group is presently implementing Phase II of the investigation with support from the James Irvine Foundation. This research examines the involvement of baccalaureate-granting institutions in CTE transfer and the experience of students who have successfully transitioned to occupational majors in California's public and private colleges and universities. The RP Group will use findings generated by studying and documenting the journey of these students to engage educators and employers in efforts to make the transfer system more efficient and effective.

## Methodology

Phase I of the CTE Transfer Research Project included a literature review and quantitative and qualitative components designed to answer three primary questions: (1) What system is in place to support CTE student transfer between community colleges and four-year institutions in California, (2) How is this system working, and (3) What are opportunities for improvement?

## Literature Review

As background for the study, the RP Group reviewed over 100 related publications and quickly discovered limited information and minimal scholarly research about the specific nature and challenges of CTE transfer. Studies generally featured innovative models thought to promote occupational transfer as well as a range of factors that may hinder this transition (see sidebars "Strategies Supporting CTE Transfer" and "Factors Compromising CTE Transfer" for literature review highlights). Because of the limited availability of research on CTE transfer, the RP Group also reviewed a select number of studies focused on traditional student transfer, extrapolating how findings might apply to CTE transfer students.

## Qualitative Research

### Economic and Workforce Trend Analysis

The RP Group performed an analysis of economic and workforce trends to identify occupations that, over the next decade, are expected to experience shortages in their demand for baccalaureate-level trained workers. To update information gained from a review of the major

studies on this subject, the research team interviewed representatives from the California Employment Development Department Labor Market Division, the Public Policy Institute of California and the Campaign for College Opportunity to solicit experts' opinions about how and whether projections should be adjusted to reflect the current economic downturn. This portion of the study resulted in the selection of the following high-demand disciplines for in-depth study: engineering, accounting, teacher education, nursing, and administration of justice as well as emerging disciplines including green technology, digital technology and biotechnology.

### CTE Practitioner Surveys and Interviews

Additionally, the RP Group conducted a survey asking CTE instructors, counselors, administrators, and others engaged in CTE programs to identify factors that they believe support and compromise CTE transfer. More than 450 individuals from 95 California community colleges responded. The project simultaneously conducted semi-structured interviews with 60 CTE faculty from a range of targeted CTE

### Strategies Supporting CTE Transfer

A review of available literature reveals several emerging approaches thought to aid students in pursuing baccalaureate-level preparation in a range of occupations. These strategies go beyond the traditional approach of articulation as the primary conduit for transfer between educational segments. They include the development of innovative degrees such as the **Applied Baccalaureate** (Ignash & Kotun, 2005; Bragg, Townsend & Rudd, 2009) and the **Community College Baccalaureate** (Floyd & Walker, 2009; Floyd, 2006; Floyd, Skolnik & Walker, 2005) which support students' pursuit of advanced training in occupational disciplines.

Several community colleges have also formed collaborative relationships with four-year institutions through **University Centers** to provide learners greater local access to the baccalaureate degree and meet pressing local or regional workforce needs (Lorenzo, 2005; Windham, Perkins & Rogers, 2001).

Additionally, Ignash and Kotun (2005) found that several states have crafted **Special Block Articulation Agreements** or policies between community college and four-year partners to facilitate the transfer of a grouping of units or courses within an occupational program.

disciplines. While most interviewees represented community colleges, faculty from the University of California (UC) and California State University (CSU) systems as well as National University also participated. The interviews investigated in more depth the questions explored in the survey and delved into the challenges and opportunities that are particular to individual CTE disciplines.

### Student Perspectives Pilot

The RP Group also conducted surveys, focus groups, and interviews with 42 CTE students at three different

community colleges representing health education, nursing, geographic information systems, engineering, and heavy equipment maintenance majors and a total of 26 transferred students enrolled in a UC engineering program and a CSU nursing program. This activity, which is at the center of Project's current Phase II, piloted an exploration of: (1) who and what shaped students' thinking about transfer, (2) where they found related information, (3) what barriers and supports they encountered in the transfer process, and (4) what advice they have for their peers and educators.

