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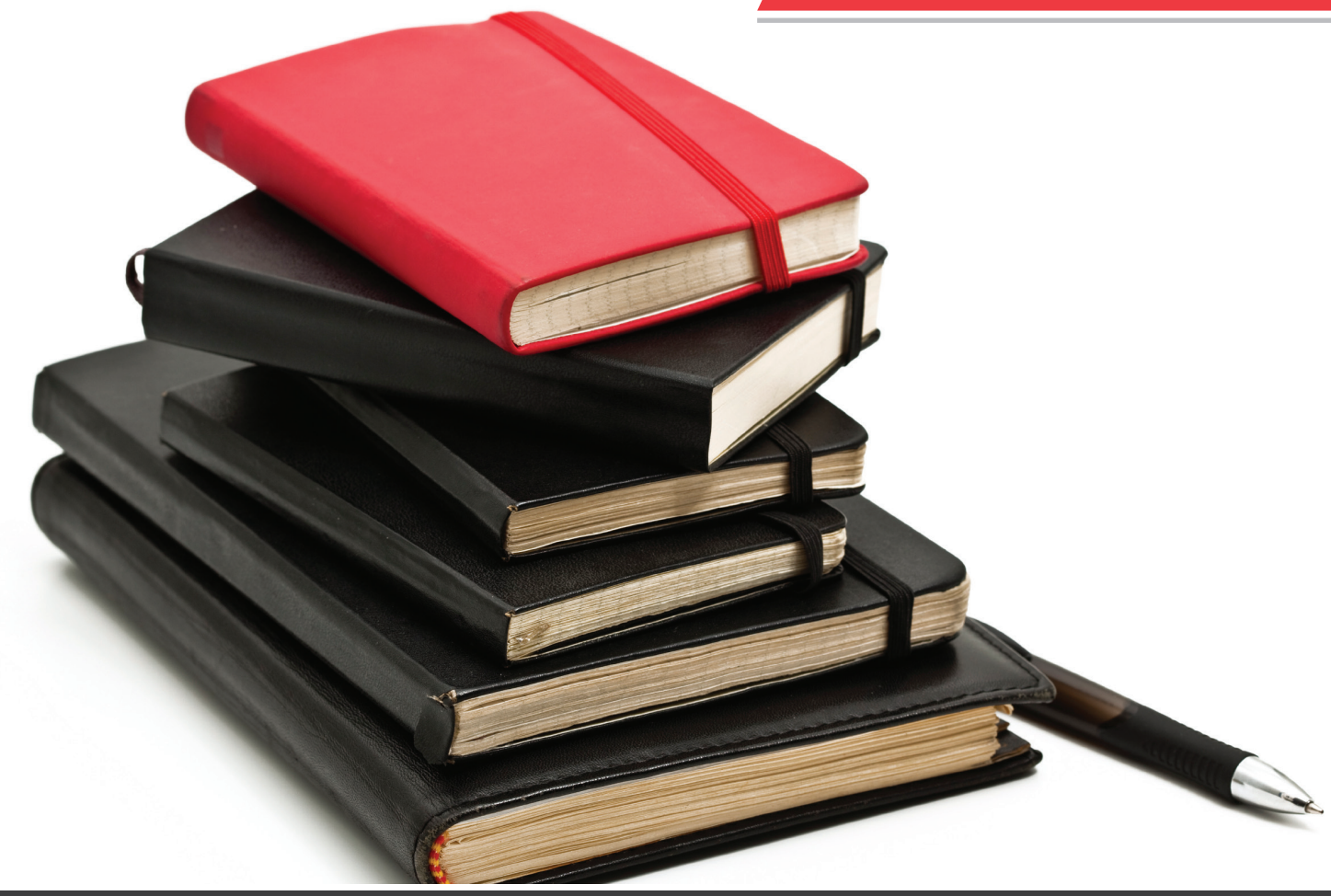
PREPARING COMMUNITY COLLEGE STUDENTS FOR JOBS AND CAREERS



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Preamble

The importance of community colleges has never been as recognized by our country's state and national elected officials as it is today. Community colleges are viewed as an essential, if not the most essential, resource in addressing the economic and workforce development needs of many regions and communities across the country. The 1988 seminal report issued by the Commission on the Future of Community Colleges called for expanding the "narrow backgrounds" of many community college students by expanding their career education focus to include general education along with job-specific skill training.[1] The report encouraged overcoming departmental narrowness by integrating technical/career studies with the liberal arts. The concern was that all students should expand their horizons. In a sense, we are calling for a similar integration between career and job training and the liberal arts through the infusion of the essential foundational employability skills across community college programs. The motivation is simple. We know these foundational skills are important to performance in 98% of family-supporting jobs pertinent to and targeted by community colleges across the various occupational sectors, as well as to achieving success in occupational training/education-related programs.

