Structure in Community College Career-Technical Programs: A Qualitative Analysis

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Abstract

Using data obtained from interviews and program websites at Washington community and technical colleges, the authors of this study examine the structure of community college career-technical programs in allied health, business and marketing, computer and information studies, and mechanics and repair. A framework for structure with four dimensions—program alignment, program prescription, information quality, and active program advising and support—is used to evaluate the practices of relatively high- and low-performing colleges within each field of study. The authors reviewed the websites of all programs at high- and low-performing colleges in each of these fields of study and conducted case studies on individual programs from these fields, interviewing faculty, administrators, and counselors to learn more about the dimensions of structure in the programs. The allied health, computer and information science, and mechanics and repair programs were all found to be highly structured; the business and marketing programs were found to have a moderate level of structure. Overall, given that all of the programs were at least moderately structured, there was limited evidence of a connection between program structure and program performance.

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1. Introduction

Increasing the number of postsecondary credentials, particularly those earned in community colleges, is a major national goal. However, current graduation rates from community colleges are low: Fewer than 36 percent of first-time community college students in 2003–04 completed a program of study and attained a credential within six years (Radford, Berkner, Wheeless, & Shepherd, 2010). To meet national goals for credential attainment, significant reform is needed within community colleges to increase graduation rates.

One possible area of reform is the way programs of study are structured to promote student completion. Based on a review of research on college student success and the behavioral economics literature, Scott-Clayton (2011) hypothesized that "community college students will be more likely to persist and succeed in programs that are tightly and consciously structured, with relatively little room for individuals to unintentionally deviate from paths towards completion, and with limited bureaucratic obstacles for students to circumnavigate." Rosenbaum, Deil-Amen, and Person (2006) developed a concept of structure similar to Scott-Clayton's in their study of a sample of community colleges and occupational colleges (both for-profit and not-for-profit). They identified students' lack of knowledge about college procedures and realistic pathways to graduation as a barrier to completion for students in the community colleges. In contrast, at the occupational colleges, they found very structured programs that allowed little choice and provided a clear sequence of courses. Limiting choice creates less room for mistakes that may prevent students from reaching their goals. Rosenbaum et al. also found that the advising offered at the occupational colleges was more intensive and mandatory for all students, compared with the optional and often inaccessible advising offered at the community colleges. Moreover, at the occupational colleges, peer cohorts progressed through programs together, providing students with additional structure and support.

In addition, Rosenbaum et al. (2006) found that the community colleges lacked strong labor market linkages and did not prepare students well for finding employment. Unlike occupational colleges, the community colleges had weak advisory boards (if any) that met infrequently and were not composed of employers that were likely to hire

graduates. Job placement efforts at the community colleges were haphazard rather than active with dedicated staff, and community college staff did not emphasize social skills necessary for employment, such as appropriate workplace attire and punctuality.

This research from Rosenbaum et al. (2006) suggests that the structure of college programs influences student success. Its value for understanding program structure in community colleges, however, is limited. Many of Rosenbaum et al.'s criticisms of community colleges are based on analysis of the full range of programs in community colleges, including liberal arts and sciences, rather than on analysis of the specific career-technical[1] programs that are most comparable to those offered by occupational colleges.[2] Prior research suggests that students in liberal arts and career-technical programs may have very different characteristics and intents (Jenkins & Weiss, 2011). In this paper, we examine how program structure may affect student success in the specific context of community college career-technical programs.

We build on Scott-Clayton's (2011) and Rosenbaum et al.'s (2006) conceptions of structure in order to examine the structure of community college career-technical programs in Washington State. Although we recognize that the institutional practices associated with higher levels of structure may exist at both the college level and the program level, in the current study, we focus primarily on program-level practices, and specifically on how programs are organized and how information about the programs and their requirements is conveyed to students.[3] Program-level practices can help students complete a credential quickly and efficiently and can also help facilitate the recruitment process by drawing prospective students directly into the program and onto the path toward a credential.

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[1] We refer to programs designed to prepare students for direct entry into the labor market (as opposed to general liberal arts programs designed for baccalaureate transfer) as "career-technical programs." Elsewhere, these programs are sometimes referred to as "workforce" or "occupational" programs.

[2] The research design used by Rosenbaum et al. did not allow for the systematic comparison of similar programs across the two sectors, though they made some attempts in that direction. Although the student survey they conducted was administered to students in similar introductory classes across the sectors, the student interview sample (which appeared to be heavily relied upon for some conclusions) was not. Moreover, as the authors note, the selection of colleges was not random within each sector but rather included some well-regarded private sector colleges and some relatively low-performing community colleges, such that generalizations about the sectors from their sample may not be warranted.

[3] College-level practices relating to structure include recruitment, orientation, and counseling and advising practices that relate to students' choice of program.

To understand these practices from the perspective of the college as an institution, we developed a framework of program structure, drawing on previous literature. This framework of program structure has four dimensions: program alignment, program prescription, information quality, and active program advising and support. Program alignment and program prescription both relate to how programs and fields of study are organized—that is, the choices made at the colleges about what comprises a program and field of study. *Program alignment* refers to how the program is linked to employment and further educational outcomes. *Program prescription* refers to whether the program requirements are clearly specified and the level of flexibility students have in choosing their courses. *Information quality* refers to the quality of the informational resources available to students. *Active advising and student support* refers to the actions college staff take to convey program information to students and keep students engaged in—and progressing through—their programs.

With this framework, we aim to understand how community and technical college career-technical programs in Washington State are organized and how that organization may affect students. In this paper, we address the following research questions:

1. How closely are programs aligned with further educational and employment opportunities, and to what extent does this alignment vary across programs in practice?
2. How prescribed are program requirements, and how much variation in program prescription is there across programs in practice?
3. What is the quality of information available to current and prospective students, both through the college website and other means, and how does this vary across programs in practice?
4. What types of advising and student supports are offered to current and prospective students?
5. Is there any relationship between the degree of structure along these dimensions and program performance, defined by completion rates of long-term certificates and associate degrees?

In the next section of this paper, we describe our methodology in our field-of-study and site selection and subsequent fieldwork. In the following sections, we examine

the manner in which our four dimensions of structure are reflected and implemented in our sample of programs. We then consider how structure might be associated with program performance. Finally, we discuss the findings of this study and our recommendations for colleges and for future research.

2. Methods

We pursued our research questions in three stages. Using administrative data from the state of Washington, we selected four fields of study for further qualitative research and selected relatively high- and low-performing colleges within each field of study. We then reviewed the websites of all programs at high- and low-performing colleges in each of these fields of study, noting the program requirements and the quality of information available to students. Finally, we conducted case studies on high-performing and low-performing programs in each field, interviewing faculty, administrators, and counselors to learn more about the dimensions of structure in the programs.

2.1 Administrative Data and Site Selection

To select our sample of programs, we used data from administrative records provided through a data sharing agreement by the Washington State Board for Community and Technical Colleges (SBCTC). These data included transcript records and demographic information for all first-time students at Washington community and technical colleges who began their studies during the 2005–06 academic year.

We used transcript records to select fields of study and colleges for our qualitative research. We distinguish here between fields of study and programs. Fields of study are broad sets of programs that generally fall within two-digit Classification of Instructional Programs (CIP) code categories, such as business and marketing or allied health. [4]

[4] Using a taxonomy adapted from the National Center for Education Statistics, we categorized courses in students' transcripts into one of 22 fields based on their CIP codes: arts, humanities, and English; mathematics and science (STEM); social and behavioral sciences; agriculture and natural resources; automotive and aeronautical technology; business and marketing; secretarial and administrative studies; communications and design; computer and information science; cosmetology; culinary services; engineering and architecture; engineering/science technologies; education and child care; allied health; nursing; construction; manufacturing; mechanics and repair; transportation; protective services; and other career-technical.

Programs are groupings of courses that lead to a specific credential; they are subsets of broader fields of study. For example, an accounting long-term certificate is a program within the business and marketing field of study.[5]

We identified fields of study with relatively high enrollments across the Washington community and technical colleges. In order to have enough data to perform analyses for the selection of sites for our later qualitative research, we focused on colleges where at least 20 students were served at a time within a given field of study. For each field of study, we identified how many out of the 34 Washington community and technical colleges served at least 20 students attempting a concentration in that field; Table 1 shows a list of these fields of study, ranked by the number of colleges with 20 or more students enrolled. For our analyses, we selected the four fields with the most such colleges: business and marketing; computer and information science; allied health; and mechanics and repair. Because we focus on issues that take place at the program level, we limited our sample to students who attempted a concentration in a particular field of study, taking at least three classes or twelve quarter credits within a single field.[6]

After selecting fields of study, we sought to identify relatively high- and low-performing colleges in each field so that we might observe a diverse set of policies concerning program structure. We did not make direct comparisons between high- and low-performing programs due to concerns that this analysis (conducted at the field-of-study level) might not effectively measure performance of the specific programs, which we later examine in case studies. However, given the absence of a better program-level measure, we used these performance rankings in our site selection process and in making some tentative observations about the relationship between program structure and student outcomes. Appendix A details our methods in ranking colleges along program performance, and Section 4 discusses the specific problems with the selection methodology. Ultimately, for each field of study, we ranked all colleges with at least 20

[5] At some colleges, several credentials may be packaged together and taught by the same group of faculty members, such that a student might earn several certificates en route to an associate degree. Though some colleges might refer to this entire package of credentials as a "program," in this paper, we refer to this as a "program pathway," as distinguished from a program that leads to a specific credential.