### Factors Compromising CTE Transfer

While states and institutions work on new ways to support CTE transfer, a review of available literature highlights several factors that continue to complicate this transition. These include significant variation in the degree to which baccalaureate institutions award students credit for courses they have completed in community college occupational/CTE courses (Bragg & Reger, 2000). These policies often vary by institution so that a course accepted for credit by one university may be rejected by another (Cohen & Ignash, 1993; Striplin, 1999). Further, students enrolled in community college occupational programs may not be required to complete general education coursework (Ignash & Kotun, 2005). In turn, students who later decide to transfer will often find that they have semesters of general education requirements to complete before they are deemed transfer ready.

Fundamental issues of communication and coordination between two- and four-year systems also contribute to the disjointed nature of career pathways for occupational learners (Hughes & Karp, 2006; Reeve Bracco & Callan, 2002). While some research indicates that state-level articulation policy can facilitate transfer (Townsend, 2001), most system-wide agreements for CTE students are limited to one or two occupational disciplines (Ignash & Kotun, 2005).

The historical view of CTE programs as terminal may additionally impact students' transfer experience. Despite their educational and career interests or needs, CTE students often receive little encouragement to pursue transfer (Bragg, 2001; Townsend, 2001; Cohen & Ignash, 2003; Frederickson, 1998). Roska (2006) also finds that when community colleges focus on awarding certificates in CTE disciplines rather than degrees, student attainment of transfer can be negatively impacted.

### Quantitative Research

In addition to these Phase I qualitative activities, the RP Group engaged in a quantitative investigation of CTE courses and programs and of CTE students. The RP Group used the California Community Colleges' course classification system to identify and investigate the infrastructure of CTE courses and programs in the state. For more information on this system, known as the *Taxonomy of Programs*, visit: [www.cccco.edu/Portals/4/TopTax6\\_rev0909.pdf](http://www.cccco.edu/Portals/4/TopTax6_rev0909.pdf). The study began by documenting the CTE infrastructure of transferable courses and programs. On the student side, the study followed six CTE cohorts, each made up of first-time college students entering a community college in a single academic year between 1997-98 and 2002-03. Two categories of students were included in the cohorts: "CTE concentrators" and "CTE degree and certificate completers."

CTE concentrators are students who have completed 12 or more transferable units in a CTE program such as "accounting" or "engineering technology." CTE degree and certificate completers are students who receive a degree or certificate in a CTE program without completing 12 transferable units in one specific CTE discipline. The study calculated transfer rates by dividing the number of students who transferred from each cohort by the number of students in the cohort.

The quantitative study proceeded to investigate enrollments, transfer rates and destinations in four clusters of CTE programs: (1) those related to occupations projecting high growth, (2) those related to occupations with a high demand for baccalaureate-trained workers, (3) those related to emerging occupations, and (4) those with the highest student enrollment.

### Findings

The following section presents findings from Phase I of the RP Group's investigation. A full report of the first stage of the research can be found at <http://www.rpgroup.org/content/about-stp3>.

# California's Community Colleges Have a Robust CTE Infrastructure That is Underutilized for the Purposes of Transfer

California's community colleges have a flexible, expansive, and expanding infrastructure of CTE programs, including a vast array of transferable coursework in CTE disciplines that relate to occupations projected to experience shortages in the availability of baccalaureate-trained workers. For example, in 2007-08, one college offered approximately 63 different transferable courses in computer software development. During the same period, another college had nearly 38 different transferable courses in digital media while another offered upwards of 31 courses in child development.

