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An Examination of California's Health Science Capacity Building Programs: A Multi-Faceted CTE Model Impacting Youths' Career Readiness in Healthcare



PREPARED BY:
California Department of Education
College and Career Transition Division

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Healthcare

The State Superintendent Tom Torlakson and staff from the College and Career Transition Division under the direction of Dr. Patrick Ainsworth, Assistant Superintendent, developed this report.

This report reflects an extensive volume of research, analysis and writing from a team at Mental Health America of Los Angeles under the direction of Gustavo Loera, Ed.D., author and Principal Investigator, Mental Health America of Los Angeles; co-authors Jonathan Nakamoto, Ph.D., WestEd, Robert Rueda, Ph.D., University of Southern California, and Ken Yates, University of Southern California.

External reviewers and editorial contributors included: Cindy Beck, California Department of Education, Carla Cherry, Kern Resource Center, Julia Scalise, Mental Health America of Los Angeles, and Ann Stone, Mental Health America of Los Angeles.

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The following individuals made major contributions to the overall project:

Sandy Hanlon, Science Teacher, Palmdale High School (Retired)
Mike Hanlon, Science Teacher, Palmdale High School (Retired)
Mark Jones, ROP Instructor, Lincoln High School
Doug McCreath, Assistant Superintendent, Manteca USD
Alex McDowell, Science Teacher, Nevada Union School District
Ken Ramirez, Science Teacher, Nevada Union School District
Kathy Ruble, Coordinator, School to Career/ROP, Manteca USD
Nikki Siercks, Educator, Administrator, James Monroe High School (Retired)
Randy Siercks, Social Science Teacher, High Tech Los Angeles Charter (Retired)
Matt Tassinari, History Teacher, Palmdale High School
Pat Twyman, Administrator, Health Occupations Center/ROP/Adult Ed. (Retired)

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For more information on Health Science Capacity Building (HSCB) programs, please visit Health Careers Resource Consortium at www.health-careers.org

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Executive Summary

The California Department of Education (CDE) is pleased to present the results of research on the effectiveness of the **Health Science Capacity Building (HSCB) Project**. This Executive Summary offers a brief background of the HSCB project, followed by an overview of the purpose of the study, research questions, and findings. The research studied the impact of a career pathway project on students' readiness to pursue jobs in the healthcare industry, which has a growing need for a culturally diverse and competent workforce. We surveyed both students and their educators, looking at collaboration among teachers and growth of students' knowledge, experience, and confidence related to their healthcare careers.

THE HEALTH SCIENCE CAPACITY BUILDING (HSCB) PROJECT

In 2005, the California Legislature funded the Governor's Career Technical Education (CTE) Pathways and Workforce Development Program. Its purpose was to align K-12 career technical education with post-secondary education to promote health careers and recruit, educate, and train future and/or existing health professionals for careers in areas of unmet need. One part of the program was the HSCB project. The HSCB project is a career and educational model that combines classroom education, community work, and college planning.

The HSCB project pathway consists of a multi-year sequence of academic and technical courses that provides students as early as the 7th grade with a structured progression of secondary and post-secondary education. The CDE funded 40 high schools through the initiative in the 2010-2011 school year. Most of the HSCB high schools are designed to be schools within schools (i.e., small schools). They have 50 to 500 students who take a sequence of academic and CTE courses (e.g., English, social studies, and medical terminology) together. Two of the schools are charter and magnet schools and had all of their students participate in the pathway programs. A major component of the pathway programs is articulation with a post-secondary school so students have the opportunity to earn college credit while completing their high school education. Moreover, students are able to transition into post-secondary education and continue with the health-related career pathway with the opportunity to earn a certificate or license.

Each pathway program has a program coordinator, CTE teacher(s), academic teachers, a guidance counselor, a middle school representative(s), a post-secondary representative(s), industry partners, and a Health Science Medical Technology (HSMT) mentor. The educators work on curriculum development and alignment within the pathway programs as well as with the middle schools, post-secondary institutions, and industry partners. The educators also participate in the annual Health Science Educators' Institute, which is an intensive three-day professional development workshop. The academic teachers integrate CTE standards into the core academic standards and students enroll in a CTE elective course. As part of the pathway programs, the students complete a work-based

learning experience, take field trips related to healthcare careers, and participate in Health Occupations Students of America (HOSA) leadership activities. HOSA is a student organization that aims to promote healthcare careers and enhance the delivery of quality healthcare. The students also develop an education plan and meet with their counselors regarding their plans.

The HSCB project aims to increase educators' knowledge of, confidence with, and experience with the healthcare industry so they can better integrate industry skills and HOSA leadership principles into their curriculum. For middle school students, the project works to increase their interest in healthcare careers. At the high school level, it seeks to increase students' knowledge of, confidence with, and experience with the industry. In addition, the project seeks to increase students' academic achievement, increase their leadership skills applicable to the healthcare industry, and help them complete a Regional Occupational Program (ROP) health-related certificate. The long-term goals for the participating students are for them to enroll in and complete post-secondary healthcare programs, complete a healthcare-related certificate/license, and obtain jobs in the healthcare industry.

PURPOSE AND RESEARCH QUESTIONS

The overall goal of the study was to examine the effectiveness of the HSCB project at the 40 participating high schools during the 2010-2011 school year. The purpose was both formative and summative in that we sought to provide information that could help guide program improvement and present data that assessed the performance of the program. Given the limited data on the participants, the first step was to describe the students and educators who took part in the programs. We also examined the extent to which the students and educators participated in core elements of the programs. Furthermore, we assessed the program's impact on students' knowledge, experience, and confidence related to healthcare careers. The specific research questions were: (1) What were the demographic characteristics of the students and educators in the 40 pathway programs? (2) To what extent did the students participate in career awareness and development activities (e.g., work-based learning, resume writing)? (3) To what extent did the educators collaborate with their pathway colleagues and align their curriculum with their partners? (4) Did the pathway students show growth on their knowledge, experience and confidence related to healthcare careers (i.e., their healthcare career readiness)? and (5) Was there an association between growth on the students' healthcare career readiness (i.e., their knowledge, experience, and confidence) and the amount of career awareness and development activities that they participated in and the amount of encouragement they received from their pathway teachers and counselors?

DEMOGRAPHIC CHARACTERISTICS OF THE PATHWAY STUDENTS AND EDUCATORS

The students who participated in the pathway programs during the 2010-2011 school year came from diverse racial/ethnic backgrounds. Of the 5,626 students, Latinos comprised 43% and Whites comprised nearly 20%. Asians, Filipinos, and African Americans each constituted between 5% and

12%. This racial/ethnic composition was generally consistent with the statewide distribution of K-12 students (Ed-Data, 2011). It is hoped that many of these students will be part of California's healthcare industry in the future. A key implication of this data is that the healthcare workers who are products of pathway programs will be racially/ethnically diverse. To help ensure this, the CDE should continue to fund pipeline programs in high schools with racially/ethnically diverse student bodies.

Nearly 75% of the pathway educators identified themselves as White. Although educators were not exceptionally diverse in terms of racial/ethnic backgrounds, the proportion that was White was only slightly higher than the statewide percentage for teachers (Ed-Data, 2011). Despite limited diversity, the teachers integrated academic core curriculum with CTE curriculum in a variety of ways and used multiple approaches designed to teach a diverse group of students. In addition, the educators had worked in the field of education for an average of 15 years. Educator longevity and experience may play a role in encouraging students' participation in CTE-related activities and in shaping students' career interests.

PATHWAY STUDENTS' CAREER AWARENESS AND DEVELOPMENT ACTIVITIES

Student and educator survey data showed that the work-based learning component of the pathway programs was in need of improvement. The CDE's target was to have students complete 100 or more hours of work-based learning during the 2010-2011 school year. However, slightly more than half of the students reported that they did not have work-based learning or did not know whether they had work-based learning during the year. Although educators indicated that their students participated in more work-based learning than the students reported, only 15% of educators indicated that their students, on average, completed more than 100 hours.

Pathway students engage in a variety of activities to fulfill the work-based learning experience (e.g., listening to speakers). However, students may not classify these experiences as work-based learning because they do not recognize these as such and/or educators do not present them as work-based learning. To improve these numbers, pathway programs may explore: (1) establishing more partnerships with employers and community-based organizations that have the capacity to offer three day a week job placements for one semester, (2) focusing on field trips that are relevant to the healthcare field, and (3) increasing the capacity of their HOSA chapter to provide students with leadership-skill building to help them search for work-based opportunities. The CDE also may want to set a more attainable goal for the number of work-based learning hours.

The student survey data revealed that 54% of the 11th graders and 77% of the 12th graders reported that they wrote a resume during the 2010-2011 school year. Of these students, 63% indicated that they received help from pathway staff. The CDE aims to have all pathway students write and bring resumes to work-based learning interviews and placements. Pathway staff should investigate ways to dedicate more time to resume writing and mock interviews with real healthcare employers.

Pathway students completed a survey scale that included six general questions about their career awareness and development activities. Descriptive results showed that more than 60% of the students reported discussing careers and work with other students and adults at least three times during the year. The majority of students reported engaging in the other activities (e.g., attending an activity when adults talked about jobs) at least once during the year. The data from students at a subset of six schools who completed the scale in the fall and spring showed that the students' number of experiences with career awareness and development activities increased moderately across the year.

PATHWAY EDUCATORS' COLLABORATION WITH THEIR PATHWAY COLLEAGUES AND CURRICULUM ALIGNMENT

One HSCB goal is to have pathway educators collaborate with colleagues on curriculum integration to help teachers function as a professional learning community and work as a unit to enhance classroom instruction and student learning and motivation. Over half of the teachers indicated they worked with their colleagues to integrate HSMT and HOSA leadership principles into their curriculum at least once a month. Additionally, 70% of the teachers worked with their colleagues to plan and develop lesson plans that used collaborative teaching and/or instructional practices at least once a month. Nevertheless, the CDE may consider placing more emphasis on increasing interdisciplinary efforts. The CDE could require the programs to use grant resources to have core academic teachers spend more time with CTE teachers to integrate HSMT standards into their academic curriculum and, in the process, engage in interdisciplinary projects.

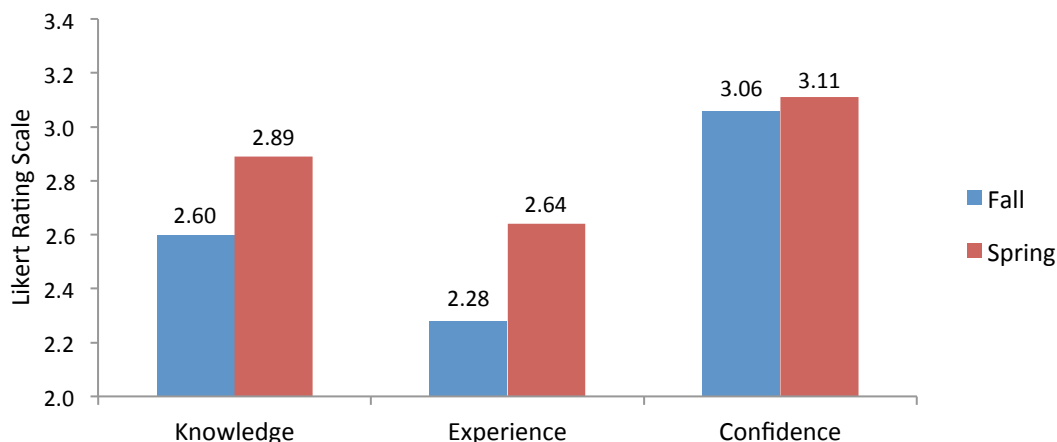
Another HSCB aim is to have pathway programs align their curriculum with colleges/universities, industry partners, and middle schools. These partnerships are critical to establishing a program of study that provides students with a smooth transition process between middle school and high school and when they leave high school for college. The partnership also helps to maximize the use of resources, such as in Regional Occupational Centers and Programs (ROCPs) and college courses. Fifty-five percent of the educators reported aligning their curriculum with a community college and/or university “some” or “a lot.” The percentage of educators that reported aligning their curriculum “some” or “a lot” with industry partners and middle schools was 47% and 40%, respectively. Future research should determine the capacity of the pathway programs to align their curriculum with the different sectors. It may be that the pathway program educators are already doing as much alignment as their time constraints and other responsibilities allow them to do.

PATHWAY STUDENTS' GROWTH ON THE HEALTHCARE CAREER READINESS MEASURES

In spring 2010-2011, students reported a moderate amount of knowledge related to healthcare careers. Average ratings on the knowledge items (e.g., “How much knowledge do you have about using the skills needed for healthcare careers?”) were typically around 3 (i.e., “some” knowledge) on the 4-point scale. Students’ ratings on the experience items (e.g., “How much experience do you have with HOSA?”) were somewhat lower than their ratings for the knowledge items. Average ratings on experience items were generally between 2 (i.e., “a little” experience) and 3 (i.e., “some” experience) on the 4-point scale. Of particular note were the low ratings on the item asking about students’ level of experience with HOSA, which suggests that pathway programs may want to have a greater emphasis on HOSA and its leadership activities. Finally, students’ ratings on the confidence items (e.g., “How much confidence do you have that you will complete the education requirements needed for healthcare careers?”) were higher than their ratings for the knowledge and experience items.

Pathway students at a subset of six schools completed the knowledge, experience, and confidence items in the fall and spring, which allowed for an assessment of their growth during the time they participated in the program. Analyses revealed that students’ knowledge, experience, and confidence related to healthcare readiness showed statistically significant growth (see Exhibit E-1 for fall and spring means). The amount of the growth would be classified as medium sized program effects for the knowledge and experience measures and a small program effect for the confidence measure. Although there are limitations with the pre-test/post-test research design, results suggest that the programs had a positive impact on students’ healthcare career readiness. Their increased levels of knowledge, experience, and confidence could lead to improved commitment to educational and career goals.

Exhibit E-1: Means on the Knowledge, Experience, and Confidence Measures in the Fall and Spring for the Pathway Students in the Pre- and Post-Test Schools (n = 837 students)



PATH MODEL PREDICTING STUDENTS' HEALTHCARE CAREER READINESS

A path model (i.e., a statistical model that examines potential causal relations among variables) was tested with the student survey data from the subset of six schools to investigate how pathway program activities were associated with changes in students' healthcare career readiness (i.e., knowledge, experience, and confidence) from fall to spring. The model used five activities as predictors: (1) hours of work-based learning, (2) number of pathway field trips, (3) a measure of general career awareness and development activities, (4) counselor encouragement for healthcare careers, and (5) pathway teacher encouragement for healthcare careers. The analysis indicated that a greater number of career awareness and development activities and teacher/counselor encouragement were linked to increases in students' knowledge, experience, and confidence. The results provide support for the notion that the pathway program activities can lead to increases in students' healthcare career readiness.

