INSTITUTE FOR HIGHER EDUCATION
LEADERSHIP & POLICY

CAREER OPPORTUNITIES:

Career Technical Education and the College Completion Agenda

Part II: Inventory and Analysis of CTE Programs in the California Community Colleges

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Executive Summary

Strengthening and Streamlining Career Technical Education

The Obama Administration has once again demonstrated the important role community colleges play in educating our nation's workforce and boosting our nation's economy with its recently proposed Community College to Career Fund. This $8 billion fund is aimed at forging partnerships between colleges and businesses to train workers for good-paying jobs in high-demand fields. To be positioned to benefit from this and other potential opportunities, the California Community Colleges (CCC) should accelerate efforts to strengthen and streamline career technical education (CTE). Our research reveals a potential for much greater value to be realized from the CTE mission area. Despite healthy course enrollments and credit accumulation in vocational coursework, only a small percentage of students earn certificates or vocational associate degrees. The colleges collectively offer a vast array of CTE programs that our research tells us could be better shaped to meet student and employer needs.

As a follow up to our February 2011 report, *The Road Less Traveled*, we have embarked on a four-part project to examine the status of the CTE mission area of the California Community Colleges and ultimately to identify ways that state and system policy can best support colleges in operating CTE programs that meet the needs of students and their regions. The first report, released January 2012, concluded that fragmented and complex organizational structures and funding arrangements preclude development of a coherent systemwide strategy for CTE.

For this second report, we examine the full set of career-oriented credentials offered by the CCC. We inventory CTE programs across the system and analyze program information as a basis for understanding how the breadth and complexity of CTE programming within and across colleges contributes to the overall performance of CTE. We also strive to determine how well the CTE programs offered across the system are meeting students' needs to identify, enroll in, and complete programs with real value in today's labor market.

Key Issues

Our analysis of the inventory of career-technical education programs suggests that the policies and procedures that have produced the current set of program offerings should be revisited so that the tremendous potential of the community colleges to position students for workforce success can be realized. Below we identify several issues that deserve attention as efforts move forward to improve the effectiveness of CTE in the California Community Colleges.

Extensive Program Offerings Appear Inefficient

The vast array of programs across the CCC does not appear to reflect careful planning around which programs are most essential to meeting the needs of the economy and the interests of students in credentials with real value. Currently in the 142 CTE fields of study, the colleges collectively offer about 8,000 certificate programs and 4,500 associate degree programs. Each community college offers anywhere from 32 to 275 programs in 7 to 52 fields. Enrollments and completions (i.e., reported awards of certificates and degrees) are highly concentrated in a small portion of fields. Just 13% of the fields accounted for 75% of all CTE enrollments; fewer than 6% of the fields produced *over half* of the reported awards for the three years of data we analyzed. This high concentration of enrollment and completions implies that program review processes are ineffective at keeping program offerings vital. While a few of the small programs may be serving a narrow but critical interest, in general it is inefficient to support many programs that serve few students and contribute little to student success. Our data also suggest that some colleges stretch themselves too thin in an effort to have a comprehensive set of offerings. Such extensive offerings may be confusing for students, who receive little informed counseling about CTE programs.

Abundance of Short-term Certificates Limits Workplace Value

Two-thirds of all certificate programs offered across the CCC are short-term certificates, or certificates of less than one year, or 30 credits. While some short-term certificates likely provide a good return for established workers seeking additional skills in their field, research suggests

they are of little value to young students with no prior college credential or to older displaced workers seeking training for a new career. The two fields with the most program offerings systemwide – Office Technology/Office Computer Applications and Child Development/Early Care and Education – are related to service occupations with lower expected salaries for graduates. A total of 1,564 local programs in these two fields are offered. Having so much invested in short-term certificate programs and in programs related to service occupations likely diverts important state investment in CTE programs that will add more to graduates' earning power and enhance the state's economic prospects. Short-term certificates could be a first step toward a credential providing real economic benefit, assuming they served to encourage students to continue and complete a longer-term certificate or degree. But it is not apparent – from either the recent research or more generally from institutional accountability data – whether short-term certificates actually serve as building blocks for longer-term ones.

Variability within Similar Programs is Problematic

The considerable inconsistency across similar programs – in name, credit length, course requirements, expectations for basic skills competency – creates unnecessary confusion that prevents good understanding among students and employers about the meaning of particular credentials. For example, the program requirements for an associate degree in Engineering Technology differ significantly at three colleges in the same economic region. Two of the programs require about 30 major credits while the third requires only 18 major credits. The specific course requirements vary greatly as well. These inconsistencies across programs can be confusing to students and employers who want to understand the skills and competencies one learns in a program. Most unfortunately, this variability can dilute the value of credentials earned by students in the California Community Colleges.

A Review of Program Offerings with Respect to Effectiveness Criteria

This four-part study is guided by a set of seven criteria that characterize an effective CTE enterprise, drawn from an extensive review of the literature on career education and workforce preparation (see Figure 2). All but the first are relevant to this second report in the series. Below we describe how the collective program inventory of the CCC fares with respect to these criteria.

Criterion 2. Prospective students are helped to identify and enroll in CTE programs of interest. The shortage of high school and community college counselors well-informed about CTE program offerings creates barriers for students to identify appropriate programs. Further, the sheer number of programs offered would seem to confound some students, especially since some of the 12,500 programs "on the books" are no longer offered and many programs are similar but slightly different. Without proper guidance, it would be difficult for students to know why to pick one over the other.

Criterion 3. Program offerings adapt to changing labor market needs. The distribution of student enrollments across fields indicates that there are many programs that serve very few students. Such programs might be offered because of ineffective college processes for discontinuing low-priority programs or because of faculty availability, but they do not appear to be meeting student and employer needs. The scant completions in many fields, and the extreme concentration of completions in a small share of fields, raises questions about the processes for adjusting program offerings to accommodate available resources. The data indicate that some colleges may be stretched too thin in an effort to have a comprehensive set of offerings.

Criterion 4. Efficient pathways exist for transition into entry-level credentials and advancement through credential levels. There is no question that the community colleges offer a vast and rich set of career-oriented programs. Less obvious is whether those programs are organized into efficient pathways. The abundance of short-term credentials (two-thirds of all certificate programs) could be "blocks" that a student could stack to advance step-by-step in their careers, but there is no basis either in college catalogs or the management information system to know whether the certificates are designed to provide such pathways. The concentration of completions in a small set of fields and the corresponding low completion records of other programs does suggest that whatever pathways do exist are not as efficient as they might be.

Executive Summary

Criterion 5. Students and employers understand the skills and competency outcomes of credential programs. Variation in credit and substantive requirements across similar programs likely reflects some real differences in the need for specialized or technical content – differences that we might expect to see across different regional labor markets and in industries without agreed-upon standards. But variation across similar programs that does not reflect different labor market requirements will confuse students and employers about the meaning of those degrees and the skills they certify and, consequently, will devalue the credential. The wide range of total credits and substantive requirements across CTE programs (even in the same region) would seem to leave doubt among employers about the skills and knowledge that a new hire would hold and the level of responsibility for which he or she would be suited. The variation of program content and depth is a problem for students as well, who may not know what jobs they will be prepared for by choosing a particular program.

Criterion 6. Credentials have market value for students, as validated by outcomes data. The uncertainty among employers about the skills and competencies of graduates impinges on the market value of credentials. In addition, colleges do not systematically track labor market outcomes of graduates. With a few exceptions, colleges do not compile student enrollment by program so they cannot review outcomes by program. Nor do they track labor market outcomes for students who enroll in selected courses without completing a certificate or degree, yet colleges emphasize that many students benefit from taking just a few courses. The system reports only aggregate labor market outcomes for all students who earned a degree or certificate, so absent local efforts, there is no basis for validating the labor market value of individual credentials. The substantial share of CTE awards that are short-term certificates raises questions about whether many CCC students are earning credentials with real value in the labor market.

Criterion 7. Resource allocation for CTE programs is predictable and responsive to workforce priorities. Findings from the analysis of the program inventory suggest that resources are not always allocated in response to workforce priorities. The high incidence of programs with few enrollments and of programs with few completions indicates that resources might be spread too thinly over too large an array of programs – some of which are not high priorities for students or employers.

Looking Ahead

Across California's community colleges one finds impressive programs that are training California's workforce in traditional, expanding, and emerging fields – fulfilling a mission that is unmatched by any other postsecondary sector. California's future unquestionably depends on a healthy CTE enterprise across its community colleges. Our analysis of the extensive inventory of CTE programs across the college system indicates that there is unmet potential to help students earn credentials of value in the workplace and to help employers match graduates to their needs. The CCC could enhance its value to California by orienting program offerings more purposefully to distinct regional needs, to programs of proven value, and to those that colleges have the capacity to deliver effectively. The Chancellor's Office is pursuing a number of reforms, many as an outgrowth of the Student Success Task Force, that complement an agenda to sharpen the focus of CTE programs. Our four-part series is designed to inform these efforts. Our next two reports will describe some policy directions undertaken by other states that might offer lessons for California, and will look comprehensively at California policies that influence the CTE mission and offer an agenda for policy change that could increase student success.

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A Research Agenda to Improve Support for Career Technical Education Programs

The Obama Administration has recently proposed an $8 billion Community College to Career Fund aimed at forging partnerships between colleges and businesses to train middle skill workers for good-paying jobs in high-demand industries.[1] Various elements of this new program would place colleges and college systems across the country into competition for funding that could be vital to the economies of the successful competitors. In the event that this fund comes to fruition, California's community colleges would be well advised to seize this opportunity to accelerate efforts to strengthen and streamline career technical education (CTE) across the system. College systems that can document an effective and efficient CTE mission would be a clear choice for increased federal investment.