At the same time, the infrastructure is generally underutilized in terms of its potential capacity to aid CTE students in completing lower-division major requirements at community colleges prior to transfer. The indication of underutilization is the relatively low and declining number of students who complete a cluster of courses in CTE programs (defined here as a minimum of 12 transferable units). Between 1997-98 and 2002-03, as more students enrolled in CTE credit and transferable courses and as colleges added new CTE programs to the infrastructure, the number of students in the cohort of CTE concentrators and CTE degree and certificate holders decreased by 14% from 43,914 in 1997-98 to 37,749 in 2002-03. Of particular concern is that the number of CTE cohort students is particularly low in several disciplines related to occupations expected to drive California economic growth, including engineering, biotechnology, computer information Systems, and Environmental technology.

## CTE Transfer Varies Significantly by Discipline, College, and Student Groups

### Disciplines

While the transfer rate for CTE concentrators averaged 20.5% across all disciplines, transfer rates and numbers vary widely among programs. For example, CTE concentrators transferred at an overall rate of 79.5% in engineering while those in accounting transferred at an overall rate of 43.7%. At the same time, accounting programs produced an average of 5,036 transfers per year while engineering programs produced only 181.

Certainly there are students who transfer into four-year programs like engineering who are not included in this study's cohort. However, the low number of transfers fulfilling a concentration of coursework in a career-oriented discipline like engineering calls into question

why more students do not complete a portion of their lower-division course requirements prior to transfer. In the case of engineering, the state's projected workforce shortages coupled with the significant number of colleges offering 20 to 25 transferable units of engineering coursework leads one to consider how it would be useful to determine ways community colleges can increase the number of concentrators in this program, and in turn the related engineering transfer count.

### Colleges

Transfer rates also often vary significantly within CTE programs from one college to another. For example, data from one college revealed a 76% transfer rate in accounting – the highest transfer rate for that CTE program area. By comparison, the college with the fifth highest ranking in accounting had a transfer rate of 57%. The difference of 19 percentage points between these rates beckons questions about what certain colleges are doing to lead the pack with such significant margins.

This research indicates that many CTE programs have strong transfer rates, a finding that is inconsistent with previous studies of transfer suggesting that colleges are either transfer- or CTE-focused (Cohen & Brawer, 1996). At the same time, colleges with high certificate completion rates in the CTE programs studied by the research team tend to have lower transfer rates in these same programs and may suggest a negative correlation between transfer and certificate completion in individual CTE programs rather than between transfer and CTE in general. This discovery aligns with a similar results found by Roska (2006) in a study of transfer in community colleges with an occupational emphasis.

### Students

Among the 245,000 CTE students included in the quantitative analysis, just over 50,000 (or 20.5%) transferred during the time period studied. This investigation revealed considerable variation in transfer rates and areas of CTE study among different student groups. For example, CTE transfer rates varied particularly across different ethnic groups (see Table 1: CTE Student Enrollments and Transfer Rates by Ethnicity. While Asian students make up 12.5% of CTE concentrators (those who completed a minimum of 12 units of transferable coursework in a CTE program), they represent nearly 22% of all CTE transfers. At the same time, Latino students comprise over 28% of CTE concentrators, compared to 21% of all CTE transfers.

Concern has been raised about the fact that Latinos, the fastest growing population segment in California, are less likely to complete baccalaureate-level education than most other ethnic groups and are especially underrepresented.

sented among baccalaureate holders in STEM disciplines (Cook & Cordova, 2007).

The CTE Transfer Research Project found that Latino students make up the largest proportion of CTE learners concentrating in family and consumer sciences and the lowest proportion in information technology—one occupational area expecting high demand and fast growth. By contrast, the largest proportion of Asian students is in information technology while the lowest is in education. African-American students make up the largest portion of CTE concentrators in education and the lowest portion in agriculture and natural resources. Conversely, the largest portion of White students is found in agriculture and natural resources while the lowest is found in education.

## The California State University (CSU) System Receives the Most CTE Transfers

Reflective of the state’s Master Plan for Higher Education, the California State University (CSU) system stands out as the top recipient of CTE transfers in the state. Among all CTE students in the cohort, two thirds transferred to a CSU institution, 13% each to the University of California (UC) system and to private in-state institutions, and 8% to out-of-state institutions. At the same time, certain disciplines showed higher rates of transfer to the UC system, including computer software development and computer science at 48% and 52% respectively.