[6] Washington State colleges operate on the quarter system, and students must take at least twelve credits in a given quarter to be considered full-time students. Thus, under our definition, a concentrator is a student who attempts at least one term's worth of coursework in a given field of study.

concentrators from the 2005–06 cohort in that field based on how well they performed relative to expected completion rates of long-term certificates and associate degrees and used this list to select colleges for the website review and interview stages of our study.

Table 1
Fields of Study, Ranked by Number of Colleges With 20 or More Students Enrolled

Field of Study	Rank	Number of Colleges with 20+ Students Enrolled	Total Number of Students Enrolled
Business and marketing	1	23	2,259
Computer and information sciences	2	22	1,041
Allied health	3	21	1,140
Mechanics and repair	4	15	835
Manufacturing	5	11	645
Education and child care	6	10	724
Construction	7	10	1,286
Protective services	8	8	364
Cosmetology	9	5	273
Engineering/science technologies	10	5	536
Secretarial and administrative services	11	4	278
Culinary services	12	4	271
Transportation	13	4	207
Agriculture and natural resources	14	3	250
Communications and design	15	3	213
Nursing	16	3	366
Automotive and aeronautical technology	17	0	17
Engineering and architecture	18	0	30
Other career-technical		6	421
Not assigned		16	789
Arts, humanities, and English		29	6,746
Mathematics and science (STEM)		28	2,284
Social and behavioral sciences		23	1,775

Source: SBCTC administrative data.
Note. Students whose primary intent was vocational home and family life (that is, to take parenting classes) were excluded from the analysis, as were students obtaining food cards (licenses to handle food in Washington that require a short course).

2.2 Website Review

In the summer of 2011, we reviewed the websites of programs in the four fields of study across 20 colleges that were relatively high-performing or low-performing within the field of study. We collected data on all programs at the college within each field of study, as defined by the CIP codes. For example, the computer and information sciences field at a given college might include several distinct program pathways: computer applications technology, information technology, and multimedia communications.

Through the colleges' websites, we collected information on program prescription (that is, the amount of choice and specificity in requirements in the programs). Because the websites are an important way that colleges convey information on programs to students, we assessed the quality of information on colleges' programs on their websites, looking for availability and ease of accessibility.

2.3 Interviews

Following the website review, we chose one high-performing program pathway and one low-performing program pathway within each of the four fields of study, ensuring that the two colleges selected offered comparable program pathways. Choosing comparable programs allowed us to focus on differences in their structure rather than differences in course content. A program pathway in diesel and heavy equipment, for example, might be too substantively different from a program pathway in marine maintenance technology to allow us to draw conclusions about program structure from differences observed between them, even though both pathways fall into the broad category of mechanics and repair. Table 2 displays the program pathways we highlighted from each field of study for these case studies.

During the fall of 2011, we interviewed key college staff involved with each of the eight programs, including an academic dean, preferably in charge of career-technical programs; a department chair in the selected field of study; at least two faculty members in the program; and a counselor or advisor from student services/counseling. The semi-structured telephone interviews were typically one hour in length and covered several topics, including program alignment, program prescription, information quality, and active advising and student support.

Table 2
Program Pathways Selected for Case Study Within Each Field of Study

Field of Study	Program Pathway
Allied health	Medical assisting
Business and marketing	Accounting
Computer and information sciences	Computer network technology
Mechanics and repair	Automotive technology

3. Findings

In this section, we highlight findings from the three stages of data collection and analysis and address our five research questions. We first describe findings related to each of the four dimensions in our framework of program structure (program alignment, program prescription, information quality, and student advising and support) and then examine the relationship between program structure and performance.

3.1 Program Alignment

Program alignment refers to the ways in which programs of study are intentionally structured to be well aligned with pathways and institutions outside the college. Program alignment is an important part of program structure because it influences both the curriculum that students are exposed to while in the program and students' academic and career opportunities upon graduation. In examining this dimension of structure, we rely on data from our case studies of individual programs.

Case studies of individual programs. Through our research, we identified three primary manifestations of program alignment. *Labor market alignment* refers to connections with industry and employers that affect the content and format of a program. *Alignment with local employment opportunities* refers to ways in which a program directly prepares students to enter the local entry-level job market. *Educational alignment* refers both to structure of programs within the program pathway at the college and to the creation of transfer pathways that connect students to other academic institutions.

These three types of alignment may often intersect, and within different programs, different values may be placed on each type of alignment. In addition, there are a variety of ways to achieve each type of alignment (see Table 3 for details), and tradeoffs are often made between them. For example, in a program with a strong, mandatory clinical component that often leads to a job after graduation, students may be less likely to be offered other job placement assistance. As another example, in a program where labor market alignment is not maintained via a national accreditation body, labor market alignment may be achieved through close connections with an advisory board of local employers.

Labor market alignment. Strong influence of accreditation bodies on college programs may increase prescription and limit choices about what content to offer and how to structure the program. At least one interviewee argued that accreditation is such a powerful influence on some programs that it splits occupational programs into two camps: those that are accredited by an outside body and those that are not. This administrator stated:

> Programs [at my college] that have individual accreditations (like Occupational Therapy Assistant, Physical Therapist Assistant, Funeral Services, Dental Assisting)—those accrediting bodies really put them through the sieve as it were. They really drive the limitations of what a program can do, because [the accreditation bodies] are becoming more and more prescriptive in their requirements. Whereas computer network technology is much more closely aligned with their industry through their advisory committees, there may be industry certifications that apply, but there isn't a regional or national accrediting body for them. That's a really big one that creates two different camps of programs.

Labor market alignment varies more across fields of study than across colleges within fields of study. However, there is some variation within fields in the strength of the advisory board. In general, programs in the field with the most rapidly changing technologies seem to rely most heavily on their advisory boards. Faculty in both computer network technology programs used their advisory boards to keep up with changes in industry standards, modifying the curriculum to incorporate new developments such as cloud computing and Voice over Internet Protocol on the advice of the boards.

Table 3
Manifestations of Program Alignment in Individual Programs

	Medical Assisting		Accounting		Computer Network Technology		Automotive	
Criteria	**Program 1**	**Program 2**	**Program 3**	**Program 4**	**Program 5**	**Program 6**	**Program 7**	**Program 8**
Labor market alignment								
Influence of national accreditation bodies	Strong influence	Strong influence	No accreditation body	No accreditation body	No accreditation body	No accreditation body	Strong influence	Strong influence
Influence of advisory board	Moderate influence	Moderate influence	Little influence	Moderate influence	Strong influence	Strong influence	Strong influence	Moderate influence
Other industry influences	N/A	N/A	Service clubs	Instructor a member of WA Society of CPAs	Moderate influence of certifications	Moderate influence of certifications	N/A	N/A
Alignment with local employment opportunities								
Hands-on training (e.g., internships, clinical experience, lab time)	Mandatory clinical experience	Mandatory clinical experience	None	Internship available but rare	Internship available but rare; lab time	Internship available but rare; lab time	Lab time	Mandatory internship; lab time
Integration of career guidance into program	Little job search information incorporated	Little job search information incorporated	Little job search information incorporated	Little job search information incorporated	Some job search information incorporated	Some job search information incorporated; optional job search elective	Mandatory job search course	Some job search information incorporated
Active job placement	Clinical placement often leads to job placement; moderate faculty involvement	Clinical placement often leads to job placement; no faculty involvement	No faculty involvement	Moderate faculty involvement	Moderate faculty involvement	Moderate faculty involvement	Strong faculty involvement	Strong faculty involvement
Tracking transfers and employment outcomes of graduates	Detailed employment tracking	Detailed employment tracking	Limited employment tracking	Some employment tracking	Limited employment tracking	Limited employment tracking	Some employment tracking	Some employment tracking
Educational alignment								
Stackable credentials within the college	1 stackable long-term certificate	3 stackable certificates	4 mostly stackable certificates	2 stackable certificates	1 stackable long-term certificate	3 stackable certificates	1 stackable long-term certificate	7 mostly stackable certificates
Emphasis on associate degree	Low emphasis	High emphasis	High emphasis	High emphasis	Low emphasis	High emphasis	High emphasis	High emphasis
Opportunities for baccalaureate transfer	Transfer rare and difficult	Transfer rare and difficult	Transfer rare; articulation agreement	No transferability	No transferability	Articulation agreements	Transfer rare; articulation agreement	Transfer rare; articulation agreement

Advisory boards also played a significant role in the automotive programs, where they were mandated by the accreditation process but considered essential to the mission of ensuring students are well prepared for jobs. The advisory boards of the medical assisting programs, in contrast, had only moderate influence, perhaps due to tight national accreditation standards, which limited the extent to which advisory boards could influence the program further. Accounting seems to have much less labor market alignment under our definition, though this may be because the field has not changed drastically over time. However, one accounting program did add 10-key typing to the program following the advice of its advisory board.

Alignment with local employment opportunities. All of the occupational programs we examined were designed to prepare students for employment. However, the programs differed in the approaches used to help students make a seamless transition into the working world. The majority of programs incorporated some kind of hands-on training to prepare students for the type of work they would be doing upon graduation. This component was the strongest in medical assisting, where a clinical experience was mandatory and often led to job placement after graduation. Only one other program—one of the automotive programs—required an internship as part of the curriculum. This requirement could be fulfilled in one of two ways: A student's regular job or as little as 50 hours of job shadowing could both qualify. Several other programs offered internships for credit, but program staff reported they were rare. A computer networking technology faculty member at one such program said that program staff did not focus on matching students with internships, noting that it seemed like many companies offering internships "just wanted someone to do work and not pay them." It is also worth noting that two programs (one automotive program and one accounting program) did not offer internships due to lack of placement opportunities. However, in both programs, a strong lab component (with a similar environment to what students would experience upon beginning entry-level employment) was incorporated into the daily schedule.

