



**EXPLORATORIUM OF HEALTHCARE  
CAREERS  
FINAL REPORT  
2015 – 2018 ACADEMIC YEAR'S**



# EXPLORATORIUM OF HEALTHCARE CAREERS

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## **Special Appreciation:**

A note of special appreciation is extended to the Explore HCC project lead, Dr. Barry Hillman, who conceived of this three-year effort. Also, to Dr. S. Todd Stolp, Ms. Kathi Joye, Dr. Stacey Hoffman, Ms. Martha Stolp, Mr. David Urquhart, Mr. Larry Cope, Ms. Jamie Lindsey, Ms. Christina Allende, and Ms. Julia Rhodes for their unwavering support in the development and implementation of the **EXPLORE HCC** workshop program.

**The Exploratorium for Health Care Careers Project**  
HealthLitNow  
Program Summary Report, 2015-2018

**Executive Summary**

HealthLitNow (HLN) is a 501(c) 3 organization seeking to promote community-based Health Literacy. HLN Programs are designed to enhance both short-term and long-term healthcare outcomes for K-12 students, their families, and the community at large, consistent with the *National Action Plan to Improve Health Literacy*.<sup>1</sup> In 2015, HLN launched the Exploratorium of Health Care Careers (EXPLOREHCC) to help public schools address their goals for health literacy and to promote awareness of health career opportunities. Functioning as a health careers exploration program, the program uses fun, interactive workshops to help students expand their health literacy while introducing them to the diverse universe of careers in the healthcare sector. EXPLOREHCC takes advantage of the inherent fascination we have with the health sciences to present evidence-based personal and public health information in an entertaining “light bulb moment” format to 7th, 8th and 9th grade students, at a time when lifelong interests are being formulated and in a structure that integrates well with California teaching standards. The program gained quick adoption by California schools in its home communities of Tuolumne and Calaveras counties, with 20 public schools and 4,337 students participating during three years of the pilot study. Pre-post surveys completed by the students document a significant increased interest in pursuing a career in healthcare after participation in the program, with 36% of students expressing interest prior and 48% expressing interest following participation. A notable increase in self-assessed health literacy was also identified. The unique and innovative design of this program was recognized in 2017 when it was selected as one of twelve Finalists by the California Health and Human Services Agency in their statewide competition “Let’s Get Healthy California, Innovation Challenge.”

The demand for and success of EXPLOREHCC encourages the creation of a method for wider adoption and dissemination to schools in other communities beyond its current home in the Sierra foothills of California. To that end, this Summary Report describes the history and organizational structure of EXPLOREHCC, includes curricula for the 18 workstations that were presented during operations from 2015 to 2018, and provides suggestions for how the program might be tailored for communities with different demographics and health literacy priorities. It is hoped that this report will enable schools and school districts to implement the program for specific school contexts and needs in virtually any community. Data collected during the pilot years of the program suggest that EXPLOREHCC offers a tangible way to help schools impact health literacy, thereby improving the efficient utilization of existing health care resources in this country, and promises to help the nation address widening shortfalls in the healthcare workforce.

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<sup>1</sup> U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2010). *National Action Plan to Improve Health Literacy*. Washington, DC: Author.

## I. Introduction

HealthLitNow (HLN) is a 501(c) 3 organization that was formed on December 18, 2014, with two primary goals in mind. First, to promote community-based Health Literacy, consistent with the *National Action Plan to Improve Health Literacy*.<sup>2</sup> Health Literacy, as defined here, includes both *Personal* Health Literacy - relating to personal health decisions that improve individual health outcomes - and a newer concept labeled *Public* Health Literacy. Public Health Literacy is defined here as “the degree to which individuals and groups can obtain, process, understand, evaluate, and act upon information needed to make personal and public health decisions that benefit the community.”<sup>3</sup> HLN engages a broad alliance of community participants to offer technical and non-technical Health Literacy programs with a specific reach into area schools.

The second goal of HLN is to address growing gaps in the U.S. health care workforce. HLN was born in the rural Sierra Nevada foothills of California, in Tuolumne and Calaveras counties. Local residents are familiar with a lament repeated year after year that local job opportunities for graduating high school students are scarce. At the same time, more than 200 local healthcare positions at all educational levels were recently unfilled due to a lack of qualified applicants. HLN designed a comprehensive program, the *Exploratorium of Health Care Careers* (EXPLORE HCC), to address this paradox by raising awareness of employment opportunities in the health care field early in the educational process so that students could structure future classes with their guidance counselors to prepare for these jobs.

