Online Occupational Education in Community Colleges: Prevalence and Contextual Factors

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Executive Summary

This study examined the current state of online occupational programs in community colleges and explored issues related to institutional, economic, and social indicators that influence (a) the offering of online programs and (b) the programmatic connection to workforce development needs. This project is the first national study that categorizes and inventories specific types of online occupational programs in community colleges. The study included a national random sample of 321 institutions in the United States. Data were collected through institutional websites, statewide websites, follow-up emails, and phone inquiries to institutions. The following sections summarize key findings.

Prevalence of Programs

- Among sampled institutions with data available ($n = 301$), 47.5% offered credit-granting online occupational programs. We defined *online occupational programs* as limited to programs that the institutions identified as being online, with 50% or more of course content available through online communication technologies.
- Although 47.5% of institutions offer online occupational programs, previous NRCCTE research found that 76.3% of institutions offer credit-granting occupational courses (Johnson et al., 2003). This finding suggests a need for institutions to build and promote online programs in order to create increased accessibility for students searching for cohesive sequences of online courses.
- Most online occupational programs were in subjects that are more easily taught online. In the sample, 43.6% of all online occupational programs were part of the Business Management/Administration and Marketing fields. Although programs were available in skill-based fields like Health Science, most such programs were in areas such as Health Informatics, which are more easily taught online.
- Previous NRCCTE research found that courses in skill-based fields like Veterinary Technology and Funeral Service Education can be successfully taught online when integrated with face-to-face, lab, or clinical requirements (Benson et al., 2004). The current study found that such programs are rare, which illustrates a need for institutions and states to provide the resources necessary to develop such programs, especially in high-need Health Science, Green Technologies, and skilled Manufacturing occupations.
- A small majority of the online occupational programs in the sample award certificates or diplomas (52.4%) rather than associate's degrees (47%). Other studies have found that community college certificate programs have declined in popularity since 1990 (Levesque et al., 2008). However, online certificate programs provide convenient and accessible options that lead to greater results for some students. According to evidence from Florida, occupational certificate programs can provide students from weaker economic and academic backgrounds with the most opportunity for economic mobility compared to other degree options (Jacobson & Mokher, 2009). This finding illustrates that institutions are providing some valuable online options for students from less advantaged academic and economic backgrounds.

Connection to Workforce Development Needs

- Among colleges offering online occupational programs, 26% offered one or more programs associated with the state's five fastest-growing occupations (overall average of .65 programs per college in the five fastest-growing occupations).
- Among the institutions offering online occupational programs, 39% offered one or more programs in the state's top 10 occupations with the most projected openings (overall average of .89 online programs at each college in the sample).
- A minimal relationship existed between colleges' online offerings in high-demand, high-growth fields and the specific institutional, social, and economic characteristics for institutions. In other words, little meaningful connection was found to indicate that certain types of institutions (e.g., in counties with high unemployment) were more likely to offer online occupational programs in high-demand, high-growth fields in their states. The only meaningful finding was a minimal connection with the degree of statewide centralization for the institutions.

Community and Institutional Demographics

- Institutions with higher percentages of White students are more likely to offer online occupational programs. However, other national studies have found that students of color and White students have comparable participation rates in distance education (Flowers, Moore, & Flowers, 2008; National Center for Education Statistics, 2003b). These findings illustrate a potential need for additional online program development in colleges with larger percentages of students of color.
- Most institutional, social, and economic indicators had no role in determining whether colleges offered online occupational programs. Aside from racial variables, variables such as institutional enrollment, percentage of part-time students, and local unemployment rates had no relationship with whether institutions offered online occupational programs.

Governance and Centralization

- Institutions operating under statewide governance structures and in states with more highly centralized statewide practices have more online occupational programs than other types of institutions.

As online education will play an increasingly central role in the nation's workforce development efforts, this study will provide institutions and policymakers with national data to influence future decisions.

Online Occupational Education in Community Colleges: Prevalence and Contextual Factors

Increasing numbers of students rely on the access and convenience afforded by online education to develop job skills, achieve economic mobility, and increase their contributions to society. Although online education permeates most community colleges, some colleges offer more online programs than others. Programs in some fields are more widely offered online than those in others. This project sought to understand the possible factors that influence such differences. As the first phase of a larger project that seeks to understand online career and technical education (CTE) in community colleges, this study examined the connection between institutional, economic, and social indicators that influence (a) the prevalence of online occupational programs and (b) the connection of those programs to state workforce development needs.

Background to the Study

Online Education in Community Colleges

The availability of online education at community colleges is growing. Two-year colleges quickly became the most dominant providers of online education (Allen & Seaman, 2003) in response to their community-oriented missions. Ninety-six percent of public community colleges offer one or more online courses (Parsad & Lewis, 2008), and 41% of public community colleges offer entire degrees online (American Association of Community Colleges, 2008). Community colleges that responded to the Instructional Technology Council's annual survey (2008) indicated an 18% increase in online enrollment. Additionally, 67% of survey respondents indicated that they offer non-credit online education courses, up 6% from the previous year. Despite the large number of online courses available, 70% of survey respondents indicated that their college is not keeping pace with students' demand for online courses. With fluctuating gas prices affecting commuting costs, demand for online courses is likely to continue growing (Association for Career and Technical Education, 2008).

Workforce Development and Social Equality: The Role of the Community College

As the U.S. economy continues to transition, employers need the ability to tap into a workforce with the required skills to meet new demands. Occupational Education is continuing to adapt to economic and workforce development demands, and community colleges play an especially important role in this process. Community colleges provide flexible, low-cost, job-specific, and high-quality opportunities for diverse groups of students and have been called upon repeatedly in current economic recovery efforts.

Community colleges are uniquely connected with their communities by providing facilities for community use, displaying agility by responding quickly to employer needs, and providing customized or technical training for employers. This connection to the community has led community colleges to expand their focus beyond the original emphases on traditional academic or vocational credit-granting education. Today, most community colleges offer non-credit programs such as developmental education, professional or technical training, and contract training for employers (Davis, 2008; Jacobs & Dougherty, 2006; U.S. Government

Accountability Office, 2004). These programs often result from formal and informal partnerships with employers, labor unions, community agencies, and others to promote a more expansive workforce development mission (Orr, 2001). According to a survey of state legislators from 50 states, community colleges are perceived as being most responsive to states' workforce development and training needs when compared to other types of higher education institutions (Ruppert, 2001).

Community colleges have also made substantial contributions toward increasing access to education and increasing overall social equality through enhancement of individual opportunity (Cohen & Laanan, 1997). A two-year degree can increase average worker income by 20% to 30% when compared to high school graduates (KnowledgeWorks Foundation, 2002). Community colleges provide job-specific programs that allow students to enhance their existing job skills or move directly into the workforce. For students from lower income families who also have weaker academic backgrounds, certificates in occupational fields from community colleges provide the most effective opportunity for economic mobility, according to a large-scale examination of employment and education data of 144,545 Florida residents (Jacobson & Mokher, 2009). According to that study, postsecondary certificates were the only credential to significantly increase earnings for low-performing high school students when compared to those without credentials. Among other degree seekers, strong positive earnings effects were limited to high-performing high school students. Despite the opportunity afforded by occupational certificates, Jacobson and Mokher found that most disadvantaged students took community college courses that were unlikely to affect their earnings, if completed. This finding suggests increasing the availability and promotion of occupational certificate programs as attractive pathways for increasing economic mobility. If a primary goal of a community college education is to provide economic mobility for students, the study suggests that high-performing students from low-income backgrounds should be encouraged to pursue associate's, bachelor's, and graduate degrees. Those from weaker academic backgrounds should, at a minimum, be exposed to the significant earnings potential associated with completing certificate programs.

Workforce Development through Online Education

A previous NRCCTE study found that 76.3% of responding community colleges offered occupational courses through technology-enabled distance learning (Johnson et al., 2003). As community colleges seek to fulfill their missions to contribute to workforce and economic development, online education may contribute to that goal by offering online credit, non-credit, and employer-sponsored programs. Online learning is also becoming an increasingly relevant means of fulfilling the social goal of providing individual educational and economic opportunities. Online courses provide more convenient access to those who cannot attend face-to-face courses, particularly working adults and single parents (Floyd, 2003; Johnson et al., 2003). Credit-granting programs and non-credit online programs provide students and employers with both opportunity and flexibility.

Institutional Issues in Online Occupational Education

Although online learning has grown substantially, this medium for instruction presents unique challenges for community colleges, faculty, and students. Data from the Instructional

Technology Council's annual survey indicate that distance education administrators' greatest challenges are a lack of support staff needed for training and technical assistance and limited student services for online students (Instructional Technology Council, 2008). The greatest faculty challenges are workload issues, training, and compensation (Haber & Mills, 2008; Hardy & Bower, 2004; Instructional Technology Council, 2008; Maguire, 2005).

Cox's (2005) analysis of online learning at 15 community colleges showed that although faculty members who become early adopters of and innovators in online learning require less administrative support, other, later-adopting faculty require more administrative support; this requires significant overhead investments. Piña (2008) found significant relationships among several variables affecting this need, such as the academic level of the institution and its organizational design, locale, and training/professional development opportunities for faculty. For example, when compared to other institutions, he found that two-year colleges were less likely to offer fully online degrees, online academic advising services, and technical support for students. Distance learning in two-year colleges was more likely to be managed through a centralized entity, although rural institutions were less likely to provide instructional design support, professional incentives, or professional development for online learning. These findings suggest that institution type and organizational design influence the implementation of online learning.

Some online learning programs operate under entrepreneurial self-funded models that allow additional flexibility for employers to create new curricula in response to workforce development needs. Other institutions have strong, responsive cultures that adapt to workforce development needs or operate under statewide governing boards that mandate such responsiveness. Community colleges have also utilized external resources in order to offer online learning. In some cases, consortia, larger institutions, or corporations provide curriculum development, technical support, or even instruction (Ives, 2006). For example, a survey of public two-year colleges found that 42% of institutions acquire some credit-granting courses from commercial vendors, whereas 79% of institutions acquire some non-credit courses from commercial vendors (Parsad & Lewis, 2008). These partnerships or outsourcing arrangements have been utilized in both credit-granting and non-credit workforce development programs. Each of these organizational arrangements requires different approaches for gaining internal support and for promoting online learning growth.