Introduction

BUILDING CALIFORNIA'S HEALTH CAREERS PIPELINE

Recent healthcare reform efforts have begun to look at the secondary and post-secondary education sectors as a major focus for strategies to increase the size of the workforce and diversity in the health professions (see Patient Protection and Affordable Care Act of 2010). Efforts are directed toward enhancing the healthcare industry's workforce education and training practices including recruitment, placement, and employment in healthcare settings. Improving workforce diversity in healthcare is not just a strategy for reducing health disparities (Smedley, Butler, & Bristow, 2004), but is also a strategy for improving quality of care (Cohen, Gabriel, & Terrell, 2002).

As the nation's population continues to become increasingly diverse, minorities are projected to comprise 54% of the U.S. population by 2050. Consistent with the national trend, California's population is also growing, aging, and becoming increasingly diverse. In fact, California's population is the most diverse in the entire world consisting of immigrants from more than 60 different countries. By 2030, California's population is expected to grow from 34 million to 49 million and about one in every five Californians will be older than 65 (Hackbarth, Goldman, & Vaiana, 2010). The number of Latinos in California is expected to grow to 22 million, the Asian population to six million, African-Americans to 2.5 million, and White non-Hispanics will remain stable at 16 million (State of California, Department of Finance, 2007). These demographic shifts, combined with the retirement of aging health workers, will have critical implications for the state's healthcare workforce. According to the Georgetown University Center on Education and the Workforce: *Help wanted – projections of job and education requirements through 2018* (Carnevale, Smith, & Strohl, 2010), there will be 46.8 million job openings between 2008 and 2018, of which 14.4 million will be new and 32.4 million will be replacements for workers who have retired.

According to the Public Health Institute and the UC Berkeley School of Public Health's report entitled *Diversity in California's health professions – current status and emerging trends* (Bates, Hailer, & Chapman, 2008), changes in California's youngest and oldest populations will have important implications for the healthcare workforce. The report emphasizes five key points: (1) the state's elderly population will likely be the major recipients of healthcare in the future, (2) California's population over the age of 65 is projected to increase to about 8.3 million by 2030, (3) the growth in elderly Californians is expected to result in an unprecedented increase in the overall demand for healthcare services, (4) the state's younger population represents the state's future pool of labor on which the healthcare workforce will draw, and (5) the labor pool will need to draw heavily upon Latino youth who are projected to make up nearly 60% of California's population under the age of 18 by 2030.

To respond to these healthcare needs, California must grow and maintain a healthcare workforce of approximately one million workers for the next two decades—making Career Technical Education (CTE) a critical component of a high school education (U.S. Department of Education, 2011). In the absence of strategies to increase workforce diversity in the health professions (Andrulis, Siddiqui, Purtle, & Duchon, 2010), such as with health-related career pathway models that impact human capital, health disparities will continue. The success of a health-related career pipeline, or CTE program of study concerned with addressing the critical worker shortages in the healthcare industry, depends on factors such as knowledge and skills, as well as motivational factors that impact choice activities, persistence, and effort. The present study examines the impact of a multi-faceted CTE and workforce pathway program on high school students’ knowledge, experience, and confidence levels in their pursuit of healthcare careers. Specifically, the aim of this investigation is to examine the effectiveness of the Health Science Capacity Building (HSCB) project at 40 high schools that participated in the program during the 2010-2011 school year.

CTE is one of the main goals of California’s public education system, as well as the community college system. The 2008-2012 California State Plan for Career Technical Education called for providing students with industry-linked programs that make it possible for students to reach their career goals and acquire the skills necessary for “economic self-sufficiency.” In middle school, the goal of CTE is to spark an interest in students and engage them in career exploration opportunities. In high school, students focus on career orientation and take the next steps towards preparing for a future in certain career pathways. Although the effectiveness of CTE has been open to debate (Plank, DeLuca, & Estacion, 2008), it has been associated with increased student motivation. Motivational factors, which impact students’ choice of activities, persistence, and effort, are related to student engagement and eventually positive school outcomes (Fredricks, Blumenfeld, & Paris, 2004).

The goals of CTE correspond directly to changes in our society, such as population growth, declines in graduation rates, and changes in the skills that are necessary for the workplace. CTE addresses the major issues faced by education policymakers in regards to “fixing” our schools. In addition to improving our K-12 schools, CTE seeks to improve the workplace skills of high school and college graduates entering a variety of fields, including the healthcare industry. As our society moves from an industrial to a globalized economy, 21st Century Skills (Partnership for 21st Century Skills, 2009), such as entrepreneurship, creativity and innovation, and flexibility and adaptability, will be required to successfully navigate future life and work demands in high-growth job industries like healthcare.

The synergy between secondary and post-secondary CTE and the 21st Century Skills needed for healthcare careers is critical for the education system and the U.S. economy. Both frameworks focus on the acquisition of relevant knowledge and skills through education and training to increase students’ capacity and preparation for high-demand industries, such as healthcare. As the U.S. economy shifts to a progressively higher dependence on high-level knowledge and skills, especially in healthcare, it is clear that young people will typically need to have at least a post-secondary

certificate to successfully compete in this economy (Carnevale & Desrochers, 2003; Carnevale, Smith, & Strohl, 2010). When looking at the growing demand for workers with post-secondary education and training, 60 million people or 42% of the workforce will need some form of occupational certification or licensure (Carnevale et al., 2010). For example, recent reports that examined the workforce needs in California have indicated that the healthcare industry is the sector with the greatest need for workers with Associate degrees and certificates (Fountain & Cosgrove, 2006; Hagreaves, Cherner, O’Neil, Solomon, & Semerdjian, 2007). There is a need for effective programs and approaches that will be able to meet this need. One option is the pipeline approach – including CTE and related approaches such as the HSCB project, which target career awareness and development, supportive relationships with educators, and experiential learning.

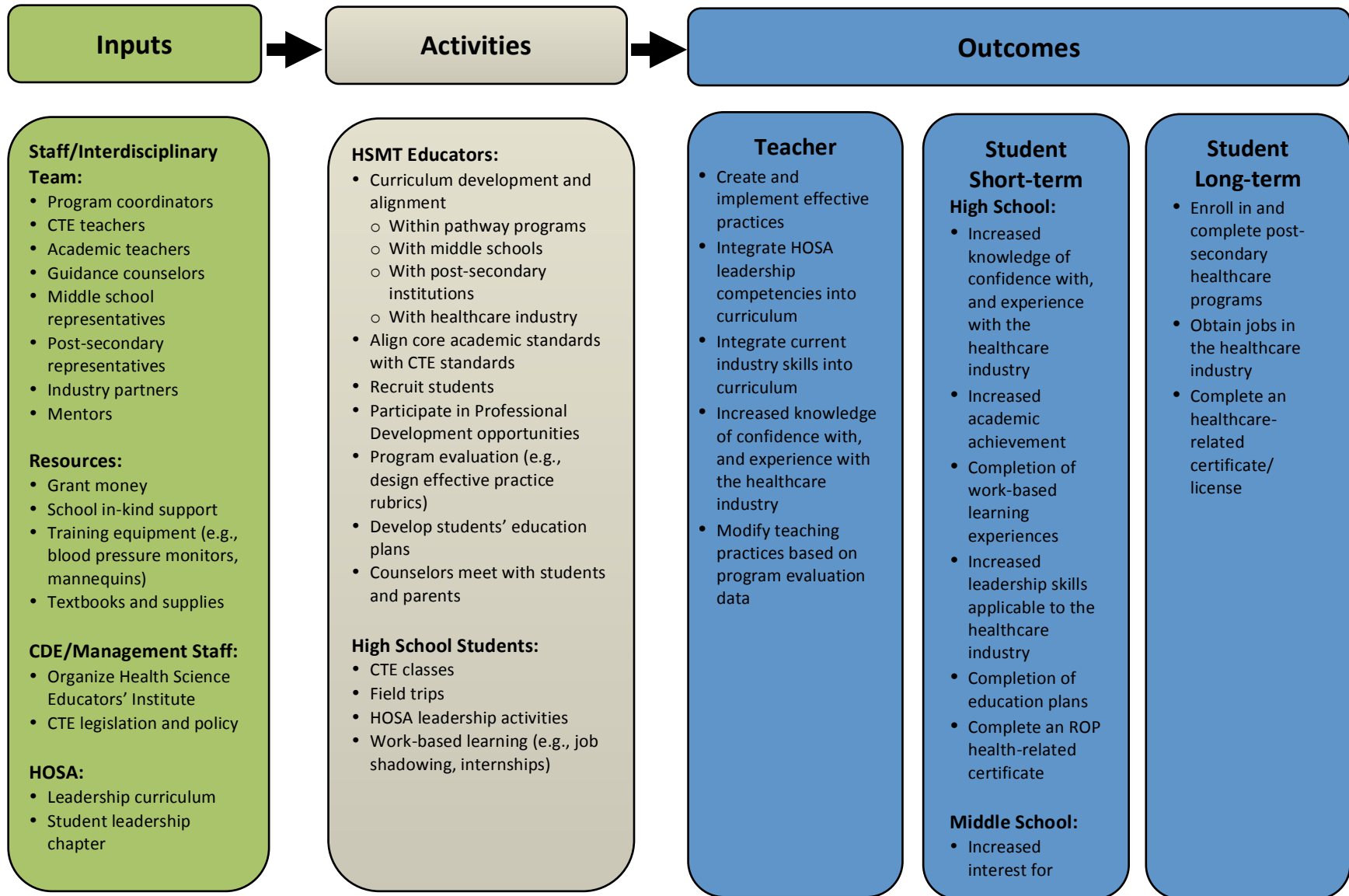
WORKFORCE STRATEGY: THE HEALTH SCIENCE CAPACITY BUILDING (HSCB) PROJECT

In 2005, the California Legislature funded the Governor’s Career Technical Education (CTE) Pathways and Workforce Development Program. Its purpose was to align K-12 career technical education with post-secondary education to promote healthcare careers and recruit, educate, and train future and/or existing health professionals for careers in areas of unmet need. One part of the program was the HSCB project. The HSCB project is a career and educational model that combines classroom education, community work, and college planning.

The HSCB project pathway consists of a multi-year sequence of academic and technical courses that provides students as early as the 7th grade with a structured progression of secondary and post-secondary education. The CDE funded 40 high schools through the initiative in the 2010-2011 school year. The schools organized a team that included educators from their feeder middle schools and local colleges/universities and from industry partners. A logic model for this program is shown in Exhibit 1.

Most of the HSCB high schools are designed to be schools within schools (i.e., small schools). They have 50 to 500 students who take a sequence of academic and CTE courses (e.g., English, social studies, and medical terminology) together. Two of the schools are charter and magnet schools and had all of their students participate in the pathway program. A major component of the HSCB project is articulation with a post-secondary school so students have the opportunity to earn college credit while completing their high school education. Moreover, students are able to transition into post-secondary education and continue with the health-related career pathway with the opportunity to earn a certificate or license.

Exhibit 1: HSCB Pathway Program Logic Model



Each pathway program has a program coordinator, CTE teacher(s), academic teachers, a guidance counselor, a middle school representative(s), a post-secondary representative(s), industry partners, and a Health Science Medical Technology (HSMT) mentor. They work on curriculum development and alignment within the pathway programs, with the middle schools, with post-secondary institutions, and with industry partners. The educators also participate in the annual Health Science Educators' Institute, which is in an intensive three-day professional development workshop. The students' academic teachers integrate CTE standards into the core academic standards and students enroll in a CTE elective course. As part of the pathway programs, these students complete a work-based learning experience and take field trips related to health careers. Furthermore, students participate in Health Occupations Students of America (HOSA) leadership activities. HOSA is a student organization that aims to promote healthcare careers and enhance the delivery of quality healthcare. The students also develop an education plan and meet with their counselors regarding their plans.

The HSCB project aims to increase educators' knowledge of, confidence with, and experience with the healthcare industry so they can better integrate industry skills and HOSA leadership principles into their curriculum. For middle school students, the project works to increase their interest in healthcare careers. At the high school level, it seeks to increase students' knowledge of, experience with, and confidence with the industry. In addition, the project seeks to increase students' academic achievement, increase their leadership skills applicable to the healthcare industry, and help them complete a Regional Occupational Program (ROP) health-related certificate. The long-term goals for the participating students are for them to enroll in and complete post-secondary healthcare programs, complete a healthcare-related certificate/license, and obtain jobs in the healthcare industry.

From the very beginning of its existence in 2005, fostering economic and human development has been the central focus of the HSCB project. Consistent with the aims of the federal Carl D. Perkins Vocational and Technical Education Act of 2006—to educate and prepare young people to meet the critical worker shortage in the healthcare industry—the core of the HSCB project is predicated on establishing a quality integrated career and educational model accessible to all students. Based on this framework, students acquire education and on-the-job training by combining classroom education, community work, and college planning toward a range of jobs in the healthcare industry.

The HSCB project presents information to students early in their education program that will encourage them to consider a career in healthcare. HSMT educators committed to helping students achieve a “high amount of enjoyment, total concentration, and a continuous interest in their work” (Bakker, 2008) are those who integrate the health careers curriculum across the disciplines, and design cumulative, articulated content across the levels of education. Under the California Education Code Sections 33430-33432, five key component criteria were identified to ensure that CTE coursework “will result in higher levels of achievement, technical skills, and knowledge necessary for

students to pursue a full range of healthcare employment at support, technical, or professional levels” (California Department of Education, 2005). These five components are:

- (1) Establish administrative involvement and structure at the secondary and post-secondary levels to support the project.
- (2) Create an interdisciplinary team to work on curriculum development, course alignment and career development activities.
- (3) Develop academic strategies to engage students in a CTE program of study that will consist of an integrated, standards-based curriculum; diversified teaching strategies; work-based learning; use of technology; and multi-measure assessments.
- (4) Offer professional development opportunities to strengthen the secondary, post-secondary and industry partnership, increase coordination of curricula between the secondary level and the occupational certification or licensure programs, and increase the educators’ knowledge of healthcare concepts.
- (5) Strengthen community partnerships to support CTE project.

The goal of the HSCB program is to establish a rich, rigorous, and integrated health careers path, kindergarten through employment, to serve students from every school in California. Establishing quality integrated programs that are accessible to all students will enable them to fulfill their individual career goals and will help meet the healthcare industry’s human resource demands.

HEALTH SCIENCE EDUCATORS’ INSTITUTE

The Health Science Educators’ Institute was built on the notion that proper design and implementation of CTE programs is vital to student motivation and learning (Castellano, Stringfield, & Stone, 2003; Plank et al., 2008), and meeting the competency demands of the healthcare industry. The Institute functions as a training mechanism for HSMT educators to come together once a year and engage in an intensive three-day professional development workshop. This approach is consistent with professional learning communities, which are defined as groups of people working together and collaboratively solving problems in a professional context with a shared common purpose (Dufore & Eaker, 1998; Wenger & Snyder, 2000). It is in this context that educators are given the opportunity to network and share effective practices and improve their pedagogy.