In a February 2011 report titled *The Road Less Traveled*, we studied student progress through several CTE pathways.[2] Our analyses led us to conclude that there is a large but unfulfilled potential within the CTE mission area of the California Community Colleges (CCC) to provide Californians with credentials of value. We found that despite healthy course enrollments and credit accumulation in vocational coursework, only a small percentage of students earn certificates or vocational associate degrees. In the pathways we studied, we found a vast array of programs and credentials, significant variation in credit and programmatic requirements across seemingly similar programs, and a lack of emphasis on the awarding of vocational credentials by colleges. As a follow-up to *The Road Less Traveled*, we have undertaken a more comprehensive research agenda on CTE.

Figure 1
IHELP Research Agenda to Improve the Policy Environment in Support of CTE

- Part I: Overview of structure and funding for CTE and identification of key issues (released January 2012)
- Part II: Inventory and analysis of CTE certificates and vocational associate degree programs (this report)
- Part III: Effective state policy approaches used in other states to support CTE
- Part IV: Comprehensive analysis of state policy environment affecting CTE in California and recommendations for policy change

This report is the second part of a four-part project to examine the status of the CTE mission area of the CCC and ultimately to identify ways that state and system policy can best support colleges in operating CTE programs that meet the needs of their students and their regions (Figure 1). The entire four-part study is guided by a set of criteria that characterize an effective CTE enterprise in support of student success and a competitive state workforce (Figure 2). We will use these criteria, which emerge from the research and practice literature on career education,[3] to help us assess the status of CTE and to identify areas for, and possible means of improvement.

Scope of This Report

In this report we inventory CTE programs across the CCC to provide baseline information about the range of CTE programs that the colleges offer and in which students enroll. We analyze program information as a basis for understanding how the breadth and complexity of CTE programming within and across colleges contributes to the overall performance of CTE. Drawing on the system's own inventory of Chancellor's Office-approved programs,[4] augmented by a review of the catalogs of 109 colleges[5] for information on college-approved programs,

Figure 2
Criteria for an Effective Career Technical Education Mission

1. Programs articulate with K-12 where appropriate
2. Prospective students are helped to identify and enroll in CTE programs of interest
3. Program offerings adapt to changing labor market needs
4. Efficient pathways exist for transition into entry-level credentials and advancement through credential levels
5. Students and employers understand the skills and competency outcomes of credential programs
6. Credentials offered have market value for students, as validated by outcomes data
7. Resource allocation for CTE programs is predictable and responsive to workforce priorities

we analyze the array of CTE programs to address the following questions:

- What programs do the colleges offer?
- Are program offerings well defined and structured so students and employers understand the skills and competencies associated with each degree and certificate program?
- What programs are students pursuing?
- What programs are students completing?

We consider the answers to these questions, collectively, in the context of the criteria for effective CTE programming. Fundamentally, we want to know whether the CTE programs offered across the system are meeting *students' needs* to identify, enroll in, and complete programs with real value in today's labor market.

We base our analyses on the CCC's Taxonomy of Program (TOP) codes. In this report, we use the term "field" to refer to an area of study defined by a 4-digit TOP code (see Definitions box).[6] We use the term "program" to refer to individual local certificate and associate degree programs within those fields offered at the colleges. We focus only on fields (i.e., TOP codes) defined by the CCC as part of CTE and on credit programs within those fields (i.e., excluding any programs and college-issued credentials offered through non-credit coursework such as adult education or not-for-credit contract education).

Brief Summary of CTE Credentials in the CCC

The Board of Governors of the CCC, through the administrative and regulatory oversight of the Chancellor's Office, is responsible for approving all associate degree programs and certificate programs of at least 18 semester credits. Colleges submit their program approval requests to the Chancellor's Office, where they are reviewed by the Academic Affairs Division to determine if all relevant elements of Title 5 have been followed.

Associate degrees awarded by the CCC are of two types, the Associate of Arts (A.A.) and the Associate of Science (A.S.). Requirements for both degrees are similar and include a general education (GE) component (number of credits and specific course requirements vary across colleges and programs), a major or area of emphasis of at least 18 credits, and electives or other locally required courses to bring the total credits to a minimum of 60 semester credits. The Academic Senate of the CCC recently defined the A.S. as applying to science, technology, engineering and math disciplines and all CTE fields, with the A.A. applying to all other subject areas.[7]

The colleges award certificates of varying lengths, with those of 18 or more credits requiring Chancellor's Office approval. Colleges must also seek approval for certificates of 12 to 17 credits if those certificates are to appear on student transcripts. Colleges can award lower-credit certificates without approval, but must call them something other than "Certificates of Achievement," the term for Chancellor-approved certificates (e.g., Certificates of Recognition, Certificates of Accomplishment).

Definition of Terms as Used in this Report

TOP Code: The codes used by the CCC to classify educational programs into subject areas. TOP codes have a total of 6 digits, but can be combined into broader subject areas by looking at fewer digits. Some TOP codes are defined by the CCC as being part of the system's CTE programs – only fields and programs with CTE TOP codes are included in our analyses.

Field: An area of study as defined at the 4-digit TOP code level (i.e., the first 4 digits of the 6-digit code). Example: TOP code 0514 is Office Technology/Office Computer Applications. At the more specific 6-digit level, this field encompasses Court Reporting, Legal Office Technology, Medical Office Technology, and Office Management.

Program: A certificate or degree program at an individual college (including both programs approved by the Chancellor's Office and those approved by the colleges). Examples include the associate degree in Dental Hygiene offered at Foothill College and the certificate in Court Reporting offered at Cypress College.

A Research Agenda to Improve Support for Career Technical Education Programs

As certificates are highly focused on skill sets, they do not typically include general education requirements. (Many associate degree programs consist of the skill-related courses of a certificate program combined with an appropriate general education component.) Certificate programs differ from associate degree programs as well in the required basic skill proficiencies – an issue we noted in *The Road Less Traveled*. We found that basic skills proficiency for under-prepared students has not been well addressed for those seeking certificates. Few certificate programs require English or math, allowing under-prepared students to avoid basic skills courses and raising the question of whether students in those programs are acquiring the skills needed to succeed in the workplace. While some students acquire basic skills in contextualized CTE curricula, such practices are not widespread.[8]

There are three levels of program approval: college, region,[9] and Chancellor's Office. The regional approval is intended to ensure regional needs are met while avoiding unnecessary duplication of effort and competition among colleges within a region. The Chancellor's Office divides the state into ten regions, which are collapsed into seven to form regional consortia for program approval (see appendix for definition of the regions).

There are some opportunities for students to stack credentials in CTE fields. For example, if a low-unit certificate is a required prerequisite for another low-unit certificate, and the two together total at least 18 credits, colleges are required to submit the combined sequence for approval as a Certificate of Achievement, so that any student who earned the two low-unit college-approved certificates would also have earned the Certificate of Achievement. Associate degrees in CTE fields are often designed to layer GE and other local course requirements (e.g., physical education, health) on top of the requirements for a certificate. While this creates opportunities for CTE students to add a degree after earning a certificate, the degree can require substantially more than the 60 total credits that generally make up an associate degree in cases of high-unit certificate programs. The colleges do not offer *applied* associate degrees as do many other states' community colleges for CTE fields (e.g., the Associate of Applied Science or Associate of Applied Arts), degrees that generally require 60 total credits, but consist of fewer GE credits and more technical coursework.

Program Offerings

We examined program offerings across colleges and regions, looking at patterns of numbers of offerings and types of offerings by credential and by field. The menu of offerings implicitly reflects colleges' judgments about program need and value to students and affects the allocation of resources across the system. Community colleges in California offer certificates and associate degrees in 142 CTE fields of study. Across these 142 fields, the colleges collectively offer approximately 8,000 certificate programs and 4,500 associate degree programs. This is not the count of *different* types of programs, as many similar programs are offered by different colleges across the state. However, as we discuss later, many similarly-named programs look very different across colleges.

Colleges Offer Large and Variable Numbers of Programs

On average, each community college offers 113 different certificate and degree programs in 25 fields (this does not, of course, include liberal arts and sciences degrees). Not surprisingly, given the diversity in college size and circumstance, the average masks a huge variation across colleges, with the number of fields offered by a college ranging from 7 to 52 and the number of programs offered at a single college ranging from 32 to 275. Figure 3 shows the colleges with the most and the fewest vocational degree and certificate programs. It shows that some colleges offer about 200 more programs than others. Clearly

Figure 3
Colleges with the Most and Fewest Vocational Degree and Certificate Programs

College (headcount enrollment)	Number of Programs (associate & certificate)	Number of Certificate Programs	Number of Associate Degree Programs	Number of Fields with Program Offerings
Colleges with over 250 programs				
Long Beach Community College (26,700)	275	181	94	52
Southwestern College (19,000)	265	172	93	48
Orange Coast College (24,400)	261	159	102	48
Palomar College (30,000)	258	157	101	47
Cerritos College (23,000)	254	152	102	43
Colleges with fewer than 40 programs				
Barstow College (5,000)	39	22	17	16
Crafton Hills College (6,200)	38	29	9	8
Evergreen Valley College (8,000)	35	20	15	11
West Hills Coalinga (5,200)	34	20	14	10
Copper Mountain College (5,400)	32	23	9	7

Program Offerings

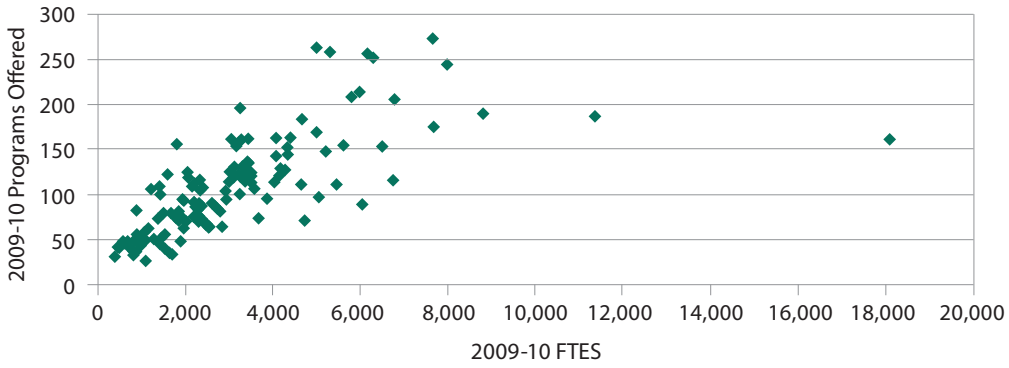
there is a relationship between college size and number of programs offered, but we found some variability within that relationship. That is, the colleges that offer the fewest number of programs (see Figure 3) are not the smallest colleges in terms of enrollment. And the colleges that offer the most programs are not all among the largest; for example, Southwestern is much smaller than Long Beach yet offers nearly as many programs.