EXPLOREHCC takes advantage of the inherent fascination we have with the health sciences to present evidence-based personal and public health information in an entertaining “light bulb moment” format to 7th, 8th and 9th grade students, at a time when lifelong interests are being formulated and in a structure that integrates well with California teaching standards. By doing so, the program tangibly and directly addresses both goals of the HLN organization, to enhance health literacy while simultaneously promoting awareness of and interest in health-related careers.

This report covers the third year of operation for EXPLOREHCC and summarizes the three-year experience of the program. Because the target population is comprised of three consecutive grades of the middle and high school years, curricula are now in place and have been piloted for each of the three years. This provides opportunities to evaluate the performance of each year of the curricula, to monitor the longitudinal progress of students as they progressed through the program, and to identify the strengths and weaknesses of the project as implemented in these pilot counties. Because ongoing assessments and feedback have provided strong evidence that the program is successfully achieving its goals, this summary report seeks to provide a blueprint by which the program might be replicated in other communities with similar or different demographics.

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<sup>2</sup> U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2010). *National Action Plan to Improve Health Literacy*. Washington, DC: Author.

<sup>3</sup> Freedman, D et al, *Public Health Literacy Defined*, *Am J of Prev Health*, May 2009 Vol 36, Issue 5 pp. 446-451

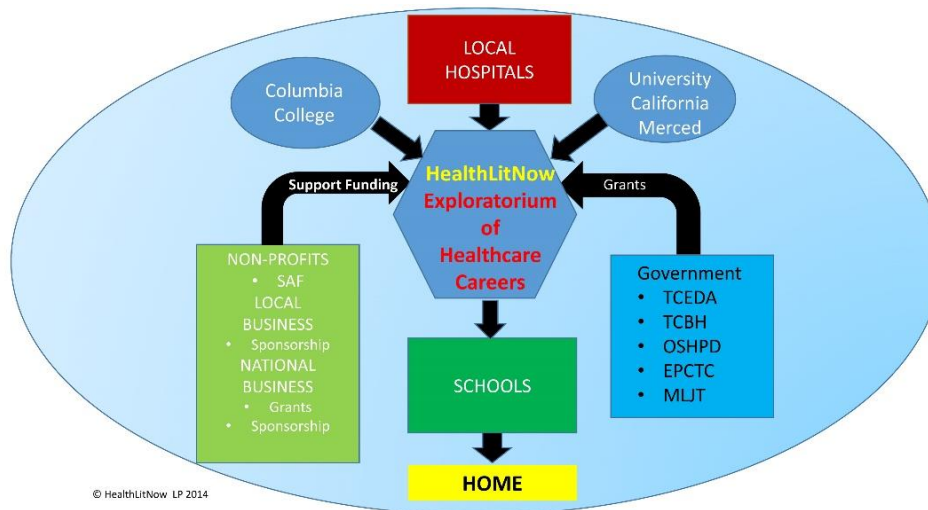
EXPLOREHCC is the flagship program for HealthLitNow (HLN). Any community or organization interested in advancing health literacy and health career awareness for their local student population may benefit by replicating the strengths and recognizing the challenges encountered by HLN in launching and sustaining the EXPLOREHCC program. To facilitate any such efforts, the organizational structure of HLN will be reviewed in section II. *HealthLitNow*. The process by which the EXPLOREHCC program content was developed will be addressed in the following section, III. *EXPLOREHCC Program Design Process*. In the next section, IV. *EXPLOREHCC Program Structure*, the details of each 2-hour workshop presentation are provided. Finally, in section V. *EXPLOREHCC After Action Review*, the assets that contributed most notably to our success and the specific challenges encountered while operating the program will be highlighted and in section VI. *Outcome Data* outcome data is presented.