Organizational issues can be explored through a multi-level analysis that considers organizational approaches as influenced by state and institutional levels. Research at these levels has been lacking in the online learning literature (Arbaugh & Benbunan-Fich, 2005), as most previous studies have focused on course-level pedagogical issues. Exploration of such organizational design issues can help us understand the minimal conditions required to make offering online occupational programs successful.

Using data from a broader study from 2000-2002, Cox (2005) found that six interrelated components determined the extent to which institutions offered online courses: (a) administrative commitment, (b) online student support services, (c) the availability of a full-time online coordinator, (d) internal/external financial and technological resources, (e) adequate faculty participation, and (f) online professional development. Cox concluded that the extent of online

course offerings depended upon institutions providing relatively basic components in each of these six areas. Our NRCCTE study builds on Cox's findings by considering larger contextual issues such as institutional, workforce, and economic factors affecting the offering of online occupational programs.

In the last 40 years, higher education in the United States has increasingly focused on outcomes, market concerns, and responsiveness to workforce needs as part of the public investment in education (Education Commission of the States, 1997). In particular, the focus on the economic and workforce development has impacted the way in which community colleges interact with local communities. However, the way in which this responsiveness has been manifested is largely dependent on structural and governance factors at the state level (Tollefson, 2000). Such factors include the degree of state community college centralization and the form of the community college governance system. For example, some states have a unified board that operates community colleges and universities; other states have loose coordinating bodies that have little control; and other states operate their community colleges through the state's land grant university system. These structures have a major role in determining how policy, funding, and curricular decisions are made.

Levin (1998) found that government influences and central administrative structures can lead to a perceived decrease in internal control over resources and curriculum. This perception can result in a narrowing of mission and lack of free agency. On the other hand, perceptions of internal control and strong institutional culture can lead to entrepreneurialism and principled responses to external influences (Cox, 2005; Levin, 1998). Such decentralized arrangements can lead to increased responsiveness to local community and workforce development needs. However, central administrative structures can create scalability and equitable statewide distribution of resources (Cohen & Brawer, 2003). Central governance structures can also lead to greater accountability, which could also contribute to a more direct linkage with workforce development needs.

Conceptual Framework

In order to consider these structural, cultural, and social factors in a theoretically sound manner, a coherent framework was used to provide a lens for understanding the internal and external influences that help determine the extent to which community colleges offer online occupational programs. Astley and Van de Ven (1983), in their classic metaframework for viewing organizations, explained that organizations can be viewed along two analytical dimensions. The first dimension relates to whether organizations exist and respond to stimuli at the *macro level* (as groups of organizations) or *micro level* (as individual organizations). The second dimension addresses whether organizations possess agency and function in *deterministic* or *voluntaristic* ways. A deterministic orientation reflects the view that behavior is determined through reactions to structures and constraints that control and stabilize the system. A voluntaristic orientation reflects the view that individuals and organizations are "autonomous, proactive, self-directing agents" (Astley & Van de Ven, 1983, p. 247). Their meta-framework is presented in a four-quadrant model that provides four views of organizations (see Figure 1):

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- If organizations exist primarily as *individual entities* (micro perspective) functioning *voluntaristically*, then they "are continuously constructed, sustained, and changed by actors' definitions of the situation" (p. 249). In such cases, both the environment and the organization can be changed through political negotiation.
- If organizations exist primarily as *individual entities* (micro perspective) responding in a *deterministic manner*, then "organizational behavior is…shaped by a series of impersonal mechanisms that act as external constraints on the actors" (p. 248). In such a system, change means adapting to external influences in a technical manner at a local level.
- If *total populations* (macro perspective) of organizations are responsive as groups and respond in a *deterministic manner*, then individual organizations either "'fit' into a niche or are 'selected out' and fail" (p. 250). In such a system, there are limits to the degree of choice that can be exercised when faced with external influences and change occurs at a broad level.
- If organizations *collectively exist* (macro perspective) and *voluntaristically* collaborate, they "mediate the effects of the natural environment" (p. 251). In such cases, negotiation, conflict, and compromise result in organizations having symbiotic relationships and changing each other.

These four perspectives are not mutually exclusive; instead, tensions manifest themselves between the four emphases. Although the metaframework focuses on organizations, Astley and Van de Ven (1983) encourage its use when considering the interactions of individuals and groups within organizations and within populations of organizations. This lens helps to integrate issues related to organization design and workforce/economic factors by considering both internal and external stimuli and by considering the degree of agency that can be exercised by institutions, programs, and individuals. Figure 1 displays the study's dimensions as illustrated through this metaframework.

	Inactive	Interactive
Macro Level (as populations)	**Inactive** Total populations responding deterministically *Levels for Consideration* State* Region* Groups of Institutions* Institution Program Individual Contributor	**Interactive** Collectives collaborating voluntaristically *Levels for Consideration* State Region Groups of Institutions* Institution* Program Individual Contributor
Micro Level (as individuals)	**Reactive** Individual entities responding deterministically *Levels for Consideration* State Region Groups of Institutions Institution* Program Individual Contributor	**Proactive** Individual entities functioning voluntaristically *Levels for Consideration* State Region Groups of Institutions Institution* Program* Individual Contributor*

Level at which Institutions Respond (left vertical axis, Macro Level to Micro Level)

| Deterministic Orientation | *Degree of Agency* | Voluntaristic Orientation |

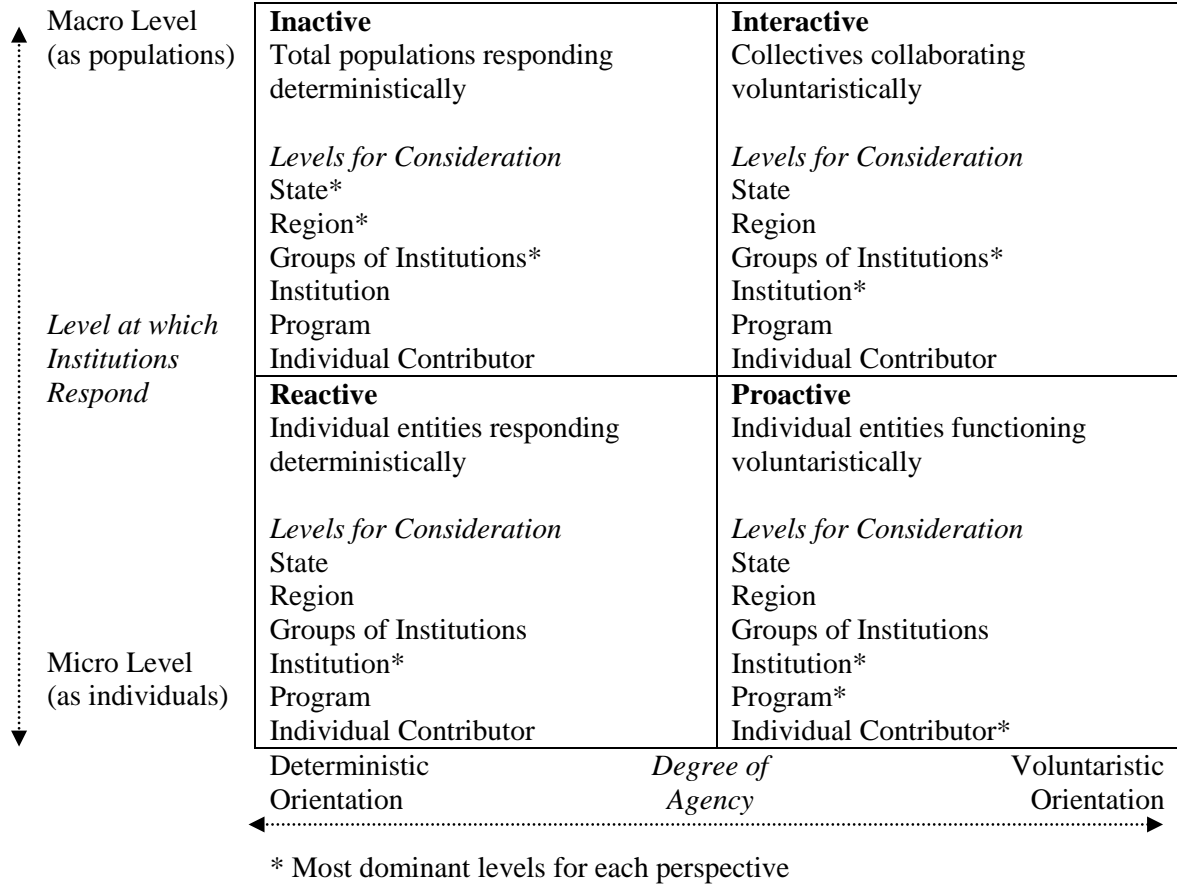* Most dominant levels for each perspective

FIGURE 1. Organizational perspectives for online occupational programs. Adapted from Astley and Van de Ven (1983).

Because this study is largely exploratory, this framework was used as a broad conceptual lens, as opposed to being used as a tight theoretical framework. This framework is multidimensional, allowing us to consider multiple issues in determining the variables influencing the offering of online occupational programs, such as:

- The effect of *institutional governance* structure on the offering of online occupational programs. For example, an institution that operates under a statewide administrative structure could have a very different process for responding to economic and workforce needs compared with a local institution that has its own board with minimal accountability to state authorities.
- The effect of *state and local social and economic variables* on offering online programs. For example, institutions in communities with a high unemployment rate might have an increased level of expectation that they should contribute to local economic development compared with institutions in areas with low unemployment. The increased level of expectation might result in increased scrutiny and responsiveness on the part of the institutions.

- The effect of the *program type* on offering online programs. For example, certain programs might lend themselves to being taught online. Alternatively, there might be a need to attract more students to certain fields. Online courses could help make certain programs more attractive because of their convenience.

As will be seen in our findings and conclusion sections, this conceptual lens helped us consider whether state and local variables, institutional variables, or program-level variables influence whether online programs are offered.