The focal basis of the Health Science Educators’ Institute is to provide educators with an organizational structure to engage in meaningful conversations about performance goals that support students and their HSCB program. Key outcomes for educators include: (1) gaining a stronger network of colleagues and developing new teaching strategies, (2) learning ways to incorporate experiential learning strategies consistent with real-life experiences that are tied to student motivation and career interests, (3) increasing knowledge of current healthcare concepts and ways to incorporate healthcare topics into their curriculum, and (4) gaining strategies to engage community and educational stakeholders in the design and implementation of the program

components to ensure students have a smooth transition from high school to post-secondary education and ultimately access to healthcare workforce employment opportunities.

REVIEW OF RELATED LITERATURE

This literature review pertains to CTE programs and healthcare-related career pathways as a means of facilitating students' transition from secondary to post-secondary to the workforce. The case for CTE rests on the principle that students can have a promising career and be better prepared for life when they are presented with an education that consists of both technical and academic knowledge and skills as opposed to just a college-preparatory education. This premise is supported by research from Symonds, Schwartz, and Ferguson (2011) who contend that simply emphasizing college-preparatory courses as the only track to college and career opportunities undermines students' chances of gaining meaningful career readiness skills.

Students, parents, and educators have typically tried to plot the best course of action so that students can complete the educational and employability requirements needed to enter a high-skill and high-demand field. More recently, legislators and educational policymakers have begun to focus on changing high school CTE programs from an unfavorable academic option to an “integrated educational program of study” model for all students that translates into a successful transition from high school to college and the workforce (Kazis, 2005; Lokes et al., 2007; Silverberg, Warner, Fong, & Goodwin, 2004). High-quality CTE programs that are committed to serving a diverse group of students in a school environment that promotes strong connections between educators and students, as well as secondary and post-secondary institutions and the industry will translate into impacts on knowledge and skill attainment, real-life experience, and self-efficacy (U.S. Department of Education, 2011).

Today's CTE no longer has a relationship to the old vocational education programs that were once seen as dumping grounds or slots for underachieving students deemed ill prepared for college. In fact, studies have found CTE to be strongly associated with increasing student engagement and reducing dropout rates (Elliot, Hanser, & Gilroy, 2001; Plank, 2001; Plank et al., 2008), especially for students who are not motivated by a purely academic program (Symonds et al., 2011). Plank and his colleagues (2008) suggest that students' engagement is maximized when they experience the alignment of CTE and academic courses. This reinforces the importance of providing students, especially ones who have become disengaged from school, an integrated program of study where there are strong connections with academic and industry-focused teachers and highly engaged peers. An integrated CTE and academic program of study has significant potential to increase students'

“CTE focused teachers have already integrated core academic content into their CTE Courses...the challenge now is for the academically focused teachers to integrate CTE content into their academic curriculum”

-Dr. Patrick Ainsworth

persistence in school and successful transition into post-secondary education and the healthcare workforce. Patrick Ainsworth, Assistant Superintendent, Career and College Transition Division and a strong proponent of CTE, argues that, “CTE focused teachers have already integrated core academic content into their CTE courses...the challenge now is for the academically focused teachers to integrate CTE content into their academic curriculum” (personal communication, May, 2011). Failing to integrate academic classes can lead to a deficit model where students defined as at-risk are channeled into CTE-only courses with few core rigorous academic subjects, resulting in negative outcomes (Plank et al., 2008) and lowered expectations from teachers, parents, and students themselves (Kemple, 2008).

Any progressive industry, such as the healthcare sector, seeking to be efficient in performance and production will require highly trained individuals who are committed and identify themselves with their job/career (Walakira, 2000 as cited in Kagaari, 2007). Therefore, the goal of CTE programs is to produce students who possess the capability to acquire the necessary skills and knowledge to perform the required work with little or no on-the-job training (Cox & King, 2006). To achieve this goal, it is essential that CTE programs be successfully designed and implemented (Plank, 2001), and that students’ on-the-job performance be regularly evaluated (Walakira, 2000 as cited in Kagaari, 2007). Highly successful CTE programs are those that have strong leadership (Castellano, Stringfield, & Stone, 2001) and a dedicated team of teachers attempting to have a positive impact on CTE students.

PROGRAM ACTIVITIES AND CAREER READINESS DIMENSIONS

On the basis of previous research in related areas, we predicted that CTE-related program activities such as career awareness and development, supportive relationships with educators, and experiential learning would have positive associations with healthcare career readiness – knowledge, experience, and confidence. In the following paragraphs, we briefly review the literature on the CTE-related program activities and the three components of healthcare career readiness.

For decades, career preparation or career readiness has been viewed as a major developmental task for youth. *Career awareness and development* has been found to be a key predictor of successful career choices and smooth transitions from school to work (Koivisto, Vinkur, & Vuori, 2011; Savickas, 1999). Brown and Thakur (2006) identified domain-specific career development practices, such as receiving information about career opportunities that included education and entry-employment requirements, career assessments, and exposure to role models in a variety of contexts. In the process of ensuring that students acquire the necessary set of competencies to reach their career potential, teachers and counselors need to serve as key information brokers and mentors. *Supportive relationships with educators* increase students’ motivation and interest in a career pathway. Teachers and counselors who serve as adult mentors have been shown to have a major impact on students’ school experiences and career aspirations (Appleton, Christenson, & Furlong, 2008; Crain, 2005).

Experiential learning (e.g., internships, job shadowing, and externships) is “the process whereby knowledge is created through the transformation of experience...knowledge results from the combination of grasping and transforming experience” (Kolb, 1984, p. 41). For students to develop employability or career potential (Van de Heijde & Van de Heijden, 2006), it is important that they be provided with frequent opportunities that expose them to real-world experiences that extend their capabilities (Pulakos, Arad, Donovan, & Plamondon, 2000). At the onset of determining students’ career potential or optimal use of competencies within or outside the classroom, it is important to know how much they know or do not know about career-specific competencies in order to have a successful school and workplace experience.

Anderson, Krathwohl, and colleagues (2001) make the distinction between types of *knowledge* that can serve as a framework for organizing CTE and HSMT curriculum: (1) *Factual knowledge* refers to basic knowledge such as terminology, details or elements that one must be familiar with to be successful in the classroom, (2) *Conceptual knowledge* refers to the acquisition of conceptual, theoretical, and strategic knowledge including categories, classifications, principles, and models, (3) *Procedural knowledge* refers to knowing “how to” do something that requires specific type of skill and process, and (4) *Metacognitive knowledge* refers to self-knowledge or awareness of one’s own cognition. Metacognitive knowledge is the type of knowledge that allows one to self-monitor and self-evaluate while achieving a specific goal. Boreham (2002) argued that knowledge and skill is embodied within students and educators, and these interactions lead to opportunities for students to experience and find relevance in what they are learning. In addition, Hedin (2010) emphasized the importance of student exposure to real-life experiences and the educators’ role in enhancing that learning process.

Experiential learning has become an integral and meaningful component to CTE programs in which participants become active learners. In this context, *experience* means that students are able to develop and apply knowledge or skill to real-life scenarios and tasks. This is accomplished not only through classroom instruction, but also through participation in related student leadership organizations (e.g., HOSA), and experiential educational projects associated with CTE. According to Sturko and her colleagues (2008), understanding how people construct meaning from their experiences can be helpful in designing and developing learning opportunities for them. Findings from previous research support a central proposition that possessing employability skills, such as critical thinking, problem solving, collaborating with others, and overall work-based learning skills consistent with the emerging needs of industry (Martin, 2008; Mclester & McIntire, 2006), are critical to student success in transitioning to the workforce. Therefore, students gaining experience in using these skills will be better prepared for the workplace. Pulakos et al. (2000) add that the development of employability skills can only be attained if people are provided with meaningful learning experiences and given frequent opportunities for them to practice and increase their confidence and capabilities.

Confidence beliefs have been shown to be associated with career-related activities and career choices (McAuliffe et al., 2006), career exploration (Creed, Patton, & Prideaux, 2007), and career persistence (Lent, Brown, & Larkin, 1984). In other words, students with low levels of confidence may lack the

knowledge and skills in career-related activities to implement a career plan. However, students who are able to sustain their self-confidence in a CTE program are likely to be more effective in self-managing their efficacious beliefs and reach their school and career goals. Achievement motivation theorists (Eccles et al., 1983; Eccles & Wigfield, 1995; Wigfield & Eccles, 2000) contend that individuals' career choice, career persistence, and school performance can be explained by their beliefs about how well they will do on a specific activity and the extent to which they value the activity.

PURPOSE AND RESEARCH QUESTIONS

The overall goal of the study was to examine the effectiveness of the HSCB project at the 40 participating high schools during the 2010-2011 school year. The purpose of the study was both formative and summative in that we sought to provide information that could help guide program improvement and present data that assessed the performance of the program (Rossi, Lipsey, & Freeman, 2004). Given the limited data on the participants of the 40 pathway programs, the first goal of the research project was to describe the students and educators who took part in the programs. We also examined the extent to which the students and educators participated in core elements of the programs. Finally, because there is little information on the contributions of specific program components and how they contribute to student outcomes, we assessed the impact of the pathway programs on the students' knowledge, experience, and confidence related to healthcare careers. The specific research questions addressed by the current study are outlined below:

- (1) What were the demographic characteristics of the students and educators in the 40 pathway programs?
- (2) To what extent did the students participate in career awareness and development activities (e.g., work-based learning, resume writing)?
- (3) To what extent did the educators collaborate with their pathway colleagues and align their curriculum with their partners?
- (4) Did the pathway students show growth on their knowledge, experience, and confidence related to healthcare careers (i.e., their healthcare career readiness)?
- (5) Was there an association between growth on the students' healthcare career readiness (i.e., their knowledge, experience, and confidence) and the amount of career awareness and development activities that they participated in and the amount of encouragement they received from their pathway teachers and counselors?

Research Methodology

SURVEY RESPONDENTS AND SURVEY ADMINISTRATION

The current research project administered online surveys to students and educators that took part in one of the 40 HSCB programs¹ in California during the 2010-2011 school year (all HSCB pathway program sites are illustrated in Appendix A). Outlined below are descriptions of the study's three groups of survey respondents: (1) students at pre- and post-test schools, (2) students at post-test only schools, and (3) pathway educators.

STUDENTS AT PRE- AND POST-TEST SCHOOLS

The six pathway programs that had students complete the pre- and post-test surveys were in schools located in Southern California within driving distance of the researchers' offices. We surveyed these students in October of 2010 (i.e., the pre-test) and in March through May of 2011 (i.e., the post-test). The variability in the dates of the spring survey administration was a result of the schools' state testing schedules and the availability of the schools' computer labs.

At the pre-test, the research team went to the schools' computer labs and provided the students an assent form that described the goals of the research project and notified them that they did not have to complete the survey if they did not want to participate in the research project. The assent form also contained the survey URL and a unique survey access code. At the post-test, the research team returned to the schools' computer labs and returned the students' assent forms so the students could use the same survey access code. The use of the survey access codes allowed the research team to link the individual students' responses from the pre-test with their responses from the post-test. Students in the spring who had not completed a pre-test were provided with an assent form and a survey access code.

We surveyed total of 1,223 students in these six pathway programs. The average number of respondents per pathway program was 177.3 (range = 73 to 289 students) in the fall and 166.0 (range = 79 to 272 students) in the spring. In the fall, the overall response rate was 91.2% (i.e., 1,064 completed surveys / 1,167 total students in the programs) and ranged from a high of 94.7% to a low of 77.0% across the six programs. Although we could not obtain an exact response rate for the spring, we estimated that it was similar to the fall response rate. Of the 1,064 students that completed the survey in the fall, 78.7% (i.e., 837 students) completed the post-test in the spring. The 227 students who did not complete the post-test were absent on the data collection days, or were no longer enrolled in the program or school.

¹ There were initially 41 pathway programs, but one school dropped out.

STUDENTS AT THE POST-TEST ONLY SCHOOLS

The students who completed only the post-test survey attended one of the other 33 pathway programs² throughout California. Although it would have been optimal to collect data in the fall and spring in order to assess students' growth at these schools, resource limitations precluded the research team from administering pre- and post-test surveys to students in all 40 pathway programs. We surveyed the students in these pathway programs in March, April, and May of 2011. Consistent with the pre- and post-test schools, the survey administration dates at the post-test only schools depended on the schools' state testing schedules and the availability of the computer labs.

The research team emailed each program coordinator a sheet with the student survey URL and each program's survey access code. The program coordinators or teachers brought the students to the schools' computer labs and distributed the survey URL and access codes to the students. One program could not gain access to the computer lab at its school and assigned the survey as homework. The first page of the survey described the goals of the research project and noted that the students did not have to complete the survey if they did not want to participate in the research project. The first page of the survey also said that if they agreed to participate in the research project, they should enter the survey access code given to them by their teacher and complete the survey.

A total of 4,403 students in the 33 programs completed the spring survey. The average number of respondents per school was 133.4 (range = 20 to 375 students). Fifty-five percent ($n = 18$ programs) had more than 100 students complete the survey. We were unable to calculate an exact response rate for the post-test only schools. However, our estimates suggest that it was above 70%.

PATHWAY EDUCATORS

In the spring of 2011, the research team obtained the names and email addresses of the pathway program educators from the programs' coordinators. In total, the coordinators provided the names and email addresses of 416 educators. The average number of educators per program was 10.4 and ranged from 4 to 23 educators. Forty-eight percent of the programs had more than 10 educators.

The research team emailed the pathway educators requests to complete the survey in March, April, and May of 2011. The survey administration took place on a rolling basis as the program coordinators provided the research team the names and email addresses of the educators. After the initial emails were sent out, the research team and many of the coordinators sent follow-up emails to non-respondents to encourage them to complete the survey. The first page of the survey outlined the goals of the research project and noted that the survey was voluntary.

² One of the pathway programs had not yet enrolled students.

A total of 347 pathway educators completed the survey resulting in a response rate of 83.4%. The response rates varied significantly across the programs and ranged from a high of 100.0% to a low of 37.5%. Sixty-five percent ($n = 26$) of the programs had response rates of 80.0% or higher.

DESCRIPTION OF THE SURVEY ITEMS AND SCALES

The research team designed the student and educator surveys in parallel to assess a range of current healthcare career and teaching topics. The two surveys contained a number of overlapping sections and items. For instance, the students were asked to report on their level of knowledge about a variety of healthcare career topics and the educators were asked to report on their perceptions of their students' knowledge about the same topics. The surveys were composed largely of closed-ended questions, but included a small number of open-ended questions. The report does not include an analysis of all of the questions included in the surveys and only the items that are included in the report are described below.

STUDENT SURVEY

The student survey included a total of 78 items that the students in all grades completed. The students in the 11th and 12th graders received an additional nine items related to college applications, applying for jobs, and writing resumes. The surveys administered in the fall and spring to the students at the pre- and post-test schools and to the students at the post-test only schools were identical.

BACKGROUND QUESTIONS

The survey contained questions asking about the race/ethnicity, gender, and grade level of the students.

GENERAL QUESTIONS RELATED TO THE PATHWAY PROGRAM

Included in the survey were a number of general questions dealing with the pathway programs. The survey contained questions related to the number of hours of work-based learning the students completed, the importance they placed on their CTE classes, and the number of times their pathway program provided them opportunities to volunteer in the community.