In addition to providing hands-on training, most programs helped to prepare students in some way for the job search. One automotive program required a three-credit course in job seeking skills as part of its program, and one computer network technology program offered a two-credit elective course on resumes and interviews. The other

automotive and computer network technology programs, as well as the accounting programs, did not offer an explicit course but incorporated some career guidance into the curriculum by preparing the students with mock interviews, including information on resume preparation, or both.

Faculty members differed in their degree of involvement in job placement for students. At one medical assisting program, the program director did not have time for placements; the program director at the other did some informal networking with program graduates to assist them with their job search. Neither accounting program had faculty members actively assisting with job placement, though both colleges had campus-wide job placement offices. Automotive faculty members, in contrast, were very active in job placement; interviewees at both programs reported that faculty members frequently helped students find a good job fit. Computer network technology faculty members were moderately active, sending out information about available job opportunities in class or via online social networks as they came up.

All colleges received data from the state on the employment outcomes of their graduates, although there was variation in the extent to which this information was valued, considered timely and accurate, and used. Colleges also varied in the extent to which they performed their own tracking of students' employment outcomes. Whether employment tracking was a priority for colleges was heavily influenced by external requirements. The accrediting bodies for the medical assisting and automotive technology programs required careful tracking of employment placement and success. For example, one allied health program performed 30-day and 90-day reviews of graduates' employment placements and outcomes. Other colleges used more informal methods of tracking students, such as optional online social networks for alumni in the computer network technology programs.

Educational alignment. "Stackable" credentials—that is, credentials that can be earned along the way to a longer term credential—were an important component of the occupational programs we studied. All eight programs offered at least one certificate that could be earned along the way to an associate degree. In particular, each program offered either a certificate earned after the first year of program requirements or a certificate earned after the completion of all program courses (except general education

requirements). However, there was a great deal of variety in how many other opportunities there were to earn shorter term certificates in specific areas along the way to the associate degree. Three programs—across three different fields of study—offered no further opportunities for stacking credentials. Others offered a range of additional options, from a single short three-course accounting clerk certificate at one school to seven specialized short-term automotive technology certificates at a different school that could be earned either along the way to an associate degree (sometimes with some limited additional coursework) or separately. The diversity in types of certificates offered was largely explained by whether certificates were designed to be aligned with external industry standards (as in the case of the specialized short-term automotive technology certificates) or whether they were designed as a potential stopping point for students without a clear labor market linkage.

Programs and colleges differed in their emphasis on alignment with further education, both in terms of encouraging associate degrees and offering opportunities for baccalaureate transfer. This could be thought of as a tension between educational alignment and alignment with local employment opportunities. Programs that emphasized the former could be considered to have an educational orientation, whereas programs that emphasized the latter could be considered to have an employment orientation. Programs with an educational orientation are likely to emphasize the importance of earning an associate degree and possibly a bachelor's degree. For example, the college that ran both Program 2 and Program 6 (in medical assisting and computer network technology) encouraged the students in each program to earn the associate degree. Faculty in the college's computer network technology program encouraged students to aspire to a bachelor's degree and worked to create strong articulation agreements with nearby colleges and universities, anticipating that students may face barriers in career mobility later in life without the opportunity to earn these additional credentials. In contrast, programs with an employment orientation were likely to emphasize skills needed for immediate job placement, even if doing so may lead to fewer opportunities for additional education. For example, not as many students in Program 1 (medical assisting) earned an associate degree because the certificate leads to strong employment opportunities, and certificate holders and associate degree holders earn similar wages. In Program 5

(computer network technology), the associate degree was considered a good option for students who could not otherwise find jobs. Little to no thought was given to improving students' prospects for baccalaureate transfer because a bachelor's degree is not considered necessary in the labor market.

Given that all of the programs we examined were occupational programs, baccalaureate transfer was rare even among schools that had an articulation agreement. Both automotive programs had developed an articulation agreement with a four-year college in a neighboring state for a bachelor of science degree in automotive technology, but neither reported the degree as being common for students. Similarly, Program 3 (accounting) had an articulation agreement with another college in the state, but students rarely transferred. Transfer was slightly more common in Program 6 (computer network technology), which was in the process of finalizing an articulation agreement with a state university for a bachelor's degree in technology and design. Meanwhile, another nearby college was developing a four-year program in information technology for the health industry where Program 6 graduates could enroll as juniors. However, the use of articulation agreements may be limited by the ability of students—particularly students with low socioeconomic status—to relocate for educational opportunities that are not within commuting distance.

Overall assessment. In general, the career-technical programs we examined were tightly aligned with labor markets and local employers through accreditation agencies and advisory boards. This was somewhat less true in the accounting programs than in other program areas. Additionally, all of the programs provided students with some assistance in job search skills and job placement, often integrating job search skills directly into the curriculum. In some cases, faculty members used their connections to help students find local employment opportunities. However, programs held diverse attitudes toward alignment with further educational opportunities. At some colleges, the career-technical program was seen as a terminal degree and further education seen as unnecessary, and at others, it was seen as important to give students the option to pursue further education. Views on this issue differed even between programs with similar content at different colleges.

3.2 Program Prescription

Program prescription refers to how clearly a program's requirements are delineated and how flexible those requirements are. Highly prescribed programs aim to prevent students from enrolling in unnecessary coursework. A highly prescribed program might include more required program courses than electives; use a cohort model, in which students proceed through the coursework as a group; integrate general education courses into the technical program; and schedule courses with intentionality both within and across semesters.

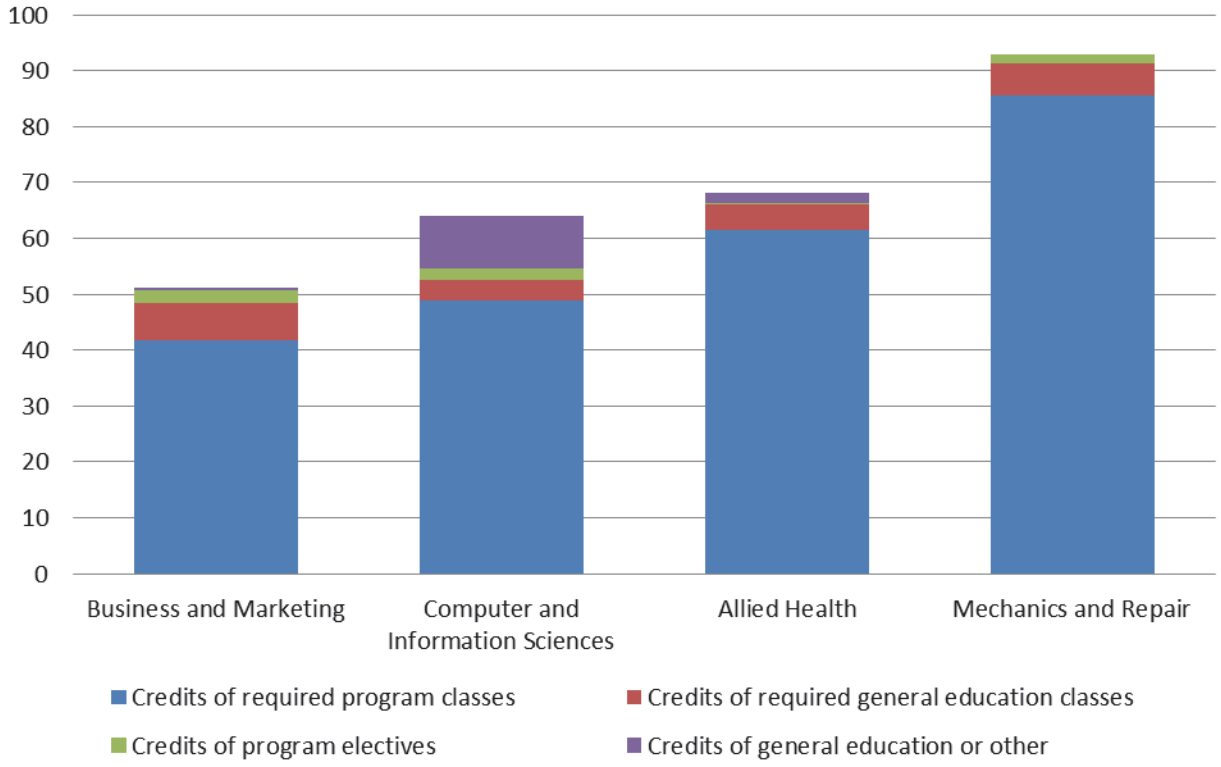
Website review. A key goal of our website review was to better understand program requirements within our four fields of study. College websites should list all required courses for each program, and we collected this information for all programs within each college within a given field of study. In particular, we recorded the total number of credits required to attain a credential in each program and the distribution of these credits across four categories: required program classes, required general education classes, program electives, and general education or other electives. The examination of program requirements provides an indication of program prescription as reflected in the degree of choice students are permitted in selecting their courses. A more prescribed program would have a greater proportion of required credits that are specifically mandated, as opposed to allowing room for electives. Additionally, a more prescribed program would have more of its required credits fall within the program area itself, as opposed to within the general education curriculum. The concept of prescription could include additional issues such as whether courses are required to be taken in a particular sequence.[7] In the following summary of results, program requirements are reported separately for long-term certificates and associate degrees, which have different credit requirements.