Problem, Purpose, and Research Questions

Problem and Purpose

Within studies of distance education at community colleges, occupational programs have often been neglected. No study has systematically inventoried and analyzed the specific content areas of occupational online programs available in community colleges. Moreover, no study has considered the organizational design issues and contexts associated with the offering of online occupational programs. An earlier NRCCTE study (Johnson et al., 2003) examined the overall presence of online occupational programs in community colleges and some of the characteristics associated with those programs. However, this study's analysis was not conducted at the program level. The current project builds on the Johnson et al. study by including program-level characteristics as a unit of analysis.

Another NRCCTE study (Benson et al., 2004) compared student outcomes in face-to-face and distance versions of the same courses. The researchers found no significant difference in outcomes associated with the two delivery mediums, which is consistent with findings of studies outside the CTE realm. For example, Fjermestad, Hiltz, and Zhang (2005) analyzed 30 such comparative studies and found that in 86% of cases, online or blended courses had the same or better outcomes when compared with traditional face-to-face courses. Issues surrounding institutional context, policies, and organizational structure are critical in determining the success and sustainability of online learning programs (Arbaugh & Benbunan-Fich, 2005; Vrasidas & Glass, 2002). However, these issues have received less attention in previous research studies despite the high priority given to such institutional issues by community college practitioners (Instructional Technology Council, 2008). The second phase of this NRCCTE study will pay special attention to organization design issues within institutions and the relationship those issues have with online occupational programs.

A database was developed using existing data from national, state, and institutional sources. After compiling the database, the data were examined to understand (a) the extent to which online occupational programs are offered in community colleges and (b) the institutional, social, and economic characteristics that increase or decrease the likelihood of community colleges offering online occupational programs.

Research Questions

This project addresses the following research questions:

1. What types of online occupational programs are offered in an online format?
2. Is there a relationship between community college institutional characteristics (e.g., institutional size, institutional demographics, community college governance model) and the number and types of online occupational programs offered?
3. Is there a relationship between a community college's local context (e.g., economic indicators, state and local workforce development needs) and the number and types of online occupational programs offered?

Study Design

As noted, Astley and Van de Ven's (1983) metaframework for viewing organizations is the primary conceptual lens for viewing community colleges and online occupational programs in this study. Figure 1 depicts the levels being considered and dimensions for understanding how those levels affect organizational approaches at the institutional and program levels.

Our research questions were answered by compiling a database of online occupational programs and institutional characteristics for a sample of 321 community colleges. Data on state characteristics, institutional characteristics, and program offerings were gathered by mining institutional websites, local, state, and federal databases and reports, and national community college databases. Additionally, individual colleges were contacted directly when data could not be obtained through other sources. The unit of analysis was at the institution and program levels.

Sampling Strategy

The sampling procedure replicates parts of the procedure used in the Johnson et al. (2003) study. The target population consisted of the 1,081 institutions in the database of the American Association of Community Colleges (AACC; i.e., community colleges, technical institutes, junior colleges). This population consists of single-campus colleges, multi-campus colleges, and colleges that are affiliated with a university. For the sample, 321 institutions were randomly selected to participate in order to achieve a confidence level of 95% and a confidence interval of 4.59. Complete data were available for 301 colleges.

Scope of Study

This study focuses on *online education*, which describes a specific medium through which *distance education* is offered. Distance education is a broader concept that encompasses "all forms of education in which all or most of the teaching is conducted in a different space than the learning, with the effect that all or most of the communication between teachers and learners is through a communications technology" (Moore, 2003, p. xiv). Programs were considered "online" if face-to-face instruction was reduced or eliminated by 50% or more as a result of online communication technologies. In other words, programs that include hybrid courses were included if they incorporate a small amount of on-campus or face-to-face lab work, which is similar to the scope of similar studies (Johnson et al., 2003; National Center for Education Statistics, 2003a).

This study encompasses the overlapping realms of both career and technical education and workforce development. In some ways, workforce development is a broader term that encompasses the wide variety of work-related education that occurs in community colleges (Gray & Herr, 1998; Jacobs, 2006; Jacobs & Dougherty, 2006). Due to data gathering limitations, this phase of the project encompassed only credit-granting degree/certificate programs, whereas the second phase of this study will consider some aspects of non-credit programs.

Included programs were limited to *occupational programs*, as defined and classified in a National Center for Education Statistics (NCES) study (Phelps & Greene, 2001). The NCES study defined an occupational program as "a sequence of courses designed to prepare students for an occupation (e.g., nurses' aide) that typically requires education below the baccalaureate level" (Phelps & Greene, 2001, p. A-7). The broad categories in that classification scheme were business/marketing occupations, technical/mechanical occupations, building trades, health/life science occupations, and service occupations. Their classification scheme also included more specific subcategories under each broad category.

Instrumentation

This study analyzed the types of online occupational programs offered at community colleges throughout the United States and the relationship program offerings have with institutional, social, and economic variables.

Our database was compiled of institutional characteristics, social and economic characteristics of the county where the institution was located, and online occupational program offerings. Data were collected through national and statewide databases, institutional websites, and direct inquiries to community colleges.

The institutional, social, and economic data were gathered from several archival database sources including: AACC, NCES Integrated Postsecondary Education Data System (IPEDS), U.S. Census Bureau, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis. Online occupational program data were collected from state/district level virtual campus or online consortium websites, individual institution websites, and telephone/email correspondence with institutional admissions, curriculum, advising, and online learning staff. Appendix A provides a comprehensive list of variables and data sources used.

After the program data were collected, each program was classified using the Career Clusters and Career Pathways classification scheme, developed by the States' Career Clusters Initiative of the National Career Technical Education Foundation (States' Career Clusters Initiative, 2008). The 16 Career Clusters (e.g., Business, Management, and Administration) offer a broad categorical distinction whereas Career Pathways provide more precise distinctions within individual Career Clusters (e.g., Administrative and Information Support; Human Resources; Management). The process of coding the programs occurred in stages, with the researchers classifying and discussing the appropriate coding approaches in three rounds with a smaller number of programs. After agreement was reached on the appropriate coding approach, one

researcher coded the remaining programs. After the entire sample of programs was coded, a second researcher, who was followed by a third researcher, verified the accuracy and appropriateness of the entire coding enterprise. Disagreements regarding coding were reconciled through consensus.

The classification of institutional governance structure and degree of centralization came from Lovell and Trouth's (2004) paper in which each state's system was classified according to the specific governance model and according to the degree of centralization. Some taxonomies that explain and classify governance for community colleges are unwieldy and difficult to manage (Lovell & Trouth, 2004). Lovell and Trout built a new taxonomy, based on their review of existing taxonomies, that categorizes community colleges by two key factors: structure (type of community college system/board) and degree of centralization.

First, in order to understand the structure of community colleges and the state agencies to which they report, Lovell and Trouth (2004) incorporated Tollefson's (2000) classification of governance. Using this, each state was placed into the following categories (see Table 1).

Table 1
State-Level Community College Structures

State Board with Responsibility for Community Colleges	Description	Percentage of States (%)
State Board of Education	Oversees community colleges and K-12 systems in a general sense. Most control left to local institutions and boards.	12
State Higher Education Board or Commission	Exercises influence over state universities and community colleges by approving programs and recommending annual budget priorities to the legislatures. Usually found in states with local boards.	20
State Community College Coordinating Board	Holds moderate control over community colleges, particularly concerning finances and academic operations.	22
State Community College Governing Board	Oversees most community college operations, including employment of faculty, staff, and administrators; approving academic programs and budgets; establishing systemwide employment, salary, and benefit policies; and ownership of local colleges' physical plants.	12
State Board of Regents	Similar to a State Community College Governing Board, but also governs state universities.	28
Multiple Systems	States that utilize more than one structure for multiple systems.	6

Next, Lovell and Trouth (2004) added Garrett's (1999) measure of degree of centralization to their taxonomy. Garrett's approach classified the degree to which individual state systems were centralized or decentralized in order to depict the degree of local control, rather than simply the structure under which each institution exists. Each college in our sample was placed into one of the levels on that continuum (see Table 2) based upon the ways states performed 29 functions within their community colleges (Garrett, 1999).

Table 2
Degree of Statewide Centralization in Community College Systems

Degree of Centralization	Percentage of States (%)
Highly Centralized	10.2
Centralized	28.5
Moderately Centralized	10.2
Moderately Decentralized	24.4
Decentralized	22.4
Highly Decentralized	4

The two taxonomies depict different conditions and do not overlap exactly. For example, states with a State Community College Governing Board were placed into the highly centralized, centralized, moderately centralized, moderately decentralized, and decentralized categories. Therefore, the separate measures for governance and centralization are valuable categories of analysis.

Validity and Reliability

The validity and reliability of the data sources were assessed prior to data collection. Social and economic data were collected from reputable national archival databases, with the most recent data being utilized (see Appendix A). In every instance, social and economic variable data were collected from a single source, thus reducing possible measurement error due to confounding sources.

Program-level data were collected from state/district virtual campus and online consortium websites, individual academic institution websites, and telephone/email inquiries with institutions. In instances in which state- or district-level websites were utilized, reported information was verified through individual academic institution websites to ensure the validity of the data. Online occupational program data came from self-identified data, meaning this study was interested in the existence of institutionally identified online programs (rather than groups of online courses not identified by the institution as an online program). In order to reduce subjectivity in the data, precise procedures were followed in the collection of these data. State- or district-level websites were accessed first. If information was not available at the state or district level, individual college websites were accessed. In cases in which definitive data regarding the offering on online occupational programs could not be established through online sources, institutions were contacted via telephone, using a protocol. If telephone contact could

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not be made, voicemail messages were left. Unresponsive institutions were contacted via repeat telephone calls, then by email.

Data Analysis

Various analyses provided an understanding of the relationship between program offerings and institutional characteristics (e.g., institutional, social, and economic indicators). Table 3 contains the analyses conducted in the study.