Interestingly, the data showed that there were more transfers to the University of Phoenix than to any individual UC campus. University of Phoenix transfers were more likely to be African-American or Latino students and less likely to be Asian than transfers to other institutions.

## Some CTE Transfer Supports Are in Place

Surveys, focus group and interviews with California community college practitioners revealed a range of institutional as well as intra- and inter-segmental strategies supporting students’ transfer in career-oriented disciplines.

At the institutional level, practitioners cited the incorporation of transfer information into CTE courses and faculty promotion of transfer paths as supportive of this transition. Additionally, respondents referenced targeted guidance in the form of faculty, peer group and counseling support, and counselors specifically assigned to CTE disciplines as particularly effective in helping students pursue additional baccalaureate-level preparation. These institutional practices contribute to what practitioners frequently referenced as a broader “transfer culture” at their institution whereby the expectation for and support toward the achievement of transfer permeates all aspects of the students’ college experience—whether they are CTE-oriented or not.

Additionally, community college practitioners noted several intra- and inter-segmental strategies as useful in encouraging and aiding CTE transfer. Specifically, there are statewide agreements in place that facilitate the path to transfer in child development and nursing (for more information, see sidebar “Community College Faculty Lead the Way to Establishing a Transfer Path for Early Childhood Students” and “California State University Nursing Programs Standardize Lower-Division Major Requirements for Community College Students”). No other CTE disciplines had such arrangements in place at the time of this research. At the same time, practitioners cited developing regional agreements, often between one CSU and several local community colleges, around one CTE program. Some respondents discussed university partnerships that have developed across the state. These arrangements are designed to offer baccalaureate-level coursework at the community college campus to address local workforce development needs as well as issues of distance and cost.

Community college practitioners also underscored the importance of local outreach efforts in which UC, CSU, and/or private colleges visit the community college to promote their CTE programs. A few respondents noted bridge or connector courses for students interested in transfer designed to increase their preparedness for university-level instruction. Finally, several respondents spoke about the use of Articulation Systems Stimulating Inter-institutional Student Transfer (ASSIST.org)—an

online repository of all articulation information for publicly-funded education institutions. Users of this system, which is reported to generate more than 1 million hits per month, can identify which CTE courses transfer to the four-year institution of a student’s choice.

**Table 1. CTE Student Enrollments and Transfer Rates by Ethnicity**

	All CTE Students		All CTE Transfer Students		% Difference
	Count	Percent	Count	Percent	
African American	16,578	6.7%	2,485	4.9%	-1.8%
Asian	30,607	12.5%	11,041	21.9%	9.5%
Filipino	8,335	3.4%	1,865	3.7%	0.3%
Latino	69,555	28.3%	10,667	21.2%	-7.1%
White	98,572	40.1%	19,536	38.8%	-1.4%
Total	245,637		50,390		

## There's Room for Improvement

Community college practitioners participating in the CTE Transfer Project survey and interviews also underscored several challenges to student transfer in occupational disciplines. Reflective of literature review findings, one of the biggest barriers respondents mentioned centers on the lack of alignment between postsecondary segments. Practitioners noted that the major courses required at the two-year level for CTE students often

vary significantly across receiving four-year institutions. Additionally, many courses required for the associate's degree are incompatible with courses required for CTE transfer programs. Issues of guidance also stand in the way of successful student transfer, with respondents noting that an insufficient number of hours are provided for the academic counseling of CTE students and that outreach by the four-year colleges to occupational learners at community colleges is inadequate.