The nation's community colleges receive well-deserved recognition for their excellent work. At the same time, many unaddressed needs forecast by the Commission on the Future of Community Colleges continue to be concerns today. Preparing individuals for success in

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the workplace, having an individual's skills aligned with opportunity, and empowering individuals by strengthening their career literacy skills remain—in part—unfinished business, and the documentation of this reality should be a compelling force for action.

Community colleges are at the nexus of providing education and training that meet the skill requirements of the workplace.[2] The demand for community colleges to train workers to be immediately productive has never been more critical than in today's continuously changing technology- and information-based world economies.[3] While recognizing their multi-faceted missions, community colleges will increasingly be valued and held accountable for how well exiting students perform in the workplace.[4] Their attention and resources must increasingly align to the competencies and skills required by the workplace.

This paper examines several challenges community colleges will need to address to meet workforce development demands and reach their full potential in preparing community college students for jobs and careers. The challenges identified are driven by our accumulated data sets that illuminate three important workforce pipeline gaps: *skill*, *degree target*, and *planning*. While our recommendations are not intended to be definitive answers, they are meant to contribute to the discussion, suggesting ways to help light the path for community colleges and to be responsive to changing workforce development needs.

Introduction

As community colleges strive to prepare today's students for in-demand, family-supporting jobs, workforce pipeline gaps exist that will challenge community colleges well into the 21st century—not the least of which is an increasingly diverse socio-demographic group often lacking readiness for college-level study. Drawing on data from our academic and workforce assessment data archives, we have identified three types of **Persistent Gaps**:

01 **THE SKILLS GAP**—Gaps in the acquisition of important work-related skills—including foundational and "soft" skills—between prospective workers and demands of job openings is surprisingly large in a workforce plagued by unemployment hovering around 9%.[5] This skills gap reality includes a significant percentage of community college program completers.

02 **THE DEGREE TARGET GAP**—Gaps between community college degrees awarded and job openings suggest we are not generating a sufficient number of individuals prepared for the job opportunities available in their community. While not an easy challenge to address, seeking closer alignment between programs offered and regional employment needs and opportunities requires attention.

03 **THE PLANNING GAP**—Our research points to a gap between the programs of study individuals are pursuing and family-supporting job opportunities. We have a challenge to address the limited "career literacy" skills individuals are bringing to the community college doorstep.

> *We focus on occupations that offer family-supporting wages and that are most directly relevant to community colleges.*

Data are presented that quantify each gap, identify challenges community colleges face in closing these gaps, and lead to recommendations for community college leaders to address these challenges. We focus on occupations that offer family-supporting wages[6] and that are most directly relevant to community colleges—middle-skill[7] jobs and those in which community colleges are likely to be the most significant source of education or training (i.e., associate degree or post-secondary vocational award).[8] Throughout, we refer to these as the *targeted* occupations. These targeted occupations account for about half of the middle-skill jobs and 23% of all projected job openings between 2008 and 2018.[9] The typical annual wage in 2008 dollars in the targeted occupations is approximately $40,000.[10]

** We recognize that the term "middle-skill" is not endorsed by everyone, particularly those considering it in the context of one's aspirations. We use the term as a convenience given the extensive literature concerning middle-skill jobs and the shared understanding by most that the category includes jobs that require education and training beyond high school and short of a four-year degree. This job category includes jobs that are demanding, are currently being addressed by community colleges, and provide a salary level necessary to support a family.*

Current Knowledge of Pipeline Gaps

THE SKILLS GAP: WORKER SUPPLY VS. BUSINESS DEMANDS

How well are community college students prepared for the workforce? Do they have the necessary skills to meet workforce demands? As the largest single provider of postsecondary education and the primary engine for delivering workforce education and training in the United States, community colleges are tapped to help solve the high unemployment/high worker demand paradox: a majority of employers—52%—are struggling to fill mission-critical positions despite a persistently high unemployment rate.[11] To solve the paradox, community colleges must target the skills we know matter in the workplace. To do this, we need clear definition and measurement of the skills that matter at both the individual and occupational levels.