Table 3
Analysis Techniques Used in the Study

Analysis Description	Analysis Type	Independent Variable(s)	Dependent Variable(s)
Profile of institutions in sample	Descriptive statistics	n/a	n/a
Determining whether there is a difference in community and institutional demographics among those institutions offering online occupational programs and those that do not	MANOVA	Has online occupational programs grouping; Does not have online occupational programs grouping	Institutional, social, and economic indicators
Influence of governance models on the number of online occupational programs	ANOVA	Community college governance model	Number of online occupational programs
Influence of degree of statewide centralization	ANOVA	Degree of statewide community college centralization	Number of online occupational programs per 10,000 students
Online occupational programs classified by Career Pathways and Career Clusters	Descriptive statistics	n/a	n/a
Type of degree offered through online occupational programs	Descriptive statistics	n/a	n/a
Determining whether institutional, social, and economic variables predict the	Forward entry multiple regression	Institutional, social, and economic indicators	Number of online occupational programs per 10,000

number of institutional programs in the state's five fastest-growing occupations			students[1]
Determining whether institutional, social, and economic variables predict the number of institutional programs in the state's top 10 occupations with the most projected openings	Forward entry multiple regression	Institutional, social, and economic indicators	Number of online occupational programs

Limitations

There are several limitations that should be considered when interpreting our findings. The number of online programs included in this sample was limited to programs in which (a) the institution identified them as being "online programs" and (b) 50% or more of the program requirements could be fulfilled online. Regarding the first requirement, there were cases in which no official online program was available. However, online courses could be pieced together in such a way as to allow a student to take 50% or more of program requirements online. Such programs were not included in the sample because of (a) the importance of only counting programs that clearly indicated that they were online to potential students and (b) reliability issues related to piecing together data to determine whether enough online courses existed that would allow a student to take 50% or more of the requirements online. Additionally, we measured the number of online occupational programs rather than the percentage of occupational programs offered online at each institution. An examination of the percentage of total programs offered online would have accounted for differences in total occupational program offerings between institutions. In some ways, such a percentage measure would have been preferable. However, such a measurement would not have accounted for programs that offer specialized online certificates under one program umbrella. Such tracks are sometimes offered only through the online medium or are not promoted as being available face-to-face. Therefore, to increase data reliability, online programs were simply counted rather than considered as a percentage of total programs. In order to account for the variability of institution size, the program variable was normalized by considering the number of online occupational programs per 10,000 students. This variable accounted for size differences among colleges.

Another set of methodological concerns relates to the institutional, economic, and social indicators included in the study. Most institutional data are limited to those data included in IPEDS. Although IPEDS is a standard database used by higher education researchers, its reliability can be limited because the data are compiled by hundreds of institutional researchers at various institutions. Next, when using secondary data sources, errors in the aggregation and interpretation of data may occur because the analysts were not involved in the planning or

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[1] Using the number of programs per 10,000 students accounted for differences in enrollment between institutions. For example, one institution has 28 online occupational programs but has less than 1300 total students, whereas another has four programs and nearly 20,000 total students. Although many community colleges do not have 10,000 students, data were normalized to the 10,000-student level in order to increase understandability.

collection of data (Church, 2002). The last concern relates to economic and social indicators. Many of the indicators are based upon the county in which the institution is located. Because rural and suburban community colleges often serve multiple counties and urban community colleges sometimes serve only small portions of counties, these data do not perfectly reflect the communities that these institutions serve.

Findings

Institutional Level

The institutional level of analysis provides the first lens through which to examine the second and third research questions. First, a description is provided of the sampled institutions. Next, an analysis is provided of the relationship between (a) institutional, social, and economic variables of the colleges and (b) whether the colleges offer any online occupational programs. Last, the study considers the relationship between (a) the number of online occupational programs offered per 10,000 students at each college and (b) the statewide governance approach under which each college functions.

Profile of sample institutions. Data were available for 301 colleges, of which 47.5% ($n = 143$) offered online occupational programs. The 143 colleges that provide online occupational programs offered 1,201 individual programs with a mean of 8.6 (Mdn = 5, $SD = 10.3$, Range from 1 to 59) online occupational programs per college. Forty-five states were represented in the random sample as well as one independent island nation associated with the United States (Palau). The institutions represent the entire spectrum of the 12 locale types, with the highest frequencies being "rural: fringe" (17.7%), "suburb: large" (14.7%), and "city: small" (14.3%) locales. Tables 4 and 5 display the community college governance structures and degree of centralization represented in the sample.

Table 4
Community College Governance Structures for Sample (N = 301[2])

State Governance Model	N	%
State Board of Education	26	8.7
State Higher Education Board or Commission	68	22.7
State Community College Coordinating Board	112	37.3
State Community College Governing Board	32	10.7
State Board of Regents	48	16
Multiple structures in state	14	4.7

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[2] There were incomplete data for one institution residing in an independent island nation.

Table 5

Degree of Centralization for Sample Institutions

Degree of Centralization	*N*	%
Highly Centralized	20	6.7
Centralized	52	17.3
Moderately Centralized	44	14.7
Moderately Decentralized	109	36.3
Decentralized	69	23.0
Highly Decentralized	6	2.0

For the institutions in the sample, the institutional, economic, and social variables are displayed in Appendix B. The average student enrollment was 7,689 students with the majority of students enrolled part time (58.7%), female (59.7%) and White (64.6%). The overall retention rate for first-year students was considerably higher for full-time students (57.6%) than part-time students (40.8%). The average median age for the county in which the college resides was 36.1, slightly higher than the national median age of 35.3 (U.S. Census Bureau, 2000). Educational attainment for the areas in which the institutions are located was slightly less than national averages. The percentage of the population with a high school diploma or higher (25 years and older) was 80% compared to the national rate of 80.3%. The percentage of the population with a bachelor's degree or higher (25 years and older) was 22% compared to the national rate of 24.4% (U.S. Census Bureau, 2000).

Community and institutional demographics. In order to determine if there was a difference between institutional, social, and economic characteristics of colleges offering online occupational programs and those that do not, a multivariate analysis of variance (MANOVA) was conducted. The sample population of colleges was disaggregated into a dichotomous grouping variable, colleges that offer online occupational programs (*n* = 143) and colleges that do not offer online occupational programs (*n* = 158). A MANOVA was performed with offering of online occupational programs as the independent variable and the 22 institutional, economic, and social indicators as the dependent variables. The MANOVA removed cases that had missing data on any of the 23 institutional, economic, and social variables, resulting in an analysis of 294 colleges (98% of the sample). It was hypothesized that there would be a significant group difference between schools that offer online occupational programs and those that do not, based on the institutional, social, and economic indicators. Table 6 provides descriptive statistics for institutional, social, and economic factors examined in the study.

Table 6

Descriptive Statistics by Offering of Online Occupational Programs

	Has online occupational program offerings			
	Yes (*n* = 140)		No (*n* = 154)	
	M	*SD*	*M*	*SD*
State: Average annual economic growth rate (1996-2006)	5.00%	1.09	5.20%	1.25
County: Median household income (2007)	47,918.69	13,339.87	50,382.18	13,193.26
State: Economic growth (percent change in real state GDP by state, 2006-2007)	2.17%	1.34	1.88%	1.29
County: Unemployment rate (2007 annual)	4.76%	1.31	4.76%	1.44
County: Median age (2000)	35.96	3.40	36.22	3.42
County: Percent high school or higher (25 or older; 2000)	80.20%	7.84	79.61%	6.77
County: Percent Bachelors or higher (25 or older; 2000)	21.25%	9.14	22.61%	9.07
County: Percent in labor force (16 and older; 2000)	63.93%	6.39	62.07%	5.56
College: Institution student enrollment	8122.49	15,338.03[3]	7136.36	7222.37
College: Percent full-time	41.13%	11.23	40.69%	12.35
College: Percent part-time	58.84%	11.24	59.24%	12.30
College: Percent male (Fall 2007)	40.80%	6.94	39.87%	7.95
College: Percent female (Fall 2007)	59.20%	6.94	60.13%	7.95
College: Percent White (Fall 2007)	71.45%	19.21	58.44%	24.42
College: Percent Black (Fall 2007)	10.91%	12.02	13.79%	15.44
College: Percent Hispanic (Fall 2007)	7.59%	14.05	12.65%	15.92
College: Percent Asian/Pacific Islander (Fall 2007)	2.41%	3.02	7.23%	13.97
College: Percent American Indian/Alaskan (Fall 2007)	1.39%	3.96	1.14%	3.62
College: Percent unknown race (Fall 2007)	5.35%	6.32	5.49%	6.38
College: Percent nonresident alien (Fall 2007)	0.81%	1.52	1.03%	1.78
College: Percent full-time first-time student retention	57.77%	10.01	57.19%	10.75

[3] The large amount of variance can be explained by the presence of an outlier (population of 168,881). Removal of the outlier results in a decrease in the descriptive statistics (*M* = 7,210.87, *SD* = 4,851).

| | Has online occupational program offerings | | | |
| | Yes (*n* = 140) | | No (*n* = 154) | |
	M	*SD*	*M*	*SD*
State: Average annual economic growth rate (1996-2006)	5.00%	1.09	5.20%	1.25
County: Median household income (2007)	47,918.69	13,339.87	50,382.18	13,193.26
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County: Percent high school or higher (25 or older; 2000)	80.20%	7.84	79.61%	6.77
County: Percent Bachelors or higher (25 or older; 2000)	21.25%	9.14	22.61%	9.07
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College: Institution student enrollment	8122.49	15,338.03[3]	7136.36	7222.37
College: Percent full-time	41.13%	11.23	40.69%	12.35
College: Percent part-time	58.84%	11.24	59.24%	12.30
College: Percent male (Fall 2007)	40.80%	6.94	39.87%	7.95
College: Percent female (Fall 2007)	59.20%	6.94	60.13%	7.95
College: Percent White (Fall 2007)	71.45%	19.21	58.44%	24.42
College: Percent Black (Fall 2007)	10.91%	12.02	13.79%	15.44
College: Percent Hispanic (Fall 2007)	7.59%	14.05	12.65%	15.92
College: Percent Asian/Pacific Islander (Fall 2007)	2.41%	3.02	7.23%	13.97
College: Percent American Indian/Alaskan (Fall 2007)	1.39%	3.96	1.14%	3.62
College: Percent unknown race (Fall 2007)	5.35%	6.32	5.49%	6.38
College: Percent nonresident alien (Fall 2007)	0.81%	1.52	1.03%	1.78
College: Percent full-time first-time student retention	57.77%	10.01	57.19%	10.75
College: Percent part-time first-time student retention	41.26%	12.68	40.31%	14.20

The MANOVA was statistically significant.[4] Nineteen percent of the variance in the dependent variables was explained by the grouping variable, presence/absence of online occupational programs.[5] According to Cohen (1988), this is a large effect. The univariate tests revealed significant group difference in the percentage of White students in the college population, F $(1,292) = 25.42, p = .000$, and the percentage of Asian/Pacific Islander students in the college population, F $(1,292) = 15.93, p = .000$.[6] The partial η^2 statistic revealed that 8% of the variance in the percentage of White students was explained by the presence/absence of online occupational programs. This is considered a medium sized effect (Cohen, 1988). Similarly, partial η^2 revealed that 5% of the variance in the percentage of Asian/Pacific students was explained by the presence/absence of online occupational programs. This is classified as a small effect (Cohen, 1988).