## **II. HealthLitNow**

### **A. Background**

HLN was formed in partnership with the Tuolumne County Economic Development Authority (TCEDA), Tuolumne County Health Department (TCHD), Tuolumne County Behavioral Health Department (TCBH), the UC Merced Blum Center, area hospitals and clinics, and area businesses. The board of directors of HLN consists of the Mr. David Urquhart, Superintendent of Big Oak Flat School District, Mr. Larry Cope, CEO, Tuolumne County Economic Development Authority, Steven Roussos Ph.D., MPH, Executive Director, Blum Center UC Merced, Mr. Raj Rambob, Executive Director of Amador Tuolumne Community Action Agency, Ms. Julia Rhodes, president KleenSlate Concepts, Mr. James Gianelli, Attorney, and Ms. Sherri Reusche, Trustee, Calaveras Unified School Board. HLN senior management team consists of Barry A. Hillman, Ph.D, president HealthLitNow, S. Todd Stolp MD, Senior Project Manager, HealthLitNow, Ms. Jamie Lindsey Tuolumne County Program Coordinator, and Ms. Christina Allende RN, Calaveras County Program Coordinator. The offices of HLN are located at 99 N. Washington St., Sonora, CA and 101 Hospital Rd. Sonora, Ca. on the third floor of the former Tuolumne County General Hospital. The HLN Business Model is presented below as Figure 1. More information can be found at [www.healthlitnow.org](http://www.healthlitnow.org)

This HLN organizational structure enabled collaboration with multiple community organizations, including Tuolumne and Calaveras County schools, Tuolumne County Behavioral Health, Tuolumne County Health Department, Mother Lode Job Training, Mark Twain Medical Center, Native American clinics, philanthropic organizations, Columbia Community College, the University of California Merced Blum Center, and private industry. Each of these partners played an important role in advancing the objectives of the EXPLOREHCC program.



**Figure 1. – HealthLitNow Business Model**

SAF=Sonora Area Foundation, TCEDA=Tuolumne County Economic Development Association, TCBH=Tuolumne County Behavioral Health, OSHPD=Office of Statewide Health Planning and Development, EPCTC=Economic Prosperity Council of Tuolumne County, MLJT= Mother Lode Job Training

## B. Operational Area

Tuolumne County is a rural county on the west slopes of the Sierra Nevada mountains in California, bordered by rivers to the north and south, on the west by the San Joaquin Valley and on the east by mountains that reach 13,000 feet in elevation. Since the year 2000, Tuolumne County’s population decreased by almost 3%. In contrast to the rest of California where slightly over 60% of the population is white, over 90% of Tuolumne County is white. The 2015 median income in Tuolumne County of \$54,000 is approximately 20% below that of the rest of the state.

Calaveras County has a demography and economic profile that is similar to Tuolumne County.

## III. EXPLOREHCC Program Design Process

Highlighted by the Affordable Care Act, a well-established movement in Public Health began to emerge over the past two decades that has pushed population-based preventive measures further upstream, working with new vocabularies to describe such concepts as the *determinants of health*, the *built environment* and *community preparedness*.<sup>4</sup> The implications of the burgeoning literature in this field is that primary prevention – taking deliberate steps before illness is present in an individual or community – is critical to improvements in Public Health. Indeed, achievement of the Triple Aim of health reform - namely improved health, improved healthcare delivery and lower per-capita health care costs - is easily connected to earlier and community-wide disease prevention. The authors suggest that if upstream public health interventions are to receive public, and therefore, political support, improved Health Literacy in this country is a prerequisite. But conceiving ways to implement and fund improvements in Health Literacy has been difficult. The model described in this report uses a focus on K-12 education to align the current educational science standards with principles of

<sup>4</sup> Frieden, T *Government’s Role in Protecting Health and Safety* NEJM 368;20 1857-59 May 16, 2013

healthcare and healthcare employment opportunities to create a more health literate community and a more broadly motivated potential healthcare workforce. This is the strategy behind the development of the EXPLOREHCC program.

Initial funding for the EXPLOREHCC project was procured through the California Office of Statewide Health Planning and Development (OSHPD) which provided consecutive grants for all three years of the program totaling approximately \$36,000. During the second year of operations, a \$227,000 two-year grant through the California Workforce Investment Board was procured to expand the program from Tuolumne County to Calaveras County schools. This grant was administered by a local Workforce Innovation and Opportunity Act funded job agency, Mother Lode Job Training, with indirect costs of 20.7% (47K/227K). Additional funding was also sought and awarded through a number of local and regional grant programs that shared the health literacy and health career awareness mission of the project.

With this mission in mind, the design of the EXPLOREHCC workshops began with the selection of partners. High level meetings were conducted with the Tuolumne County Superintendent of Schools, the Tuolumne County Economic Development Authority leadership, Sonora Regional Medical Center (now Adventist Health Sonora), the Tuolumne County Behavioral Health Department, The Tuolumne County Health Department, the University of California at Merced, Columbia College (a part of the California Community College system) and the board of the local community foundation, the Sonora Area Foundation, to explore other possible opportunities for sustainable funding and to gather input into other potential local and/or regional partners to join the effort.