The relative importance of these and other factors

### Community College Faculty Lead the Way to Establishing a Transfer Path for Early Childhood Students

In 2005, an association of California community college Early Childhood educators initiated the Early Childhood/Child Development (EC/CD) Curriculum Alignment Project (CAP) to develop and deliver an aligned core of coursework across the system. A team of faculty launched CAP by identifying courses that provide foundational instruction for entry-level teachers of younger children. The following year, hundreds of faculty worked together to review and modify this curriculum and ultimately produce a set of course outlines designed to guide cross-college alignment. By 2007, the project formally recommended eight 3-unit, lower-division transferable courses and an EC/CD Major Transfer Degree incorporating these 24 units. As a result, this "Lower-Division 8" offers students striving for a bachelor's degree a clear path and provides participating public and private universities an articulated transfer package.

EC/CD departments at local community colleges can request an "alignment tool kit" from CAP that consists of course descriptions and student learning outcomes and objectives. To verify that they meet CAP's criteria, local colleges must submit an application to a blind peer review process. A web site offers information on the initiative and lists CAP-approved colleges.

With participants from the California Community College and the California State University systems, CAP offers one example of how a committed inter-segmental team led by community college faculty can cooperatively reach agreement on a curriculum package that enables lower-division students to move seamlessly between institutions to fulfill transfer requirements and benefit from a streamlined transfer process. For more information, visit: [www.childdevelopment.org/cs/cdtc/print/htdocs/services\\_cap.htm](http://www.childdevelopment.org/cs/cdtc/print/htdocs/services_cap.htm)

### California State University Nursing Programs Standardize Lower-Division Major Requirements for Community College Students

California's community colleges offer 75 Associate Degree in Nursing programs and graduate more than 10,000 students per year. The CSU system hosts 17 Bachelor of Science Nursing (BSN) programs that graduate approximately 2,000 students per year. While the Associate Degree in Nursing—at least during the recent nursing shortage in California—provided graduates with ample job opportunities, there is now increased demand on the employer side for nurses to hold BSNs. In 2005-2006, CSU's Nursing programs reached agreement to standardize their lower-division major requirements through the statewide Inter-segmental Major Preparation Articulated Curriculum (IMPAC) initiative. Accordingly, community college students can prepare for transfer knowing that course requirements do not vary across the CSU nursing programs they may be considering for their BSN.

In addition to standardizing the lower-division major requirements, the CSUs agreed on a general education pattern for their nursing programs. Further, through IMPAC, nursing and science faculty from community colleges and the CSUs collaborated to collapse the essential elements of three chemistry courses formerly required for nursing transfer students into a single chemistry course specifically designed to cover essentials of general chemistry, organic chemistry and biochemistry related to the practice of nursing. As a result, transfer students can now take one chemistry course and meet transfer requirements. However, only a limited number of community colleges have the capacity to offer this course which means that students may have to commute long distances to enroll in this potentially time-saving offering.

varied across disciplines. As mentioned above, statewide agreements like the one standardizing four-year course requirements across all CSU nursing programs facilitates transfer for community college RN students. Meanwhile, inconsistent lower-division major requirements represent a significant barrier to transfer for engineering students while it is less of a problem for those making this transition into accounting programs.

Students participating in the pilot of survey, focus group, and interview instruments universally spoke about the need to provide two kinds of support to CTE students desiring to pursue baccalaureate-level preparation. Learners noted the importance of offering personal and motivational support that makes CTE students believe they can transfer. Second, student respondents emphasized the need for accurate information about the technical and logistical aspects of the transfer process.

## Conclusions

Several key points emerged from Phase I of the CTE Transfer Research Project.

- There is a need and the opportunity to increase CTE transfer in many disciplines.
- The community college system maintains a large and underutilized infrastructure of transferable courses that could provide significant numbers of students with lower-division major preparation in disciplines related to high-growth occupations requiring a bachelor's degree.
- For a large number of CTE programs—including many projecting high demand for baccalaureate-trained workers—the number and percentage of students who transfer with 12 or more transferable units in that particular program is low.
- The study's preliminary findings raise a compelling question: How many transfer students use the community college CTE infrastructure and how many bypass these courses to complete lower-division major requirements after transfer? Put differently, is the problem one of students' underutilization of the CTE infrastructure to prepare for transfer, and/or is it that few students transfer into CTE baccalaureate programs? The project's Phase II is currently investigating this question by backward mapping the courses that students took prior to transfer in several targeted disciplines including engineering, accounting, teacher education, and nursing.
- The study uncovered a wide range of factors and approaches that support transfer for CTE students. Some of these are statewide; others are regional in nature; yet others are specific to a particular discipline.
- The qualitative component of the study also uncovered a wide range of factors that make transfer chal-

lenging for CTE students including limited guidance on course-taking requirements; issues of alignment between community college and four-year programs; and incompatibility between course requirements for AA/AS degree completion and those for transfer.