Figure 4 explores this relationship between number of programs and college enrollment. It shows that larger colleges generally offer more programs but that some smaller colleges have program offerings disproportionately larger than their enrollment might suggest. Several colleges in the 1,500 to 5,000 full-time equivalent student (FTES) range offer more programs than much larger colleges, including a college with fewer than 2,000 FTES that offers more than 150 programs and one with about 3,500 FTES that offers nearly 200 programs. There is a wide range among the colleges in the number of programs offered in relation to the size of the college. At one extreme, a college offers one CTE program for every 11 students (FTES) enrolled while at the other extreme, a college offers one CTE program for every 110 students enrolled. (These offerings are in addition to the general education/transfer programs.)

A number of factors should be considered when interpreting data on the number and variability of programs across colleges:

Not all programs "on the books" are offered. It is likely that a significant portion of the programs listed in college catalogs are not currently active.[10] As we noted in Part I of this series,[11] colleges lack effective program discontinuation policies. We have learned that lower priority programs are more often "shelved" than officially terminated because of the work involved to restart a program once terminated, allowing them to remain in catalog listings. There may also be delays in reflecting current program offerings in the college catalog.

Figure 4
Number of Programs Offered is Related to College Size (FTES)



Program Offerings

A single occupational area may be served by multiple, related programs. Many programs lend themselves to multiple offerings to cover a variety of skill sets aimed at preparing students for different types of jobs within the same basic occupation. To illustrate, Figure 5 shows the program offerings at one community college in three commonly offered fields. Some programs likely share courses and others may build on one another. Thus, the absolute count of programs in a college may greatly exceed the qualitatively different programs that are offered.

Colleges have different mixes of mission. Some colleges emphasize the CTE mission more heavily over general education and transfer. That would logically result in those colleges having more CTE programs relative to their enrollment than colleges that emphasize the transfer mission.

Small colleges face unique challenges in meeting student needs. The potential set of CTE programs is far more extensive than the set of general education/transfer programs. Small colleges lack the resources and the critical mass of students and faculty to effectively offer a wide range of programs, yet small *rural* colleges, in particular, serve students who don't have alternatives if they wish to pursue a particular program. Small colleges that are closer to other colleges may have more opportunities to specialize and coordinate offerings with neighboring colleges so that students who live in that region have access to a fuller set of programs.

Large colleges may have opportunities to coordinate offerings. Large colleges have more resources to offer a wider array of programs and serve regions with a larger range of occupations that justify a larger set of offerings. But in contrast to small colleges in more geographically isolated areas, larger urban colleges may not need to offer all programs that their neighboring colleges offer because students have the opportunity to choose, from among several colleges, the one that offers their program of choice.

Figure 5
Example of Program Offerings at One Community College in Some Commonly Offered CTE Fields

Office Technology	Child Development/Early Care and Education	Automotive Technology
Associate Degrees:		
AS, Office Management	AA, Early Childhood Education	None
Certificates (total credits):		
Office Mgmt (37) Administrative Assistant (35) General Office (31) Word Processing/Desktop Publishing (30) Medical Office Assistant (17) Office Applications (13.5) Office Assistant (12)	ECE Site Supervisor (60) ECE Master Teacher (48) ECE Teacher (40) ECE Associate Teacher (12)	Auto Dealer Technician (67) Auto Master Technician (59) Auto Electronic Technician (43) Auto Mechanical Technician (41) Apprenticeship, Auto Master Technician (40)

Program Offerings

Many Programs are Those of Lesser Documented Value in the Workplace

Figure 6 shows the number of certificate and degree programs in the ten fields with the most programs offered throughout the community college system. Collectively, these ten fields account for 41% of total program offerings. These ten fields account for 36% of the FTES in CTE. The figure shows the total number of certificate and degree programs in each field and the breakdown by associate degree and certificate programs. It divides certificates into short-term and long-term, revealing that a large share of certificates offered in these commonly-offered fields are less than one year in length. For example, 655 of the 925 programs in Office Technology/Office Computer Applications, the field with the most programs across the state, are certificate programs. Among them, 75% are short-term certificates of fewer than 30 credits. *Two-thirds of all certificate programs* across the CCC are certificates of less than one year or 30 credits.

Research suggests that the market value of associate degrees in occupational fields is greater than other associate degrees.[12] Other research demonstrates that there are consistent economic benefits to longer-term certificates (30 or more units),[13] which can "lead to well-paid careers, particularly among low-performing students."[14] But short-term certificates of less than

Figure 6
Certificate and Degree Programs in the 10 CTE Fields with the Most Offerings

Field	Total Number of Certificate and Associate Programs Offered	Average Number of Programs		Number of Associate Degree Programs	Number of Certificate Programs			
		Per College	Per Region		College Approved (< 18 credits)	Chancellor's Office Approved, Short-Term (18-29 credits)*	Chancellor's Office Approved, Long-Term (30+ credits)	Percent of Certificate Programs that are Short-Term (<30 credits)
Office Technology/Office Computer Applications	925	8	132	270	304	187	164	75%
Child Development/Early Care and Education	639	6	91	177	175	122	165	64%
Digital Media	557	5	80	143	207	69	138	67%
Business Management	534	5	76	177	150	107	100	72%
Automotive Technology	515	5	74	137	181	104	93	75%
Manufacturing and Industrial Technology	443	4	63	152	116	85	90	69%
Computer Infrastructure and Support	404	4	58	109	163	69	63	79%
Administration of Justice	400	4	57	166	99	73	62	74%
Accounting	341	3	49	114	89	87	51	78%
Electronics and Electric Technology	330	3	47	117	48	67	98	54%

*Also includes some Chancellor's Office-approved certificates of 12-17 credits, in cases where colleges sought approval to allow such certificates to be listed on student transcripts