The creation of the EXPLOREHCC materials was accomplished over the four months preceding each school year, with input from multiple disciplines and with field testing of proposed components before assembling the proposals into six separate workstations for each of the three school years. All partners were invited to these meetings. During these summer brainstorming sessions, possible themes for the year were introduced and discussed. Feedback was gathered and further research into potential resources was conducted. The final meeting included rehearsed presentations of the proposed workstations to the team members with the collection of final feedback. Once the draft curriculum was finalized, training sessions with each of the potential workstation presenters were conducted and final edits made to the subject matter.

Criteria were established for the subject matter for each workstation. First, was a desire for material that included a certain “Wow!” factor. Fortunately, health topics are rich with such material, from a student observing their own electromyogram as they contracted their arm muscle while hooked up to an EMG, to discovering a Matchbox© toy in a model of a colon by looking through a colonoscope. Second, it was critical that the subject matter be evidence-based. As the curricular standards for the EXPLOREHCC workshops fell mostly within the STEM subjects (Science, Technology, Engineering and Math), conveying the importance of the scientific method and learning to interpret scientific evidence was of great value. Thirdly, the selection of subject matter was restricted to material that could be easily transported to school campuses and assembled in time for each two-hour workshop. Some equipment, such as a

terrarium used to represent an example of an ecosystem, required maintenance between sessions and therefore had to be stored in a different location than the equipment that was normally stored in a portable trailer. Other items were consumable, such as dried cricket snacks that were offered to students, and others, like unusual fruits, required preparation. For practical reasons, such components were kept to a minimum. Another factor influencing the selection of workstation materials was, of course, cost. Much of the equipment was built by HLN staff when possible, and certain technology, such as virtual reality goggles, was simply outside of the available budget.

To assure high fidelity of the subject matter between presentations conducted by different presenters, workstation leaders were requested to cover the subject matter in careful accordance with the guide that was prepared for each workstation. However, because engagement of the students was our most important goal, presenters were also encouraged to personalize their presentations in such a way that their own enthusiasm for the subject matter was evident. Many scientific fields were represented by the background of the presenters, including neurophysiologists, physicians, teachers, engineers, nurses, counselors, public health educators, dieticians and sociologists, so there was no shortage of expertise and devotion to the subject matter on the part of the workstation speakers. Achieving a delicate balance between the consistency of presentations and the creativity and expertise of each individual presenter required ongoing communication and teamwork throughout the program year.

#### **IV. EXPLOREHCC Workshop Structure**

EXPLOREHCC ([www.EXPLOREHCC.org](http://www.EXPLOREHCC.org)) provides 7<sup>th</sup> – 9<sup>th</sup> grade students in area schools a series of two-hour hands-on, non-didactic, evidence-based workshops, each one consisting of six separate 15 minute workstations, to foster enhanced health literacy and awareness of career opportunities in healthcare. During the first three years, 4,337 students from 20 public schools in Tuolumne and Calaveras counties participated in EXPLOREHCC. The success of the program is evident from the pre- and post- survey data (see section VI. *Outcome Analysis*, below) as well as from feedback collected from teachers and students who participated in these three pilot years, between 2015-2018.

Three years of curricula have been developed for the EXPLOREHCC program, allowing for a number of advantages during implementation. First, each class of 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> grade students is able to experience a different program each year. Second, when experienced in sequence, each curriculum builds on the material presented in the prior year, beginning with physiologic principles, advancing in the second year to look at the systems of the body, and culminating in the third year with a broad and holistic look at the topic of overall health. A final advantage of this three-year model became evident when students recognized the EXPLOREHCC logo and the staff from the prior year with fond memories of the experience. Because student health education was only a secondary goal, the EXPLOREHCC format purposely avoids a didactic model. Instead, the primary objective of EXPLOREHCC is to inspire students to pursue further interest in health careers and health topics after they leave the session, allowing EXPLOREHCC to exploit the opportunity for “light bulb moments” by including a robust dose of fun into each workstation, encouraging students to continue on their own to “explore” the health topics that capture their interest.



18 STEM- based workshop stations have been developed (six workstations for each of the three years), aligned with the California Department of Education Next Generation Science Standards (NGSS). Each workstation enables students to have hands-on, entertaining engagement with the Brain, Heart, Lungs, Eyes, Ears, Diet, the Urinary System, the Immune System, the Integumentary System, the Gastrointestinal System, the Nervous System, the Skeletal System, Genetics and Behavioral and Community Health. Guides for each of these workstations are available for review at the EXPLOREHCC website, [www.EXPLOREHCC.org](http://www.EXPLOREHCC.org).