CAREER AND JOB RELATED QUESTIONS

The survey asked about the amount the pathway programs influenced the students' college/career interests and the number of field trips they took with their pathway program to learn about a business or industry. Additionally, the survey had the students report on the amount of encouragement they received from their teachers and counselor to pursue a healthcare career. The

11th and 12th graders answered two questions about completing applications to colleges, universities, and training programs and two questions related to writing resumes. The 11th and 12th graders also answered a question about what type of job they thought they would have when they finished their schooling.

In addition, the survey included Kemple, Poglinco, and Snipes' (1999) six item scale on career awareness and development activities. The questions in the scale included activities that take place inside of school (e.g., "had discussions with other students about careers and work"). The students rated the items on a 1 (*never*) to 4 (*6 or more times*) scale. In the fall (i.e., the pre- and post-test students), the scale had good reliability ($\alpha = .81$). In the spring (i.e., all students), the scale also showed good reliability ($\alpha = .83$).

KNOWLEDGE, EXPERIENCE, AND CONFIDENCE QUESTIONS

The research team created 29 items to measure three key dimensions and aspects of health science career technical education standards: (1) knowledge, (2) experience, and (3) confidence. The students rated the 29 items on a 1 (*none*) to 4 (*a lot*) scale. The knowledge subscale was comprised of 10 items (e.g., "How much knowledge do you have about using the skills needed for healthcare careers?") and the experience subscale contained eight items (e.g., "How much experience do you have with Health Occupations Students of America [HOSA]?"). The confidence subscale included 11 items (e.g., "How much confidence do you have that you will complete the education requirements needed for healthcare careers?"). In the fall and the spring, all of the subscales had high levels of reliability (all α s > .89).

EDUCATOR SURVEY

The educator survey contained a total of 89 items. However, the survey contained a number of skip patterns and the educators did not answer all 89 items. For example, the respondents who reported that they did not teach classes (e.g., administrators) did not receive a subset of 14 questions related to teaching.

BACKGROUND QUESTIONS

The survey included items asking about the educators' race/ethnicity, gender, academic degrees held, types of teaching credentials/certificates held, current position in their school, and years of teaching experience.

GENERAL QUESTIONS RELATED TO THE PATHWAY PROGRAM

The educator survey had a number of general questions dealing with the pathway programs. The survey contained questions related to the number of hours of work-based learning the students

completed and the amount the pathway programs influenced the students' college/career interests. The survey also asked about how much time the educators worked with their colleagues on interdisciplinary curriculum and how they had aligned their curriculum with colleges/universities, industry partners, and middle schools.

QUESTIONS FOR TEACHERS

The respondents who indicated that they were teachers reported on the grade level(s) they taught and whether they taught CTE standards in their classes. In addition, the teachers completed a five item scale assessing how often they worked with their pathway colleagues to integrate CTE material into their curriculum (e.g., "How often do you work with pathway colleagues to integrate HOSA leadership principles into your curriculum?"). The teachers rated the five items on a 1 (*never*) to 5 (*more than once a week*) scale and the items showed good reliability ($\alpha = .80$).

KNOWLEDGE, EXPERIENCE, AND CONFIDENCE QUESTIONS

The research team modified the items used to measure the students' knowledge, experience, and confidence with different dimensions and aspects of health science career technical education so that they were appropriate for the educators. The educators were asked to rate their students' knowledge (e.g., "How much knowledge do your pathway students have about applying and interviewing for jobs in the healthcare industry?") and experience (e.g., "How much experience do your pathway students have using the medical terminology that workers in the healthcare industry use?") using a 1 (*none*) to 4 (*a lot*) scale. To allow for comparisons across the students and educators, the knowledge and experience items were parallel for the two groups of respondents. The 10 item knowledge scale ($\alpha = .95$) and the eight item experience scale ($\alpha = .94$) showed excellent reliability. The 11 confidence items asked the teachers to report on their own confidence level about teaching a variety of healthcare related topics (e.g., "How much confidence do you have that you can teach your pathway students problem-solving strategies needed for healthcare careers?") and preparing their students for healthcare careers (e.g., "How much confidence do you have that you can prepare your pathway students to work in teams at healthcare work sites?"). The items were rated on a 1 (*none*) to 4 (*a lot*) scale and showed excellent reliability ($\alpha = .92$).

Findings

PATHWAY STUDENT DEMOGRAPHIC CHARACTERISTICS

The demographic characteristics of the pathway students are shown in Exhibit 2. Overall, the pathway students were split approximately equally across 9th, 10th, 11th, and 12th grade. Some individual pathway programs, however, enrolled only students in specific grades (e.g., 9th graders or 11th and 12th graders). Females comprised two-thirds of the participants of the pathway programs. The over-representation of females in the pathway programs is consistent with their over-representation as workers in the healthcare industry (U.S. Bureau of Labor Statistics, 2010).

Exhibit 2 - Demographic Characteristics of the Pathway Students

	Pre- and Post-Test Schools (n = 6)		Post-Test Schools (n = 33)		All Schools (N = 39)	
	n	%	n	%	n	%
Grade Level						
9th grade	348	28.5%	1,055	24.0%	1,403	25.0%
10th grade	228	18.7%	1,067	24.2%	1,295	23.0%
11th grade	267	21.9%	1,252	28.4%	1,519	27.0%
12th grade	376	30.8%	1,027	23.3%	1,403	25.0%
Total	1,219	100.0%	4,401	100.0%	5,620	100.0%
Gender						
Female	755	61.9%	2,949	67.5%	3,704	66.3%
Male	465	38.1%	1,419	32.5%	1,884	33.7%
Total	1,220	100.0%	4,368	100.0%	5,588	100.0%
Race/Ethnicity						
African American/Black	45	3.7%	226	5.1%	271	4.8%
American Indian or Alaska Native	4	0.3%	33	0.7%	37	0.7%
Asian	76	6.2%	557	12.7%	633	11.3%
Filipino	160	13.1%	164	3.7%	324	5.8%
Hispanic/Latino	643	52.6%	1,800	40.9%	2,443	43.4%
Pacific Islander	14	1.1%	17	0.4%	31	0.6%
White	135	11.0%	965	21.9%	1,100	19.6%
Other/Unclassified	17	1.4%	87	2.0%	104	1.8%
Multiple Ethnicities	129	10.5%	554	12.6%	683	12.1%
Total	1,223	100.0%	4,403	100.0%	5,626	100.0%

The students in the pathway programs were from diverse racial/ethnic backgrounds. Latinos constituted the largest racial/ethnic group followed by Whites. Asians, Filipinos, and African Americans each comprised between 5% and 12% of the pathway student population. The racial/ethnic breakdown of the students in the pathway programs was largely consistent with the statewide percentages reported by the California Department of Education. An exception was the percentage of students who reported multiple ethnicities for the current survey, which was much higher than the percentage reported by the California Department of Education (Ed-Data, 2011).

PATHWAY EDUCATOR DEMOGRAPHIC CHARACTERISTICS

The demographic characteristics of the pathway educators are outlined in Exhibit 3. Two-thirds of the pathway educators were female. Additionally, nearly 75% of the pathway educators were White, which is slightly higher than the statewide percentage for teachers of 69.2% (Ed-Data, 2011). Hispanics/Latinos constituted the next largest racial/ethnic group, but their percentage in the pathway programs (8.9%) was roughly half the statewide percentage of 17.4%. On average, the respondents had worked as educators for 15.1 years ($SD = 9.1$) and had worked in their schools for 8.6 years ($SD = 6.6$), which indicates that the pathway programs had a group of educators with considerable experience.

Exhibit 3 - Demographic Characteristics of the Pathway Educators

	n	%
Gender		
Female	230	67.3%
Male	112	32.7%
Total	342	100.0%
Race/Ethnicity		
African American/Black	11	3.2%
American Indian or Alaska Native	0	0.0%
Asian	18	5.2%
Filipino	7	2.0%
Hispanic/Latino	31	8.9%
Pacific Islander	2	0.6%
White	259	74.6%
Other/Unclassified	3	0.9%
Multiple Ethnicities	16	4.6%
Total	347	100.0%

Exhibit 4 outlines the educational backgrounds of the pathway educators. Thirty-seven percent of the educators reported their highest degree was a bachelor’s degree and 46.8% indicated a master’s was their highest degree. Approximately 5% of the respondents held an Ed.D. or a Ph.D. The five individuals who reported a non-teaching certificate or license as their highest degree likely had at least an Associates’ degree given that they were licensed vocational nurses, a registered nurse, or had a Designated Subjects Teaching Credential. In addition, nearly three-fourths of the educators reported that they held a California Secondary Teaching, Single Subject Credential and 35.9% held a California Cross-cultural, Language, and Academic Development (CLAD) Certificate. Twenty-nine percent indicated that they had other credentials or certificates, such as a registered nurse license or an athletic trainer certification.

Exhibit 4 - Educational Backgrounds of the Pathway Educators

	n	%
Highest Academic Degree		
Associate’s degree	6	1.7%
Bachelor’s degree	127	36.9%
Master’s degree	161	46.8%
Education specialist or professional diploma based on at least one year’s work past a Master’s degree	28	8.1%
Ed.D.	7	2.0%
Ph.D.	10	2.9%
Non-teaching certificate or license	5	1.5%
Total	344	100.0%
Teaching Credentials/Certificates		
Probationary certificate (the initial certificate issued after satisfying all requirements except the completion of a probationary period)	6	1.8%
California Elementary Teaching, Multiple Subject K-12 Credential	51	15.0%
California Secondary Teaching, Single Subject Credential	245	72.1%
California Bilingual, Cross-cultural, Language, and Academic Development (BCLAD) Certificate	13	3.8%
California Cross-cultural, Language, and Academic Development (CLAD) Certificate	122	35.9%
Standard Designated Subject/CTE Credential	44	12.9%
Other credential or certificate	99	29.1%
Total	340	100.0%

Note: Educators were allowed to report on multiple credentials/certificates.

The positions of the pathway educators and the grade levels taught by the teachers are shown in Exhibit 5. Nearly half of the respondents reported that they were academic teachers and 11.0% indicated that they were administrators or principals. Nineteen percent reported that they held multiple positions, such as program coordinator and ROP teacher. A small percentage of respondents had just one position, such as counselor, ROP teacher, CTE teacher, or program coordinator. The teachers reported largely teaching 9th through 12th grade with small numbers providing instruction to middle school students and in post-secondary institutions. In addition, 60.2% of the teachers taught CTE and academic standards in their classes. Thirty-four percent taught only academic standards in their classes and the remaining 5.8% of the teachers taught only CTE standards in the classes.

Exhibit 5 - Positions of the Pathway Educators and Grade Levels Taught by the Pathway Teachers

	n	%
Positions		
Academic teacher	166	48.0%
ROP (Regional Occupation Program) teacher	19	5.5%
CTE (Career Technical Education) teacher	9	2.6%
Program coordinator	10	2.9%
Counselor	29	8.4%
Administrator/Principal	38	11.0%
Other	11	3.2%
Multiple positions	64	18.5%
Total	346	100.0%
Grade Levels Taught by the Teachers		
7th grade	17	6.9%
8th grade	20	8.1%
9th grade	104	42.3%
10th grade	131	53.3%
11th grade	160	65.0%
12th grade	139	56.5%
Community college level	7	2.8%
Four-year university level	3	1.2%
Total	246	100.0%

Note: Only educators who indicated that they taught at least one class reported on the grade levels they taught. Educators were allowed to report that they taught more than one grade level.

PATHWAY STUDENT KNOWLEDGE ABOUT HEALTHCARE CAREERS

The means on the knowledge items for the students in the pre- and post-test schools in the fall and spring, students in all schools (i.e., pre- and post test schools and post-test only schools) in the spring, and educators are included in Exhibit 6.

Exhibit 6 - Means on the Knowledge Items for the Students in Pre- and Post-Test Schools in the Fall and Spring, Students in All Schools in the Spring, and Educators in the Spring

Item	Students in the Pre- and Post-Test Schools				Students in All Schools		Educators	
	Fall		Spring		Spring		Spring	
	Mean	n	Mean	n	Mean	n	Mean	n
1. How much knowledge do [you/your pathway students] have about using the skills needed for healthcare careers?	2.7	1,060	3.0	991	2.9	5,362	3.2	327
2. How much knowledge do [you/your pathway students] have about the education requirements needed for healthcare careers?	2.8	1,058	3.0	990	3.1	5,335	3.3	326
3. How much knowledge do [you/your pathway students] have about applying and interviewing for jobs in the healthcare industry?	2.3	1,057	2.6	989	2.7	5,329	3.0	324
4. How much knowledge do [you/your pathway students] have about using problem solving strategies needed for healthcare careers?	2.4	1,051	2.7	987	2.7	5,330	3.0	325
5. How much knowledge do [you/your pathway students] have about the types of behaviors that are appropriate at a healthcare work site (for example, having a positive attitude, wearing proper clothing, not using slang)?	3.1	1,056	3.3	986	3.3	5,340	3.3	324
6. How much knowledge do [you/your pathway students] have about working in teams at a healthcare work site?	2.6	1,044	2.9	985	2.9	5,319	3.1	322
7. How much knowledge do [you/your pathway students] have about Health Occupations Students of America (HOSA)?	2.4	1,056	2.7	983	2.5	5,330	3.2	322
8. How much knowledge do [you/your pathway students] have about the medical terminology that workers in the healthcare industry use?	2.4	1,053	2.7	982	2.8	5,317	3.2	322
9. How much knowledge do [you/your pathway students] have about developing an education plan that will lead to a healthcare career?	2.6	1,052	2.8	987	2.9	5,322	3.2	322
10. How much knowledge do [you/your pathway students] have about what school counselors and other resources can do to help [you/your pathway students] carry out [your/their] education plan(s)?	2.4	1,055	2.6	983	2.7	5,302	3.1	322

Note: Pathway students reported on their own knowledge levels and pathway educators reported on their students' knowledge levels. The items were rated using a 4-point scale (1 = *none*; 2 = *a little*; 3 = *some*; 4 = *a lot*).