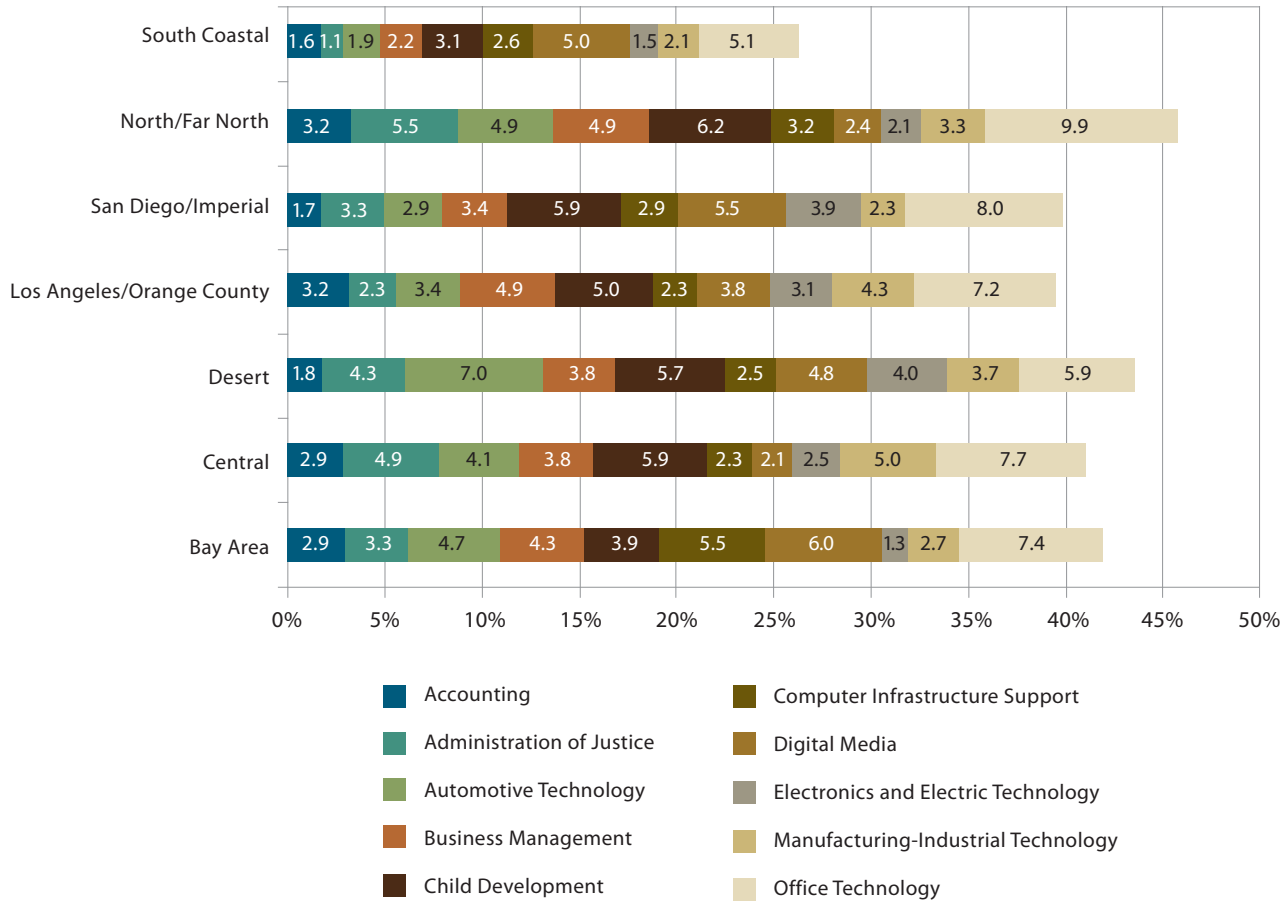
Program Offerings

one year have less economic value to students, with completers shown to earn no more than students who start but do not complete such programs.[15] Short-term certificates are likely to have more value for employed adults needing quick skill upgrades or for those who combine several short-term certificates into a higher-value credential, but alone, their value to students has not been validated. Field of study also affects the value of certificates, with those in health care, technology, construction trades, and repair demonstrating strong returns but certificates related to service occupations failing to show consistent value. The top two fields of Office Technology/Office Computer Applications and Child Development/Early Care and Education are related to service occupations with lower expected salaries for students.

Regional Offerings Vary to Some Extent

Every one of the seven regions of the state offers CTE programming, with colleges in each region[16] collectively offering, on average, 1,782 vocational certificate and degree programs in 119 fields. There are slight differences in the most commonly offered fields across regions. Figure 7 displays the distribution by region of the ten most commonly offered fields systemwide, showing that each region has a somewhat different emphasis across fields. Some of the variation is clearly related to regional economic strength. For example, the Bay Area has the highest relative effort devoted to Computer Infrastructure Support and Digital Media. Some of it, like the focus on Administration of Justice in the North/Far North, reflects chosen programmatic priorities.

Figure 7
Distribution by Region of 10 Most Common Fields, Systemwide
(Numbers on Graph Indicate Percentage of Region's Total Programs)



Definition and Structure of Programs

We examined the structure of CCC programs, in terms of their length (total credits required) and specific course requirements. Program structure affects how readily students can understand and appropriately choose among the various programs, and how transparent the meaning of the specific degrees and certificates is to employers who might seek to hire graduates of the programs.

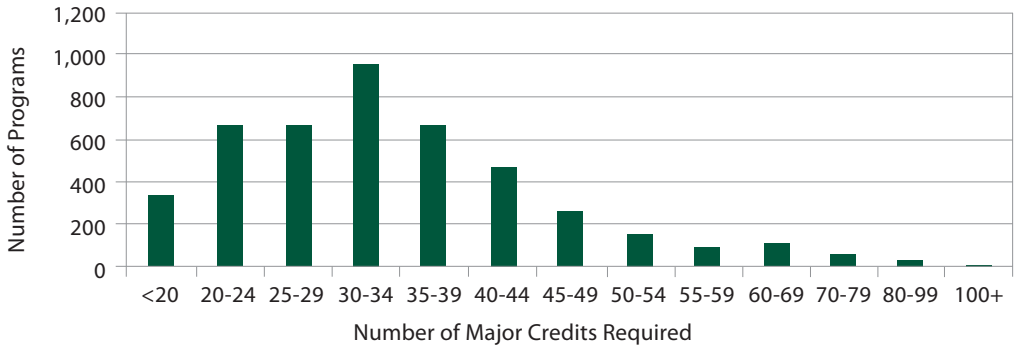
Associate Degrees

There is considerable variation in requirements across associate degree programs, both across fields and within the same field. On average, associate degree programs across the CCC require 34 major credits (Figure 8), in addition to the credits required to complete general education and other coursework required by individual colleges. The average number of major credits required within a field ranges from 18 to 77 credits. At the extremes, one field has an average major credit requirement less than 20 (Health Occupations, General) and three fields have average major credit requirements of at least 65 (Respiratory Care/Therapy, Radiologic Technology, Physicians Assistant).

Looking at individual programs rather than averages within fields, there is even more variation. There are 275 CTE degree programs (about 6% of the total) across the system that require 18 major credits, which is the minimum requirement according to regulations established by the CCC Academic Senate. However, six programs require at least 100 major credits, including one program each in Dental Hygiene, Nursing, Court Reporting, Respiratory Care, Paramedic, and Radiologic Technology. About 20% of all fields include at least one degree program that requires more than the typical overall credit requirement for an associate degree (60 credits).

It is not surprising that different programs, aimed at different occupations, require quite different amounts of coursework. More surprising is the variation we found across seemingly similar programs offered in the same region. Figure 9 shows an example of variation across programs offering an associate degree in Engineering Technology in three colleges in the same region – the Central Valley. Two of the programs require about 30 major credits made up of specific course requirements, while the third requires only 18 major credits that students select from a list of courses. The specific course requirements vary substantially across the programs. For example, two of the programs require coursework in chemistry and physics while the third does not. One program requires Calculus while the others require statistics (with Calculus listed as a possible elective course in one of the programs).

Figure 8
Number of Major Credits Required for Associate Degree



Definition and Structure of Programs

Certificates

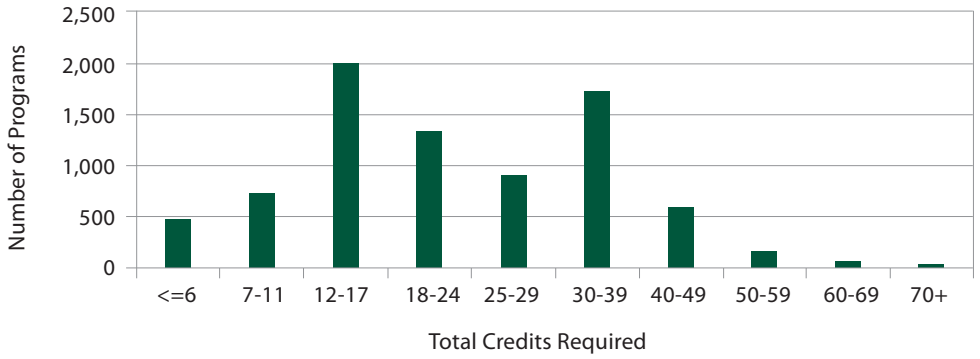
Certificate programs vary greatly in the numbers of credits required (Figure 10). On average, they require 24 credits. At the extremes, four fields have average credit requirements of 15 or less and three fields have average credit requirements of greater than 60. The three fields with an average that exceeds the usual total credit requirement for an associate degree (60) are Physicians Assistant (average 88 units, ranging from 86 to 89 units), Radiologic Technology (average 67 units, ranging from 10.5 to 95 units), and Diagnostic Medical Sonography (average 61 units, ranging from 26 to 102 units).

As with associate degrees, there is even more variation across individual certificate programs than across the averages within fields. Individual program credit requirements range from 0.5 credits to 102 credits. Six fields include at least one certificate program that requires only 0.5 credits (Fire Technology, Emergency Medical Services, Administration of Justice, Electronics and Electric Technology, Medical Assisting, and Paramedic). Eighty-two fields of study include at least one certificate program of 10 credits or fewer. Some of these very short-term certificates likely involve specific skill upgrades or continuing education for people already holding the primary credential required to work in the field. At the other end of the spectrum, two fields of study include at least one certificate that requires more than 100 credits (Diagnostic Medical Sonography and Office Technology/ Office Computer Applications) and 32 fields include at least one certificate that requires more than 60 credits.

Figure 9
Example of Variation across Associate Degree Programs in Engineering Technology

Merced College	San Joaquin Delta College	Modesto Junior College
30 major credits, as follows: ■ General Chemistry (5) ■ Physics (4) ■ Engineering Materials (3) ■ FORTRAN Programming (3) ■ Elementary Mechanics (3) ■ Direct and Alternating Current Circuits (5) ■ Descriptive Geometry (3) ■ Calculus I (4)	*18 major credits, selected from (all 3 credits):* ■ Drafting (Engineering, Computer-aided, Civil, Machine) ■ Materials & Measurement ■ 3-dimensional Modeling ■ Machine Design ■ Mech. & Elec. Systems ■ Industrial Control Systems ■ Applied Surveying ■ Technical Statistics ■ Applied Statistics	*31 major credits, as follows:* ■ General Chemistry (5) ■ General Physics OR Mech. Heats & Waves (5) ■ Intro to Engineering & Architecture (1) ■ Engineering Graphics (4) ■ Elementary Statistics (5) ■ 6 credits from General Computer Lit (3), Machine Tool Tech (4), Arc & Gas Welding (3) ■ 5 elective credits from a list (mostly Drafting or Calculus)

Figure 10
Number of Credits Required for Certificates



Definition and Structure of Programs

Figure 11 shows an example of variation across programs offering a certificate in Computer Programming in three colleges in the Bay Area. One of the programs requires 47 to 56 credits, while the second program requires 30 credits and the third requires just over 20 credits. One of the programs requires students to take a writing course while the others do not. Clearly, the students completing these similarly-named programs, in the same economic region of the state, would enter the job market with widely varying skills and competencies.