Each workshop begins with a presentation to the students, during which students are asked which jobs they may have performed in the past and about their motivations for working at a job. The importance of health in virtually any job is highlighted and the definition of “healthcare career” is then defined in the context of EXPLOREHCC. This provides an opportunity to broaden the definition of “healthcare career” beyond the traditional doctor, nurse and therapist to include community planners responsible for building healthy communities; food scientists responsible for developing healthy foods and making them attractive, affordable and available; software engineers designing medical records and data systems; insurance navigators responsible for helping the general population find their way through a cumbersome healthcare system, etc...

During the opening presentation, students are introduced to a poster entitled “The Tree of Hippocrates.” In a word cloud format, different tiers of healthcare careers are listed, grouped according to the educational requirements for each tier (See Figure 2).

The weights assigned to the fonts in the word cloud are derived from data published by the US Bureau of Labor Statistics, 2015, describing the fastest growing careers in healthcare. The trunk of the tree represents a standard level of health literacy that all students will hopefully achieve upon graduation from high school. The first tier of the tree represents occupations that require post-high school training in a certificate program, for example to qualify for a food safety permit or a phlebotomy certification. The next tier up requires the equivalent of an Associates Degree and includes such careers as Registered Nursing and Respiratory Therapy. Further up the tree are careers that typically require a Bachelor’s Degree, and up further still are positions requiring Masters Degrees and finally Doctorate degrees. This poster intends to convey confidence that careers in health are accessible to all students, even if a particular student does not see a lengthy college education in his or her future.



Figure 2, “The Tree of Hippocrates”

Following this short presentation, students then watch a 5- to 10-minute video produced by HLN to introduce the theme for the workstations they will be exploring during the program. Two complete videos have been produced by HLN for this purpose and are described below. After watching the video, students are divided into six groups of 6 to 8 students each and each group is sent to one of the workstations set up around the room. For this target age group and this subject matter, we found that managing groups larger than 8 students was less effective and groups larger than 10 students were problematic.

### A. Year One

In the first year curriculum, physiological concepts are demonstrated in a hands-on fashion. As an example, students are wired with an electromyograph (EMG) device to see the electrical action potential generated by muscle contraction, and then a second student is attached to a transcutaneous electronic nerve stimulator (TENS unit) that

allows the first student to stimulate muscle activity in the second student. At another station, students learn about the nutritional content of foods from around the world by tasting crickets and chips made from insects, comparing the nutritional content of each with typical orange colored cheese-flavored corn snacks. Unusual fruits and comparative diets from around the world are shared and sampled. To make this first year station more relevant to a local community, specific ethnic diets or food accessibility issues could be introduced into the EXPLOREHCC curriculum. At a third station, students explore a model of the circulatory system by pumping water through a system of surgical tubing, noting the basis for the systolic and diastolic blood pressure measurements and identifying the source of the sounds produced by each contraction of the heart. Year One workshops included:

- 1. Audiology: Hear, Hear**
- 2. Vision: Eye, Eye, Aye**
- 3. Pulmonary: Pulmonary Puzzles**
- 4. Diet and Nutrition: Funky Fruits**
- 5. The Nerves: The Backyard Brain**
- 6. Circulation: The Heart of the Matter**

## **B. Year Two**

In the second year, the video shared with students introduces the concept of “Youland,” a Minecraft© world in which the systems of the body are depicted as components of a community – the central nervous system is represented by the government, the circulatory system is represented by the transportation system, the respiratory system by banking, the digestive system by groceries and commerce, the urinary system by water treatment and the colon by the solid waste system. Thus, this second year curriculum builds upon the first year material by extending physiological concepts to the level of bodily systems, making the concepts more accessible to student understanding by using familiar entities – transportation, banking, grocery stores, trash collection – to describe the internal systems of the body. Examples of workstation activities include an opportunity to navigate a model of the colon with a real colonoscope to discover various polyps and other assorted surprises hidden within the corrugated pipe. At the neurological system station, students see a full-sized model of a skeleton with nerves travelling through their anatomical pathways represented by fiber-optic tubes that glow as the light is turned on in the calvarium. An electromyogram is hooked up to demonstrate biofeedback techniques and to allow students to operate a robotic hand, introducing potential careers in bioengineering. Year Two workshops included:

- 1. Integumentary System: A Border to the World**
- 2. The Skeletal System: The Guy Down Under and the Building Department**
- 3. The Immune System: Who’s Watching the Store? Law Enforcement, Fire Prevention and Public Health**
- 4. The Digestive System: The Elementary Alimentary Tract and the Solid Waste Department**
- 5. The Urinary System: In Praise of Pee and the Water Treatment System**
- 6. The Central Nervous System: The Government**

### **C. Year Three**

The video presented for the third-year curriculum introduces the concept of “balance” in health. This model describes how health can be divided into four sectors, in which physical health – the notion that is traditionally emphasized as we discuss eating well, avoiding injury and taking care of our bodies – is only one of the four components. The other components include intellectual health, emotional health, and social health (note that the mnemonic “P-I-E-S” makes easy fodder for a “Pie Chart”). This lesson is intended to destigmatize mental and behavioral health issues and introduce the importance of public health as a community issue. By embracing behavioral health issues, this final year of curriculum seeks to build upon the previous year’s bodily system curriculum by reconstructing the whole organism in the minds of the students and bringing the topic of health into the real world, opening students eyes to the fact that the highest risks for morbidity and mortality (“illness and even death”) in their age group involve behavioral health and public health issues – suicide, overdose, and car accidents related to inattention or intoxication. One of the workstations that received particular interest from the students was a station presented by members of the Tuolumne Band of Me Wuk Indians, sharing local Me Wuk culture and history in the context of health. By illustrating their timeless cultural commitment to a balanced approach to life, our Me Wuk colleagues added a respectful depth to the students’ understanding of balance in health. Year Three workshops included:

- 1. Who Is Selling You Imbalance?**
- 2. How the World Lives in Balance: The Tuolumne Band of Me Wuk Indians**
- 3. Balance Schmalance: Scientific Critical Thinking**
- 4. Genetics: Nature vs. Nurture**
- 5. Balance in the Brain: The Superhero Brain**
- 6. Finding Balance in a Career: Careeropoly**



For a complete review of the curricula described above, please visit the EXPLOREHCC website at [www.EXPLOREHCC.org](http://www.EXPLOREHCC.org) to download the materials. The guide for each Workstation identifies the Next Generation Science Standards addressed by the materials in the workstation to facilitate consistency with recommended science curricula for the grades in question.

At the conclusion of the program, students regroup to share their experience and to provide feedback. A member of the EXPLOREHCC presenters team is often asked to address the students as a final effort to help the students grasp the workshop theme. This last presenter might be a professional who once attended the same school or a member of the local Native American tribe or a relative of one of the students.

#### **V. Strengths and Challenges: After Action Review**

Expertise and participation from the education sector was critical to the development of curriculum and implementation of the program. Teachers schedules are routinely saturated with the requirements imposed by teaching standards such as those for the Language Arts, Science (e.g. Next Generation Science Standards) and Health Education. It is important that health literacy programs target students when the curriculum can most effectively inspire their interest. Input from educational experts identified the 7th, 8th and 9th grades as the age groups most likely to be receptive to the material and a time when students would begin the process of deciding upon and selecting their future high school class schedules.

On site partnerships with science teachers and facility staff at each school campus was also a critical component for success. Most schools utilized their gymnasium for the workshop, but schools with site limitations substituted large classrooms. Setting up the workstations required the transport of tables and all equipment to the campus locations in a 12 foot trailer and assembly of each workstation. This labor was accomplished by HLN/EXPLORHCC staff. Adhering to schedules, minimizing school disruptions and being fully self-supplied with equipment and labor is an important component of achieving credibility among staff at schools.





Workstations were purposely designed to be attractive and provocative, with black table cloths at each workstation adding a certain formality to the program. Visual interest was achieved by including such items in displays as a full sized human skeleton model, a microscope, a full-sized colonoscopy unit, plates of various unusual fruits, a terrarium full of Venus Fly Traps, a mobile with a variety of interesting symbols hanging from its arms and an opportunity to eat insects.