The term "skills gap" is often used to describe the persistent mismatch between skills demanded by employers and the skills possessed by the workforce. In the longstanding[12] and ongoing skills gap dialogue, employers and those preparing the workforce have struggled to find a common skills language. To that end, we recently proposed a simple definition of "skills gap" as the difference between the skills needed for a job versus those possessed by a prospective worker.[13] While simple in nature, this definition is both powerful and actionable because it requires comparison of the same skill at the individual and occupational levels using the same metric. Moreover, because the gap is measured for individuals, macro gaps are easily conceptualized and measured by simply aggregating individuals' data.

Fundamentally, the importance of understanding skill gaps escalates with the importance of the skills being measured. The term *foundational skill* describes skills that are prerequisites to acquiring more job-specific skills and predict job performance across a wide spectrum of occupations. Given a national repository of occupational skill and task data for more than 18,000 jobs that have been profiled over the last 17 years,[14] we are able to identify occupational skill requirements for three specific skills: *Applied Mathematics*, *Locating Information*, and *Reading for Information*.[15] These three skills are needed for 98% of job openings in the targeted occupations.[16]

We compared the skills of individuals with a middle level of education (one to three years of postsecondary education) to the skills demanded by the community college target occupations

that offer family-supporting wages.[17] **This analysis approximates gaps in foundational skills for individuals exiting community colleges.** We found that:

1. On average, individuals with one to three years of post-secondary education were adequately skilled for just **57%** of the job openings in the target occupations. Individuals were deemed adequately skilled for an occupation if their skill levels met or exceeded those required by the occupation.

2. One in 5 individuals with this education level were adequately skilled for **10% or fewer** of the job openings in the target occupations.

3. Only **1 in 4** individuals with this education level were adequately skilled to allow job mobility and meet the demands of a large majority of occupations.[18]

Skills gap analysis can be a catalyst for understanding the needs of individuals and groups of prospective workers. The example presented here focuses on specific foundational skills, but the method applies to any skill that can be measured for an individual and profiled for an occupation. In particular, certain "soft" skills (e.g., time management and other such employability skills as effective communication, teamwork, innovation, and creativity) are increasingly recognized as important for workplace success, but also are lacking among prospective workers.[19]

INSTITUTIONAL CHALLENGE: ADDRESSING WORKFORCE SKILL GAPS

It may not be enough to provide students with the academic knowledge or technical training required by an occupation or industry. To meet our nation's workforce needs and better serve students, community colleges must also address gaps in foundational skills. Integrating foundational skills development as an outcome of community college programs is a formidable yet achievable challenge if addressed head on. Institutional challenges associated with addressing skill gaps will include:

- Gaining institution-wide commitment to the integration of foundational skill instruction into the curriculum.

- Developing partnerships and systems to make the articulation of skills needed by businesses ingrained in the operations of the community college and business community.

- Understanding precisely if and how current program offerings address foundational skills in program curriculum; addressing skills needed across a wide spectrum of occupations that would help individuals acquire more job-specific skills and greater career mobility.

- Addressing tension between existing systems based on course and credit hour completion versus a system based on development and mastery of important workplace skills.

- Improving students' soft skills that employers have identified as lacking.[20]

- Addressing skill gaps in a personalized yet scalable way. Each student will have his or her own gap, suggesting movement toward modularized curriculum. Related to this challenge is the development of institutional networks whereby local students can choose from modularized offerings from additional institutions, allowing each institution to focus on strengths.

- Employing research and designing accountability systems to measure effectiveness of preparing individuals for the workplace.

The challenges associated with skill gaps are not isolated from the challenges associated with the mismatch between degrees awarded and job openings discussed next.

THE DEGREE TARGET GAP: COMMUNITY COLLEGE DEGREES AWARDED VS. BUSINESS DEMAND

How strong is the alignment between the numbers of degrees currently awarded by community colleges and the number of anticipated job openings within the targeted occupations? Our analysis suggests that some areas of study need more students to meet employer needs, while other degrees awarded are not related to the targeted occupations most directly filled by students exiting community colleges.

We tabulated the number of degrees awarded by community colleges during the 2009-2010 academic year, and by area of study (classified under the Classification of Instructional Programs [CIP] code families, a detailed coding system for postsecondary instructional programs[21]). Using the relationship of CIP codes to occupations (using the Standard Occupational Codes [SOC] which are the occupational classifications used by the Bureau of Labor Statistics[22]), along with projected 2008-2018 job openings for each SOC code, we then measured the demand of each CIP code family pertinent to the target occupations.[23] Because CIP and SOC codes do not relate in a 1:1 fashion, the estimates for each area of study are proxies—not exact measures—of demand level.