Across all fields of study, the majority of credits necessary to earn a credential were in required program courses (see Figures 1 and 2, which reflect program requirements as reported on the 20 college websites we reviewed). In long-term certificate programs the vast majority of courses were specifically mandated courses

[7] Though some college websites reported information about recommended sequencing, this information was not reported consistently enough across program websites to compare programs along this measure.

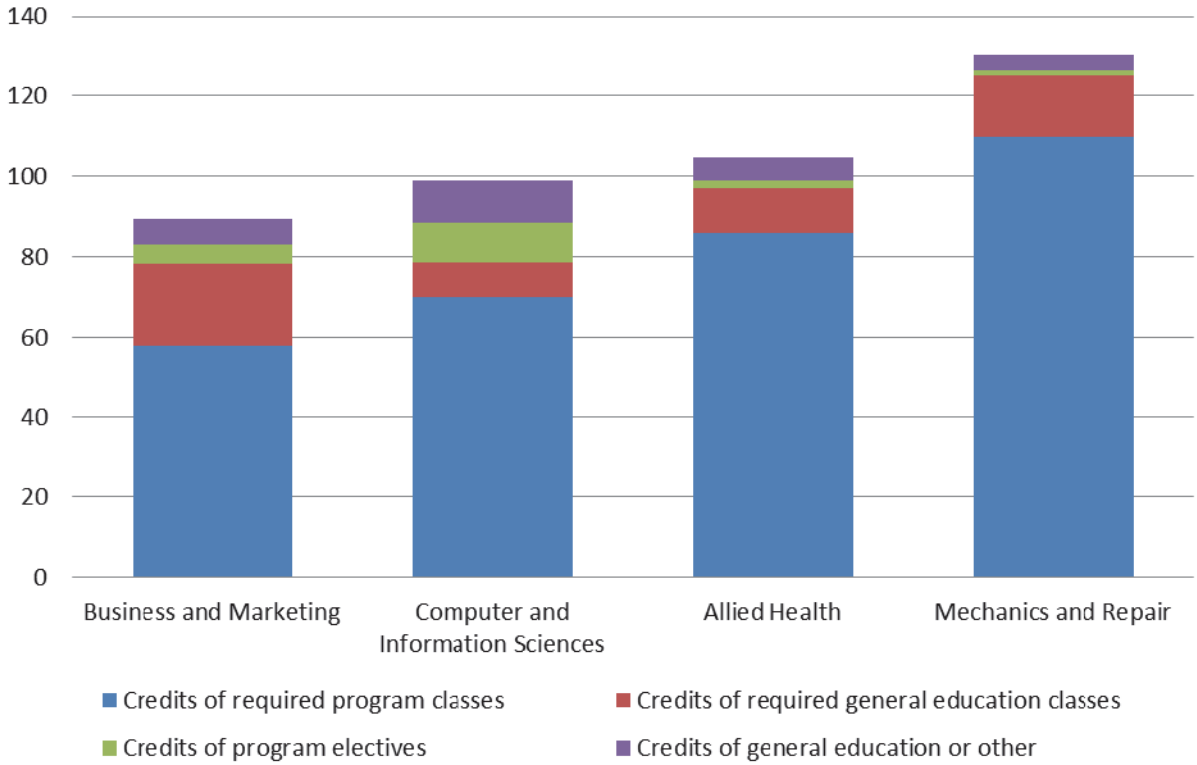
within the program area. Associate degree programs had more general education requirements and elective courses but were still dominated by required program courses. Overall, community and technical college career-technical programs in these four fields of study did not tend to include a high number of electives or general education requirements.

Figure 1
Program Requirements in Long-Term Certificate Programs by Field



Source: College websites.

Figure 2
Program Requirements in Associate Degree Programs by Field



Source: College websites.

In addition to counting the number of required and elective credits, we assessed the degree of program prescription using a rubric (see Table 4 for overall ratings and Table 5 for details). This assessment was based on a review of all required and elective courses, regardless of whether they came from the program area or from the general education curriculum. Programs were coded as very prescribed, fairly prescribed, or somewhat prescribed, depending on how much choice students had in their course selection. For example, a program that allowed students to choose one program elective from three options and to choose between two social science courses to meet the general education requirement might be coded as fairly prescribed. Theoretically, we could have coded programs as not very prescribed, but none of the programs we examined fell into that category.

Table 4
Assessment of Program Prescription in Career-Technical Programs by Field and Type of Credential

Rating	Long-Term Certificates				Associate Degrees			
	Business and Marketing	Computer and Information Sciences	Allied Health	Mechanics and Repair	Business and Marketing	Computer and Information Sciences	Allied Health	Mechanics and Repair
Average score	2.8	2.8	2.9	2.8	2.4	2.4	2.5	2.8
Number of programs examined	23	15	17	22	23	15	17	22

Source: College websites.
Note. Program prescription was rated on a scale from 1 ("somewhat prescribed") to 3 ("very prescribed").

Table 5
Manifestations of Program Prescription in Individual Programs

Criteria	Medical Assisting		Accounting		Computer Network Technology		Automotive	
	Program 1	Program 2	Program 3	Program 4	Program 5	Program 6	Program 7	Program 8
Amount of electives	No electives	Very few electives	Very few electives	Very few electives	No electives	Very few electives	Very few electives	Very few electives
Cohort model	Cohort; entry 1x/year, 2x w/ special funding; waiting list	No cohort; flexible model	No cohort	No cohort	Cohort; entry 2x/ year	Cohort; entry 2-3x/year	Cohort; entry 1x/year with some exceptions	Cohort; entry 1x/year with some exceptions
Sequencing/ degree of rigidity	Rigid	Somewhat flexible; some courses have prerequisites	Highly flexible, with recommended sequences	Highly flexible, with recommended sequences	Rigid	Rigid with some exceptions	Rigid	Rigid
Integration of general education requirements	Not integrated	Recently integrated	Not integrated	Not integrated	Not integrated	Recently integrated	Integrated	Recently integrated
Intentionality in course scheduling	Block scheduling; informal faculty coordination	Faculty coordination	Departmental coordination	Informal faculty coordination	Block scheduling	Block scheduling	Block scheduling	College-wide schedule

Across fields of study, most programs were very prescribed. This assessment is consistent with our finding that a large number of credits in each program were required program credits (see Figures 1 and 2). In general, long-term certificate programs were more prescribed than associate degree programs within the same field. Nearly all long-term certificate programs were rated very prescribed; there was slightly more variation among associate degree programs.

Case studies of individual programs. Findings from the case studies of two programs within each field of study were generally consistent with the results from the website review. Through interviews conducted with faculty, counselors, and administrators, we found all of the programs to be very clearly prescribed, with few or no elective courses. For most programs, the majority of the courses required for the associate degree were in the technical program area as opposed to general education courses. Among all the courses required for an associate degree, both program and general education, very few were left up to the choice of the students.

Cohort models. Cohort models, in which students both enter a program and take all subsequent courses together, were used in five of the eight programs we examined (with the exceptions of the two accounting programs and one allied health program). In the automotive programs and the allied health program with a cohort, the cohort model was largely a result of the very prescribed nature of these programs as determined by external accreditation standards. In computer network technology, faculty preferred the cohort model because it allowed them to incorporate hands-on lab experiences and to devise course content that progressively builds upon previous course material.

College staff reported that the cohort model creates bonds between students, who support each other as they progress through the program. Furthermore, it allows faculty to get to know the students better and to identify problems more easily. However, several college staff mentioned that the cohort model can have downsides, including a lack of flexibility in students' course schedules to accommodate work or family obligations. The cohort model programs required a full-time commitment, precluding students who had substantial work commitments from enrolling. College staff reported that this full-time commitment helped students to progress through the program and be more focused than those who also had job commitments.

Sequencing/degree of rigidity. Some cohort models limited the points in the year when students could enter the program so that cohorts of students could enter together. Although more frequent entry points allow students to spend less time waiting to begin enrollment, not all programs have enough faculty to run multiple cohorts per year. Some programs allowed for flexibility in when students could enter the programs, even if there were a rigid entry point in theory. The computer network technology and automotive programs made some exceptions to allow students to enter into an existing cohort. In these cases, although enrollment was flexible, it was not completely open. For example, in one of the automotive programs, students could enroll in the winter term after the cohort began in the fall, but they could not join that cohort in the spring term. Programs that did not use the cohort model allowed students to begin the program at any time during the year. The accounting programs in particular were very flexible in this respect and also allowed students to take courses in the order that would best suit their schedules.

All programs that used a cohort model had a very rigid sequence of required courses. Often, if a student missed taking a course with the cohort or did not pass a course in the required sequence, the student could not retake the course until it was offered the next year. In some cases, students could make up courses over the summer term. Many program staff working with cohorts reported that faculty got to know students well and could intervene to help struggling students, so that few students would not pass required courses. However, rigid course sequences might limit the types of students who are able to enroll in the program because students who need the flexibility to stop out of college for non-academic reasons and resume their education later would be unable to do so.

Rigid course sequencing is often driven by the cohort model but may also exist in programs that do not use cohorts. One allied health program without a cohort model had fairly rigid sequencing requirements because many of the required courses built on each other. Because of the abundance of prerequisites among the program courses, students had to take courses in a specific sequence, and program staff provided guidance on how to do this through group advising sessions each term before course registration. In contrast, the accounting programs, which also had no cohorts, offered students a great deal of flexibility in the sequence in which they could take the courses. One of these

programs offered a suggested course sequence but did not mandate that students follow it; the other program provided students with a checklist of courses to take but no recommended sequence.