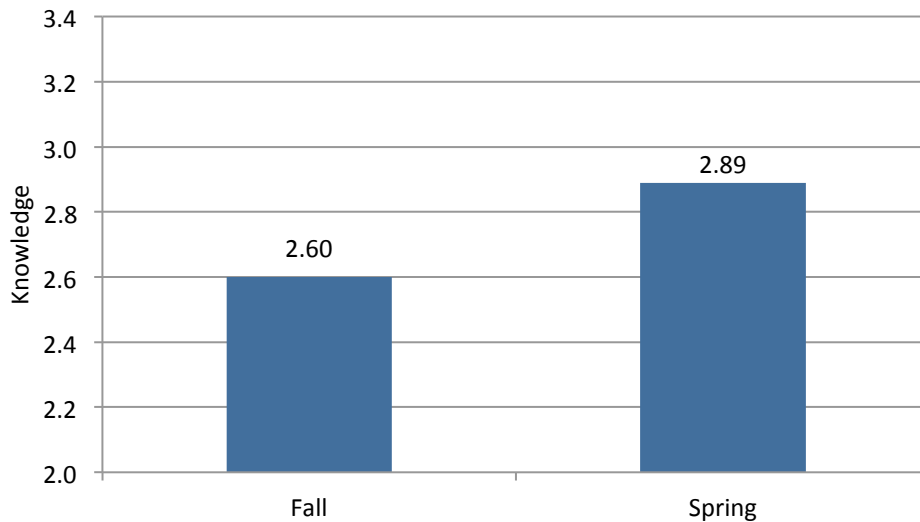
The means for the knowledge items in the fall for the students in the pre- and post-test schools were generally between 2 (*a little*) and 3 (*some*) on the 4-point scale, indicating the students reported moderate levels of knowledge. In the spring, the students in the pre- and post-test schools and students in all schools reported higher levels of knowledge. The average ratings in the spring were typically around 3 (*some*) on the 4-point scale. Overall, the educators' mean ratings exceeded the students' ratings and were equal to or greater than 3.0. This trend is consistent with the previous research that has shown that teachers tend to overestimate their students' achievement (Begeny, Krouse, Brown, & Mann, 2011).

Of particular note were the students' and educators' responses to the question asking about how much knowledge the students have about the education requirements needed for healthcare careers. In the spring, the students ($M = 3.1$) and the educators ($M = 3.3$) reported that the students had moderate to high levels of knowledge about the education requirements. Similarly, the students ($M = 2.9$) and educators ($M = 3.2$) reported in the spring that the students had moderate to high levels of knowledge about developing education plans that will lead to a healthcare career.

To further investigate the impact of the pathway programs on the students' knowledge levels in the pre- and post-test schools, we utilized a one-group pre-test/post-test design, which assessed the students' knowledge levels at the beginning and end of the school year (Shadish, Cook, & Campbell, 2002). Although this type of quasi-experimental design does have limitations (e.g., the students could show gains due to maturation or experiences outside of the pathway programs), it can provide some evidence that the pathway programs have impacted the students' knowledge levels. We created a composite measure by averaging the 10 knowledge items in the fall and the spring. The means in the fall ($M = 2.60$, $SD = 0.64$) and the spring ($M = 2.89$, $SD = 0.61$) on the composite measure are depicted in Exhibit 7 for the students who completed both surveys ($n = 837$). The students showed significant growth from fall to spring, $t(836) = 14.07$, $p < .001$. This finding suggests that the pathway programs had a positive impact on the students' knowledge levels. The effect size³ for this amount of growth was $ES = .46$ and is considered a medium sized program impact based on Cohen's (1988) guidelines for interpreting effect sizes.

³ The effect size was estimated by calculating the difference between the fall and spring means and dividing the difference score by the pooled standard deviations for the fall and spring.

Exhibit 7 - Means on the Knowledge Composite Measure in the Fall and Spring for Students in the Pre- and Post-Test Schools



PATHWAY STUDENT EXPERIENCE WITH HEALTHCARE CAREERS

Exhibit 8 shows the average ratings on the experience items for the students in the pre- and post-test schools, students in all schools in the spring, and educators. The means for the experience items in the fall for the students in the pre- and post-test schools indicated that the average student reported having slightly more than “a little” (i.e., a rating of 2) experience with a variety of activities related to healthcare careers. The students in the pre- and post-test schools and students in all schools had higher levels of experience in the spring, but the means were generally between 2 (*a little*) and 3 (*some*). Only one item asking about their experience behaving appropriately at a healthcare work site was above 3.0. Consistent with the trend for the knowledge items, the educators rated the students’ level of experience higher than the students rated their own experience. This discrepancy was particularly pronounced in the item asking about the students’ experience with HOSA. The educators rated this item nearly a full point higher than did the students. Many of the educators had recently completed a regional HOSA training at the time they completed the survey. As a result, HOSA may have been more prominent in their minds than in the minds of the students.

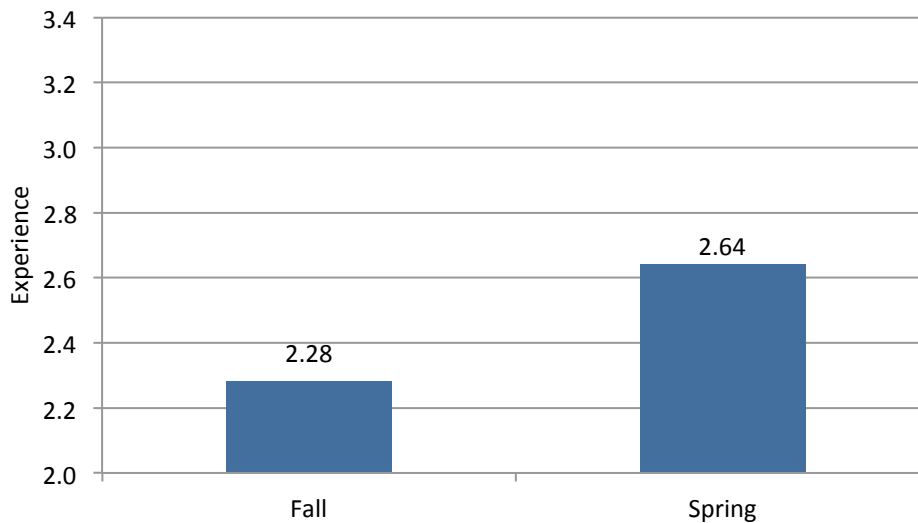
Exhibit 8 - Means on the Experience Items for the Students in Pre- and Post-Test Schools in the Fall and Spring, Students in All Schools in the Spring, and Educators in the Spring

Item	Students in the Pre- and Post-Test Schools				Students in All Schools		Educators	
	Fall		Spring		Spring		Spring	
	Mean	n	Mean	n	Mean	n	Mean	n
1. How much experience do [you/your pathway students] have using the skills needed for healthcare careers?	2.3	1,054	2.7	988	2.7	5,329	3.0	323
2. How much experience do [you/your pathway students] have using problem solving strategies needed for healthcare careers?	2.2	1,051	2.6	986	2.6	5,308	2.9	323
3. How much experience do [you/your pathway students] have behaving appropriately at a healthcare work site (for example, having a positive attitude, wearing proper clothing, not using slang)?	2.8	1,056	3.1	987	3.1	5,313	3.2	322
4. How much experience do [you/your pathway students] have working in teams at a healthcare work site?	2.2	1,054	2.7	983	2.6	5,292	2.9	320
5. How much experience do [you/your pathway students] have with Health Occupations Students of America (HOSA)?	1.9	1,051	2.2	991	2.2	5,304	3.0	324
6. How much experience do [you/your pathway students] have using the medical terminology that workers in the healthcare industry use?	2.2	1,043	2.5	984	2.6	5,300	3.1	322
7. How much experience do [you/your pathway students] have developing an education plan that will lead to a healthcare career?	2.3	1,045	2.7	977	2.7	5,288	3.1	323
8. How much experience do [you/your pathway students] have seeking out school counselors and other resources to help [you/them] carry out [your/their] education plan(s)?	2.2	1,050	2.5	987	2.5	5,278	3.1	323

Note: Pathway students reported on their own experience levels and pathway educators reported on their students' experience levels. The items were rated using a 4-point scale (1 = *none*; 2 = *a little*; 3 = *some*; 4 = *a lot*).

In order to examine the impact of the pathway programs on the students' experience levels in the pre- and post-test schools, we again utilized a one-group pre-test/post-test design. We formed a composite measure by averaging the eight knowledge items in the fall and the spring. The means in the fall ($M = 2.28$, $SD = 0.71$) and the spring ($M = 2.64$, $SD = 0.68$) on the composite measure are shown in Exhibit 9 for the students who completed both surveys ($n = 833$). The students grew significantly between the fall and spring, $t(832) = 15.32$, $p < .001$, which suggests the pathway programs positively impacted the students' experience levels. The effect size based on this amount of growth ($ES = .54$) is classified as a medium sized program effect based on Cohen's (1988) guidelines for interpreting effect sizes.

Exhibit 9 - Means on the Experience Composite Measure in the Fall and Spring for Students in the Pre- and Post-Test Schools



PATHWAY STUDENT CONFIDENCE REGARDING HEALTHCARE CAREERS

The average ratings on the confidence items for the students in the pre- and post-test schools and students in all schools in the spring are displayed in Exhibit 10. The means for the confidence items were higher than the means for the knowledge and experience items. The means in the fall and spring for the pre- and post-test schools and the spring for all students were comparable and were generally above 3 (*some*). The students had moderate to high levels of confidence in the spring that they would complete the education requirements needed for healthcare careers ($M = 3.2$). The students had somewhat less confidence in the spring that HOSA would help them understand their career choices ($M = 2.7$). It is possible that students did not feel that HOSA would be particularly helpful for them because there is a lack of HOSA programming after the yearly competition in the spring. The HOSA competition events (state and national levels) are designed to assess the knowledge, skills, and leadership capabilities of students in healthcare areas, such as CPR/first aid, medical terminology, and extemporaneous speaking. The pathway programs may need to focus more on HOSA leadership activities to instill more confidence in the students that HOSA would be helpful to them.

The students' high levels of confidence agree with prior research that has found that U.S. students report fairly high levels of confidence in their academic abilities when compared to students in other countries. It should be noted, however, that there exists a negative correlation between confidence and actual achievement. In other words, the nations with higher levels of confidence tend to have lower achievement scores (Loveless, 2006). Future research should explore whether the pathway students' confidence levels are aligned with their actual skills and knowledge.

Exhibit 10 - Means on the Confidence Items for the Students in Pre- and Post-Test Schools in the Fall and Spring and Students in All Schools in the Spring

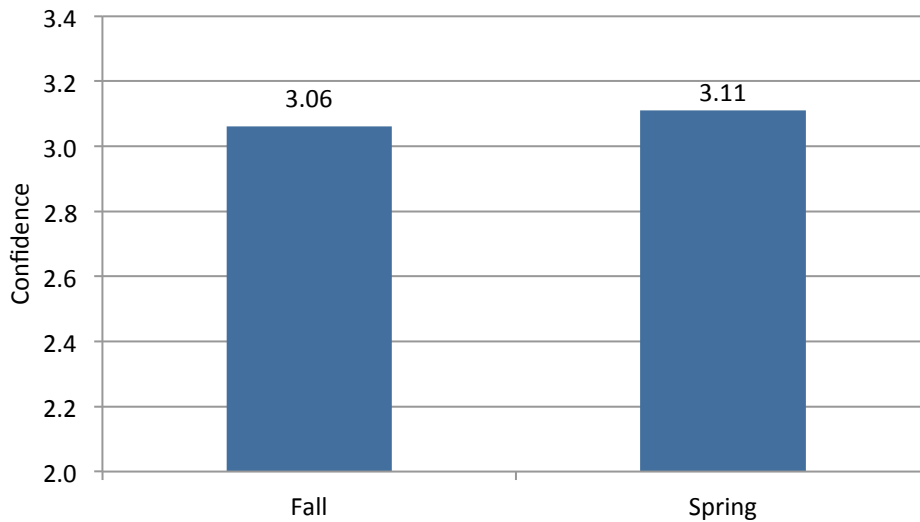
Item	Students in the Pre- and Post-Test Schools				Students in All Schools	
	Fall		Spring		Spring	
	Mean	n	Mean	n	Mean	n
1. How much confidence do you have that you can use the skills needed for healthcare careers?	3.0	1,053	3.1	986	3.1	5,317
2. How much confidence do you have that you will complete the education requirements needed for healthcare careers?	3.2	1,052	3.2	990	3.2	5,310
3. How much confidence do you have that you can successfully apply and interview for jobs in the healthcare industry within the next five years?	3.0	1,051	3.0	988	3.0	5,298
4. How much confidence do you have that you can use problem solving strategies needed for healthcare careers?	2.8	1,056	3.0	982	3.0	5,306
5. How much confidence do you have that you can behave appropriately at a healthcare work site (for example, having a positive attitude, wearing proper clothing, not using slang)?	3.4	1,050	3.4	986	3.4	5,314
6. How much confidence do you have that you can work in teams at a healthcare work site?	3.1	1,049	3.2	982	3.2	5,297
7. How much confidence do you have that Health Occupation Students of America (HOSA) will help you understand your career choices?	2.8	1,055	2.8	983	2.7	5,290
8. How much confidence do you have that you can use the medical terminology that workers in the healthcare industry use?	2.9	1,051	2.9	977	3.0	5,286
9. How much confidence do you have that you can seek out school counselors and other resources to help you carry out your education plan?	2.8	1,045	2.9	974	2.9	5,260
10a. How much confidence do you have that the education plan you developed will lead to a healthcare career?	3.4	485	3.4	493	3.4	2,893
10b. How much confidence do you have that you could develop an education plan that will lead to a healthcare career?	2.7	420	2.5	338	2.6	1,917

Note: The items were rated using a 4-point scale (1 = *none*; 2 = *a little*; 3 = *some*; 4 = *a lot*). Respondents who indicated that they had developed an education plan received item #10a and respondents who indicated that they had not developed an education plan received item #10b.

We utilized a one-group pre-test/post-test design to investigate the impact of the pathway programs on the students' confidence levels. We formed composite measures by averaging the 11 confidence items in the fall and the spring for the students in the pre- and post-test schools. Exhibit 11 displays the means in the fall ($M = 3.06$, $SD = 0.69$) and the spring ($M = 3.11$, $SD = 0.66$) on the confidence composite measure for the students who completed both surveys ($n = 835$). The students grew significantly between the fall and spring, $t(834) = 2.60$, $p < .01$. However, the effect size based on

this amount of growth ($ES = .09$) is considered a very small program effect based on Cohen's (1988) guidelines. It may be that the pathway programs did not directly target the students' confidence levels. It is also possible that many of the students' confidence levels were so high to begin with that there was little room to increase.

Exhibit 11 - Means on the Confidence Composite Measure in the Fall and Spring for Students in the Pre- and Post-Test Schools



PATHWAY EDUCATOR CONFIDENCE TEACHING ABOUT HEALTHCARE CAREERS

The means on the educator confidence items are displayed in Exhibit 12. These items asked the educators about their confidence in teaching their students health science material and preparing their students for a healthcare career. Overall, the educators reported high levels of confidence in their abilities. The means for all of the items were between 3 (*some*) and 4 (*a lot*). For example, the teachers reported a high level of confidence ($M = 3.4$) that they could help their pathway students complete the education requirements needed for healthcare careers. Future research should determine whether the teachers' confidence levels are aligned with their actual ability to provide instruction on health science topics and prepare students for careers in the healthcare industry.