In Table 1, we present the eight areas of study with the largest demand-over-supply ratios. The ratios are defined such that the average ratio is 1.0; that is, the total demand across CIP codes

TABLE 1: COMMUNITY COLLEGE AREAS OF STUDY WITH LARGEST SHORTAGES

AREAS OF STUDY (CIP CODE FAMILY)	SUPPLY[23]	DEMAND PROXY	RATIO
CONSTRUCTION TRADES	19,414	147,357	7.6
TRANSPORTATION & MATERIALS MOVING	16,280	73,929	4.5
BUSINESS, MANAGEMENT, MARKETING & RELATED SUPPORT SERVICES	106,043	319,314	3.0
SCIENCE TECHNOLOGIES/TECHNICIANS	2,103	5,931	2.8
MECHANIC & REPAIR TECHNOLOGIES/TECHNICIANS	50,977	111,788	2.2
PRECISION PRODUCTION	23,652	47,925	2.0
LEGAL PROFESSIONS & STUDIES	7,242	9,596	1.3
HEALTH PROFESSIONS & RELATED PROGRAMS	241,771	191,262	0.8

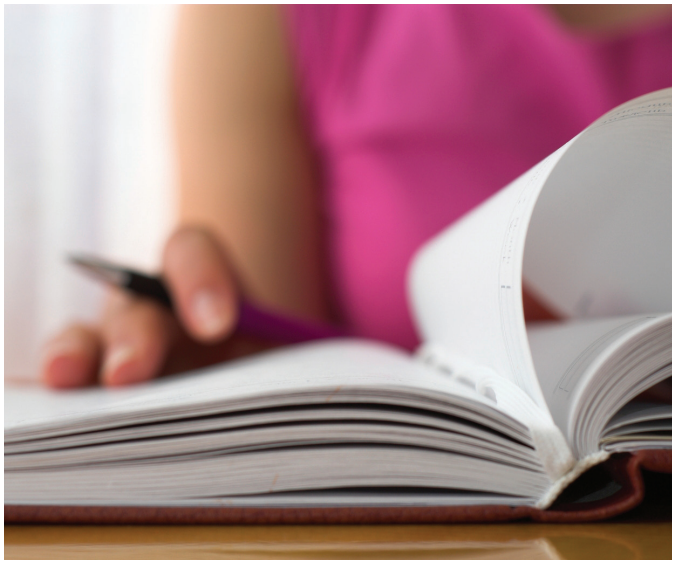
TABLE 2: AREAS OF STUDY WITH NO DIRECT RELATION TO TARGETED OCCUPATIONS

AREAS OF STUDY	SUPPLY
LIBERAL ARTS & SCIENCES, GENERAL STUDIES & HUMANITIES	234,596
EDUCATION	20,256
PUBLIC ADMINISTRATION & SOCIAL SERVICE PROFESSIONS	5,170
PSYCHOLOGY	2,720
ENGINEERING	2,393
PHYSICAL SCIENCES	2,357
FOREIGN LANGUAGES, LITERATURES & LINGUISTICS	2,155

is set equal to the total of the degrees awarded in 2009-2010 (supply). Areas of study with demand proxy-supply ratios greater than 1.0, therefore, have relative shortages of potential workers while areas with ratios less than 1.0 have relative surpluses. If there were perfect alignment between the degree areas currently awarded at community colleges and future family-supporting job openings, each area of study would have a ratio of 1.0.

Of all community college degrees awarded in 2009-2010, almost a third have no clear link to the target occupations at the associate degree level.[24] In Table 2 we list areas of study that are currently being offered by community colleges that serve as a prerequisite to pursuing a four-year degree. For example, more than 230,000 awards were made in *Liberal Arts and Sciences, General Studies and Humanities*.

The abundance of degrees awarded that are not directly related to the targeted occupations (Table 2) means students earning these degrees must continue their education at four-year institutions—and persist to a bachelor's degree—to arrive at



a clear job path. Our longitudinal data on students who obtained a community college award in these areas of study show that 43%[25] obtained a bachelor's degree within four years after the award. Thus, four years after their community college award, 57% of the students may be left without a clear path to a family-supporting occupation.

Combining Tables 1 and 2, alignment between the degree areas currently awarded at community colleges and future family-supporting job openings could seemingly be strengthened if more students choose areas of study with shortages, such as Science Technologies and Business. Alignment of program of study to opportunity also pertains to the career path selected by the 43% of individuals achieving a four-year degree.