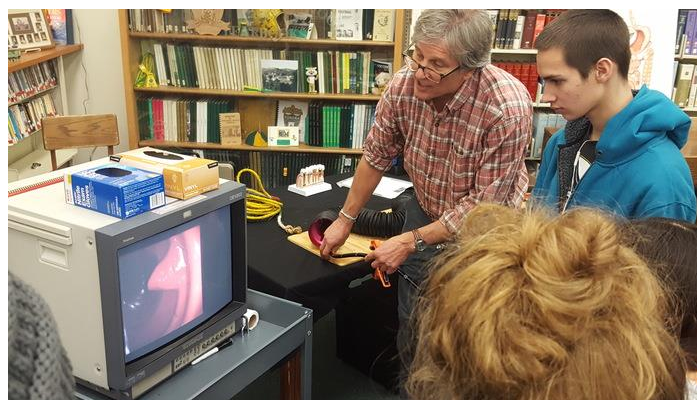
County Behavioral Health and Public Health departments provided staff to be workstation presenters and contributed to the development of materials when Behavioral Health Department and EXPLOREHCC program goals overlapped. Mother Lode Job Training provided staff for both Tuolumne and Calaveras programs in addition to major grant funding. Such partnerships allowed funding streams like Tobacco Prevention and Maternal, Child and Adolescent Health funds to synergize with EXPLOREHCC grant funds.

The regional tribal government, the Tuolumne Band of Me Wuk Indians, contributed presenters for the third year curriculum. By sharing the Native American cultural belief in the value of “Balance” as a way of life, local tribal representatives opened students’ eyes to a different culture within their own local communities and helped students understand that intellectual, emotional and social health concerns are just as important as physical health issues.



One of the great strengths of EXPLOREHCC was derived from the local roots of the program. The two HLN leaders who managed the program had been active in the community for many years. The HLN President, Dr. Barry Hillman, PhD., is a former local business owner and currently serves on the Tuolumne County Juvenile Justice Commission and the Board of the Tuolumne County Economic Development Authority. Dr. S. Todd Stolp, MD, ran a local family practice for 20 years, and retired from the Tuolumne County Health Department after 12 years as the Local Health Officer. The value of the many community connections that come from deep community roots and credibility repeatedly proved to be an important ingredient for success.

Local hospitals and regional health systems were sought as partners in sustaining the EXPLOREHCC program since health literacy and promotion of health careers in youth are both efforts that stand to benefit the local health care system. It was also considered that a partnership between non-profit health facilities and the EXPLOREHCC program would help hospitals meet the Community Benefit requirements that accompany their classification as a non-profit health system. The local hospital in Calaveras County, Mark Twain Medical Center, contributed staff to participate as workstation presenters and contributed funds to the HealthLitNow scholarship fund for that county. The local hospital in Tuolumne County, Sonora Regional Medical Center (now Adventist Health Sonora) expressed great interest in the program, but for the most part remained unengaged.



Arranging schedules with the schools, identifying a staging area on campus and gaining timely access to the venue on the day of each workshop was a labor intense endeavor. Not surprisingly, as schools experienced their second and third year of participation these tasks proceeded in a much smoother fashion.

Assuring that classes had completed a pre-survey prior to participation and then completed a post-survey after participation required diligent pursuit. Hard copy surveys were used on campuses that lacked internet access and computer resources for students, but schools were encouraged to utilize an internet based survey whenever possible. The survey data was then compiled by HLN staff and analyzed in chart format to assess program outcomes and to meet the obligations of certain grant agreements.

## **VI. Outcomes Analysis**

Several different approaches might be applied to assess the degree of success achieved by the EXPLOREHCC project. Formative evaluations were conducted concurrently during the implementation of the program by seeking immediate feedback from the students and teachers regarding their satisfaction with the program. Formative feedback included favored workstations, desire to continue annual participation in the program and recognition of program themes. These formative interactions were consistently positive. Examples include a broad choice of preferred workstations following each workshop and ongoing follow-up questions from curious students regarding the principles discussed at specific workstations, particularly requests to repeat an activity that was presented earlier. At many schools, after perusing the workstations, students in classes outside of the target population expressed dismay that they would not have an opportunity to participate. After the first year of implementation, schools enthusiastically sought to schedule the EXPLOREHCC program on their campuses, resulting in expansion of the program from Tuolumne to Calaveras county schools after procuring additional funding from the California Workforce Investment Board.

### **A. Assessment Strategies**

Formative assessment education principles were implemented by the use of “white boards” (Kleenslate®) provided to all students at the beginning of each program so that questions to each workstation group could be answered by the students and held up for the leader to read. This immediate feedback to the workstation presenter contributed to prompt student assessment, assured ongoing student engagement and assisted with ongoing program development. For most programs, students were randomly divided into workstation groups by handing out white boards of six different colors immediately prior to dispersing students to the different workstation tables identified by color code. The random assignment of groups helped to break up social cliques that at times threatened to divert attention from the subject matter – a commonly applied educational principle familiar to teachers.