Exhibit 12 - Means on the Confidence Items for Educators in the Spring

Item	Mean	n
1. How much confidence do you have that you can teach your pathway students the skills needed for healthcare careers?	3.3	320
2. How much confidence do you have that you can help your pathway students complete the education requirements needed for healthcare careers?	3.4	319
3. How much confidence do you have that you can prepare your pathway students to successfully apply and interview for jobs in the healthcare industry within the next five years?	3.4	319
4. How much confidence do you have that you can teach your pathway students problem-solving strategies needed for healthcare careers?	3.3	318
5. How much confidence do you have that you can prepare your pathway students to behave appropriately at healthcare work sites (for example, having a positive attitude, wearing proper clothing, not using slang)?	3.6	318
6. How much confidence do you have that you can prepare your pathway students to work in teams at healthcare work sites?	3.3	316
7. How much confidence do you have that you can advise pathway students to establish a Health Occupations Students of America (HOSA) chapter?	3.0	317
8. How much confidence do you have that you can teach your pathway students how to use the medical terminology that workers in the healthcare industry use?	3.2	315
9. How much confidence do you have that you can teach your pathway students how to seek out school counselors and other resources to help them carry out their education plans?	3.5	318
10a. How much confidence do you have that the education plans your pathway students developed will lead to a healthcare career?	3.5	196
10b. How much confidence do you have that you could help your pathway students develop an education plan that will lead to a healthcare career?	3.1	97

Note: The items were rated using a 4-point scale (1 = *none*, 2 = *a little*, 3 = *some*, 4 = *a lot*). Respondents who indicated that the majority of their students had developed an education plan received item #10a and respondents who indicated that the majority of their students had not developed an education plan received item #10b.

WORK-BASED LEARNING

The number of hours of work-based learning completed by the pathway students based on the students' and educators' survey responses are shown in Exhibit 13. Overall, the educators reported that the students completed more hours of work-based learning than the students reported they completed. For instance, 16.8% of the students indicated that they completed 51 or more hours of work-based learning while 24.9% of the educators reported that their students, on average, completed 51 or more hours of work-based learning. The number of work-based learning hours completed was much higher for 11th and 12th graders in comparison to 9th and 10th graders. Twenty-nine percent of the 11th and 12th graders completed 51 or more hours of work-based learning while only 3.5% of the 9th and 10th graders had finished the same number of hours.

Just over half of the students reported that they did not have work-based learning or did not know whether they had work-based learning. The students engage in a number of activities, such as

listening to speakers and taking field trips, which they may not identify as work-based learning. Even work-based learning activities like job shadowing may be categorized by the students as field trips. The work-based learning activities are all designed to enhance students’ knowledge and skills and identification with career pathway, but take many forms ranging from classroom projects to guest speakers and real-life internships. CDE and the health pathway educators should more clearly identify what constitutes a work-based learning experience so that the students can more clearly connect the activities they take part in to the goals of the pathway programs.

There was considerable variability across the pathway programs in terms of how many hours of work-based learning the students completed. Based on the survey data, it appears some pathway programs had organized relatively effective work-based learning components, while others had not. For example, in five of the pathway programs, at least 50% of the students reported completing 31 or more hours of work-based learning. These five pathway programs may have strong connections with industry partners. For example, a strong connection with an organization like Kaiser Permanente can make it much easier for a pathway program to have an effective work-based learning component. In contrast, in 27 of the programs, at least 50% of the students reported not having work-based learning or not knowing whether they had work-based learning.

Exhibit 13 - Number of Hours of Work-Based Learning Completed as Reported by the Pathway Students and Educators

	Pathway Students		Pathway Educators	
	n	%	n	%
Less than 10 hours	868	16.2%	92	26.7%
11-30 hours	381	7.1%	53	15.4%
31-50 hours	346	6.5%	26	7.5%
51-100 hours	440	8.2%	35	10.1%
More than 100 hours	459	8.6%	51	14.8%
Don't have work-based learning this school year	2,068	38.7%	42	12.2%
Don't know	784	14.7%	46	13.3%
Total	5,346	100.0%	345	100.0%

Note: The spring responses are reported for the students in the pre- and post-test schools. The Pathway educators reported on the number of hours completed, on average, by the students in their programs.

IMPORTANCE PLACED ON CAREER TECHNICAL EDUCATION CLASSES

Overall, the pathway students reported that they placed a high level of importance on their CTE classes (see Exhibit 14). Fifty-seven percent of the students indicated that their pathway classes are “very important” to them. Similarly, 46.7% of the students reported that, in comparison to their other core subjects, it is “very important” to them to learn the material in their CTE classes and

another 42.1% reported that it is “somewhat important”. The CTE classes may be particularly important to the students because they see more value in school when it is linked to potential career paths. This finding is in accordance with Eccles and Wigfield’s (1995, 2002) expectancy-value theory that posits that youth will value tasks which they believe they can succeed in and will eventually be more successful in developing workplace competencies.

Exhibit 14 - Importance Placed on Career Technical Education (CTE) Classes

	Not important at all	Not very important	Somewhat important	Very important	Total	
	%	%	%	%	%	n
How important do you think [your CTE classes] are for you?	2.5%	5.7%	35.2%	56.6%	100.0%	5,174
Compared to math, English, and social studies, how important is it to you to learn the material in [your CTE classes]?	2.7%	8.5%	42.1%	46.7%	100.0%	5,179

Note: The name each program used to refer to their CTE classes was inserted in the items. The spring responses are reported for the students in the pre- and post-test schools.

PATHWAY STUDENTS’ CAREER AWARENESS AND DEVELOPMENT ACTIVITIES

Exhibit 15 displays the pathway students’ responses to six items that asked how often they took part in specific career awareness and development activities. The majority of the students reported that they engaged in each of the activities at least once during the 2010-2011 school year. The two highest rated items dealt with having discussions about careers and work with other students and adults. For both of these items, over 60% of the students reported engaging in these types of discussions at least three times during the 2010-2011 school year. The two lowest rated items asked about attending an activity when adults came to their schools to talk about jobs and getting instruction or counseling on how to find a job. Over 69% of the respondents indicated that they took part in these two activities less than 3 times during the 2010-2011 school year. The activities assessed by these six items are critical to the success of the pathway programs. As such, these six items should be linked to the pathway programs’ goals that are created at the Health Science Educators’ Institute. As mentioned earlier, the Institute is an intensive three-day professional development program that provides educators the opportunity to strengthen and align CTE and core academic curriculum while, at the same time, sharing resources and effective practices with colleagues.

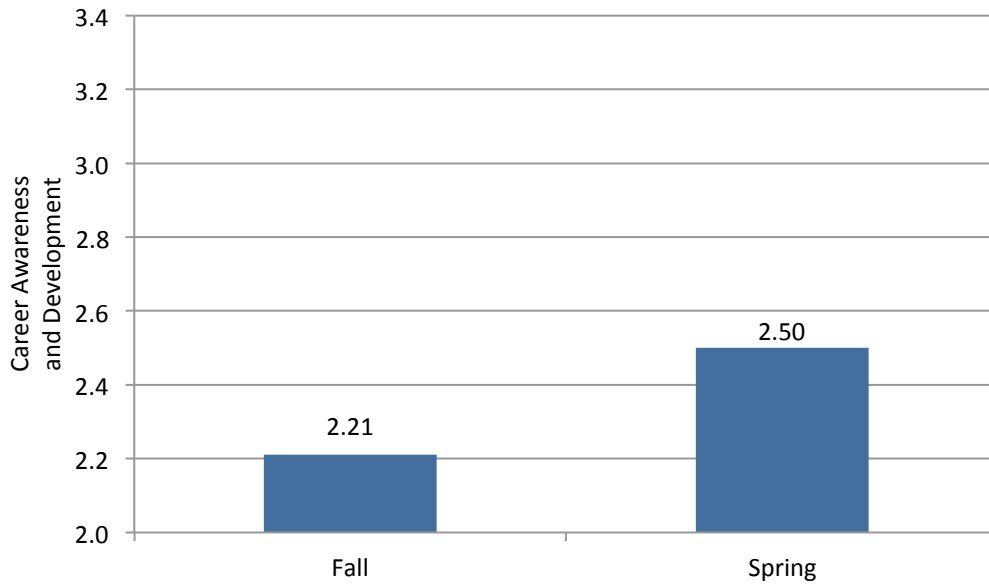
Exhibit 15 - Career Awareness and Development Activities in School

During the current school year (2010-2011), how often have you...	Never %	1 - 2 times %	3 - 5 times %	6 or more times %	Total %	n
...studied about different kinds of jobs and their requirements in class?	10.2%	34.5%	31.7%	23.6%	100.0%	5,348
...had discussions with other students about careers and work?	8.1%	26.7%	31.5%	33.7%	100.0%	5,337
...gotten instruction or counseling on how to act on the job?	20.7%	32.3%	25.9%	21.1%	100.0%	5,308
...had discussions with adults such as teachers about careers and work?	9.4%	28.6%	31.2%	30.7%	100.0%	5,304
...attended an activity when parents or other adults came to school to talk about jobs?	37.5%	32.7%	19.3%	10.4%	100.0%	5,321
...gotten instruction or counseling on how to find a job?	35.5%	33.8%	19.6%	11.1%	100.0%	5,316

Note: The spring responses are reported for the students in the pre- and post-test schools.

In order to evaluate the growth of the students in the pre- and post-test schools on the items assessing career awareness and development activities, we employed a one-group pre-test/post-test design. We created a composite measure by averaging the six items in the fall and the spring. Exhibit 16 displays the means in the fall ($M = 2.21$, $SD = 0.69$) and the spring ($M = 2.50$, $SD = 0.70$) on the composite measure for the students who completed the fall and spring surveys ($n = 837$). The students showed significant growth from fall to spring, $t(836) = 11.51$, $p < .001$. The effect size for this amount of growth was $ES = .42$ and is considered a medium sized effect based on Cohen's (1988) guidelines. In other words, the students' number of experiences with career awareness and development activities increased moderately across the school year.

Exhibit 16 - Means on the Career Awareness and Development Composite Measure in the Fall and Spring for Students in the Pre- and Post-Test Schools



The pathway students' responses to two questions asking about their career awareness and development activities outside of school are shown in Exhibit 17. Overall, it appears the pathway programs provided the students more opportunities to volunteer in their communities than to take field trips to learn about a business or industry. Nearly 50% of the students reported that their pathway program provided them opportunities to volunteer at least once a month. In contrast, 37.5% of the students reported that their pathway program took no field trips to learn about a business or industry and 37.9% reported just one or two field trips. It should be noted that the students' responses varied dramatically across the pathway programs. In some pathway programs, the vast majority of the students reported that they took no field trips while in other programs over one-third of the students reported at least 3 to 5 field trips. While the number of field trips taken is important, they are only meaningful if the pathway program staff can make them relevant to the healthcare industry and link them back to classroom instruction.

Exhibit 17 - Career Awareness and Development Activities Outside of School

	Never	A few times a year	Once a month	At least once a week	Total	
	%	%	%	%	%	n
How often does [name of health careers academy] provide you with opportunities to volunteer to help out in your community (by working at a community event, visiting the elderly, tutoring students, etc.)?	19.5%	32.8%	20.0%	27.7%	100.0%	5,237
	None	1 - 2 trips	3 - 5 trips	6 or more trips	Total	
	%	%	%	%	%	n
During this school year (2010-2011) how many field trips has [name of health careers academy] provided for you to learn about a business or industry?	37.5%	37.9%	18.8%	5.9%	100.0%	5,245

Note: The name of each program was inserted in the items. The spring responses are reported for the students in the pre- and post-test schools.

The 11th and 12th graders' experiences completing applications to colleges and training programs and writing resumes is outlined in Exhibit 18. In comparison to the 11th graders (22.4%), a greater percentage of the 12th graders (51.3%) reported getting help filling out applications to colleges/universities, certification programs, and other training programs. Of the students who reported that they received help filling out applications, a large percentage (65.4% of the 11th graders and 49.7% of the 12th graders) indicated that they received assistance from their pathway program. In addition, approximately 60% of the students indicated that they received help from their family or friends. Fifty-four percent of the 11th graders and 77.2% of the 12th graders reported that they had written a resume. Of the students who reported writing a resume, over 60% received help writing their resume from pathway staff.

Each pathway program is required to have a counselor that is involved in working with students and their parents to explore career and post-secondary opportunities including occupational certification or license. The pathway programs would certainly benefit from more participation by the schools' counselors. However, this may not be possible given work-loads of guidance counselors in California. According to data presented by the American School Counselor Association, California had the highest student-to-counselor ratio in the country at 814-to-1 during the 2008-09 school year (American School Counselor Association, n.d.). Research (Career Institute for Education and Workforce Development, 2002; Feller, 2003; Herr, 2002) indicated that when a comprehensive quality counseling component is lacking, students are more likely to make poor career choices and engage in a course of study that will be misaligned with their career aspirations.

Exhibit 18 - Application and Resume Writing Questions by Grade Level

	11th grade		12th grade		
	n	%	n	%	
Have you gotten help filling out applications to colleges/universities, certification programs (for example, Licensed Vocational Nursing, Medical Lab Technician, X-Ray Technician, etc.), or other training programs?	Yes	324	22.4%	662	51.3%
	No	1,122	77.6%	629	48.7%
	Total	1,446	100.0%	1,291	100.0%
Where have you gotten help from filling out applications to colleges/universities, certification programs (for example, Licensed Vocational Nursing, Medical Lab Technician, X-Ray Technician, etc.), or other training programs?	Family/friends	190	59.2%	403	61.6%
	[name of health careers academy]	210	65.4%	325	49.7%
	School or other program	136	42.4%	365	55.8%
	Work site mentor	33	10.3%	74	11.3%
	Other	22	6.9%	50	7.6%
	Total	321	100.0%	654	100.0%
Have you written a resume?	Yes	781	53.7%	998	77.2%
	No	673	46.3%	295	22.8%
	Total	1,454	100.0%	1,293	100.0%
Did you get help from [name of health careers academy] staff when writing your resume?	Yes	476	61.5%	633	64.2%
	No	298	38.5%	353	35.8%
	Total	774	100.0%	986	100.0%

Note: The name of each program was inserted in the items and response options where appropriate. The spring responses are reported for the students in the pre- and post-test schools.

The amount the pathway students' reported that their counselors and teachers encouraged them to pursue a career in the healthcare industry is shown in Exhibit 19. Overall, the students reported receiving more encouragement from their pathway teachers to pursue a healthcare career. Just over 50% of the students reported that they had “a lot” of encouragement from their pathway teachers. In contrast, only 22.7% of the students felt that they received “a lot” of encouragement from their school counselor. This trend is consistent with anecdotal information indicating that the counselors have not typically been involved heavily with the pathway programs.

Exhibit 19 - Counselor and Teacher Encouragement to Pursue a Healthcare Career

	None	A little	Some	A lot	Total	
	%	%	%	%	%	n
How much do [name of health careers academy] teachers encourage you to pursue a career in the healthcare industry?	6.1%	12.9%	30.7%	50.3%	100.0%	5,273
How much does your school counselor encourage you to pursue a career in the healthcare industry?	29.6%	18.9%	28.8%	22.7%	100.0%	5,353

Note: The name of each program was inserted in the item. The spring responses are reported for the students in the pre- and post-test schools.