> *We can take steps to assist individuals to make informed decisions. If we change nothing, we do a disservice to individuals who invest time and resources in studies that are not aligned with opportunities.*

Given our societal values of individual exploration based on interest and freedom of choice, the idea of channeling students into programs based only on employment prospects is antithetical to our societal values of individual exploration based on interest and freedom of choice. At the same time, we can take steps to assist individuals to make informed decisions. If we change nothing, we do a disservice to individuals who invest time and resources in studies that are not aligned with opportunities. This challenge requires building the career literacy skills of students served by the community college and providing the necessary information about career pathways leading to family-supporting careers.

INSTITUTIONAL CHALLENGE: ADDRESSING GAPS IN CREDENTIALING SUPPLY AND DEMAND

In addition to the skills gap, the degree target gap between community college degrees awarded and projected job openings presents another set of challenges for community colleges. Like the skills gap, this gap applies at the individual, local, and national levels. Potential issues include:

- The current and foreseeable reality for community colleges is that resources will be limited during a time of increasing enrollment. This will require that institutional priorities be reexamined and high-demand areas of strength be developed, perhaps at the expense of areas of low demand. Dealing with fallout from downsizing or eliminating offerings in some degree areas will be challenging. Institutional actions may require:
  - Providing students with advising services and information needed to ensure informed decisions with awareness of the areas of study with greater job opportunity and demand. This step is in part consistent with the conclusion reported in Chapter 3 of Fulfilling the Promise of the Community College,[26] which suggests that learning support and academic advising services are believed to be the most important contributors to student success. It is also consistent with the significant college completion agenda now being addressed by many community colleges. It has the additional benefit of increasing an informed alignment between student programs of study and the needs and opportunities of the workplace, and establishing a high degree of relevance for the student by connecting program of study with future occupation and employment.
  - Ensuring that all students—including those in areas of study that require education beyond the community college—have the skills needed to enter the workforce. By meeting this challenge, community colleges can close the "path to nowhere" that plagues some degree recipients.

The degree target gap is related to, and is likely partly caused by, gaps between the career plans of community college students and available or anticipated job openings. Addressing the gaps earlier in the pipeline is a key challenge that must be faced by community colleges, with help from a broad range of community, education, and workforce stakeholders.

THE PLANNING GAP: STUDENT CAREER PLANS VS. JOB OPENINGS

How well do the career plans of adult learners and students entering community colleges from high school reflect projected openings in the targeted family-supporting jobs? Our analysis suggests an overabundance of high school students entering community colleges planning to enter low-demand career areas. Our analysis is based on data from high school graduates of 2010 who took the ACT® test in high school and enrolled at a community college in fall 2010.[27] These students specified their occupational plans at the time they registered for the ACT; we categorized their planned occupations into 26 career areas.

Using a table specifying occupations directly related to the 26 career areas, we approximated the demand of the targeted jobs associated with those career areas. The estimates for each career area is a proxy—not an exact measure—of demand level.

In Table 3, we present the career areas with the largest demand over supply ratios, as well as career areas that appear to have an overabundance of student interest.

Because the measure of demand was scaled so that the total demand equaled the total supply, ratios greater than 1.0 suggest relative shortages of potential workers while values less than 1.0 suggest a relative surplus of students planning to pursue that career area.

The results suggest that two business-related career areas (Marketing & Sales and Management) suffer from shortages of interested students. The numbers of traditional students planning on careers in Distribution & Dispatching, Communications & Records, and Construction & Maintenance are quite small compared to the corresponding demand of those jobs in community college–supported targeted occupations. Conversely, nearly 10% of ACT-tested 2010 community college enrollees plan on a career in the arts (Creative & Performing Arts or Visual Applied), yet very few of the targeted job openings are in these areas. Many of the career areas with a surplus of student interest require more than a community college degree.

The data on ACT-tested community college students suggests that traditional students may not be well informed of the best career pathways they should follow as they engage with the community college. Information signaling targeted job availability needs to get to students sooner as they explore options for college and careers.

INSTITUTIONAL CHALLENGE: ADDRESSING THE PLANNING GAP

In addition to the skills and degree target gaps, the gap between career plans of traditional students and job openings presents additional challenges for community colleges. These include:

- Communicating candidly with educational stakeholders earlier in the pipeline about the need for students to develop more crystallized plans that fit with their personal interests and abilities, and align to community college career programs that connect to jobs.
- Ensuring that students understand the pitfalls of using community college enrollment for career exploration as opposed to skill development. Students who change areas of study are less likely to graduate in a timely fashion, putting an additional strain on community colleges as they strive to address regional skills gaps.[28]
- Developing faster course-correction methods for students whose career plans do not fit well with their personal interests, abilities, and expectations for earnings upon completion.