Figure 11
Example of Variation across Certificate Programs in Computer Programming

Laney College	Gavilan College	San Jose City College
47-56 credits: ■ Intro. Computer Science (5) ■ Intro. Programming (5) ■ C Programming (4) ■ Intro to Operating Systems (1) ■ Operating Systems Scripting (1) ■ Web Publishing (1) ■ Data Comm./Networks (4) OR Web Pub. II (2) ■ One writing class (3) ■ Programming w/C++ (4) ■ Data Structures/Algorithms (4) ■ Java Programming I (4) ■ UNIX/LINUX Op. Sys. (4) ■ 3 electives (e.g., Java, Assembly Language, Info Security, XML Apps.)	*21-22 credits:* ■ C++ Programming I (4) OR C++ Scientific Prog. (3) ■ C++ Programming II (4) ■ UNIX/LINUX Operating Systems (4) ■ 10 credits from among: ■ Web Page Authoring I (2) ■ Assembly Language Programming (4) ■ Java Programming I (4) ■ C#.NET Programming (4) ■ Visual Basic.NET Programming (4) ■ Perl Programming/Lab (3) ■ Web Sites with SQL and PHP (4)	*30 credits:* ■ Intro. Computer Information Systems (3) ■ C++ Programming (3) ■ Visual Basic Programming (3) ■ Data Structures (3) ■ Object-oriented Programming (3) ■ Java Programming (3) ■ Intro to UNIX (3) ■ 9 credits of CIS department electives

Programs Students are Pursuing

Here we examine the distribution of student enrollment across the universe of CTE programs. As budget constraints force colleges to trim their course offerings, course enrollment is perhaps the most important factor they consider. Eliminating low-enrolled courses is both financially prudent and seemingly responsive to students. But students may not know which CTE programs offer them more or lesser value in the labor market, and they may choose courses based on what fits their schedule. Consequently, student demand, while reflecting "popularity," or "perceived value," may not be the best measure of the actual value of programs to students seeking good employment opportunities. Nevertheless, an analysis of the distribution of student enrollments across programs is a starting point for understanding how the CCC is allocating its CTE resources and how well those priorities might reflect employer needs and differences across regional labor markets.

Data Limitations Impede Analysis by Program

Data limitations prevent us from identifying the specific programs students are pursuing. With a few exceptions like nursing and dental hygiene, most CCC students do not formally declare a program of enrollment, and most colleges do not track student progress or outcomes by program.[17] Nationally, it is common practice for students in CTE programs to declare their majors, allowing community colleges to examine program enrollments and report program outcomes in terms of completion rates, job placement rates, and earnings.[18]

Without data on program of study, we are limited to analyzing student *course enrollment* instead of *program enrollment*. We can examine the popularity among students of particular fields of study by looking at data on the full-time equivalent student enrollment in courses in each field. Between the 2007-08 and 2009-10 school years, the CCC had an average of 347,919 FTES enrolled annually in courses in CTE fields. We looked at the distribution of these enrollments across fields and regions.

Enrollments Highly Concentrated in a Few Fields

As shown in Figure 12, the difference in enrollment between the most and least popular fields is stark: between 2007-08 and 2009-10, the single field of Administration of Justice had nearly 400 times as many full-time equivalent students as the ten least popular fields combined. Child Development/Early Care and Education had nearly 300 times as many FTES as the ten smallest programs combined. The ten highest enrolled fields shown in Figure 12 account for just seven percent of the fields (10 of 142) yet accounted for half of student enrollments. If we extended the figure to include eight more programs, we'd see that 13% of the fields account for 75% of the enrollment. The converse of these high-enrolled fields is that most fields enrolled few FTES systemwide. Having many programs with very few students raises questions about whether program review and elimination procedures in the CCC are working to ensure that programs offered are really needed. It also suggests that the state's investment in CTE may not be as efficient as it could be.

Most Popular Fields are Similar across Regions

The most popular fields vary somewhat across regions of the state, as shown in Figure 13. But the top three fields *systemwide* are also in the top three fields in most regions (shown in bold type). Administration of Justice is in the top three in all seven regions, while Nursing is in the top three in five regions and Child Development/Early Care and Education is among the top three fields in four regions. The commonality of the top three fields across regions suggests areas for statewide development of common standards and more consistent curricula to cut down on the program variability that may confuse students and employers and reduce the value of credentials, as noted in the last section.

Programs Students are Pursuing

Figure 12
Most and Least Popular CTE Fields as Measured by Student Enrollment (FTES)

Field	Average Annual FTES, 2007-08 to 2009-10	Percentage of Ssystemwide FTES (CTE courses only)*	Cumulative Percentage of CTE FTES
Highest Enrollment			
Administration of Justice	29,456	8%	8%
Nursing	26,575	8%	16%
Child Development/ Early Care and Education	22,909	7%	23%
Accounting	19,372	6%	29%
Fire Technology	17,764	5%	34%
Office Technology/ Office Computer Applications	13,328	4%	38%
Information Technology, General	11,541	3%	41%
Nutrition, Foods, and Culinary Arts	11,445	3%	44%
Cosmetology and Barbering	10,493	3%	47%
Automotive Technology	9,610	3%	50%
Lowest Enrollment			
Laboratory Science Technology	14	0%	
Hospital Central Service Technician	14	0%	
Other Agriculture and Natural Resources	14	0%	
Other Family and Consumer Sciences	9	0%	
Orthopedic Assistant	9	0%	
Polysomnography	7	0%	
Food Processing and Related Technologies	3	0%	
Instrumentation Technology	2	0%	
Hospital and Health Care Administration	2	0%	
School Health Clerk	2	0%	

* Rounded to nearest whole number

Programs Students are Pursuing

Figure 13
Most Popular CTE Fields as Measured by Student Enrollment by Region
(% of FTES, 2007-08 to 2009-10)

Region	Most Popular Field	2nd Most Popular	3rd Most Popular
Bay Area	**Nursing (8%)**	**Administration of Justice (7%)**	Accounting (6%)
Central	Administration of Justice (12%)	**Nursing (10%)**	**Child Development/ Early Care and Education (9%)**
Desert	**Administration of Justice (11%)**	**Nursing (9%)**	**Child Development/ Early Care and Education (7%)**
Los Angeles/Orange County	**Administration of Justice (8%)**	Fire Technology (7%)	Accounting (6%)
North/Far North	**Administration of Justice (8%)**	**Child Development/ Early Care and Education (7%)**	**Nursing (7%)**
San Diego/Imperial	**Child Development/ Early Care and Education (7%)**	**Administration of Justice (7%)**	Construction Crafts Technology (7%)
South Central	Fire Technology (11%)	**Nursing (11%)**	**Administration of Justice (10%)**

Note: bold type shows top three fields systemwide

Program Completion and Alignment with Needs

Ideally, with reference to the criteria guiding this report, we would want to know the completion and job placement rates by program in order to assess whether students are obtaining credentials of value in the workplace, and by inference, whether colleges are adjusting their program offerings to keep up with changing labor markets. There are significant data limitations preventing such analyses. As stated, the CCC does not track student enrollment by program, so outcomes by program are unknowable from systemwide data. In addition, colleges are only required to report the number of awards in Chancellor's Office-approved programs (i.e., all associate degrees and certificates of 18 credits or above, or 12-17 credits if included on student transcripts). While some colleges choose to report data on shorter-term certificates, comprehensive figures are not available for the shorter-term, college-approved programs.

Despite these limitations, we are able to shed light on the relative success of students in various programs by comparing shares of enrollment and shares of completion in selected fields. Also in this section, we note the concentration of completions in a small number of fields, we examine the fields that have the most completions and look across the regions for variation. Finally, we use available information on labor market value and need to assess how well CCC program completions appear to match labor market needs.

Completion Rates Vary Across Programs

As shown in Figure 14, some of the popular fields (and programs within them) produce higher completions than others, relative to enrollment. For example, the field of Nursing accounts for 8% of CTE enrollment, but students in this field account for 13% of certificates and degrees awarded. In contrast, Information Technology, General accounts for 3% of enrollment but less than 1% of completions. Until colleges can track student enrollment *by program*, this is a reasonable way to compare outcomes across programs and shows, for the examples just cited, that Nursing has a higher completion rate than Information Technology, General.

Figure 14
Shares of Enrollment and Completions for the 10 Most Popular (Highest FTES) Fields

Field	Share of Enrollment (FTES)	Share of Completions (certificates and degrees)
Administration of Justice	8%	9%
Nursing	8%	13%
Child Development/ Early Care and Education	7%	10%
Accounting	6%	4%
Fire Technology	5%	5%
Office Technology/ Office Computer Application	4%	2%
Information Technology, General	3%	<1%
Nutrition, Foods, and Culinary Arts	3%	2%
Cosmetology and Barbering	3%	2%
Automotive Technology	3%	3%

Program Completion and Alignment with Needs

Completions Concentrated in a Few Fields

The fields in which students complete a program (i.e., earn a certificate or degree) show a high degree of concentration (Figure 15). Three fields out of 142 (Nursing, Child Development/Early Care and Education, Administration of Justice) - just 2% of all fields - produced nearly one-third of all completions. Eight fields (fewer than 6% of the 142 fields) produced *over half* of the awards earned between the 2007-08 and 2009-10 academic years. (Recall that not all certificates of less than 18 units are reported; we have no way to determine how those short-term certificates affect the distribution of completions by field.) Because completions are heavily concentrated in a limited number of fields, many of the 142 CTE fields offered in the CCC have very few completions. While eight fields produced half of all completions, 70% of the fields (or 99 fields) combined account for only 10% of the degrees and certificates awarded. Having many programs with very few completions reduces the efficiency of the state's investment in CTE, as the goal is primarily to enroll students in programs that produce sub-baccalaureate certificates and degrees that benefit both students and the economy.