IMPACT OF THE PATHWAY PROGRAMS ON STUDENTS' COLLEGE/CAREER INTERESTS

Overall, the pathway students and educators reported that the pathway programs shaped the students' college/career interests (see Exhibit 20). Approximately 50% of both groups of respondents indicated that the pathway programs shaped the students' college/career interests "a lot". Although this is self-reported data, it agrees with the students' responses to an open-ended question that asked what careers/jobs they thought they would have when they finished their schooling. The 11th and 12th graders responded to this question and 72% reported health and behavioral healthcare careers as defined by the California Technical Education Model Curriculum Standards (California Department of Education, 2006, 2007). The most commonly identified jobs were nursing, general physician, and pediatrician.

Exhibit 20 - Amount the Pathway Program Shaped the Pathway Students' College/Career Interests as Reported by the Pathway Students and Educators

	Pathway Students		Pathway Educators	
	n	%	n	%
Not at all	401	7.6%	9	2.6%
A little	732	13.9%	39	11.3%
Some	1,600	30.3%	121	35.2%
A lot	2,540	48.2%	175	50.9%
Total	5,273	100.0%	344	100.0%

Note: The spring responses are reported for the students in the pre- and post-test schools.

PATH MODEL PREDICTING PATHWAY STUDENTS' HEALTHCARE KNOWLEDGE, EXPERIENCE, AND CONFIDENCE

We used structural equation modeling (SEM; Loehlin, 2004) to identify the program activities that were associated with increases in students' healthcare career readiness (i.e., their knowledge, experience, and confidence). SEM is a statistical technique that allows researchers to evaluate whether the data they collected provides support for hypothesized models and to assess the strength of the associations between variables. In contrast to a standard regression model which allows only one dependent variable, a benefit of SEM is that the models can incorporate multiple dependent variables. Additionally, SEM allows all of the students to be included in the models even if they have missing data (e.g., if they did not complete the fall or spring survey) when using maximum likelihood (ML) estimation (McArdle, 1994).

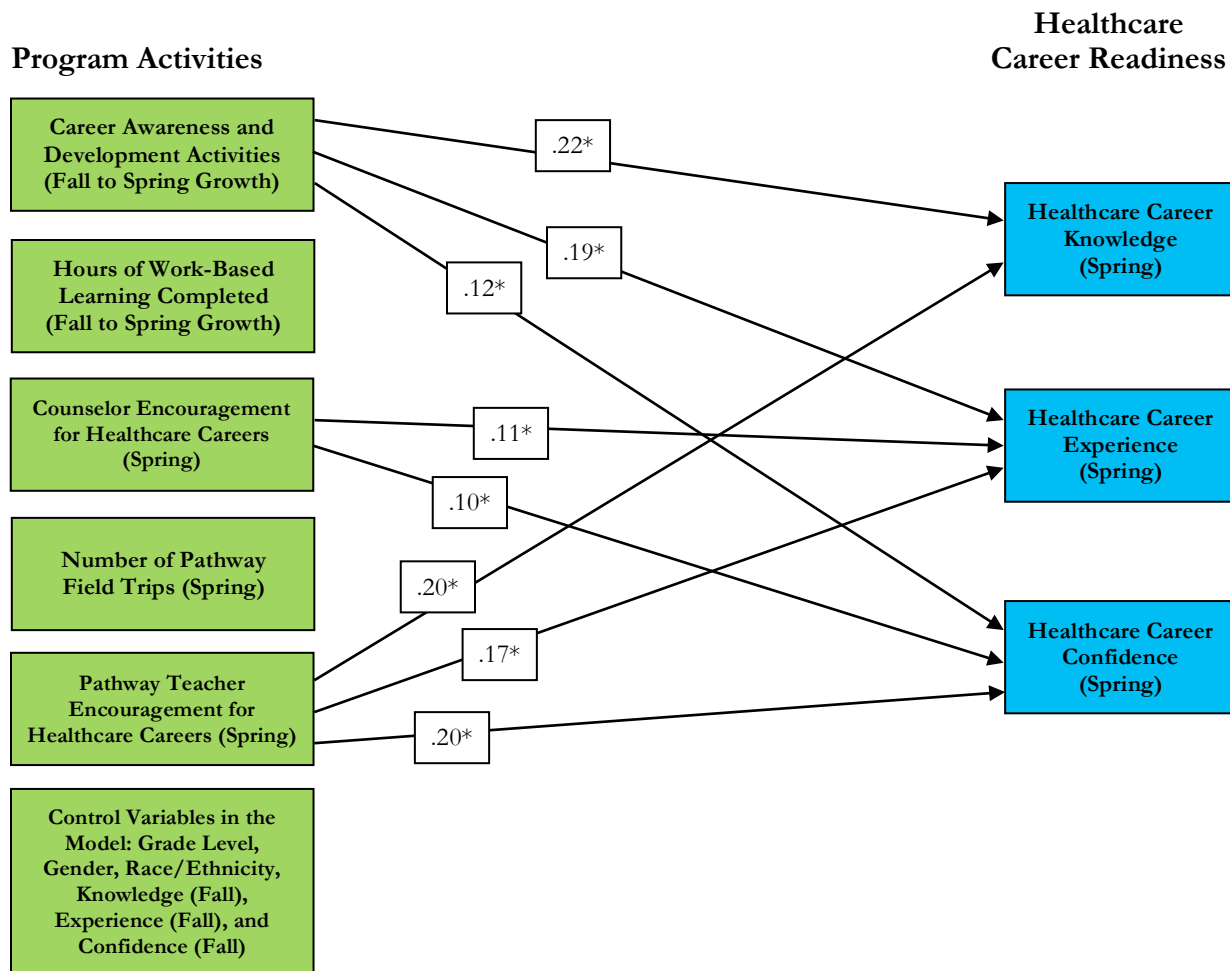
The model we tested for the current study is shown in Exhibit 21. We utilized only the data from the students in the six pre- and post-test schools for the analysis because we wanted to investigate how the program activities were related to changes in the students' healthcare career readiness. In the model, we used the program activities as simultaneous predictors of the students' healthcare career knowledge, experience, and confidence. In order to estimate the amount of activities that took place during the school year, the variables used for the career awareness and development activities and the hours of work-based learning were created by subtracting the students' spring score from their fall score. Additionally, the models used the spring reports of the number of pathway field trips and the counselor and teacher encouragement for healthcare careers. The models also included a number of control variables. The most critical control variables were the fall reports of the students' knowledge, experience, and confidence. Including these variables allowed us to assess the association between the predictors and changes in the students' healthcare career readiness across the school year. In addition, dummy coded variables for grade level, gender, and race/ethnicity were included in the model as control variables.

In the model displayed in Exhibit 21, paths from the program activities to the students' knowledge, experience, and confidence, which were not statistically significant or were below a standardized estimate of .10, have been removed. Although some of the standardized estimates below .10 were statistically significant, they are not likely to be meaningful in terms of identifying the important predictors of the students' healthcare career readiness. The model provided an excellent fit to the data as shown by the following SEM fit indices: $\chi^2(4, N = 1,223) = 4.50, p = .34$, Root Mean Square Error of Approximation = .01, Comparative Fit Index = 1.00.

The estimates shown in Exhibit 21 indicate that the career awareness and development activities and the counselor and teacher encouragement for healthcare careers were significant predictors of the students' healthcare career readiness. Specifically, engaging in a greater number of career awareness and development activities (e.g., "attending activities when parents or other adults came to school to talk about jobs") during the course of the year was associated with increases in the students'

knowledge, experience, and confidence. Additionally, reporting that the counselors encouraged them to pursue a career in the healthcare industry was related to increases in the students' experience and confidence. Finally, the students' reports that their pathway teachers encouraged them to pursue a career in the healthcare industry were associated with increases in their knowledge, experience, and confidence. The size of the regression paths were small and indicate that for every one standard deviation increase on the program activities, there was between a fifth and a tenth of a standard deviation increase in the healthcare career readiness measures.

Exhibit 21 - Path Model with the Pathway Program Activities as Predictors of Students' Healthcare Career Readiness



Note: "Fall to Spring Growth" indicates that a variable was formed by subtracting the Fall score from the Spring score. Standardized regression paths are shown. Standardized regression paths below .10 (the majority of which were not significant) have been removed from the path model. The covariances between the program activities and between the healthcare career readiness measures have been removed from the path model. $*p < .05$.

There are a number of potential reasons why the number of hours of work-based learning and the number of pathway field trips were not significant predictors of changes in the students' knowledge,

experience, and confidence. As noted previously, it is likely that the work-based learning components of the pathway programs have not been articulated clearly to the students. Similarly, the activities that constituted field trips designed to learn about a business or industry may not have been clearly identifiable by the students. As a consequence, there is likely significant measurement error in the questions asking about work-based learning and field trips. Measurement error can result in the underestimation of regression weights in statistical models (Pedhazur, 1997). In addition, the variability in the work-based learning and field trips variables was limited because a large percentage of students indicated they had not done either activity. The limited variability in these two variables also made it difficult to identify significant associations between them and the healthcare career readiness measures.

PATHWAY EDUCATORS' COLLABORATION WITH COLLEAGUES

Exhibit 22 displays the frequency with which the pathway teachers collaborated with their colleagues on curriculum integration. Over half of the respondents indicated that they worked with their colleagues to integrate HSMT standards and HOSA leadership principles into their curriculum at least once a month. Additionally, 70.3% of the teachers worked with their colleagues to plan and develop lesson plans that used collaborative teaching and/or instructional practices at least once a month. In contrast, 67.3% of the teachers worked with their colleagues to create a course outline that lists the sequence of academic and CTE topics never or just once a year. There was a large divide in the amount of time that the teachers worked with their colleagues to provide flexible time for students who needed more time to learn CTE material. Specifically, 43.5% of the teachers never provided flexible time for students while 33.4% did it at least once a week. The teachers' ability to provide flexible time is likely related to their schools' schedules and may not be indicative of a lack of collaboration with their colleagues.

The amount the pathway educators reported that they aligned their curriculum with colleges/universities, industry partners, and middle schools is shown in Exhibit 23. The educators reported aligning their curriculum with a community college and/or university slightly more than they did with industry partners and middle schools. Specifically, 54.6% of the respondents reported aligning their curriculum with a community college and/or university "some" or "a lot". The proportion of respondents that reported aligning their curriculum "some" or "a lot" with industry partners and middle schools was 46.5% and 40.3%, respectively. The educators were additionally asked which of the three partner organizations they believed was most important to collaborate with in order to help students choose a healthcare career path. The majority (66.0%) of the educators indicated that collaborating with the healthcare industry was the most important partner. Community colleges and/or universities were a distant second with 22.7%. Additionally, a small number of respondents wrote in that it was critical to work with all three types of partners to help students choose a healthcare career path.

Exhibit 22 - Teachers' Frequency of Collaboration with Pathway Colleagues

How often do you work with pathway colleagues to...	Never	Once a year	Once a month	Once a week	More than once a week	Total	
	%	%	%	%	%	%	n
...integrate Health Science Medical Technology Standards into your curriculum?	12.9%	20.4%	40.4%	15.4%	10.8%	100.0%	240
...integrate HOSA leadership principles into your curriculum?	28.5%	17.6%	32.2%	11.7%	10.0%	100.0%	239
...create a course outline that lists the sequence of academic and CTE topics?	26.5%	40.8%	19.7%	8.4%	4.6%	100.0%	238
...provide flexible time (e.g., a block schedule) for students who need more time to learn CTE material?	43.5%	5.9%	17.3%	16.9%	16.5%	100.0%	237
...plan and develop lesson plans that use collaborative teaching and/or instructional practices?	8.6%	21.0%	38.7%	15.6%	16.0%	100.0%	243

Exhibit 23 - Alignment of Curriculum with Colleges/Universities, Industry Partners, and Middle Schools

Since June 2010, how much have you been aligning your curriculum with...	Not at all	A little	Some	A lot	Total	
	%	%	%	%	%	n
... a community college and/or a university?	20.7%	24.6%	32.7%	21.9%	100.0%	333
... industry partners?	27.6%	25.8%	30.3%	16.2%	100.0%	333
... a middle school?	27.0%	32.7%	28.8%	11.5%	100.0%	330

HEALTH SCIENCE MEDICAL TECHNICAL (HSMT) MENTORS

The pathway educators' responses to two questions about their experiences with the HSMT mentors are outlined in Exhibit 24. The mentors are 8 to 10 paid educators with extensive expertise in health science and CTE. Thirty-two percent of the educators worked with their program's HSMT mentor during the 2010-2011 school year. The respondents who worked with the HSMT mentors generally found the information that they received from their HSMT mentors to be helpful. Specifically, 50.9% felt that the information was "very helpful" and 38.0% felt that the information was "somewhat helpful".

Exhibit 24 - Pathway Educators' Experiences with HSMT Mentors

		n	%
Did you work with your program's Health Science Medical Technical (HSMT) mentor this school year?	Yes	108	31.8%
	No	232	68.2%
	Total	340	100.0%
How helpful was the information you received from your HSMT mentor?	Not helpful at all	6	5.6%
	Not very helpful	6	5.6%
	Somewhat helpful	41	38.0%
	Very helpful	55	50.9%
	Total	108	100.0%

The educators also responded to an open-ended question asking what the mentors did that was helpful for their pathway team to achieve its program goals. The respondents indicated that the mentors helped them with their lesson plans and helped with the scheduling and planning of guest speakers and events. The mentors provided general guidance, answered the educators' questions, and kept them aware of important deadlines. Additionally, the HSMT mentors acted as mentors for the pathway students and one mentor helped develop a program's HOSA team. When asked an open-ended question about what more their mentor could have done to help their pathway team achieve its program goals, the respondents cited the timeliness of the communication and the accuracy of the information as areas that could be improved.

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Conclusions

CTE small schools, such as the 40 HSCB pathway programs in California, are one high school reform model that has shown promise in improving students' academic achievement and labor market outcomes (Kuo, 2010). Consistent with past research, the current study's findings suggested that the pathway programs had a positive impact on the students' healthcare career readiness. The study's findings revealed a number of other strengths of the HSCB pathway programs, such as their diverse student populations. In addition, the results highlighted areas that the pathway programs could improve to produce better student outcomes, including their work-based learning components and curriculum alignment with post-secondary education institutions. This section of the report outlines the conclusions and implications of the study's key findings.

DEMOGRAPHIC CHARACTERISTICS OF THE PATHWAY STUDENTS AND EDUCATORS

A diverse student population is central to the 40 HSCB programs primarily because these graduates will transition into the healthcare industry and impact workforce diversity in healthcare. Racial/ethnic diversity in the healthcare workforce has long been recognized as a strategy for improving quality of care (Cohen et al., 2002). The student survey data revealed that the students who participated in the pathway programs came from diverse racial/ethnic backgrounds. Latinos comprised 43% of the pathway student population and Asians, Filipinos and African Americans each constituted between 5% and 12% of the population. Whites comprised nearly 20%. The racial/ethnic composition of the students in the pathway programs was generally consistent with the statewide distribution of K-12 students (Ed-Data, 2011). Many of the students who participated in the pathway programs during the 2010-2011 school year will be employed in the healthcare industry in California over the next 40 years. A key implication of this data is that the healthcare workers who are products of the pathway programs will be a racially/ethnically diverse group. This outcome is consistent with the goals of the 2010 Patient Protection and Affordable Care Act, which called for a more diverse and competent healthcare workforce.