TABLE 3: ACT CAREER PLAN AREAS OF ENTERING COMMUNITY COLLEGE STUDENTS AND OCCUPATIONAL DEMAND

ACT CAREER AREA PLANNED	SUPPLY	DEMAND PROXY[28]	RATIO
DISTRIBUTION & DISPATCHING	44	1,284	29.2
COMMUNICATIONS & RECORDS	1,348	24,553	18.2
CONSTRUCTION & MAINTENANCE	2,049	33,418	16.3
MANUFACTURING & PROCESSING	1,153	11,158	9.7
MARKETING & SALES	2,890	21,763	7.5
MECHANICAL & ELECTRICAL SPECIALTIES	2,556	11,541	4.5
TRANSPORT OPERATION & RELATED	438	1,148	2.6
MANAGEMENT	13,278	19,185	1.4
SHORTAGE SUBTOTALS	**23,756**	**124,050**	**5.2**
PERSONAL SERVICES	1,396	0	0.0
EDUCATION	19,340	0	0.0
EMPLOYMENT-RELATED SERVICES	241	1	<0.1
CRAFTS & RELATED	1,489	4	<0.1
REGULATION & PROTECTION	6,792	41	<0.1
SOCIAL SCIENCE	9,825	133	<0.1
CREATIVE & PERFORMING ARTS	6,211	102	<0.1
AGRICULTURE, FORESTRY & RELATED	3,182	83	<0.1
APPLIED ARTS (VISUAL)	11,894	1,592	0.1
SURPLUS SUBTOTALS	**60,370**	**1,956**	**<0.1**

Recommendations

The following set of recommendations is intended to contribute to the discussion of actions community colleges can take to address the skills, degree target, and planning gaps.

01 THE SKILLS GAP: To establish a credentialing system focused on competencies, knowledge, and skill attainment—as opposed to credit-hour completion—community colleges must integrate foundational skill instruction into the curriculum across all programs for those documented skills that support successful performance in the workplace. Possible action steps include:

- Take a leadership role in building strategic partnerships with local business and community leaders. The focus should be on understanding the local economy and current labor market needs, and most importantly, identifying emerging workplace skills requirements. These partnerships should also assess the balance of leadership commitment, financial and human resources, and organizational policies and practices for the purpose of closing skills gaps in light of local workplace needs. As community colleges strive to fulfill a multifaceted mission, they must provide an array of educational services to each community while also having a laser-like focus on meeting the specific skill development needs of the local workforce.

- Collect data on program completers to measure job-related performance and the pursuit of further education. This information will facilitate partnerships with the workforce development system and employers in the region, provide evidence of graduate performance, and inform the continuing development of the education/training programs of four-year colleges based on the performance of their graduates. To meet this goal, we endorse capitalizing on the data infrastructure outlined by the Data Quality Campaign and needed for the Volunteer Framework of Accountability (VFA) to make research a tool for finding better ways to meet labor market needs. In the spirit of continuous improvement, the VFA's workforce, economic, and community development metrics[29] should be reassessed periodically to ensure they are effective and optimally weighted measures of community college effectiveness.

02 THE DEGREE TARGET GAP: Ensure that institutional resources are aligned with the requirements of the regional economy, and open the door to opportunities for program completers. Possible action steps include:

- Capitalize on layered credentialing initiatives currently serving community college students. These initiatives provide insight to local workplace skill demands and serve as evidence that the demands are being met. Access regional labor shed information, directly or with the help of a partner organization, to forecast industry sector job growth within the community college service region. This will inform the strategic allocation of program and training resources in response to needs of emerging and high-growth business sectors.

- Organize the delivery of workforce development services to ensure maximization of committed resources as measured by a response to local labor market requirements. Follow the U.S. Department of Education's Office of Vocational and Adult Education's recommendation to fully integrate credit and noncredit divisions while taking into account state funding policies; or failing that, eliminate institutional policies and practices that marginalize noncredit programs (e.g., divided teaching responsibilities, facilities or equipment; lack of noncredit-to-credit course transfers; and ineffective incentives for faculty and staff to meet workforce development goals).[30] Consolidate workforce development services within one administrative unit on campus to raise their visibility, increase efficiencies, and better articulate and advocate for the workforce development needs of students and the local labor market.