Figure 15
CTE Fields with the Highest Number of Completions (Degrees and Certificates)

Field	Total Completions 2007-08 to 2009-10	Percentage of Total 2007-08 to 2009-10	Cumulative Percentage
Nursing	25,545	13%	13%
Child Development/ Early Care and Education	20,471	10%	23%
Administration of Justice	18,538	9%	32%
Fire Technology	8,921	5%	37%
Business Administration	8,801	4%	41%
Accounting	7,802	4%	45%
Automotive Technology	6,199	3%	48%
Business Management	5,229	3%	52%
Human Services	4,861	2%	54%
Emergency Medical Services	4,840	2%	56%

Program Completion and Alignment with Needs

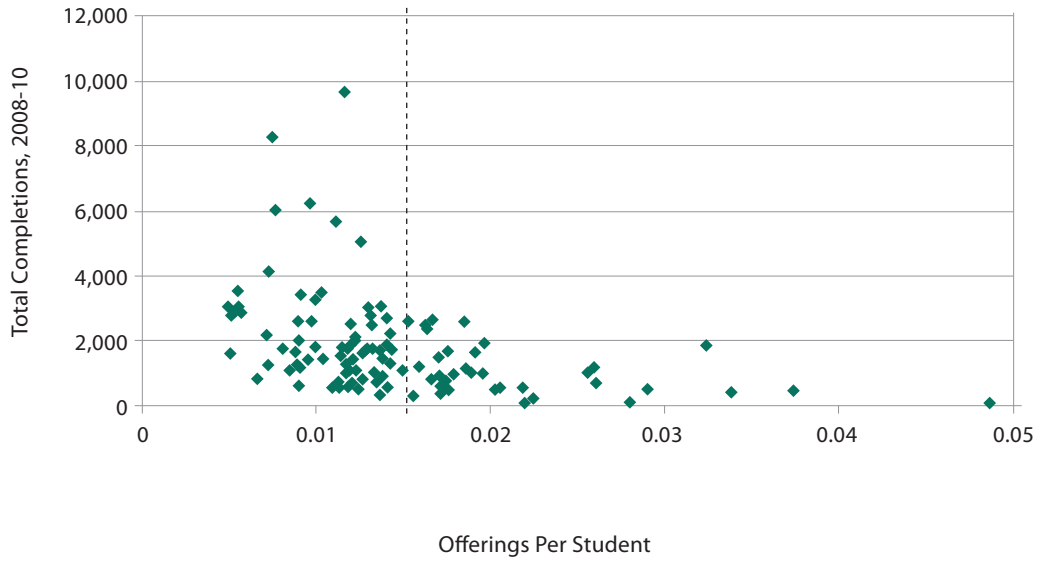
One reason for the paucity of completions in so many fields may be the tendency of some colleges to offer more programs than can effectively be supported by their enrollment and the size of their faculty.[19] To test this possibility we examined the relationship between the total number of CTE completions at a college and the number of programs offered per FTES. Figure 16 plots that relationship for all colleges. It shows that offering more programs per student is associated with fewer certificates and degrees awarded. Colleges with fewer programs relative to their enrollment see more completions of those programs. The dotted line shows generally that colleges on the rightside (more programs per enrollment) had more limited completions.

This suggests that colleges that offer more programs relative to the size of their student body may be stretched too thin in their efforts to offer a comprehensive set of CTE programs and may not be able to help as many students complete their programs. It could also be the case that some colleges with high numbers of offerings per student and low completions are offering many short-term certificates for which completions are not reported. That would reduce a concern about those colleges being stretched too thin but raise questions about the value of the short-term certificates being awarded in apparent large numbers.

Fields with Most Completions are Similar across Regions

There is a lot of similarity across regions in the fields in which students most often complete certificates and degrees (Figure 17). Many of the most commonly completed fields statewide also appear in the top three of several regions. For example, Nursing and Child Development/Early Care and Education are in the top three in all seven regions, and Administration of Justice is among the top three in four regions. A few regions have something more unique among the top three fields completed, including Fire Technology in the South Central and North/Far North regions and Business Administration in the San Diego/Imperial region.

Figure 16
Relationship between Program Offerings Per Student and Completions at Individual Colleges



Program Completion and Alignment with Needs

Figure 17
Fields with the Highest Number of Completions by Region
(% of Total Completions in the Region, 2008-09 to 2009-10)

Region	Most Completions	2nd Most Completions	3rd Most Completions
Bay Area	Administration of Justice (13%)	Child Development/ Early Care and Education (10%)	Nursing (8%)
Central	Nursing (22%)	Child Development/ Early Care and Education (11%)	Administration of Justice (9%)
Desert	Nursing (14%)	Child Development/ Early Care and Education (14%)	Administration of Justice (10%)
Los Angeles/Orange County	Nursing (12%)	Child Development/ Early Care and Education (11%)	Administration of Justice (9%)
North/Far North	Fire Technology (13%)	Nursing (11%)	Child Development/ Early Care and Education (8%)
San Diego/Imperial	Child Development/ Early Care and Education (10%)	Nursing (9%)	Business Administration (9%)
South Central	Nursing (22%)	Child Development/ Early Care and Education (7%)	Fire Technology (6%)

Program Completion and Alignment with Needs

Potential to Meet Labor Market Value Not Clearly Established

Figure 18 shows the number of completions in CTE fields in the last three years as reported to the Chancellor's Office. Forty percent of CTE awards issued by the colleges between 2007-08 and 2009-10 and reported to the Chancellor's Office were associate degrees[20] and about 20% were longer-term certificates of at least 30 credits. The remaining 40% were short-term certificates of less than one year. If all college-approved short-term certificates were included, that share would likely be substantially higher and the shares of degrees and longer-term certificates would be lower. As noted previously, the value of short-term certificates is questionable and highly dependent on individual circumstances. They are more likely to be valuable to established workers seeking to advance, because such individuals may already have degrees or other credentials on which to build. Data are not available for us to determine the distribution of short-term certificate earners by age. Such data would be important to have in order to determine whether such a high percentage of short-term certificates is warranted.

Figure 18
CTE Completions by Type of Award
(includes only awards reported to the Chancellor's Office)

	Total Completions 2007-08 to 2009-10	Percentage of Total 2007-08 to 2009-10
Associate Degrees	80,327	40%
Certificates:		
< 6 credits*	14,920	8%
6-17 credits*	37,749	19%
12-17 credits*	1,396	1%
18-30 credits	26,008	13%
30-60 credits	33,962	17%
>60 credits	4,453	2%
Total CTE Awards	198,815	100%

* Figures for these short-term certificates are incomplete. Colleges are not required to report these awards to the Chancellor's Office (certificates of 12-17 credits must be reported only for programs that are approved by the Chancellor's Office). So the percentage of awards that are short-term is likely substantially higher than shown in this table, and the percentage of awards that are degrees and long-term certificates is likely lower.

The question of whether the credentials awarded are meeting labor market needs would be best addressed through a regional analysis given the size of California and the variation in local labor markets around the state. Lacking such data, we present some information on how well the programs completed *systemwide* match up with statewide projections of the need for workers with sub-baccalaureate credentials. Figure 19 displays the ten occupations requiring either an associate degree or postsecondary vocational education that are projected to have the highest number of job openings through 2018. Four of the ten occupations match up to CCC programs that are among the top ten in the number of certificates and degrees awarded annually between 2007-08 and 2009-10 (as noted in bold).[21] Two other occupations on the list match programs included on the list of programs most commonly offered across the CCC (Computer Support/ Specialists) or most highly enrolled (Computer Support/ Specialists and Cosmetologists) but not among those with the most certificates and degrees awarded.

Figure 19
Top 10 Sub-Baccalaureate-Level Occupations with the Highest Number of Projected Job Openings, 2008-18

Occupations Requiring Associate Degree or Postsecondary Vocational Training (occupations in bold are those that match CCC programs among the 10 with the most completions reported*)
Registered Nursing
Computer Support and Other Computer Specialists
Licensed Vocational Nursing
Medical Secretaries
Automotive Service Technicians and Mechanics
Preschool Teachers
Fitness Trainers
Cosmetologists
Insurance Sales Agents
Paralegals and Legal Assistants
* Some certificates of <18 units are not reported.

Source: California Employment Development Department, Occupational Employment Projections 2008-2018. Included are the subset of occupations with Education and Training Levels 6 (Associate Degree) and 7 (Postsecondary Vocational Education)

Program Completion and Alignment with Needs

Figure 20 shows the annual projected job openings in the fastest-growing occupations in California with required education at the postsecondary sub-baccalaureate level, and the annual production of certificates and associate degrees in related fields across the CCC (as reported). The final column in the table shows the number of certificates and degrees awarded as a percent of job openings, as a measure of whether the community colleges are producing enough graduates to meet labor market demand in these fast-growing occupations. Of course, there are private postsecondary education providers in the state that likely produce sub-baccalaureate credentials in some or all of these fields. The CCC appears to be meeting the projected need for Respiratory Therapists, Radiologic Technicians, and Paramedics/EMTs. For Registered Nursing, CCC production is meeting two-thirds of the annual need according to the state's occupational projections which, combined with the production of associate degrees in nursing at private two-year institutions and the production of nursing graduates with bachelor's degrees at the California State University and private universities, may be adequately meeting current estimates of state need. We offer this analysis not as any conclusive evidence one way or the other but merely to suggest how the system might use available systemwide data to set priorities for further analysis.