Integration of general education requirements. Whether programs integrated general education courses into the sequence of program courses varied across colleges. In several programs, general education courses were only part of the required sequence of courses when they were prerequisites for program entry. In one medical assisting program, many students took general education requirements while on the waiting list for the program; others took those courses after completing the program courses. A couple of the programs recently moved to make the general education courses part of the required sequence of courses so that students would not delay taking them until the end of their program, when they would be less likely to complete them.

Intentionality in course scheduling. The extent to which faculty in the programs coordinate course scheduling may impact students' ability to complete the courses they need when they need them. Most colleges reported some way to make sure that classes would be offered to students during the semester they needed them or during a time of day that would be convenient to them. For example, faculty in one of the computer network technology programs scheduled the timing of the courses based on the demographics of the student body in the program. Because the program was targeted at students who were not working full-time, it was offered earlier in the day. College staff in other programs reported giving attention to the semesters in which a course was offered in order to make sure it was available when needed. This was sometimes accomplished through informal faculty coordination, particularly in small programs. In other cases, coordination was a result of the block scheduling of programs, where all classes during a particular time period were scheduled only for the program; other courses were typically offered at other times of the day.

Most college staff reported both benefits and drawbacks to program prescription. Highly prescribed programs made it easier for students to navigate requirements and stay on track and easier for staff to manage the programs; they also created more consistency in students' knowledge base, leading to better job preparation. However, highly prescribed programs were less flexible and less able to accommodate students'

scheduling needs or to help a student recover from a failed course. Compared with the programs examined in other fields, the accounting programs had relatively low levels of prescription with no cohorts and no sequencing requirements. Accounting program staff reported that students were given the flexibility they needed but also given guidance on which courses to take.

Overall assessment. The website review and the case studies of individual programs provide evidence that career-technical programs in the fields examined were highly prescribed. Most credits required to complete a program were mandatory (rather than elective) and program-specific (rather than general education) courses. Additionally, most programs (with the exception of accounting) gave students little to no flexibility in constructing their own programs. In fact, most of the programs we profiled used a cohort model.

3.3 Information Quality

A well-structured program should provide both prospective and current students with the information needed to make good decisions, and college websites are increasingly the primary information source for students. Thus, we examined the availability and clarity of information on program offerings to help students select programs of study and information on program requirements to help students complete programs. We used two data sources to better understand information quality: the website review and the case studies of individual programs.

Unfortunately, our methods do not provide a perfectly effective way to evaluate information quality at each college. Because we interviewed administrators, faculty members, and counselors but not students, the interviews did not enable us to identify deficiencies in student knowledge that escaped the awareness of those with power at the college. Because lack of awareness of student knowledge deficiencies among colleges is a primary criticism made by Rosenbaum et al. (2006), this may be a particular concern. However, by examining program websites with an eye for what a prospective student would see, we can partially address this concern.

Website review. During our website review, we looked at the availability and quality of information on key program characteristics. Our intention was to better understand—from the eyes of a prospective or current student—whether the website

provided the information necessary to decide whether the program was an appropriate fit and to understand the steps necessary to complete a credential. Appendix B shows the information we coded for each program website. The items we coded relate to key pieces of information that might be relevant to students as they decide whether to pursue a program and to program students as they make decisions about which courses to take, among other things. We assessed whether this information was available on the websites and how clearly the information was presented.

Among the information that might be available, we examined whether the program website clearly listed program requirements—that is, which courses are required and whether there is a mandatory sequence in which they must be taken. We examined whether there was, at minimum, some type of table, graphic, or planning worksheet showing the courses that are required in order to graduate from the program. The college websites with the highest quality information offered planning worksheets with required courses and elective course options, as well as a sample schedule that a student could take. Other websites did not include information about which courses were required (for example, a website may have included a sample schedule without indicating which courses were required and which were electives) or had conflicting information between the program website and the college's official course catalogue. The presence of such discrepancies highlights the importance of ensuring that course requirements on the website are current and accurate.

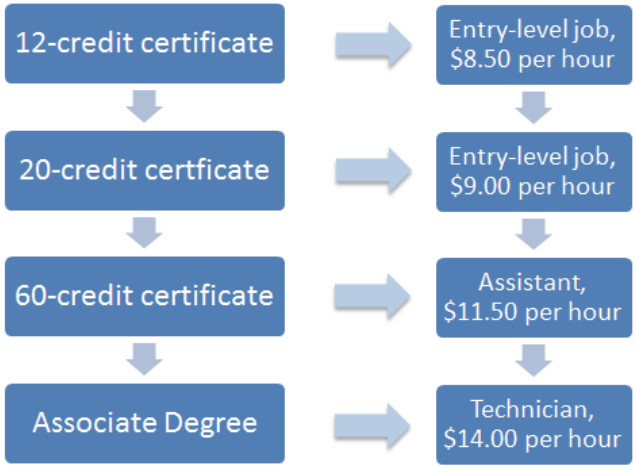
College websites should also ideally answer questions students may have about course scheduling: Ideally, how long does the program take to complete? Can students attend either full-time or part-time? How long will the program take to complete if a student has to take developmental coursework based on their placement test scores? In which quarters or semesters can the student begin the program? What time of day and which days of the week are courses offered? The websites with the highest quality information had the answers to these questions clearly listed and easily accessible.

College websites should also include clear information about program pathways, such as how different credentials within the field of study are related; whether there are points where students can leave, gain an entry-level job, and then return to the program; and whether there are certificates that can be earned on the way to earning an associate

degree or a longer term certificate. Several excellent websites offered diagrams showing how different certificates and degrees were related, as well as the type of occupation (and mean hourly wages) that could be attained at each level; see Figure 3 for a generic example. Some colleges offered a number of credentials within a given field but did not provide much information to help a prospective student decide which would be most appropriate to pursue or whether the credentials were stackable (i.e., designed to articulate directly with higher level programs).

The availability of information about prerequisites, admission requirements, and application procedures was difficult to evaluate because we had to assume that if no admission requirements were listed, the program was open to everyone. No websites that we reviewed provided current information about whether the program had a waiting list and its current length. If the program had a competitive admissions process, websites with high quality information clearly stated factors that affected admission decisions and provided a link to the program application form. If a program has prerequisites, these should also be stated clearly. For example, one career-technical program site included a printable checklist of courses that must be completed prior to program entry, along with grade requirements for each course.

Figure 3
Diagram of Certificate and Degree Progression with Related Work Opportunities



Program websites should offer information about students' options for employment or continued education. Program websites should also offer information for prospective students about the kinds of occupations that program graduates work in, typical entry-level wages, and whether there is high labor market demand for students from the program. Websites with high quality information listed jobs that recent graduates had obtained and provided data on how many students found work in their field and average wages for the occupation; other websites had no information on the topic of employment. If transfer to a baccalaureate institution is a possibility, program websites should offer information about how many students transfer, whether there are requirements that students need to meet to be eligible for transfer, and whether there are articulation agreements with any nearby colleges for students to continue their education and earn a bachelor's degree in a related field. The best websites linked to separate web pages on the topic of transfer, explaining the additional requirements students needed to meet and listing the colleges to which students commonly transferred. Unfortunately, many colleges' websites did not provide any information about transfer. It may be that these programs are not designed to lead to transfer, but ideally this would be made clear to prospective students.

No matter how strong the website content, prospective students may have questions about the program. Most program websites provided adequate contact information, including the name, position, telephone number, and email address of someone with whom students could discuss the program. However, some websites had no contact information, information that may not have been current, or too many names listed without details to determine who would be most appropriate to contact.

To provide an overall assessment of the information quality of the colleges' websites, we developed a numeric ranking system and ranked colleges on a scale of one to five. Program websites tended to have at least one significant problem that kept them from earning our top overall rating of five. Most websites had fairly high-quality information, though a couple lacked almost all useful information and earned our lowest rating of one. The average rating was approximately 3.2.

We also examined websites for their accessibility in terms of the ease of finding information. Most college websites had a search function that worked effectively to

find program pages and requirements. We found that search functions worked appropriately more than 85 percent of the time. Because many students rely on the search engine tool to find information, programs should ensure that it works correctly for their web page. Site visitors should also be able to navigate to the program page and access information on program requirements relatively quickly without a search engine. The fewer the number of clicks necessary to do so, the better. On average, about three clicks were necessary.

Case studies of individual programs. The programs relied heavily on the college websites for disseminating information to students. Most, if not all, information necessary to choose programs and learn about program requirements was available online, including college catalogs, career guides, schedules of courses, and program planning guides. At several colleges, faculty, staff, and administrators used online tools to stay informed of program requirements and to track student progression. Most program websites generally had high-quality information but were missing some key information.

A strong website is important; websites were reported to be the primary source of information for students and, in many cases, college personnel. Interviewees reported that colleges were putting more resources into developing up-to-date websites and were directing students to the sites for information. Across the colleges, faculty and staff generally felt that students were getting the information they needed, although a few specific concerns were raised. However, as noted earlier, faculty and staff may not be in the best position to judge whether students are actually getting the information they need.

We observed a few differences by program area in the dimension of information quality (see Table 6). In the automotive programs, faculty met with most prospective students before they entered the program and conducted a form of screening. In both accounting programs, faculty and staff relied heavily on program planning sheets for communicating information to students.

Information on program offerings. Students received information on program offerings through college websites, new student orientations, counseling/advising centers, and worker retraining centers. Websites and counseling centers were the two main sources of information. Word of mouth was also mentioned as a way that students find out about programs. At least three of the program websites also had informational videos.