03 THE PLANNING GAP: Better align services and information provided to students to ensure they acquire the necessary level of career literacy to navigate their personal career pathway. Opportunities, in relationship to preparation, must be clearly articulated. Action steps include:

- Identify and implement a career pathway approach to academic and career counseling initiatives to ensure an individual's successful navigation of the ever-changing workplace. In this context, provide the necessary data to students to illustrate the alignment of their individual interests with business demands. This delivery system must engage local K-12 school districts; chambers of commerce; and postsecondary education, workforce development, social service, and civic groups to effectively communicate and market anticipated trends in high-demand careers to the local community.

Conclusion

THIS ANALYSIS offers a unique view of the challenges assigned to community colleges as our nation confronts workforce planning deficiencies that threaten the ability of the United States to compete in a global economy. By subjecting the various deep-rooted challenges community colleges face to multiple forms of analysis, the findings reveal the existence of persistent gaps in skills, degree targeting, and career planning. The importance of this perspective is further supported by the collection and analysis of highly reliable data that describe the foundational skills of individuals and those required by jobs and employers. The skills gap—by any name—is not new. Community colleges have a shared responsibility for addressing a significant component of the nation's skills gap. The effectiveness of community colleges will, in large part, be determined by their ability to identify the demand for middle-skill jobs in their region, focus their resources on meeting the most pressing needs, and equip individuals to make better informed decisions.

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1. American Association of Community and Junior Colleges. (1988). *Building communities: A vision for a new century. A report of the Commission on the Future of Community Colleges*. Washington, DC: Author.

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3. See, for example: Carnevale, A., Smith, N., & Strohl, J. (2010). *Help wanted: Projections of jobs and education requirements through 2018*. Washington, DC: The Georgetown University Center on Education and the Workforce.; Katsinas, S., & Lacey, V. (1990). Trends and forces motivating community college involvement in nontraditional economic development. *Community Services Catalyst,* 20(2), 8–16.

4. See, for example: Dougherty, K, & Bakia, M. (2000). The New Economic Development Role of the Community College. (CCRC Brief Number 6). NY: Community College Research Center, Teachers College, Columbia University.; Maher & Maher. (2009). The Future Role of Community Colleges in Workforce Development. Retrieved from http://www.mahernet.com/pages/CC-FG_Final_Report_20091117r1.pdf.

5. US Bureau of Labor Statistics, Current Population Survey, Seasonally Adjusted US Unemployment Rate for August 2011.

6. We used a median earnings cutoff of $32,390 in 2008 dollars. This represents the 50th percentile of earnings based on data from the Occupational Employment Statistics program, U.S. Department of Labor, Bureau of Labor Statistics.

7. We use the same classification of middle-skill jobs as that used in *America's Forgotten Middle-Skill Jobs*, which includes the following occupational categories: Transportation and Material Moving; Production; Installation, Maintenance, and Repair; Construction and Extraction; Office and Administrative Support; and Sales and Related Occupations. Source: Sommers, D. (2007). *Overview of Occupational Projections, 2014.* Office of Occupational Statistics and Employment Projections, U.S. Bureau of Labor Statistics, Washington, DC.

8. The Bureau of Labor Statistics classifies occupations according to their most significant source of education or training. The categories are associate degree, bachelor's degree, bachelor's or higher degree plus work experience, doctoral degree, first professional degree, long-term on-the-job training, master's degree, moderate-term on-the-job training, postsecondary vocational award, short-term on-the-job training, and work experience in a related occupation. Community colleges are direct providers of two of these categories: associate degree and postsecondary vocational award.

9. US Bureau of Labor Statistics, 2008-2018 Industry and Occupational Projections.

10. Data are from the Occupational Employment Statistics program, U.S. Department of Labor, Bureau of Labor Statistics. The typical wage is calculated as the weighted median of the occupation-specific median wages, where weights are assigned by projected job openings between 2008 and 2018.

11. Manpower Group (2011). *Manufacturing talent for the human age*. Milwaukee, WI: Author.

12. U.S. Department of Labor, The Secretary's Commission on Achieving Necessary Skills (SCANS). (1992). *Learning a living: A blueprint for high performance*. Washington, DC: U.S. Government Printing Office.

13. ACT, Inc. (2011). *A better measure of skills gaps*. Iowa City, IA: Author.

14. Data in the *JobPro* database come from job profiles conducted by trained job profilers who benchmark the skills needed for various occupations. *JobPro* is representative of both the range of occupational titles covered by the Occupational Information Network (O*Net) and the distribution of levels of education found across the US Bureau of Labor Statistics Standard Occupational Classification (SOC).