Figure 20
Certificate and Degree Production in Fields Related to the Fastest Growing Occupations in California with Required Education Level at the Postsecondary Sub-Baccalaureate Level

Occupation	Projected Average Annual Job Openings (2008-18)[1]	Average Annual Associate Degrees Awarded in Related Fields (2008-10)[2]	Average Annual Certificates Awarded in Related Fields (2008-10)[2]	Awards as a Percent of Openings
Associate Degree Level				
Registered Nurse[3]	10,210	5,750	1,069	67%
Veterinary Technician	570	123	13	24%
Respiratory Therapist	560	423	135	100%
Dental Hygienist	860	277	48	38%
Biological Technician	620	41	128	27%
Health Information Technician	630	89	224	50%
Diagnostic Medical Sonographer	180	35	34	38%
Radiologic Technician	570	427	180	106%
Postsecondary Vocational Education Level				
Licensed Practical/ Vocational Nurse	3,340	289	971	38%
Medical Secretaries	3,300	38	124	5%
Paramedic/ EMT[4]	730	103	1,947	281%
Surgical Technician	480	12	33	9%
Fitness Trainer	1,450	26	113	10%

Notes: [1] California Employment Development Department, Fastest Growing Occupations 2008-2018. Listed are the subset of occupations with Education and Training Levels 6 (Associate Degree) and 7 (Postsecondary Vocational Education)

[2] California Community Colleges Chancellor's Office Datamart, Student Program Awards for 2007-08, 2008-09 and 2009-10. Note that there may have been unreported short-term certificates that are not reflected here.

[3] Certificate programs in registered nursing are either aimed at preparing students who are already licensed vocational nurses to meet RN licensing requirements, or at preparing students new to nursing to meet RN licensing requirements without completing all the general education requirements of an associate degree

[4] The certificates awarded in this field include many very short-term, low-unit certificates that likely represent skill refreshing/upgrading of current paramedics/EMTs rather than preparation of new entrants to the field

Key Issues Regarding the Inventory of CTE Programs

The community colleges serve an increasingly important function to prepare California's future workforce. With this four-part research project, we are examining the extent to which community college CTE instructional programs, with the benefit of more supportive policies, could help more Californians earn credentials that have value in the workplace. Our project is intended ultimately to produce an agenda for policy reform. For this second report, we examined the full set of career-oriented credentials offered by the colleges. Our analysis of the inventory of CTE programs suggests that the policies and procedures that have produced the current set of program offerings should be revisited so that the tremendous potential of the community colleges to position students for workforce success can be realized. Below we identify several issues that deserve attention as efforts move forward to improve the effectiveness of CTE in the California Community Colleges.

Extensive Program Offerings Appear Inefficient

The vast array of programs across the CCC, while a strength of a large and diverse set of colleges, does not appear to reflect careful planning around which programs best meet the needs of the economy and the interests of students in credentials with real value. There are many programs with very few students and many programs with very few completions, which implies that the programs exist because program review processes are ineffective at keeping program offerings vital or because they reflect faculty availability, or both.[22] While a few of the small programs may be serving a narrow but critical interest, in general it is inefficient to support many programs that serve few students and contribute little to student success. Student success is likewise reduced if colleges stretch themselves too thin in an effort to have a comprehensive set of offerings. In addition, the extensive offerings may be confusing for students, who receive little informed counseling about CTE programs. If programs "on the books" are not actually offered, as we are told is sometimes the case, students are misled about their choices. Colleges serve students best if they can provide the resources to help students finish their programs, even if that requires reducing the number of offerings.

Improving productivity is clearly an important challenge for policy and education leaders. One way to do that would be to curtail the offering of programs with very few completions that cannot be justified based on student and employer needs for credentials of value. The processes for program elimination need review to ensure the colleges can be responsive to the changing needs of California's economy. While establishing a course schedule on the basis of student demand seems responsive, students do not necessarily know what programs are valued by employers and should not be presented with choices in the schedule that will not serve them well when they try to enter the workplace.

The lack of a requirement for students to formally select a program of study (in most cases) may be contributing to excessive program offerings. With no formal accounting of how many students enroll in and complete each program, there is no basis for colleges to compare program performance and eliminate those with low interest and poor outcomes. Also, not knowing which programs CCC students are pursuing is a significant impediment to understanding and monitoring student progress and success in CTE programs.

Abundance of Short-term Certificates Limits Workplace Value

Having so many short-term certificate programs and certificates in fields related to low-paid service occupations does little to maximize the state's investment in CTE programs that will add to graduates' earning power and enhance the state's economic prospects. While some short-term certificates likely provide a return for established workers seeking additional skills in their field, research suggests they are of little value to young students with no prior college credential or to older displaced workers seeking training for a new career. Short-term certificates could be a first step toward a credential providing real economic benefit, assuming they served to encourage students to continue and complete a longer-term certificate or degree. But it is not apparent – from either the recent research or more generally from institutional accountability data – whether short-term certificates actually serve as building blocks for longer-term ones.

Key Issues Regarding the Inventory of CTE Programs

Meeting the need of established workers for short-term certificates to upgrade specific skills should remain a priority. There may, in fact, be a need to replace some short-term certificates with other short-term certificates that employers value more highly. A common explanation for low certificate production is that many students enroll only to complete a few courses that they need for employment but don't constitute a certificate. But perhaps those courses *should* be designated as a certificate program if employers in fact value that set of 6 or 9 credits. With all of the short-term certificates currently in place, it is unclear why *potential* ones of proven value to students are not offered. It appears that much could be gained from a thorough review and realignment of short-term certificate offerings. Even so, providing a reasonable complement of short-term certificates to upgrade specific skills probably does not require having short-term certificates make up two-thirds of all certificate programs. More emphasis should be placed on long-term certificates targeted at the kinds of high-need, high-wage fields that offer good opportunities for CCC students – both first-time students in search of a career and students needing to retool a previous career.

Variability within Similar Programs is Problematic

The considerable inconsistency across similar programs – in name, credit length, course requirements, and expectations for basic skills competency – creates unnecessarily confusing variation that prevents good understanding among students and employers about the meaning of particular credentials. Working across the CCC to create more consistent programs, with variation only as necessary to respond to unique regional needs, would pay off in greater clarity about the skills imparted in particular programs and would enhance the value of CCC credentials among both students and employers. The system's recent work on creating associate degrees for transfer may offer a roadmap to more consistency in occupational programs, with model curricula developed for commonly-offered degrees and certificates, of which there are many, as we documented in this report.

The considerable variation across certificate and degree programs, even those that are supposed to be the same or very similar, serves as a barrier to assessing program effectiveness and outcomes, and increases the challenge for both students and employers to understand the meaning and value of various CCC credentials.

A similar conclusion was recently reached in an analysis of Information and Communications Technology (ICT)-related certificates and degrees in 48 CCC campuses conducted by the Mid-Pacific ICT Center (MPICT) and the San Francisco Bay Center of Excellence.[23] The study found wide variation in ICT programs, degrees, and certificates across colleges "that creates confusion and difficulty for employers trying to understand the knowledge and skill sets of workers coming from community colleges, and it dilutes the value of ICT educational credentials from California community colleges."[24] As a result of the study, the CCC Chancellor's Office recently provided a grant to the MPICT team to create the CCC ICT Collaborative and work on improving ICT education across the system. The Collaborative has preliminarily reviewed the ICT-related certificates and degrees across the 112 colleges, confirming that there is substantial variation in the departments offering ICT-related programs and the titles, names, and requirements of those programs.[25] Our findings of extreme program proliferation and variability suggest that similar efforts across other major industry sectors would be beneficial.

A Review of Program Offerings with Respect to Effectiveness Criteria

From an extensive review of the literature on career education and workforce preparation, we set forth seven criteria that characterize an effective CTE enterprise (see Figure 2 on p. 1), all but the first of which are relevant to this second report in the four-part series. Below we describe how the collective program inventory of the CCC fares with respect to these criteria.

Criterion 2. Prospective students are helped to identify and enroll in CTE programs of interest. The first report in this series noted that an absence of high school and community college counselors well-informed about CTE program offerings creates barriers for students to identify appropriate programs. In addition, the sheer number of programs offered would seem to confound some students, especially since (1) some of the 12,500 programs "on the books" are no longer offered and (2) many programs, mostly certificates, are similar but slightly different, as we illustrated in Figure 11 for one field. Without proper guidance, it would be difficult for students to know why to pick one over the other.

Criterion 3. Program offerings adapt to changing labor market needs. The distribution of student enrollments across fields indicates that there are many fields (and thus programs within those fields) that serve very few students. Such programs might be offered because of ineffective college processes for discontinuing low priority programs or because of faculty interest and availability, but they do not appear to be meeting student and employer needs. The scant completions in many fields, and the extreme concentration of completions in a small share of fields, also raises questions about the processes for adjusting program offerings to meet regional needs and to accommodate available resources. The data indicate, as well, that some colleges may be stretched too thin in an effort to have a broad and comprehensive set of offerings. The local and regional structures that support CTE planning are designed to allow for regional differentiation in accordance with local labor markets. Our findings that program offerings and the enrollment and completion patterns, by field, are similar across regions point to the benefit of more detailed study to learn whether the program mix is responsive to regional labor markets.

Criterion 4. Efficient pathways exist for transition into entry-level credentials and advancement through credential levels. There is no question that the community colleges offer a vast and rich set of career-oriented programs. Less obvious is whether those programs are organized into efficient pathways. The abundance of short-term credentials (two-thirds of all certificate programs) could be "blocks" that a student could stack to advance step-by-step in their careers, but there is no basis either in college catalogs or the management information system to know whether the certificates are designed to provide such pathways. The concentration of completions in a small set of fields and the corresponding low completion records of other programs suggest that whatever pathways do exist are not as efficient as they might be. Finally, we found considerable commonality of program offerings across regions and wonder if that could be the basis for more standardized pathways across the colleges that would help students transition into and through credentials.