The colleges in the sample that offer online occupational programs had a significantly higher percentage of White students (71.5%) than those schools that did not offer online occupational programs (58.4%). Additionally, schools that offer online occupational programs had a significantly lower percentage of Asian/Pacific Islander students (2.4%) than those schools that did not (7.2%).

Influence of governance models. The analysis revealed significant relationships between governance models and the number of online occupational programs offered per 10,000 students at institutions. Table 7 depicts descriptive statistics regarding the average number of online occupational programs offered per 10,000 students, by governance model. A one-way between-subjects ANOVA was conducted to examine the effect of the state governance model on the number of online occupational program offerings. Results indicated that there was a significant effect of state governance model on the number of online occupational program offered per 10,000 students at the .05 alpha level across five levels of state community college governance, F $(4, 281) = 6.83, p < .001$. About 9% of the variance in the number of online occupational programs offered per 10,000 students was explained by the state community college governance model.[7] According to Cohen (1988), this is a medium effect.

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[4] Hotelling's Trace = .235, F $(22,271) = 2.90, p = .000$.

[5] $\eta^2 = .19$.

[6] Because of the large number of dependent variables (22), a corrected alpha level of .002 was used for the tests of univariate effects (Stevens, 2001).

[7] $\eta^2 = .089$.

Table 7

Average Number of Programs per 10,000 Students at Each Institution by Governance Model[8]

State Governance Model	M	SD	Number of Institutions
State Board of Education	7.47	13.21	26
State Higher Education Board or Commission	5.82	11.32	68
State Community College Coordinating Board	6.04	17.40	112
State Community College Governing Board	34.80	47.88	32
State Board of Regents	23.75	64.30	48

Post hoc comparisons using the Tukey HSD (honestly significant difference) test indicated that the mean score (number of online occupational programs offered per 10,000 students) for State Community College Governing Board (M = 34.80, SD = 47.88) was significantly higher than State Board of Education (M =7.47, SD = 13.21), State Higher Education Board or Commission (M = 5.82, SD = 11.32) and State Community College Coordinating Board (M = 6.04, SD = 17.40). The mean score for the State Board of Regents (M = 23.75, SD = 64.30) was significantly higher than State Higher Education Board or Commission (M = 5.82, SD = 11.32) and State Community College Coordinating Board (M = 6.04, SD = 17.40).

State Community College Governing Boards and State Boards of Regents are similar in that each oversees most community college operations, including employment, approving academic programs and budgets, establishing systemwide employment, salary, and benefit policies, and holding ownership of local colleges' physical plants. The primary difference is that State Boards of Regents oversee both community colleges and state universities.

Influence of degree of centralization. A one-way between subjects ANOVA was conducted to examine the effect of degree of statewide centralization on the number of online occupational programs offered per 10,000 students at institutions (see Table 8 for descriptive statistics). This analysis measured the relationship between the number of online occupational programs per 10,000 students and the degree of local institutional control. Results indicated that there was a significant relationship between the degree of centralization and the number of online occupational program offerings per 10,000 students at the .05 alpha level across the six levels of degree of centralization, F (5, 294) = 2.76, p = .000. About 5% of the variance in the number of online occupational programs offered per 10,000 students was explained by the degree of centralization.[9] According to Cohen (1988), this is a small effect.

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[8] Fourteen colleges were in states with multiple governance structures and were not included in the analysis.
[9] η^2 = .045.

Table 8

Average Number of Programs per 10,000 Students at Each Institution by Degree of Centralization

Degree of Centralization	*M*	*SD*	Number of Institutions
Highly Centralized	32.06	38.73	20
Centralized	20.53	44.16	52
Moderately Centralized	11.68	25.58	44
Moderately Decentralized	8.00	38.41	109
Decentralized	7.02	14.29	69
Highly Decentralized	6.73	6.69	6

Post hoc comparisons using the Tukey HSD test indicated that the mean score (number of estimated online occupational programs per 10,000 students) for highly centralized institutions (*M* = 32.06, *SD* = 38.73) was significantly higher than the moderately decentralized (*M* = 8.00, *SD* = 38.41) and decentralized (*M* = 7.02, *SD* = 14.29) institutions.

Program Level

The program level of analysis provides the answer to the first research question as well as another lens through which to view the second and third research questions. First, descriptive statistics outline the number and types of online occupational programs provided by institutions included in the sample. Second, the analysis includes both descriptive statistics and two regression models that examined the connection between (a) offering online occupational programs in high-demand, high-growth fields and (b) the institutional, social, and economic variables of each college.

Programs types. Of the 301 colleges represented in the sample, 143 (47.5%) offer at least one online occupational program. Those 143 institutions offered 1,201 individual programs (*M* = 8.4 programs per institution). All of the 16 Career Clusters were represented in the sample of online occupational programs (see Table 9). The vast majority of institutions with online occupational programs offer at least one program in Business Management and Administration (75.89%). Among those institutions offering online programs, other common clusters include Information Technology (41.84% of institutions), Health Science (39.72%), Human Services (33.33%), Law, Public Safety, Corrections, and Security (34.75%), and Education and Training (24.82%).

Table 9
Online Occupational Program Offerings

| Career Cluster | Career Pathway | Colleges Offering at Least One Program | | Total Number of Programs at All Colleges | Percentage of Total Online Occupational Programs Offered (%)[12] |
		Number[10]	Percent (%)[11]		
Agriculture, Food, and Natural Resources		**13**	**9.22**	**28**	**2.3**
	Agribusiness Systems	6	4.26	6	0.5
	Environmental Service Systems	4	2.84	7	0.6
	Natural Resources Systems	1	0.71	3	0.2
	Plant Systems	2	1.42	3	0.2
	Power, Structural, and Technical Systems	5	3.55	9	0.7
Architecture and Construction		**10**	**7.09**	**14**	**1.2**
	Design/Pre-Construction	8	5.67	12	1.0
	Maintenance/Operations	2	1.42	2	0.2
Arts		**3**	**2.13**	**5**	**0.4**
	Journalism and Broadcasting	3	2.13	4	0.3
	Visual Arts	1	0.71	1	0.1
Business Management and Administration		**107**	**75.89**	**495**	**41.2**
	Administrative and Information Support	50	35.46	131	10.9
	Business Analysis	1	0.71	1	0.1
	Business Financial Management and Accounting	52	36.88	105	8.7
	Human Resources	9	6.38	11	0.9
	Management	88	62.41	235	19.6

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[10] The bolded rows refer to the number of colleges offering at least one program in that Career Cluster. Other rows refer to colleges offering at least one program in each Career Pathway. Colleges may have a program in more than one Career Pathway, under a particular Career Cluster.

[11] Of the 143 institutions in the sample, the percentage offering a program in each Career Cluster and Career Pathway.

[12] Of the 1,201 programs represented in the sample, the percentage of programs offered in each Career Cluster and Career Pathway.

Marketing and Communications	10	7.09	12	1.0
Education and Training	**35**	**24.82**	**49**	**4.1**
Teaching/Training	35	24.82	49	4.1
Finance	**2**	**1.42**	**3**	**0.2**
Banking Services	1	0.71	2	0.2
Business Finance	1	0.71	1	0.1
Government and Public Administration	**1**	**0.71**	**1**	**0.1**
Public Management and Administration	1	0.71	1	0.1
Health Science	**56**	**39.72**	**164**	**13.7**
Diagnostic Services	6	4.26	12	1.0
Health Informatics	41	29.08	102	8.5
Support Services	1	0.71	1	0.1
Therapeutic Services	30	21.28	49	4.1
Hospitality and Tourism	**8**	**5.67**	**14**	**1.2**
Lodging	1	0.71	1	0.1
Recreation, Amusements, and Attractions	4	2.84	5	0.4
Restaurants and Food/Beverage Services	1	0.71	1	0.1
Travel and Tourism	6	4.26	7	0.6
Human Services	**47**	**33.33**	**101**	**8.4**
Consumer Services	3	1.42	3	0.2
Counseling and Mental Health Services	5	3.55	6	0.5
Early Childhood Development and Services	33	23.40	66	5.5
Family and Community Services	20	14.18	23	1.9
Personal Care Services	3	2.13	3	0.2
Information Technology	**59**	**41.84**	**179**	**14.9**
Information Support and Services	44	31.21	83	6.9
Network Services	1	0.71	40	3.3
Network Systems	17	12.06	1	0.1
Programming and Software Development	17	12.06	22	1.8
Web and Digital Communications	15	12.06	33	2.7

Law, Public Safety, Corrections, and Security	**49**	**34.75**	**89**	**7.4**
Correction Services	4	2.84	5	0.4
Emergency and Fire Management Services	9	6.38	19	1.6
Law Enforcement Services	30	21.28	42	3.5
Legal Services	14	10.64	17	1.4
Security and Protective Services	6	4.26	6	0.5
Manufacturing	**7**	**4.96**	**15**	**1.2**
Health, Safety and Environmental Assurance	2	1.42	3	0.2
Maintenance, Installation and Repair	2	1.42	3	0.2
Manufacturing Production Process Development	2	1.42	2	0.2
Production	1	0.71	1	0.1
Quality Assurance	2	1.42	6	0.5
Marketing	**18**	**12.77**	**29**	**2.4**
Marketing Communications	5	3.55	6	0.5
Marketing Management	13	9.22	21	1.7
Merchandising	2	1.42	2	0.2
Other	**9**	**6.38**	**11**	**0.9**
Science, Technology, Engineering, and Mathematics	**2**	**1.42**	**4**	**0.3**
Engineering and Technology	1	0.71	3	0.2
Science and Math	1	0.71	1	0.1
Transportation, Distribution, and Logistics	**1**	**0.71**	**1**	**0.1**
Transportation Operations	1	0.71	1	0.1

When considering which colleges offer at least one program in particular Career Pathways (a subcategory under Career Clusters), the top five pathways were Management (62.41% of colleges with online programs had at least one program), Business Financial Management and Accounting (36.88%), Administrative and Information Support (35.46%), Information Support and Services (31.21%), and Health Informatics (29.08%). Outside of the business and technology areas, programs in Teaching/Training (24.82%), Early Childhood Development and Services (23.4%), Law Enforcement Services (21.28%), and Therapeutic Services (21.28%) were offered at relatively high numbers of institutions (see Table 9).