Table 6
Manifestations of Information Quality in Individual Programs

	Medical Assisting		Accounting		Computer Network Technology		Automotive	
Criteria	**Program 1**	**Program 2**	**Program 3**	**Program 4**	**Program 5**	**Program 6**	**Program 7**	**Program 8**
Primary sources of information on program requirements	Career guide; catalogue; orientation guide	Schedule of courses; academic plan	Program planning document	Program planning document	Website	Brochures; website; catalogue	Program faculty	Website
Secondary sources of information	None mentioned	Transcript audit	Online catalog; college website; advising center	Annual schedule	Program requirement sheets; course catalog	None mentioned	Website; curriculum guide	Online tools; program handbook; advising data portal
Overall assessment of information provided to students	Mostly positive	Positive	Mostly positive	Positive	Positive	Positive	Mixed (dean: positive; counselor: negative)	Positive
Concerns about information provided	A little confusing to navigate	None	Program offerings less clearly laid out	Distinguishing between terminal and transfer degrees	None	None	Trouble accessing, especially financial aid information	None
Assessment of website (from website coding)	4	4	2	3	3.5	2	3.5	4

Some college personnel suggested that because students who come to the colleges for career-technical work already have a strong idea of what they want to do, they may not need up-front information about program offerings and career options. For example, in one of the medical assisting programs, many students knew they wanted to enter an allied health program and then chose a specific program after taking a few courses. In the computer networking technology programs, advisors and counselors found that almost all students who enrolled in the program knew what they wanted to study upon entry, though program coordinators reported that very rarely, students might decide among different offerings in a similar field (such as computer programming).

Information on program requirements. In all of the programs, the college website was a major source of information on program requirements. Several colleges aimed to develop their websites as the primary source for all information. Most of the materials produced by the colleges were available online and accessed by students as well as faculty advisors and general advisors. In at least one program, advising was frequently done online through email. Most of the programs also made information available in the form of brochures, program handbooks and planning guides, and course catalogs.

Program planning documents varied in their amount of prescription. For example, one accounting program planner provided a checklist of core and general education courses required to complete the credential but did not specify when during the two years the courses should be taken. The other program planner specified course requirements by term, although both accounting programs allowed for flexibility in course scheduling.

In both automotive programs, prospective students were encouraged to meet with program faculty prior to enrolling to discuss requirements, tour the workspace, and determine if the program would be a good fit. Faculty at one of the computer network technology programs encouraged prospective students to visit the labs and meet with faculty.

Communicating changes to program requirements. Methods for communicating program changes to advisors and others varied somewhat across the programs in our sample. Staff at four of the programs actively communicated changes by meeting with advisors or emailing them. At three programs, changes were communicated more passively through curriculum committees or program planning sheets.

Assessment of information provided to students, including website. Overall, respondents across the programs indicated that the appropriate information was available and that students were receiving the information necessary to enroll in and complete programs. Particularly in the cohort-based programs, respondents indicated that there was not much confusion among students because requirements were explicitly laid out and students were closely monitored by program faculty. This may indicate that information quality is a more important dimension of structure for programs with less program prescription—that is, programs that are not cohort-based and where faculty are not closely monitoring student progression.

Although the overall assessment of information provided was positive, individual respondents from particular programs expressed some concerns. For example, in one accounting program, an instructor indicated that students were sometimes confused about the differences between the terminal accounting degree and the transfer business degree. Financial aid information was a concern across several programs. An advisor for one college indicated that students had trouble accessing information and struggled in particular with financial aid information. At another college, a dean stated that students did not receive timely information to complete financial aid forms before deadlines.

Overall assessment. We found mixed evidence regarding information quality. In particular, program websites, although decent overall, sometimes lacked certain information that might be important for prospective or current students. This is especially concerning because program staff indicated that websites were the primary source of information for students. However, in interviews, program administrators, counselors, and faculty members generally were positive about the state of information quality and did not see need for improvement. Because we did not interview students, it is difficult to determine precisely how effective current efforts at presenting information students are. For example, students in programs with cohort models may not have a strong need for information because it is provided in the context of their courses; however, this information may still be important for prospective students.

3.4 Active Advising and Student Support

Active advising and student support refers to the actions that college staff take to assist students with enrolling in, progressing through, and completing programs. As with the other dimensions of structure, we hypothesized that colleges in which this dimension was strong would have students who were more likely to persist and attain a credential. To better understand this dimension of structure, we relied on data from our case studies of individual programs.

Case studies of individual programs. The eight colleges we studied had highly prescribed programs, reducing the amount of individual guidance and support students needed for academic planning. For the most part, students were closely monitored and supported by program faculty, with whom they often spent extensive amounts of time. This was especially true for students in programs with a cohort structure.

College advisors and counselors also provided a considerable amount of support, especially before students decided which program to enter. Program 1's college had program-specific advisors. Some students were supported by special programs such as WorkFirst, and some colleges employed early warning systems for all their students. In general, there was more variation in the guidance and support received by students not yet enrolled in programs. Table 7 provides details on different aspects of this active advising and student support in the eight colleges.

Counseling/advising model. In all of the colleges studied, once students entered a program, they were advised by the program faculty. In smaller programs, this was sometimes done by the one or two full-time faculty in the program. In the computer network technology programs, students were advised by whichever faculty member taught their first-quarter class. In most programs, especially those with a cohort model, faculty members spent 30 hours or more per week in the classroom with their students. These faculty members often developed strong relationships with students and supported them in completing the requirements of the program. Students participating in special programs such as WorkFirst received additional support from staff in these programs.

Table 7
Manifestations of Active Advising and Student Support in Individual Programs

	Medical Assisting		Accounting		Computer Network Technology		Automotive	
Criteria	**Program 1**	**Program 2**	**Program 3**	**Program 4**	**Program 5**	**Program 6**	**Program 7**	**Program 8**
Counseling/advising model for students in the program	Program-specific advisors	Program director; faculty advisors	Faculty advisors	Faculty advisors; optional self-advising after first semester	Faculty advisors	Faculty advisors	Faculty advisors	Faculty advisors
Information for undecided students	Career center; optional allied health careers course	General advisors; general allied health orientation	General advisors	General advisors	General advisors; conversation with faculty members	General advisors; conversation with faculty members	General advisors; conversation with faculty members	General advisors; conversation with faculty members
Group sessions for advising	Quarterly group advising day	Quarterly group advising day	Quarterly group advising day	Quarterly group advising day	None	Quarterly group advising day	Quarterly group advising day	Quarterly group advising day
Program orientation	Program orientation in first quarter	Annual program orientation; quarterly information sessions	General college orientation; no program orientation	General college orientation; no program orientation	General college orientation; no program orientation	Unknown	General college orientation; no program orientation	General college orientation; no program orientation
Monitoring of student progress	College-wide early alert system	Instructors monitor progress	Instructors monitor progress; college has an online program audit system	Instructors monitor progress	Instructors monitor progress	Instructors monitor progress	Instructors monitor progress; new college-wide early alert system; college has a retention and transition specialist	Instructors monitor progress; college-wide early alert system
Supports for struggling students	Mental health referrals; instruction in using online system	TRIO programs; tutoring; student-organized study groups	Advisors work with struggling students; general college supports	Advisors work with struggling students; tutoring	General counselors work with targeted populations; general college supports	General college supports; tutoring	General college supports; tutoring; peer mentors	General college supports; tutoring; peer mentors

Information for undecided students provided by programs. For the most part, undecided students were assisted by general counseling staff at the college who talked with them about their options. Student orientations also helped some students to clarify their goals and program choice. Program staff were more likely to become involved when students narrowed their choices to a general field of study. In the case of allied health, the program or division offered classes or orientations to help students select among different health careers. In computer network technology and automotive technology, prospective students met with faculty members and visited the labs. This provided students with an opportunity to discuss their interests, goals, and aptitudes and whether the program would be a good fit. The two medical assisting programs offered extra opportunities for undecided students who needed more information about the range of allied health programs—in one case, a class was offered; in the other, an orientation.

Group sessions for advising. Group advising sessions were the norm across all colleges and fields of study. These sessions were generally designed to ensure that all students in a program registered for the appropriate courses in the subsequent term to stay on track toward completing their programs. In addition, individual advising sessions with faculty were often available when needed.

Program orientation. Most of the colleges offered a general orientation session, but there was variation in the use of program-specific orientations. Medical assisting and automotive technology programs had a separate orientation, but computer network technology and accounting programs did not. Notably, one program had a substantial group of non-native English speaking students who entered via a summer program (which had its own orientation), whereas another program had a one-credit summer orientation program for entering students.

Monitoring of student progress. At most colleges, faculty members were very involved with program students and monitored their progress closely. Monitoring was more proactive in computer network technology and automotive technology programs and less so in accounting and allied health programs. In addition, several colleges had or were developing early warning systems to allow for identification of and early intervention for struggling students.

Support for struggling students. At the institutional level, all colleges offered tutoring in math and English for all students. This was a priority for colleges because, like students across the country, students in the programs we studied often struggled with math in particular. Colleges also offered a range of other supports, which differed by college, program, and the presence of support programs such as TRIO or WorkFirst. Students associated with special programs often received case management services, extra tutoring, and specialized counseling. Several programs also made arrangements for more advanced students to assist struggling students.