To help ensure a diverse and competent workforce, the CDE should continue to fund programs in high schools with racially/ethnically diverse student bodies. Future research should also investigate whether the racial/ethnic compositions of the pathway programs are consistent with the schools' racial/ethnic compositions. Even though the students who participated in the pathway programs were from diverse backgrounds, certain groups may be over- or under-represented in the pathway programs within individual schools. It is critical that all groups of students have equal access to participate in the pathway programs.

The student survey data additionally indicated that females constituted two-thirds of the participants of the pathway programs. The over-representation of females in the pathway programs aligns with national statistics that show the majority of workers in the healthcare industry are female (U.S.

Bureau of Labor Statistics, 2010). The pathway programs should explore ways to increase the number of males who enroll in the programs. One method that has shown promise is a mentoring program at Monterey Peninsula College that targets male nursing students. The mentorship program provides guidance, teaches professional behavior, and helps students discuss gender differences (Office of Statewide Health Planning and Development [OSHPD], 2010). Consistent with OSHPD's literature, the pathway programs may also highlight the large number of jobs that will be available in the future in the healthcare industry and the salaries of these jobs.

The educator survey data indicated that nearly 75% of the pathway educators identified themselves as White. However, the proportion of pathway educators who were White was only slightly higher than the statewide percentage for teachers (Ed-Data, 2011). Even though the pathway teaching force was not exceptionally diverse, the teachers integrated academic core curriculum with CTE curriculum in a variety of ways and utilized multiple approaches to teaching a diverse group of students. In addition, the survey data indicated that the respondents had worked as educators for an average of 15 years. Educator longevity can be an important aspect for the success of the programs and their students. Specifically, educator longevity and experience may play a role in encouraging students' participation in CTE-related activities and in shaping students' career interests.

PATHWAY STUDENTS' PARTICIPATION IN CAREER AWARENESS AND DEVELOPMENT ACTIVITIES

The target set by the CDE for the pathway programs was to have students complete 100 or more hours of work-based learning over the course of the school year. Unfortunately, the student and educator survey data revealed that the work-based learning component of the pathway programs was a program improvement area. Slightly more than half of the students reported that they did not have work-based learning or did not know whether they had work-based learning during the 2010-2011 school year. Although the educators indicated that their students participated in more work-based learning than the students reported, only 15% of educators indicated that their students, on average, completed more than 100 hours.

The pathway students engage in a variety of activities that are designed to fulfill the work-based learning experience (e.g., listening to speakers). However, students may not classify these experiences as work-based learning because they are not recognizing these activities as work-based learning and/or educators are not presenting them as work-based learning activities. For example, job shadowing, a one-day career exploration activity where students are paired with a professional and experience a real-life work environment, may be identified by students as a field trip. In order to improve these numbers, the pathway programs may explore doing the following: (1) establishing partnerships with employers and community-based organizations that have the capacity and positions available and appropriate for high school students semester-long 5 to 10 hours per week job placements, (2) focusing on field trips that are relevant to the healthcare field, and (3) increasing the capacity of their HOSA chapter by having the chapter provide students with ongoing leadership-

skill building opportunities that help them search for work-based learning opportunities. The CDE may also want to set a more attainable goal for the number of work-based learning hours. Not all of the pathway programs have connections with industry partners that would allow them to place a large number of students in work-based learning experiences that last for 100 hours or more.

The CDE aimed to have all pathway students write a resume as part of the pathway programs. The resume writing activity was intended to be a capstone experience for the students. The survey data revealed that 54% of the 11th graders and 77% of the 12th graders reported that they had written a resume. Of the students that had written a resume, 63% indicated that they received help from pathway staff when they were writing their resumes. Pathway staff should investigate ways to dedicate more time to resume writing and provide students with mock interview opportunities with real healthcare employers where students receive feedback on their resumes. This activity will help to reinforce the importance of having a resume.

In addition to the specific questions about their work-based learning experiences and resume writing, the pathway students completed a survey scale that included six general questions about their career awareness and development activities in school. The descriptive results showed that over 60% of the students reported engaging in discussions about careers and work with other students and adults at least three times during the school year. Furthermore, the majority of the students reported engaging in the other career awareness and development activities (e.g., attending an activity when parents or other adults who came to school to talk about jobs) at least once during the school year. The students in the pre- and post-test schools completed the same survey scale in the fall and the spring. The data from these schools showed that the students' number of experiences with career awareness and development activities increased moderately across the school year. Overall, the data indicated that the pathway students engaged in a variety of career awareness and development activities. In order to determine the impact of the pathway programs, future research should compare the pathway students' levels of career awareness and development activities with non-pathway students in their schools.

PATHWAY EDUCATORS' COLLABORATION WITH THEIR PATHWAY COLLEAGUES AND CURRICULUM ALIGNMENT

One goal of the HSCB pathway program is to have the pathway educators collaborate with their colleagues on curriculum integration based on the notion that integrating curriculum will help teachers function as a professional learning community and work as a collective unit to enhance classroom instruction and student learning and motivation. Common themes of curriculum include healthcare and academic standards, and these themes are embedded in the instruction that students receive. A primary focus of the Health Science Educators' Institute that occurs each summer is to spur collaboration among the pathway educators. The educator survey data revealed that over half of the teachers indicated that they worked with their colleagues to integrate HSMT and HOSA leadership principles into their curriculum at least once a month. Additionally, 70% of the teachers

worked with their colleagues to plan and develop lesson plans that used collaborative teaching and/or instructional practices at least once a month. The CDE may consider placing more emphasis on programs increasing their interdisciplinary efforts. In other words, the CDE could make it a requirement that programs direct grant resources toward pathway core academic teachers spending more time working together with CTE teachers to integrate HSMT standards into their academic curriculum and, in the process, engage in interdisciplinary projects.

Another aim of the HSCB pathway program is for the pathway programs to align their curriculum with colleges/universities, industry partners, and middle schools. Partnerships with employers and other educational institutions are critical to establishing a program of study that provides students with a smooth transition process between middle school and high school and when they leave high school. This approach also helps to maximize the use of school resources, such as enrolling in Regional Occupational Centers and Programs (ROCPs) and college courses. The survey data showed that 55% of the educators reported aligning their curriculum with a community college and/or university “some” or “a lot”. The percentage of educators that reported aligning their curriculum “some” or “a lot” with industry partners and middle schools was 47% and 40%, respectively. Future research should determine the capacity of the pathway programs to align their curriculum with the different sectors. It may be that the pathway program educators are already doing as much alignment as their time constraints and other responsibilities allow them to do.

PATHWAY STUDENTS’ GROWTH ON THE HEALTHCARE CAREER READINESS MEASURES

The pathway students’ healthcare career readiness was a particular focus of the current study. In order to assess the students’ healthcare career readiness, we utilized items that addressed the students’ knowledge, experience, and confidence related to healthcare careers. These three areas are the primary focus of the pathway programs. If the pathway programs are implemented effectively, the pathway students should have high healthcare career readiness when they graduate high school and enter post-secondary education institutions and the healthcare workforce.

The functioning of a progressive industry, such as the healthcare sector, depends on human capital. The human capital approach (Becker, 1965, 1993), places an emphasis on education and its impact on the productivity and efficiency of a workforce. This study examined how HSCB program activities promote and impact human capital characteristics, such as career readiness (i.e., knowledge, experience, and confidence) related to healthcare careers. The Health Science Educators’ Institute, which functions as a training and professional development mechanism for HSMT educators to come together to develop and document strategies on a work plan, is consistent with the human capital approach. The work plan strategies that result from the Health Science Educators’ Institute will enhance students’ knowledge, experiential learning, and confidence in healthcare-related topics if they are implemented correctly throughout the school year.

In the spring, the pathway students reported a moderate amount of knowledge related to healthcare careers. Their average ratings on the knowledge items were typically around 3 (i.e., “some” knowledge) on the 4-point scale. The students’ ratings on the experience items were somewhat lower than their ratings for the knowledge items in the spring. Specifically, their average ratings on the experience items were generally between 2 (i.e., “a little” experience) and 3 (i.e., “some” experience) on the 4-point scale. Of particular note were the low ratings on the item asking about the amount of experience the students had with HOSA, a career technical student organization that fosters leadership, citizenship, and interpersonal skills. These low ratings suggest that the pathway programs may want to include a greater emphasis on HOSA activities and, in particular, HOSA leadership activities. Finally, the students’ ratings on the confidence items in the spring were higher than their ratings for the knowledge and experience items. The students’ high levels of confidence agree with the past research showing that students in the U.S. have relatively high levels of confidence in their academic abilities in comparison to students in other countries (Loveless, 2006).

The pathway students at the six pre- and post-test schools completed the knowledge, experience, and confidence items in the fall and the spring, which allowed for an assessment of their growth during the time they participated in the pathway programs. Our analyses revealed that the pathway students’ knowledge, experience, and confidence related to healthcare readiness showed statistically significant growth from fall to the spring. The amount of the growth would be classified as medium sized program effects for the knowledge and experience measures and a small program effect for the confidence measure. Although there are a number of limitations associated with the pre-test/post-test research design, the results suggest that the six pathway programs had a positive impact on the students’ healthcare career readiness. Their increased levels of knowledge, experience, and confidence could lead to improved commitment to educational and career goals (Symonds et al., 2011).

PATH MODEL PREDICTING STUDENTS’ HEALTHCARE CAREER READINESS

We tested a path model with the student survey data from the six pre- and post-test schools to investigate how the pathway program activities were associated with changes in the students’ healthcare career readiness (i.e., knowledge, experience, and confidence) from fall to spring. In the path model, we utilized the following five program activities as predictors: (1) hours of work-based learning, (2) number of pathway field trips, (3) a measure of general career awareness and development activities, (4) counselor encouragement for healthcare careers, and (5) pathway teacher encouragement for healthcare careers.

The analysis indicated that the career awareness and development activities and the counselor and teacher encouragement for healthcare careers were significant predictors of the students’ healthcare career readiness. Specifically, engaging in a greater number of career awareness and development activities (e.g., “attending activities when parents or other adults came to school to talk about jobs”) during the course of the year was linked to increases in the students’ knowledge, experience, and

confidence. Furthermore, reporting that the counselors encouraged the students to pursue a career in the healthcare industry was associated with gains in the students' experience and confidence. Finally, the students' reports that their pathway teachers encouraged them to pursue a career in the healthcare industry were associated with increases in their knowledge, experience, and confidence. Although the sizes of the regression paths in the model were relatively small, the results did provide support for the notion that the program activities could lead to increases in the students' healthcare career readiness.

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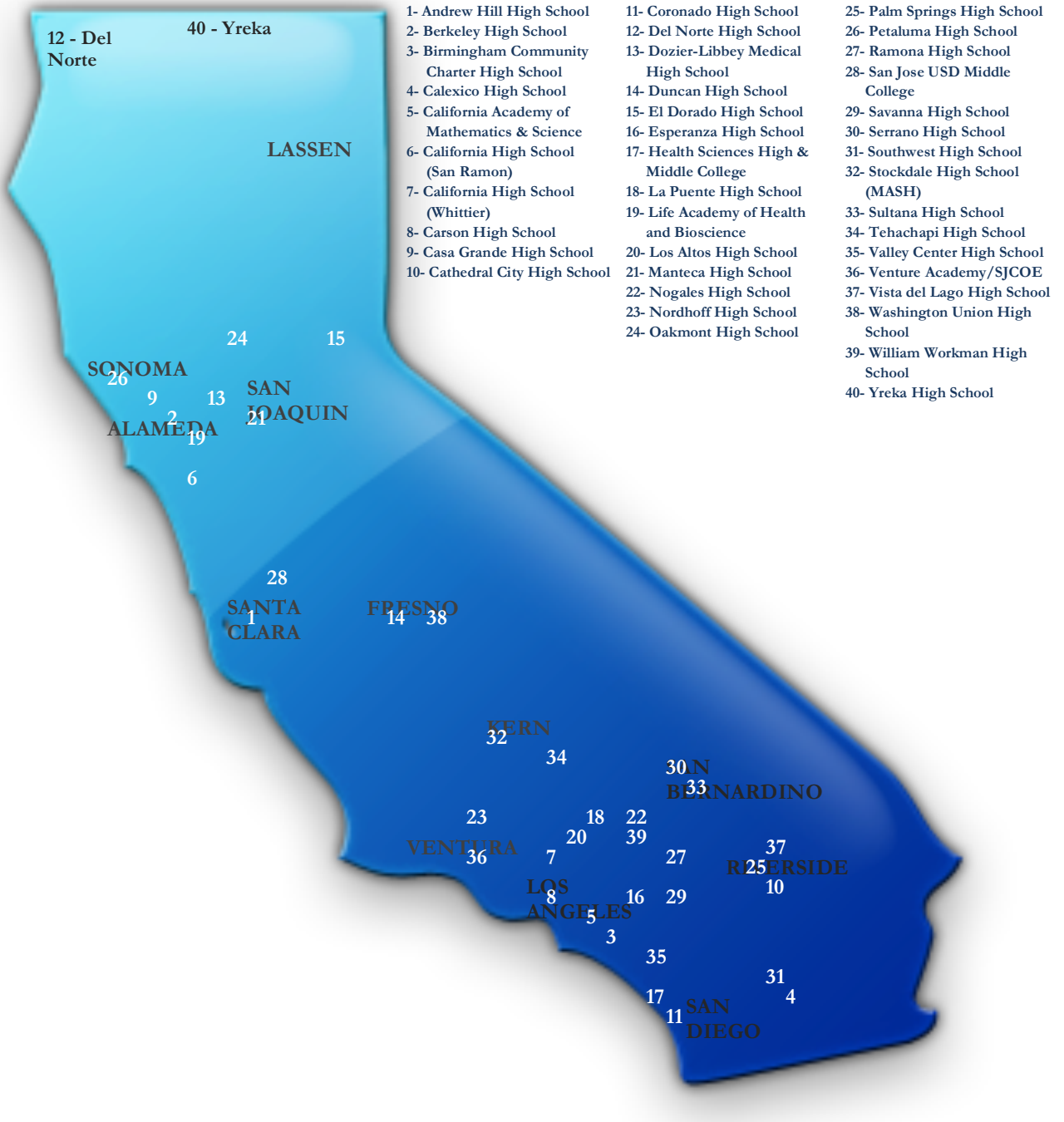
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Appendix A: HSCB Pathway Program Sites



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Appendix B: Acronyms

BCLAD	Bilingual Cross-cultural Language and Academic Development
CDE	California Department of Education
CLAD	Cross-cultural Language and Academic Development
CPR	Cardiopulmonary Resuscitation
CTE	Career Technical Education
HOSA	Health Occupations Students of America
HSCB	Health Science Capacity Building
HSMT	Health Science and Medical Technology
ROCPs	Regional Occupation Centers and Programs
ROP	Regional Occupation Program
SEM	Structural Equation Model

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