Examining the number of separate programs offered at each institution, the Business, Management and Administration Career Cluster accounted for the most individual programs at all institutions (41.2%). Information Technology (14.8%) and Health Sciences (13.7%) each accounted for about 15% of the programs. Eight percent of programs were classified in the Human Services cluster and an additional 7% were categorized in the Law, Public Safety, Corrections, and Security cluster. The Arts, STEM, Finance, Government and Public Administration, and Transportation, Distribution, and Logistics clusters each represented less than half of one percent of the total program sample ($n = 1,201$; see Table 9).

Management (19.6%), Administrative and Information Support (10.9%), and Business Financial Management and Accounting (8.7%) were the most common Career Pathways represented among the individual programs offered by the sample of institutions. These three pathways exist within the Business, Management, and Administration Career Cluster. Health Informatics (8.5%) and Information Support and Services (6.9%) round out the top five Career Pathways (see Table 9).

Degree type. The majority of the programs in the sample award a certificate or diploma (52.4%). Forty-seven percent of the online occupational programs award an associate's degree. The most common associate's degree was the associate of applied science (27.9%), followed by the associate of science (9.8%) and associate of arts (7.7%). Two percent of the programs award associate degrees in particular academic areas such as associate of nursing or associate of business. The programs were not disaggregated into distinct certificate and diploma categories because of variation in the definitions and name of the academic awards. Less than 1% of the online programs awarded other credentials such as an achievement award, endorsement, or letter of recognition.

Relationship with workforce development needs. The states' five fastest-growing occupations (2006-2016 estimate) and top 10 occupations with the most projected openings (2006-2016 estimate) were examined to assess the degree to which the colleges' online occupational program offerings matched local workforce and economic demands. Among the sample of community colleges offering online occupational programs ($n = 143$), close to 26% of the schools offered one or more programs (mean of .65 offerings per school) in the Career Pathways associated with the state's five fastest-growing occupations. Nearly 39% of the colleges offered one or more programs (mean of .89 offerings per school) in the Career Pathways associated with the state's top 10 occupations with the most projected openings. Of the entire sample of individual online occupational programs ($n = 1,201$), 7.7% were in the state's five fastest-growing occupations (n

= 93), and 10.6% were in the state's top 10 occupations with the most projected openings (n = 127).

A multiple regression[13] was conducted to determine which of the 20 institutional, social, and economic predictor variables (see Appendix C) were significant predictors of the number of online occupational programs offered by a college in the state's five fastest-growing occupations. Zero-order correlations revealed that four of the predictor variables were significantly related to the dependent variable (see Table 10). Correlations between the dependent and predictor variables were negligible to low (Franzblau, 1958).

Table 10
Significant Zero-Order Correlations Between Dependent and Predictor Variables

Variable	Five Fastest-Growing Occupations
Number of programs in five fastest-growing occupations	--
College: Degree of centralization	.24*
College: Percent of part-time students	.23*
County: Percent high school or higher	-.17*
College: Percent of female students	-.16*
County: Unemployment rate	.15*
College: Full-time student retention rate	.15*
County: Median household income	-.14*

* $p < .05$

The four-predictor model (see Appendix C)[14] was statistically significant at the .05 alpha level, $F(4, 135) = 6.81$, $p = .000$. Approximately 14% of the variance in the number of online occupational program offerings in the state's five fastest-growing occupations was predicted by (a) the degree of centralization, (b) percentage of part-time students, (c) percentage of female students, and (d) median household income.[15] This is considered to be of minimal practical significance (Gall, Gall, & Borg, 2003).

An examination of the individual relationships between the predictor variables and dependent variable revealed that the degree of centralization ($t = 2.89$, $p = .004$), percentage of part-time students ($t = 3.05$, $p = .003$), percentage of female students ($t = -2.84$, $p = .005$) and median household income ($t = -2.04$, $p = .043$) each significantly predicted the number of online occupational program offerings in the state's five fastest-growing occupations. The percentage of

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[13] Used a forward entry selection, in which the first predictor that has an opportunity to enter the equation is the one with the largest correlation with the dependent variable. If this predictor is significant, then the predictor with the largest semipartial correlation with the dependent variable is considered. This process continues until there are no remaining significant predictors (Stevens, 2001).

[14] The forward entry solution (criteria of $p < .05$ to enter variables) resulted in four predictors entering the regression equation: degree of centralization, percentage of part-time students, percentage of female students, and median household income

[15] R^2 for the four-predictor model was .168, with an adjusted R^2 of .143.

part-time students was the most important predictor of the number of online occupational program offerings in the state's five fastest-growing occupations.[16]

A forward entry multiple regression was conducted to determine which of the same 20 institutional, social, and economic predictor variables (see Appendix D) were significant predictors of the number of online occupational programs offered by a college in the state's top 10 occupations with the most projected openings. Results indicated that none of the predictor variables were statistically significant predictors of the number of online occupational programs offered by a college in the state's top 10 occupations with the most projected openings.

Conclusions and Implications for Policy and Practice

Through their workforce development efforts, community colleges are playing a central role in revitalizing the U.S. economy. The evidence from this study has expanded on theoretical and practical knowledge in the CTE field about workforce development needs, institutional issues, and economic conditions affecting online occupational programs. In this section, we interpret our key findings, consider their intersection with the study's theoretical framework, and connect them with policy and practice implications.

Prevalence of Programs

Online occupational programs are much less common than online courses overall. The number of community colleges offering credit-granting online occupational programs (47.5%) is impressive at first glance. However, the percentage of institutions offering online programs[17] is much lower than the percentage of institutions offering individual online courses. Other studies have found that 76.3% of community colleges offer online credit-granting CTE courses (Johnson et al., 2003), and 96% offer online credit-granting courses of any type (Parsad & Lewis, 2008). Despite that high percentage, past research has found that two-year colleges are less likely than other institutions to offer fully online degrees (Piña, 2008). Because many students seek to take multiple courses online due to scheduling constraints (e.g., Dobbs, Waid, & del Carmen, 2009), their options are severely limited when institutions do not promote cohesive online or hybrid programs rather than simply offering a limited number of online courses.

The most common online programs are in subjects that are more easily taught online. Although online occupational programs exist in every Career Cluster, they are concentrated in a few Career Clusters and Career Pathways that lend themselves to online delivery. Subjects requiring development of manipulative skills, labs, or fieldwork require significant resources before quality instruction can occur in an online medium (Bourne, Harris, & Mayadas, 2005; Mars & Ginter, 2007). Within the sample, 43.6% of all online occupational programs were part of the Business Management and Administration and Marketing Career Clusters. When compared to the overall national distribution of students (face-to-face or online), there might be an overemphasis on Business Management and Administration and Marketing because only 22.1% of occupational students seeking a two-year degree or less are enrolled in those fields

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[16] The standardized β for percentage of part-time students was β = .242.
[17] Programs in which 50% or more of the courses are offered online and the institutions identifies the program as being "online."

(Levesque et al., 2008). By contrast, 13.7% of the online programs in the sample were in the Health Science Career Cluster, whereas 31.7% of students seeking a two-year degree or less are enrolled in a program in health care (Levesque et al., 2008). These findings should be interpreted with caution because this study did not look at actual enrollment, only at numbers of programs, unlike the study by Levesque et al.

Programs in Business Management and Administration were offered at 75.89% of institutions; Information Technology at 41.84%; Health Science at 39.72%; Human Services at 33.33%; Law, Public Safety, Corrections, and Security at 34.75%; and Education and Training at 24.82%. When looking at the specific Career Pathways within those broad Career Clusters, the focus is on programs that can be more easily taught online. For example, within the Health Science Career Cluster, the most common Career Pathway was Health Informatics rather than clinically focused programs. These findings are similar to Zirkle's (2003) preliminary finding regarding distance education in community colleges being focused around business and information technology. Using individual programs as a level of analysis, it is clear that business programs and others that lend themselves to online delivery have responded as a group to the educational market that desires online programs. However, that same responsiveness has not occurred among skill-based technical programs. This finding provides evidence that institutions are taking a reactive system-structural view, in which individual institutions are heavily influenced by structural constraints. In this case, the institutions could be bound by the difficulties of designing online labwork or field experiences for online students in regions outside of their immediate service area. The might also be bound to having face-to-face labwork due to inadequate resources for purchasing or developing online lab tools.

In an earlier NRCCTE study of exemplary online occupational programs, no meaningful differences were found between online and on-campus sections of the same skill-based course (Benson et al., 2004). Those courses were part of programs that should have been more difficult to teach online (e.g., an Embalming course within a Funeral Service Education program, Animal Nursing and Medicine Lab within a Veterinary Technology program). However, the current study found no evidence of widespread adoption of online programs in these subject areas or others that are more challenging to deliver online. Because the Benson et al. study dealt with exemplary programs, perhaps those programs included highly committed faculty—early adopters who worked hard to ensure the success of the program. Cox (2005) concluded that institutions need significant administrative and overhead investments in order for community colleges to facilitate widespread online adoption. High levels of dedication, easily accessible vendor content, or significant support are needed to transform face-to-face skill-based courses into quality online courses. Additionally, arranging for clinical experiences or field work outside the college's traditional service area requires substantial coordination and effort. This level of commitment can be difficult to duplicate when programs spread beyond dedicated early adopters. For institutions that desire to expand their online presence, it is easier to transform more traditional discussion- or lecture-based courses into an online format, as opposed to the more hands-on, skill-based types of occupational programs that require the development of manipulative skills. Institutions, states, and vendors need to provide the resources necessary to develop online occupational programs, especially in high-need areas such as the Health Sciences and Green Technologies (President's Council of Economic Advisers, 2009). The second phase of this project will examine institutions that offer online programs in hands-on, skill-based fields of

study in order to understand how institutions have fostered online program development.