Criterion 5. Students and employers understand the skills and competency outcomes of credential programs. Variation in credit and substantive requirements across similar programs likely reflects some real differences in the need for specialized or technical content – differences that we might expect to see across different regional labor markets and in industries without agreed-upon standards. However, variation across similar programs that does not reflect different labor market requirements will confuse students and employers about the meaning of those degrees and the skills they certify and, consequently, will devalue the credential. One reason for the low numbers of certificates and degrees awarded, according to some CTE educators, is that employers don't value vocational credentials, so faculty don't steer students toward earning them.[26] Our inventory data suggest an alternative explanation: employers may not value some credentials because the variability among them makes it difficult to know the skills and competencies represented by a credential. The wide range of total credits and substantive requirements across CTE programs (even in the same region) would seem to leave considerable doubt among employers about the specific skills and knowledge that a new hire would hold and the level of responsibility for which he or she would be suited. The variation of program content and depth is a problem for students as well, who may not know what jobs they will be prepared for by choosing a particular program.

A Review of Program Offerings with Respect to Effectiveness Criteria

Criterion 6. Credentials have market value for students, as validated by outcomes data. The potential uncertainty among employers about the skills and competencies of graduates impinges on the market value of credentials. In addition, colleges do not systematically validate the market value of their programs by looking at labor market outcomes. With a few exceptions, colleges do not compile student enrollment *by program* so they cannot obtain labor market outcomes for individual programs. Nor do they track labor market outcomes for students who enroll in selected courses without completing a certificate or degree, yet colleges emphasize that many students benefit from taking just a few courses. System level accountability reporting of labor market outcomes is aggregated for all students who earned a degree or certificate, so absent individual local efforts, there is no basis for validating the labor market value of individual credentials. The substantial share of CTE awards that are short-term certificates raises questions about whether many CCC students are earning the kinds of credentials that will have real value in the labor market.

Criterion 7. Resource allocation for CTE programs is predictable and responsive to workforce priorities. The first report in this series described the challenges to predictable CTE funding presented by heavy reliance on competitive grants. Findings from the analysis of the program inventory presented in this report suggest that resources are not always allocated in response to workforce priorities. The high incidence of programs with few enrollments and of programs with few completions indicates that resources might be spread too thinly over too large an array of programs – some of which are not high priorities for students or employers. More use of "conjoint programs," in which multiple colleges in a region cooperate to design and offer a program, would be one means of better sharing resources while meeting student needs.[27]

Looking Ahead

Across California's community colleges one finds impressive programs that are training California's workforce in traditional, expanding, and emerging fields – fulfilling a mission that is unmatched by any other postsecondary sector. California's future unquestionably depends on a healthy CTE enterprise across its community colleges. Our analysis of the extensive inventory of CTE programs across the college system indicates that there is unmet potential to help students earn credentials of value in the workplace and to help employers match graduates to their needs. The CCC could enhance its value to California by orienting program offerings more purposefully to distinct regional needs, to programs of proven value, and to those that colleges have the capacity to deliver effectively.

The Chancellor's Office is pursuing a number of reforms, many as an outgrowth of the Student Success Task Force, that complement an agenda to sharpen the focus of CTE programs. The new Vice Chancellor for Workforce and Economic Development is engaging the CTE community in conversations about how best to employ leadership at the state, regional, and college levels to meet student and employer needs. Our four-part series is designed to help empower that leadership through policy reforms that will better support the CTE mission. To that end, the next report in our series will describe some policy directions undertaken by other states that might offer lessons for California. The fourth and final report will look comprehensively at the policies that now influence the CTE mission and will offer an agenda for policy change that could increase students' success in meeting their career goals through a community college education.

Appendix

Regional Consortia for the California Community Colleges

Regional Consortia	Areas/Districts in Region
North/Far North	Butte, Feather River, Lake Tahoe, Lassen, Los Rios, Mendocino-Lake, Redwoods, Shasta-Tehama-Trinity, Sierra Joint, Siskiyou, Yuba
Bay Area	Cabrillo, Chabot-Las Positas, Contra Costa, Foothill-DeAnza, Marin, Monterey Peninsula, Napa Valley, Ohlone, Peralta, San Francisco, San Jose-Evergreen, San Mateo County, Solano County, Sonoma County (Santa Rosa Junior), West Valley-Mission
Central	Gavilan, Hartnell, Kern, Merced, San Joaquin Delta, Sequoias, State Center, West Hills, West Kern (Taft), Yosemite
South Coastal	Allan Hancock, Antelope Valley, San Luis Obispo County (Cuesta), Santa Barbara, Santa Clarita (College of the Canyons), Ventura
Los Angeles/Orange County	Cerritos, Citrus, Coast, El Camino, Glendale, Long Beach, Los Angeles, Mt. San Antonio, North Orange County, Pasadena, Rancho Santiago, Rio Hondo, Santa Monica, South Orange County
Desert	Barstow, Chaffey, Copper Mountain, Desert, Mt. San Jacinto, Palo Verde, Riverside, San Bernardino, Victor Valley
San Diego/Imperial	Grossmont-Cuyamaca, Imperial, Mira Costa, Palomar, San Diego, Southwestern

Notes

1 For information on the College to Career Fund see http://www.whitehouse.gov/the-press-office/2012/02/13/fact-sheet-blueprint-train-two-million-workers-high-demand-industries-th

2 Shulock, N., Moore, C., & Offenstein, J. (2011). *The road less traveled: Realizing the potential of career technical education in the California community colleges.* Sacramento, CA: Institute for Higher Education Leadership & Policy.

3 See Appendix A in the first report in series, *Career Opportunities: Career Technical Education and the College Completion Agenda, Part I* for a listing of resources that guided the selection of the criteria.

4 See https://misweb.cccco.edu/webproginv/prod/invmenu.htm

5 We provide data for 109 of the 112 colleges. Compton Community College, Moreno Valley, and Norco College were not included. Compton is currently under management by another district and Moreno Valley and Norco are too new to have reliable data for our use.

6 The CCC uses different terms to refer to different levels of TOP codes. For the CCC, the 2-digit TOP code defines a "discipline," the 4-digit TOP code defines a "sub-discipline," and the 5th digit refers to a specific "field" within the sub-discipline (the 6th digit is always 0). We chose less technical, more intuitive terminology that matches common usage by the colleges, which refer to their own certificates and degrees as "programs." The term "field," in general usage, is broader than "program," and can be used to refer to related occupational fields as well as educational ones. Therefore, we use "field" to describe the 4-digit TOP code level, which is the level we used for analysis. We use "program" to describe an individual certificate or degree program at a college. See http://www.cccco.edu/Portals/4/AA/TopTax6_rev0909.pdf for the CCC's TOP code manual.

7 http://www.ccccurriculum.net/degrees/

8 Wiseley, W.C. (2011). Effective basic skills instruction: The case for contextualized developmental math. *PACE Policy Brief.* Berkeley, CA: Policy Analysis for California Education.

9 Regional "endorsement" rather than "approval" is the role of the regions in new program development.

10 A point made by members of the Vocational Research and Accountability Committee at its February 3, 2012 meeting in Sacramento which we attended to share our findings.

11 Shulock, N., Offenstein, J. (2012). *Career Opportunities: Career Technical Education and the College Completion Agenda: Part I, Structure and Funding of Career Technical Education in the California Community Colleges*, p. ii.

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

13 Bosworth, B. (2010). *Certificates count: An analysis of sub-baccalaureate certificates.* Washington, DC: Complete College America (p. 23).

14 Jacobsen & Mokher, 2009

15 Bosworth, 2010

16 The seven regions are those with regional consortia set up by the Chancellor's Office for program review and approval.

17 While some colleges do collect information on students' intended program, few do anything systematically with those data, and it is not reported to the Chancellor's Office MIS system to allow for any systemwide analysis.

18 The data on student CTE major is not always useful in states that collect it because it may not reflect student changes in major or sufficiently distinguish among types of credentials within a major. Nevertheless, these states have the foundation for examining CTE programs that is mostly absent in the California Community Colleges.

19 It could also be that certain fields award a lot of certificates of fewer than 18 units and choose not to report them to the system. We have no way of knowing how that under-reporting affects the distribution of awards by fields. However, we have noted that short-term certificates, alone, do not generally provide economic return to students. So our finding of highly concentrated completions among very few programs raises valid concerns that many programs are not providing good opportunities for students.

20 Some CTE students are awarded associate degrees in interdisciplinary studies, which are not included in our analyses as they are of questionable value in the marketplace and we are focused on workforce credentials.

21 The "matching" was based on matching Standard Occupational Classification (SOC) codes to Classification of Instructional Program (CIP) codes (using the National Center for Education Statistics crosswalk of 2010 SOC codes to 2010 CIP codes) and then to the CCC's Taxonomy of Programs (TOP) codes (using the CCC's 6th Edition Crosswalk of TOP codes to 2010 CIP codes).

22 In a recent report titled *Improving State Oversight of Academic Expansions*, the Legislative Analyst expressed concern that the University of California and California State University also have issues with weak processes to eliminate programs, with the incentives to create and maintain programs dependent more on faculty interest and institutional prestige rather than state needs.

23 Carrese, J. & Jones, J.B. (2011). *ICT: Information and Communications Technologies in California: Phase 3: Educational Program Input.* San Francisco, CA: San Francisco Bay Area Center of Excellence and Mid-Pacific ICT Center.

24 Carrese & Jones, 2011, p. 5.

25 California Community Colleges ICT Collaborative (2011). *ICT related academic degrees and certificates: Summary of key findings.* San Franciso, CA: Mid-Pacific ICT Center.

26 Shulock, Moore, & Offenstein, 2011

27 See a description of how conjoint programs are intended to work in the CCC's Program and Course Approval Handbook (p. 16) at http://www.cccco.edu/Portals/4/PCAH3_Mar2009_v3.pdf.

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