## Preview of Forthcoming Research from Phase II

If students transfer into occupational baccalaureate programs without completing CTE courses in their field of study at the community colleges, which pathways do they follow and why? Which factors influence the way they navigate their way through the system? How can transfer pathways into these programs become more effective and efficient? These questions drive Phase II of the CTE Transfer Research Project.

Specifically, Phase II uses three strategies to examine students' path toward occupational baccalaureate programs in engineering, accounting, teacher education, and nursing, and administration of justice: (1) backward mapping to examine and compare pathways taken by students who completed baccalaureate degrees in the targeted occupational programs; (2) implementation of focus groups and surveys with students currently enrolled in the targeted occupational programs at UC, CSU, and private four-year institutions; and (3) identification of effective practices supporting transfer in the targeted occupational programs.

The research team is presently completing its investigation of transfer into engineering. Step one included backward mapping paths followed by 4,200 California community college transfer students who obtained baccalaureate degrees in engineering between 1996-2009. A sample of preliminary findings include the following:

- Students are predominantly Asian and white and males.
- Thirty-three percent of students required more than four and less than six years from the first term of postsecondary enrollment at the community college to complete a baccalaureate degree; 35% required more than six and less than eight years; and 26% required more than eight years.
- Engineering students who transferred fewer units from the community college spent more time at the university completing their degrees; however, the reverse is not true in that students transferring 70 units or more are no more likely to complete their degrees in less than two years—and more likely to take six years or more—than groups completing fewer units in the community colleges.
- Fewer than half of engineering students completed their community college coursework at one institution;



29% attended two community colleges, 14% attended three, and 9% four or more community colleges.

Surveys and focus groups with 198 students who transferred from California's community colleges into baccalaureate programs in Engineering at three different baccalaureate-granting institutions (a UC, a CSU, and a private university) found the following:

- One obstacle to completing lower-division courses in engineering is that many community colleges do not offer these courses.
- The lower-division major requirement courses students had to complete after transfer varied widely within disciplines and between institutions. In engineering, 40% of students transferring to the CSU, compared to 25% of those transferring to the UC, had to complete four or more lower division major requirement courses after transferring.
- The students were extremely resourceful, using multiple sources to determine and confirm which courses to take prior to transfer.

In interviews, representatives from participating baccalaureate institutions identified what they perceive to be major factors supporting and compromising transfer. One interviewee from a UC institution explained that although many transfer applicants have completed the units required for general transfer to the institution, they have not completed the courses required for transfer into the college's School of Engineering. The interviewee explained that although the School of Engineering receives about 1,000 applications a year from community college students it has never been able to fill the 150 slots set aside for transfer students.

Through additional preliminary research into effective practices that might support the transition of engineering students' to bachelor's degree programs, the RP Group identified that some other occupational disciplines have begun applying technology solutions to address transfer barriers. For example, many high-demand health occupations programs offer online courses that facilitate transfer, particularly for students balancing school and work. To reduce travel and the time required to meet in person, these online programs concentrate lab work one day a week or offer it during weekends or interim sessions. This finding raises the question of how technology may be used to make it easier for community college students to access and complete lower-division Engineering courses prior to transfer.

This and many other questions will be considered in convenings where educators and industry representatives will have the opportunity to reflect on how the RP Group's research can spark and support action leading to increased transfer in their discipline. The RP Group

anticipates completing this Phase II research, releasing findings, and holding related convenings in 2012.

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