Online certificates programs are the most common type of online occupational program. A small majority of online occupational programs in the sample award a certificate or diploma (52.4%), whereas a comparable number offer an associate's degree (47%). Since 1990, certificate programs have declined in popularity. According to 2004 NCES statistics, the vast majority of occupational students seeking two-year degrees or less are working toward an associate's degree (81.5% in 2004, 64.6% in 1990) as opposed to a certificate (18.48% in 2004, 35.3% in 1990; see Levesque et al., 2008). Although this shift would seem to suggest that online occupational programs are failing to meet students' needs, a recent study funded by the Gates Foundation (Jacobson & Mokher, 2009) found that students from weaker economic and academic backgrounds are (a) more likely to complete a certificate program than an associate's degree and (b) will receive a larger earnings boost from an occupational certificate than an occupational associate's degree. Considering this important finding, the Jacobson and Mokher study found that institutions are providing some valuable online options for students from less advantaged academic and economic backgrounds. Although possibly controversial, the evidence from Jacobson and Mokher suggests that institutions should consider ways to create more opportunities for enrolling more low-income, lower academically performing students in certificate programs associated with high-demand, high-growth jobs. Such a suggestion should be considered in light of community colleges' goal to increase access and equity (Cohen & Laanan, 1997). Jacobson and Mokher's study provides evidence that, for some students, the best path to social mobility is through certificate programs. However, policymakers and educators need to consider the influence of larger social values and goals before making any decisions regarding such moves.

Governance and Centralization

Institutions operating under a State Community College Governing Board or a State Board of Regents have more online occupational programs than other community colleges. Colleges with a State Community College Governing Board and State Board of Regents model had significantly more online occupational programs per 10,000 students than institutions operating under two of the other governance models. This finding suggests that a statewide governance model may foster or require the development of online occupational programs more effectively than other types of governance. Two possible financial reasons exist for this finding. First, it is possible that states with these models more equitably distribute funds (e.g., Cohen & Brawer, 2003), which enables more colleges to invest in online programs. Second, a more tightly controlled financial system could enable central office administrators to effectively encourage local colleges to mirror the central office priorities at the local institutions. In such scenarios, state systems act proactively when making the strategic choice to emphasize online occupational programs, which might enable innovators to easily access resources for developing online programs.

In some states using a state governance approach, online program approval is facilitated through a statewide office dedicated to creating online learning opportunities through the system (e.g., Olson, 2006; Olson & Langer, 2004). Such approaches have fared better in the long term than statewide consortia, often known as virtual campuses or virtual universities. Statewide consortia

are interactive, collective organizational approaches that arose in the late 1990s when both states and institutions were eager to create and expand online learning opportunities (Garn, 2009; Hiltz & Goldman, 2005). Such arrangements allowed for resource sharing, collaboration among institutions, and funding opportunities for online program development. Garn (2009) concluded that these initiatives have been more sustainable when embedded within particular statewide governance systems, due to these systems' more reliable funding streams. For example, Minnesota Online remains as the statewide office that promotes and encourages online learning opportunities within the institutions encompassing the Minnesota State Colleges and Universities system.

Another important implication relates to the more centralized institutions offering mechanisms for centralized promotion of online programs. Although most community colleges offer online occupational courses, less than half offer online occupational programs. Statewide mechanisms can create opportunities or incentives for institutions to promote individual online courses as being part of larger online programs. In our sample, we found that some institutions reported having no online programs, but upon investigating further on their websites, one could piece together enough online courses to allow a student to take 50% or more of the courses online. Programs were not counted as "online programs" in this study unless the institutions clearly identified them as such. This lack of organized online promotion creates barriers for students who do not realize that the programs may be offered in an online format. Centralized promotion efforts allow the state system to proactively encourage online program development.

Institutions with higher levels of statewide centralization tended to have more online occupational programs. Institutions with highly centralized state governance had significantly more online occupational programs per 10,000 students than most institutions operating in moderately decentralized and decentralized systems. When considering why the highly centralized institutions had so many more programs, it is important to note that Kentucky has a unique and innovative arrangement. Online programs at all community colleges in the state are offered as online programs at any other community college in the state, as long as the home institution offers that program in the face-to-face format. For example, College X could offer online courses in Criminal Justice, whereas College Y offers that program only in a face-to-face format. A student could be admitted to and register through College Y, but take up to 75% of their courses online through College X. That student could earn their degree from their local institution, College Y, as long as 25% of the courses are taken at the local college. Because Kentucky has a highly centralized administrative structure, all students in the state can see all community college courses in the state when they register. Tuition is the same for all state residents at any community college. This arrangement allows each institution in the state to have a higher number of online programs than many other institutions in the sample. However, the large number of programs in Kentucky may have skewed the sample. Readers should interpret these findings with that in mind. This example creates a strong case for centralized administrative systems creating greater access to online occupational programs. In this case, more highly centralized systems take a proactive approach by designing administrative mechanisms that provide greater access to students. However, colleges in less centralized states can and have designed similar course-sharing arrangements among community colleges, which can create greater access to online courses. State-level community college associations, coordinating boards, and other agencies can encourage interactive collaboration between

multiple colleges increase statewide access to online courses.

The highly decentralized institutional model did not have a significantly fewer number of online programs per 10,000 students when compared to the highly centralized model. The individual institution with the most programs per 10,000 students existed within a moderately decentralized system, as did the college with the fifth most programs. In fact, only three of the colleges in the top 10 online program offerings per 10,000 students were colleges operating under a highly centralized governance model. These findings provide a counter-argument to any claims that online occupational programs need centralized state governance in order to flourish. It is clear that individual institutions can exercise their own agency in either reacting to local needs or being proactive in their approach to online education. Individual decentralized institutions can proactively create environments where these online programs flourish. This finding suggests the possibility that proactive, strategic development of online programs occurs through local conditions unrelated to degree of centralization. On the other hand, there appears to be some characteristic(s) associated with highly centralized governance and statewide governance that leads to more widespread access to online learning across a state. Colleges might create these programs under statewide mandates, incentives, or structures in which the system proactively creates conditions under which local institutions react. These contradictory findings will be further explored in the second phase of this project.

This study did not look at course quality, innovation, or buy-in from faculty. Although other studies have found that administrative support is crucial in building widespread online programs (Cox, 2005), central office mandates can lead to resentment from faculty and reluctance to support distant administrators perceived who can be perceived as removed from the needs of the local communities (Cohen & Brawer, 2003; Levin, 1998). Another important question for future research is how the quality and array of course offerings varies depending upon how the program was fostered into development.

Community and Institutional Demographics

Institutions with higher percentages of white students are more likely to offer online occupational programs. Online occupational programs are more likely to exist in community colleges with higher percentages of white students. That finding is not consistent with overall distance education enrollment patterns. Data from two NCES surveys found that participation in distance education was comparable among racial groups (Flowers et al., 2008; NCES, 2003b) It is difficult to know whether the discrepancy in program offerings in this study is due to lack of technology access at colleges with higher numbers of students of color, White students being from predominantly rural areas and attending institutions with more emphasis on online learning due geographic constraints, or financial inequities among colleges having lower percentages of White students. According to a national study of community college funding (which did not include technical colleges), urban colleges received less state revenue per full-time equivalent student, even when accounting for efficiencies gained in larger enrollment districts (Dowd, 2004). However, that study found that the percentage of African American or Hispanic students was not a significant predictor of state revenue received by colleges.

Additional research is necessary to understand why institutions with higher percentages of

students of color are less likely to offer online occupational programs. This finding has potentially important implications for policies at the federal, state, and institutional levels due to possible access inequities.

Most institutional, social, and economic indicators had no role in determining whether colleges offered online occupational programs. Aside from the racial variables previously discussed, no other significant relationships were found regarding the institutional, social, and economic indicators and the likelihood of offering or not offering online occupational programs. Surprisingly, institutional enrollment was not a significant predictor of whether colleges offered online programs. One might assume that larger institutions would have more resources, which would make them more likely to offer online occupational programs. Perhaps that obstacle is counterbalanced by smaller institutions that serve larger, rural geographic areas or want to increase enrollment beyond their traditional service areas. Additionally, economic conditions in institutions' communities failed to predict whether colleges offered online occupational programs. These findings suggest that institutions are largely shaped proactively (at the micro level) by internal factors or structural conditions, rather than by deterministic forces over which the institution has little control (e.g., institutional demographics, local economic conditions). However, the primary inconsistency with that conclusion relates to the role of racial demographics in predicting whether online occupational programs are offered, as explained in the previous section.

Connection to Workforce Development Needs

Online occupational programs show modest responsiveness to states' workforce development needs. Among the colleges offering online occupational programs, 26% offered one or more programs in the Career Pathways associated with the state's five fastest-growing occupations. Among the 143 institutions offering online occupational programs, they offered an average of .65 programs per college in the state's five fastest-growing occupations. A better indicator of workforce development needs is found in the state's top 10 occupations with the most projected openings. Among institutions offering online programs, 39% offered one or more programs in the top 10 occupations (overall average of .89 programs per college offering online programs). For the entire sample of programs, 7.7% were in the state's five fastest-growing occupations and 10.6% were in the state's top 10 occupations with the most projected openings. These findings show that online occupational programs provide some responsiveness to states' needs, which illustrates a connection between the institution and the economies in which they exist.

It is important to note that these indicators are based on statewide data rather than local data, which could have caused the numbers to be relatively low because many states have diverse needs in various regions. Additionally, these indicators included some jobs that could not be attained through an occupational certificate or occupational associate's degree.