Overall assessment. To some extent, the quality of advising and student supports was related to whether or not programs used a cohort model. With the cohort model (used by five of the eight programs we profiled) supports are built into the model of instruction. Professors spend time with students during substantial class sessions sometimes every weekday, get to know students closely, and are able to easily monitor student progress throughout the entire program. Additionally, in cohort model programs, there is typically only one course for students to register for the next semester, and students are easily advised along those lines. In programs without a cohort model, we found a wider range of advising and student supports. Colleges took additional measures to ensure student success, including implementing early warning systems, having program-specific advisors, and offering group advising days. Using strategies such as these, programs can build advising and support into the structure of the program so that all students receive additional support, even if they do not actively seek it.

4. Implications of Structure for Program Performance

4.1 Limitations of Our Performance Measures

Although our research design involved selecting colleges for qualitative research by assessing program performance, we faced challenges in comparing performance across specific programs. This section presents an analysis of differences in performance across fields of study based on our case studies, with several caveats. First, the performance data are based on data from the 2005–06 student cohort, so they reflect

program operations from up to five years prior to our case studies. Although in our interviews we asked respondents to describe any major changes that had taken place since then, we cannot guarantee an accurate description of how those programs operated in the past because of the time elapsed and in some cases personnel turnover.

Second, because of the limited sample sizes at the program level, we calculated the program performance data on the rates of long-term credential completion at the level of the field of study. Because the field of study typically includes several programs, our ability to directly observe the link between structure and performance for particular programs is limited. However, within fields of study, we typically selected programs that had the most completers and therefore were likely to be relatively large programs that substantially drove the overall outcomes for a field of study. On the other hand, this could also bias our selection toward more successful programs within a field of study. Therefore, we cannot attribute field-level completion rates to program-level performance, though the field-level completion rates are certainly suggestive.

Third, our program performance measures are based on the idea that receiving any long-term certificate or associate degree constitutes success. Programs that operate under a different definition of success—such as receiving any certificate, even a short-term one, or only receiving an associate degree—could be at a disadvantage in these rankings. Prior research suggests that the proportions of different types of credentials awarded vary substantially across colleges (Scott-Clayton & Weiss, 2011).

Although we recognize that these caveats limit the certainty with which we can link our case studies of structure in our programs with field of study performance data, it is reasonable to expect there is a degree of connection that allows us to explore possible differences in performance in relationship to program operations. These limitations are inherent to this type of research focused on specific programs—the type of focus that is necessary to understand how programs are structured.

4.2 Findings

In general, we did not observe differences in the structure-related practices of high- and low- performing programs that would account for their differences in performance. In our interviews with faculty, administrators, and counselors, we found no substantial differences in the extent of program structure across colleges within fields of

study. We did observe different models of program structure—that is, different ways that programs offered a structured experience for students—but all of the career-technical programs we examined were either highly or moderately structured. The only variation we found in the extent of program structure was between fields, with accounting programs being somewhat less structured than the others.

Data from our website review supports the finding that program performance is uncorrelated with the degree of program structure, particularly with respect to information quality. Table 8 displays a summary of website accessibility information that was collected for the high- and low-performing colleges. We found no significant differences between the two types of colleges on these scores; raw scores for the low-performing colleges were slightly but not significantly higher on these measures of information quality.

Table 8
Accessibility of Information at High- and Low-Performing Colleges

Measure	High-Performing Colleges	Low-Performing Colleges
Number of clicks to get to program requirements	3.10	2.97
Overall rating	3.08	3.30
Search function utility	0.83	0.91

Source: College websites.

Similarly, we did not find consistent patterns across high- and low-performing programs in the number of required versus elective credits or the number of program versus general education credits. However, suggestive differences emerged between programs at colleges that were assessed to be high- and low-performing within three of our four fields of study (in the accounting programs, no major factors that are part of the structure hypothesis explain the observed differences in performance).

Across the two automotive programs, differences in college-level approaches to working with students may explain some of the difference in performance. The higher performing program was in a prize-winning college, noted for its practices to promote student success that make it outstanding on the national level.

In the two medical assisting programs, differences in college-level approaches to working with students may explain some of the difference in performance. The high-

performing college had proactive systems in place to support students, including an early alert system to identify students who were having problems and provide them with extra support as soon as possible. It also offered a course on allied health careers to help students make better decisions about which program to enter, which could lead to better completion rates if students initially enter programs for which they are better suited. In addition, the two programs used different counseling models. The high-performing program relied primarily on a dedicated counselor and an advisor in the allied health fields rather than faculty advising. Both of these staff members were located in the same area as others in the allied health field and worked exclusively with those students and faculty; they were integrated into the allied health field. In the other college, the counseling was more general and less focused on specific fields of study.

In computer network technology, the high-performing program's emphasis on immediate entry-level job placement versus associate degree completion might partially explain why its outcomes exceeded those of the lower performing program. Prior research suggests that links to labor market opportunities motivate students to engage in and complete a program of study (Rosenbaum et al., 2006).

4.3 Summary

Across the fields of study, a few emerging themes help to explain the differences in performance across the eight programs. First, we found suggestive evidence that a college-level emphasis on providing proactive support to students might be beneficial. Programs in colleges with additional systems to engage and support students were more likely to be high-performing. A common college-level mechanism in high-performing colleges was an early alert system, which provides a proactive and potentially consistent way to identify students who are having trouble with a course or a program of study and intervene before they fall too far behind. The existence of this system in a college likely reflects the a high level of institutional commitment to engaging with students and providing support to promote credential completion.

Second, we found a promising practice at one high-performing college: employing dedicated counselors specific to the field of study instead of relying on faculty advisors or general counselors. The program had dedicated allied health counselors who were deeply knowledgeable about the program and dedicated to advising students in the

specific program. Because of the small sample size and because we only found one program with this practice, we cannot make generalizations about whether this practice leads to better outcomes. However, the relationship between counseling approaches and student completion is a promising area for further investigation.

Last, we noticed that the higher performing programs were less likely to emphasize the associate degree (as compared with long-term certificates that require fewer general education courses) and tended to offer fewer short-term certificates. These differences could be causally related to differences in completion rates. For example, an emphasis on earning a long-term certificate and then immediately seeking paid employment could provide students with more motivation to complete than a bigger-picture focus on an associate degree to improve long-term career options. Alternatively, these differences could be an artifact of our ranking mechanism. Students who only intend to get a short-term certificate are not considered successes in our ranking model, and long-term certificates and associate degrees are weighted equally even though associate degrees typically have more requirements. It is also possible that programs only began offering short-term certificates because many students were not graduating, so that students would have at least some credential even if they dropped out.

5. Conclusion and Recommendations

All of the programs we examined exhibited fairly high levels of structure across the four dimensions in our framework: program alignment, program prescription, information quality, and active program advising and support. In practice, however, these dimensions of structure were manifested in different ways by different programs. The eight career-technical programs we profiled were from the most popular fields of study among the community and technical colleges across the state of Washington, so our results provide information that is applicable to a large number of students pursuing career-technical programs.

None of the programs we studied were loosely structured; all were either moderately or highly structured. Table 9 summarizes these findings across the four dimensions of structure at each of the eight programs. Six of the eight programs we

studied in depth were highly structured, all of which were in fields of study (allied health, computer and information science, and mechanics and repair) where occupational or industry licensing or skill standards strongly influenced the programs. As a result, program requirements were highly prescribed, labor market linkages were fairly tight, and there were strong student supports either embedded into the program or otherwise structured into the student experience.

The two accounting programs were moderately structured. They had a moderate amount of program prescription but offered some flexibility in scheduling and elective courses; their labor market linkages were weaker than those observed in other career-technical programs; and they did not have particularly proactive counseling and advising practices. To some extent, these programs' practices may have been guided by the structures and norms associated with the field of accounting, which lacks strict industry standards or guidelines, at least at the sub-baccalaureate level. The lack of specific industry and occupational mandates for programs may be reflected in greater flexibility in how the programs are organized, such as the absence of a cohort model. In these ways, the accounting programs were more similar to other programs at the college that were focused on preparation for baccalaureate transfer and likely to have less structure and fewer labor market linkages.

Table 9
Levels of Program Structure at Each Program by Dimension

	Medical Assisting		Accounting		Computer Network Technology		Automotive	
Dimension	**Program 1**	**Program 2**	**Program 3**	**Program 4**	**Program 5**	**Program 6**	**Program 7**	**Program 8**
Overall level of structure	High	High	Moderate	Moderate	High	High	High	High
Program alignment	High	High	Low-moderate	Low-moderate	Moderate-high	Moderate	High	High
Program prescription	High	Moderate-high	Moderate	Moderate	High	High	High	High
Advising and student support	High	Moderate-high	Moderate	Moderate	High	High	High	High
Information quality	Moderate-high	Moderate-high	Low-moderate	Moderate	Moderate	Low-moderate	Moderate	Moderate-high

Program prescription was the dimension for which we found the least variation in structure. Five of the eight programs we examined followed a cohort model, in which both the courses required and the sequence in which they should be taken were mandated, with cohorts progressing through the sequence together. (In some cases, there were still opportunities for students to pursue electives after the daily schedule or over the summer.) In the medical assisting program that did not follow a cohort model, there was still relatively little flexibility in the program, and course prerequisites caused natural sequencing to occur. In the accounting programs, most courses were mandatory, but there were more opportunities for students to customize their programs.

Programs were also strongly aligned with labor markets and local employers. Labor market alignment was generally achieved through accreditation agencies, advisory boards, or both (with the partial exception of the accounting programs). Program staff also structured job search and job placement activities directly into the programs, at least to a moderate extent. Programs varied, however, in the degree to which they were aligned with further educational opportunities, particularly baccalaureate transfer; in general, most programs were viewed as terminal degrees.