15. The skills of interest in this example are measured by three WorkKeys® assessments—*Applied Mathematics*, *Locating Information*, and *Reading for Information*. The correlation of the combination of these three WorkKeys tests is estimated at 0.51 for predicting supervisor ratings of job performance according to an unpublished report *A Meta-Analysis for NCRC WorkKeys Assessments Validity Evidence* by Bennett Postlethwaite (2008).

16. We used job profiles that were conducted over the last five years. Because not all BLS occupations have been profiled over the last five years, only 87% of the projected job openings in the targeted occupations are accounted for in this analysis.

17. Skill supply was determined by scores on the WorkKeys *Locating Information*, *Reading for Information*, and *Applied Mathematics* assessments for 238,565 examinees between January 2006 and December 2010. Educational level achieved was determined via self-reported data that are included in the user registration section of the WorkKeys assessment.

18. To determine skill levels needed to ensure mobility and qualification for a large majority of the targeted occupations, we found the skill levels required for entry into 85% of the targeted occupations.

19. See, for example: Deloitte, National Association of Manufacturers, & the Manufacturing Institution. *2005 Skills Gap Report—A Survey of the American Manufacturing Workforce*. Retrieved from http://www.doleta.gov/wired/files/us_mfg_talent_management.pdf; The Conference Board, The Partnership for 21st Century Skills, Corporate Voices for Working Families, & The Society of Human Resource Management. (2006). *Are they really ready or work? Employers' perspectives on the basic knowledge and skills of new entrants to the 21st century US workforce*. Retrieved from http://www.conference-board.org/pdf_free/BED-06-workforce.pdf.

20. Manpower Group (2011). *Manufacturing talent for the human age*. Milwaukee, WI: Author.

21. The Integrated Postsecondary Education Data System (IPEDS) collects data on the number of students who complete a postsecondary education program by type of program and level of award (certificate or degree). Type of program is categorized according to the Classification of Instructional Programs (CIP), a detailed coding system for postsecondary instructional programs.

22. Standard Occupational Classification (SOC) codes are the occupation classification used by the U.S. Bureau of Labor Statistics.

23. The demand for each CIP code family was measured by first relating CIP codes to the target occupations (and their projected job openings between 2008-2018). Then, the job openings for each occupation were divided among the related CIP codes proportional to the number of degrees awarded for the CIP code family. Finally, the assigned job openings for each CIP code were summed across occupations to derive the total for the CIP code family. This number was then scaled so that the total demand equaled the total supply (the total number of community college degrees awarded).

24. The purpose of the CIP to SOC crosswalk (developed by The National Center for Education Statistics and the U.S. Bureau of Labor Statistics) is to provide data users with a resource for relating CIP codes and SOC codes. A CIP-SOC relationship indicates that programs classified in the CIP category prepare individuals directly for jobs classified in the SOC category.

25. This is based on a sample of 1,616 students who obtained a community college degree or certificate and were followed for four years thereafter to determine if they obtained a bachelor's degree. The community college awards were made in the following CIP code families: 14, 16, 23, 24, 40, 42, and 54.

26. Brown, T., King, M. C., Stanley, P., National Resource Center for the First-Year Experience & Students in Transition, & American Association of Community Colleges. (2011). *Fulfilling the promise of the community college: Increasing first-year student engagement and success*. Columbia, SC: National Resource Center for The First-Year Experience & Students in Transition, University of South Carolina.

27. More than 1.5 million 2010 high school graduates took the ACT and more than 287,000 of them enrolled at a community college in fall 2010. Of the 287,000, over 192,000 specified an occupational plan of which they were "fairly" or "very" sure. These students are the focus of this analysis.

28. Allen, J., Robbins, S. (2010). Effects of interest-major congruence, motivation, and academic performance on timely degree attainment. *Journal of Counseling Psychology,* 57(1): 23-35.

29. American Association of Community Colleges. (2011). *Voluntary framework for accountability. Preliminary technical manual v.1.0: Proposed measures for pilot testing*. Retrieved from http://www.aacc.nche.edu/Resources/aaccprograms/vfa/Documents/Forms/AllItems.aspx.

30. U.S. Department of Education, Office of Vocational and Adult Education. (2004). *The 21st-century community college: A strategic guide to maximizing labor market responsiveness, Volumes 1–3*. Washington, DC: Author.

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