Minimal connection between offering online programs in high demand, high growth fields and institutional, social, and economic variables. A decision was made to determine whether there was a connection between the institutional, social, and economic variables and whether colleges offered online programs in the state's top five fastest-growing occupations or in the

state's top 10 occupations with the most projected openings. For example, we wanted to understand whether colleges in areas with higher unemployment were more likely to offer online programs in high-demand, high-growth fields. Although there was no connection with the state's top 10 occupations, there were some variables that minimally predicted whether institutions offered programs related to the state's top five fastest-growing occupations. The strongest predictor was the percentage of part-time students in a particular institution. This finding would be logical if it related to the number of online programs offered overall; however, it seems to have little meaningful connection to the number of programs related to the top five fastest-growing occupations. The next most important predictor was the degree of centralization, which seems more logical because centralized state control could lead to more emphasis on responding to emerging statewide workforce development needs. A negative predictive relationship was found for the percentage of female students in the institution, which seems to be of minimal relevance. Last, there was a negative connection between the median household income in an institution's county and the offering of programs in the fastest-growing occupations. These four predictors accounted for 14% of the variance in the number of online occupational programs in the state's five fastest-growing occupations. This is considered to be of minimal practical significance.

The overall finding from this regression model is that there is minimal connection between (a) the offering of online programs in high-demand, high-growth areas and (b) these specific institutional, social, and economic variables. For example, it does not appear that institutions in counties with high unemployment are any more likely to offer online programs in high-growth occupations than institutions in counties with low unemployment. This finding would seemingly reject the deterministic orientation at the institutional level (e.g., individual institutions respond to their environment in an automatic, mechanistic manner). Instead, it suggests that institutions' responsiveness to economic development needs is based upon proactive voluntaristic, stakeholder-specific tendencies in which actors work to mediate and shape the effects of the economy. For example, internal institutional stakeholders and their characteristics are likely the forces shaping how the institutions respond to economic development needs.

Relevance to Policy, Practice, and Future Research

As online education plays an increasingly important role in the nation's workforce development efforts, this study provides institutions and policymakers with national data to influence future decisions. Additionally, the study provides a unique contribution to the research by applying an organizational design and theory framework to online education in community colleges.

Although the number of online occupational education programs available nationwide has reached respectable levels, additional growth is needed in key areas to more fully meet workforce development needs. In order to promote additional availability and accessibility to students, coherent online occupational programs (fully or partially online) need to be offered, rather than simply offering hodgepodges of online courses.

Research regarding online workforce development has taken on increased relevance because it reflects two of the four areas prioritized in the Obama administration's emphasis on community colleges: workforce training and online education (Jaschik, 2009b; Khadaroo, 2009).

Additionally, as community college enrollment reaches record levels and many face severe space shortages (Gonzalez, 2009; Jaschik, 2009a), online courses provide colleges with an opportunity to expand enrollment without building new facilities. As these emerging policy priorities are realized, institutions, policymakers, and researchers will be called upon to help realize the vision of workforce development as a central component of the nation's economic development.

Future research should seek to understand the processes for fostering online program development within institutions and states, especially in skill-based fields. Such research could help institutions and policymakers create more optimal conditions for fostering online program development. Additionally, future research needs to examine the relationship between course delivery options in occupational programs, specific subject matter, learning outcomes (e.g., development of manipulative skills and content knowledge), and workforce outcomes (e.g., employment statistics, earnings, employer satisfaction). Such research will provide educators, administrators, and policymakers with additional evidence for improving the quality of online instruction, which is becoming increasingly vital to the missions of community colleges .

Acknowledgments

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Appendix A
Database Variables and Sources

Variable/Variable Category	Source
Institutional-Level Variables	
Institution name	American Association of Community Colleges (2009)
Institution city/state	American Association of Community Colleges (2009)
Institution county	National Association of Counties (2009)
Institution locale (city, suburb, town, or rural)	Integrated Postsecondary Education Data System: College Navigator (2006-2007)
Institutional student demographics[18]	Integrated Postsecondary Education Data System: College Navigator (2006-2007)
Governance model	Inventory of Statewide Community College Governance Structures[19]
Degree of centralization	Inventory of Statewide Community College Governance Structures
County-Level Social and Economic Variables	
Per capita income	U.S. Bureau of Economic Analysis: Regional Economic Accounts (1996-2006)
Median household income	U.S. Bureau of Labor Statistics: Data Sets (2007)
Unemployment rate	U.S. Bureau of Labor Statistics: Data Sets (2007)
Percent high school or higher (25 or older)	U.S. Census Bureau: State & County QuickFacts (2005-2007)
Percent Bachelors or higher (25 or older)	U.S. Census Bureau: State & County QuickFacts (2005-2007)
Median age	U.S. Census Bureau: State & County QuickFacts (2005-2007)
State-Level Social and Economic Variables	
Five fastest-growing occupations (by state)	U.S. Department of Labor: CareerOneStop (2006-2016 projections)
Top 10 occupations with the most openings (by state)	U.S. Department of Labor: CareerOneStop (2006-2016 projections)
Economic growth (percent change in real state GDP by state)	U.S. Bureau of Economic Analysis: Regional Economic Accounts (2006-2007)
Online Occupational Program Variables	
Online occupational program offerings	State/district level websites, individual institution websites, communication with institutions
Degree, certificate, or diploma status of program[20]	State/district level websites, individual institution websites, communication with institutions

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[18] Part-time student status, race, gender, nonresident alien status, institution student population, full-time first-time student retention rate, part-time first-time student retention rate.

[19] See Lovell and Trouth (2004).

[20] Programs that offered more the one degree type (e.g., an institution that offers both a Certificate and an Associate of Applied Science in Web and Digital Communications) were counted once for each degree/certificate type.

Appendix B
Social, Economic, and College Student Population Variables

	N^{21}	M	SD
Average annual growth rate (1996-2006)	299	5.10%	1.17
Median household income (2007)	300	49,137.6	13,244.39
State economic growth (percent change in real state GDP by state, 2006-2007)	300	2.00	1.31
County: Unemployment rate (2007 annual)	300	4.74%	1.37
County: Median age (2000)	300	36.09	3.40
County: Percent high school or higher (25 or older; 2000)	300	79.95%	7.31
County: Percent Bachelors or higher (25 or older; 2000)	300	21.98%	9.13
County: Percent in labor force (16 and older; 2000)	300	63.00%	6.09
College: Student Enrollment	301	7,689.66	11,832.23
College: Percent Full-Time	301	41.25%	12.41
College: Percent Part-Time	301	58.70%	12.38
College: Percent Male (Fall 2007)	301	40.26%	7.81
College: Percent Female (Fall 2007)	301	59.74%	7.813
College: Percent White (Fall 2007)	301	64.66%	23.19
College: Percent Black (Fall 2007)	301	12.22%	13.87
College: Percent Hispanic (Fall 2007)	301	10.13%	15.12
College: Percent Asian/Pacific Islander (Fall 2007)	301	5.21%	11.71
College: Percent American Indian/Alaskan (Fall 2007)	301	1.25%	3.73
College: Percent unknown race (Fall 2007)	301	5.42%	6.32
College: Percent nonresident alien (Fall 2007)	301	0.94%	1.68
College: Percent full-time first-time student retention	297	57.63%	10.48

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[21] The data source was missing retention rate data for several sampled institutions. In addition, some data were unavailable for one institution residing in an independent island nation.

	N^{21}	M	SD
Average annual growth rate (1996-2006)	299	5.10%	1.17
Median household income (2007)	300	49,137.6	13,244.39
State economic growth (percent change in real state GDP by state, 2006-2007)	300	2.00	1.31
County: Unemployment rate (2007 annual)	300	4.74%	1.37
County: Median age (2000)	300	36.09	3.40
County: Percent high school or higher (25 or older; 2000)	300	79.95%	7.31
County: Percent Bachelors or higher (25 or older; 2000)	300	21.98%	9.13
County: Percent in labor force (16 and older; 2000)	300	63.00%	6.09
College: Student Enrollment	301	7,689.66	11,832.23
College: Percent Full-Time	301	41.25%	12.41
College: Percent Part-Time	301	58.70%	12.38
College: Percent Male (Fall 2007)	301	40.26%	7.81
College: Percent Female (Fall 2007)	301	59.74%	7.813
College: Percent White (Fall 2007)	301	64.66%	23.19
College: Percent Black (Fall 2007)	301	12.22%	13.87
College: Percent Hispanic (Fall 2007)	301	10.13%	15.12
College: Percent Asian/Pacific Islander (Fall 2007)	301	5.21%	11.71
College: Percent American Indian/Alaskan (Fall 2007)	301	1.25%	3.73
College: Percent unknown race (Fall 2007)	301	5.42%	6.32
College: Percent nonresident alien (Fall 2007)	301	0.94%	1.68
College: Percent full-time first-time student retention	297	57.63%	10.48
College: Percent part-time first-time student retention	296	40.83%	13.48

Appendix C
Four-Predictor Regression Model Coefficients

Variable	Unstandardized Coefficients		Standardized Coefficients
	B	*SE*	*β*
College: Degree of centralization	.249	.086	.230
College: Percent part-time students	.031	.010	.242
College: Percent female students	-.048	.017	-.227
County: Median household income	.000	.000	-.162

Appendix D
Social, Economic, and College Variables Used in Multiple Regression

Predictor Variable
College: Percent part-time students
College: Percent female students (Fall 2007)
College: Percent American Indian/Alaskan students (Fall 2007)
College: Percent Asian/Pacific Islander students (Fall 2007)
College: Percent Black students (Fall 2007)
College: Percent White students (Fall 2007)
College: Percent Hispanic students (Fall 2007)
College: Percent nonresident alien students (Fall 2007)
College: Percent unknown ethnicity students (Fall 2007)
College: Student enrollment
College: Full-time first-time student retention rate
College: Part-time first-time student retention rate
County: Percent high school or higher (25 or older; 2000)
County: Percent Bachelors or higher (25 or older; 2000)
County: Percent in labor force (16 and older; 2000)
County: Median age (2000)
County: Unemployment rate (2007 annual)
County: Median household income (2007)
County: Per capita income average annual growth rate (1996-2006)
State: State economic growth

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