In some ways, the highly prescribed nature of the programs obviated the need for highly structured information delivery, advising, and student support. Students within highly prescribed programs are given less information and guidance because options tend not to be overwhelming or confusing. That said, some programs offered strong supports, structuring advising and counseling directly into the student experience through early alert systems, program-specific advisors, and group advising days.

Overall, community and technical college career-technical programs in the fields we examined were highly structured in terms of program alignment, program prescription, and student supports (though we found room for improvement in the dimension of information quality). In contrast with the community college programs examined in Rosenbaum et al. (2006), our sample consisted primarily of highly prescribed programs with strong connections to labor markets and local employers through accreditation bodies and advisory boards. It therefore may not be possible, in general, to significantly increase the level of prescription among most career-technical programs (assuming that they are organized like the ones examined here).

The majority of career-technical programs we examined in our case studies followed a cohort model, which naturally imposes structure on students along several dimensions. Students in programs with a cohort model are given a single path toward a credential that does not leave room for mistakes and given clear information and support from instructors who spend considerable class time with them each week. On the other hand, by not leaving room for students to make mistakes, cohort models could adversely affect completion rates by imposing too many requirements for some students to realistically meet or by making it difficult for students who make mistakes to continue in the program.

We found that career-technical programs at Washington community and technical colleges were not unstructured or overly bureaucratic, as community college programs are sometimes characterized to be (see, e.g., Rosenbaum et al., 2006). Some previous research has found suggestive evidence that traditional liberal arts, transfer-oriented programs might be substantively different from (and less structured than) career-technical programs at community and technical colleges. For example, Zeidenberg and Scott (2011) analyzed the transcripts of a cohort of first-time students in Washington community and technical colleges and found that the courses taken by career-technical students clustered easily into discrete career-technical programs, but liberal arts clusters were not clearly distinguishable. This suggests that liberal arts students may not have been following prescribed pathways. It may be that even within community colleges, liberal arts programs are more loosely structured than career-technical programs, which are highly prescribed and tightly aligned with local labor markets through accreditation bodies, advisory boards, and industry certifications.

The career-technical programs we examined tended to score more poorly on the dimension of information quality, particularly with regard to prospective students who may not have been receiving information directly from program faculty. Without student interview or survey data, it is difficult to assess how well information was reaching students. However, this may be less of a concern for career-technical programs than at the college more generally; advisors reported that students entering career-technical programs typically entered the college knowing which program they wished to enroll in. That said, colleges should ensure that appropriate information is available to students,

particularly through the college website. In the Section 3.3, we provide specific suggestions for elements that should be included in all program websites. Programs should also ensure that the information that is available is correct and up-to-date.

Overall, we found limited evidence of a connection between program structure and program performance. One reason for this is that both the high- and low-performing programs we examined tended to be relatively highly structured across the four dimensions of our framework. Structured programs might be a necessary condition for success, but given the relative uniformity of structure we observed in these career-technical programs, the observed differences in their success may be due to other factors. In addition, our performance metrics, which were measured at the program area level, may have limited ability to accurately gauge the relative performance of specific programs within those broader program areas. It could be that the measures we used did not effectively distinguish between higher and lower performing programs, or that the measures reflected other factors, such as program length. To the extent that the measures accurately measure program performance, the evidence does not support the hypothesis that more highly structured programs explain differences in student outcomes. We did observe some differences between high- and low-performing programs through our fieldwork, but these were related to college-wide student support practices rather than practices specific to the programs themselves. Given that the main focus of this study was on the organization of programs rather than college supports more generally, our suggestions about the possible reasons for the differences between high- and low-performing programs are at best conjecture.

For the reasons described above, structure may not be a particularly productive element for career-technical programs to focus on as they attempt to improve completion rates because the programs we observed, at least, were already highly structured. It may be more important to help more students enter highly structured programs and to improve structure in transfer programs in liberal arts or business programs.

References

Dadgar, M., & Weiss, M. J. (2012). *Labor market returns to sub-baccalaureate credentials: How much does a community college degree or certificate pay?* (CCRC Working Paper No. 45). New York, NY: Columbia University, Teachers College, Community College Research Center.

Jenkins, D., & Weiss, M. J. (2011). *Charting pathways to completion for low-income community college students* (CCRC Working Paper No. 34). New York, NY: Columbia University, Teachers College, Community College Research Center.

Jepsen, C., Troske, K., & Coomes, P. (2012). *The labor-market returns for community college degrees, diplomas, and certificates* (Discussion Paper No. 2009-08). Lexington, KY: University of Kentucky, Center for Poverty Research. Retrieved from http://www.ukcpr.org/Publications/DP2009-08.pdf

Radford, A. W., Berkner, L., Wheeless, S. C., & Shepherd, B. (2010). *Persistence and attainment of 2003–04 beginning postsecondary students: After 6 years* (NCES 2011-151). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.

Rosenbaum, J. E., Deil-Amen, R., & Person, A. E. (2006). *After admission: From college access to college success*. New York, NY: Russell Sage Foundation Press.

Scott-Clayton, J. (2011). *The shapeless river: Does a lack of structure inhibit students' progress at community colleges?* (CCRC Working Paper No. 25). New York, NY: Columbia University, Teachers College, Community College Research Center.

Scott-Clayton, J., & Weiss, M. J. (2011). *Institutional variation in credential completion: Evidence from Washington State community and technical colleges* (CCRC Working Paper No. 33). New York, NY: Columbia University, Teachers College, Community College Research Center.

Zeidenberg, M., & Scott, M. (2011). *The content of their coursework: Understanding course-taking patterns at community colleges by clustering student transcripts* (CCRC Working Paper No. 35). New York, NY: Columbia University, Teachers College, Community College Research Center.

Appendix A: Site Selection Methodology

Because issues of structure are most relevant to programs that take some time to complete, this study focused on the completion of long-term credentials. We examined the proportion of students from the 2005–06 cohort who attempted a concentration within a given field of study at the college who earned either a long-term certificate or an associate degree by the end of the 2008–09 school year. We consider long-term certificates to be those that require one year or more of full-time study (45 quarter credits). We exclude short-term certificates (which can be completed with less than one year of full-time study) because research suggests they may have relatively little value in the labor market (Dadgar & Weiss, 2012; Jepsen, Troske, & Coomes, 2012). As a result, programs that specialize in short-term certificates may appear to have lower completion rates based on our calculations.

Using completion rates of long-term credentials as the outcome, we performed a multivariate regression using student-level data to predict expected college completion rates.[8] All students who attempted a concentration in a given field of study were included in the regression, even if they were enrolled at a college that did not have a large enough sample size to be considered for selection. We then calculated the difference between each school's actual and predicted completion rates and ranked colleges by this difference. An institution performed highly if its actual completion rate exceeded the completion rate that would be expected based on its student characteristics (and selected school characteristics).

Table A.1 summarizes the results of this analysis for colleges with at least 20 students in a given field. The first three columns summarize colleges' actual completion rates, where colleges varied widely in terms of success. The next three columns summarize colleges' predicted completion rates, or the completion rates that would be predicted for each college using the results from our multivariate regression, controlling for student characteristics. The final three columns summarize the magnitude of this

[8] Student characteristic controls included age, race, enrollment status (part-time or full-time) in the first quarter, Pell grant receipt, self-reported intent, and socioeconomic status based on census block characteristics. School characteristic controls included the degree of urbanization of the college's location and the percentage of minority students.

difference—that is, how much colleges overperformed or underperformed in relation to their expected completion rates. For example, in the allied health field, the college that performed the best relative to its projected outcome had a predicted completion rate of 31.4 percent and an actual completion rate of 52.7 percent—a difference of 21 percentage points. This difference is the value that was used to determine college performance for the purpose of site selection. Because completion rates were calculated separately for concentrators in each field of study, a given college might perform well in one field but poorly in another.

For our website reviews, we selected 20 colleges across the four fields of study, including both relatively high- and low-performing colleges. For our interviews, we selected two colleges in each of the four fields of study, including one relatively high-performing college and one relatively low-performing college. We selected the cases that maximized variation in program performance to obtain the most information-rich sources of data for our preliminary examination of the link between structure and credential completion.

Table A.1
Actual and Predicted Long-Term Credential Completion Rates Across Colleges, Based on Value-Added Measures

	Actual Completion Rate (%)			Predicted Completion Rate (%)			Difference (%)		
Field of Study	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**
Allied health	5	55	32	20	47	31	-19	21	1
Business and marketing	0	35	19	1	30	20	-17	10	0
Computer and information sciences	0	45	13	2	25	13	-11	21	0
Mechanics and repair	6	73	30	21	34	27	-18	40	3

Source: SBCTC administrative data

Appendix B: Coding Guidelines for Program Websites

Table B.1
Information Quality of Websites: Items Coded

Item	Coding Guidelines
Table or graphic on program requirements	Indicate if this is available and, if so, provide a general description
Sequence for course taking	Indicate if this is available and, if so, provide a general description
Prerequisite information	Information on prerequisites is listed (yes/no)
Transfer information listed	Including information on opportunities and requirements for transfer
Employment information	Including information on job prospects, placement assistance, anything employment related
Program performance information	Including number of credentials awarded, completion rate
Contact information for students	Where to call for more information on program
Certification or licensure associated with program	Indicate if an industry certification or state licensure is associated with the program, list the name
Application required	Indicate if the program is selective, requires admission

Source: College websites.