The EXPLOREHCC program assessment included efforts to identify process measures and compare pre- and post- test responses from students who participated in the project. By including self-assessed interest in health-related careers and knowledge of career options in the survey questions, some outcome assessment was also achieved. This approach is essentially what was required by the OSHPD grant agreement and is reported in the data charts that follow. Because program participants responded to the same survey questions for each of the three pilot years, a longitudinal analysis of the



individual annual curricula over the three pilot years is also included in this final year summary report.

A more powerful but much more problematic analysis might be attempted by engaging in a cohort study of the program participants to compare the percentage of participating students who ultimately decided to pursue a career in a health-related field after high school to a cohort of non-participating students. Because the three pilot years of this project targeted 7th, 8th and 9th graders in 2015-2018, the first graduating high school class with participation in at least one year of the program will be graduating in 2019. Therefore, this approach would not be possible until the spring of 2019. Even then, the impact of other multiple factors upon student interest in a health career is likely to obscure any effect of the EXPLOREHCC program. Even so, a look at such data might disclose some impacts that are not otherwise evident.

Several anecdotes are provided at the end of this section to share some of the incidental triumphs that were encountered during the pilot years of the program. While such outcomes may not provide formal evidence of a successful program, they highlight the rewards of EXPLOREHCC that might not otherwise be appreciated from an analysis of the survey data.

The following charts present data for the pre- and post- surveys administered to participating students during each of the three years of program implementation in Tuolumne and Calaveras county schools. A discussion of each chart follows the referenced chart, and a summary outcome analysis is provided after the anecdotal narratives are shared.

## **B. Outcome Data**

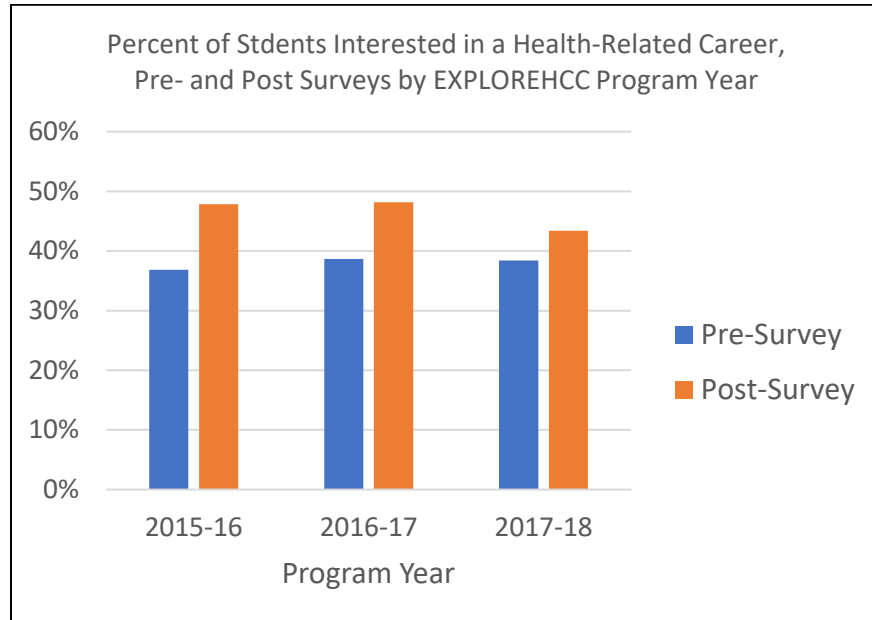
Every participating school was asked to have students respond to a Pre-Survey prior to participation in the EXPLOREHCC workshops and also to respond to the same questions in a Post-Survey following participation. The timing between the administration of the two surveys differed from school to school, in some occurring immediately following completion of the program at others occurring up to two weeks later. Questions were prepared in coordination with our granting organizations and remained consistent throughout the three pilot years of EXPLOREHCC.

The survey questions addressed interest in a future health-related career, awareness of the availability of educational financial assistance, familiarity with a number of health-related occupational terms, willingness to consider serving underserved communities and, from a consumers perspective, perceived stigma of seeking mental health care services. Sample surveys are included in the Appendix to this report.

### **1) Identifying information**

Forty-six to 48% of responders to the survey identified as female gender, but approximately 30% of students did not respond to the question of gender. In future surveys, offering a third option for nonresponders or “other” to allow for all gender interpretations would be appropriate. Participating students came from the 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> grades of California public schools throughout Tuolumne County in 2015 through 2018, and Calaveras County in 2016 through 2018.

**2) Are you interested in working at a job in a health field some day?**



Students from each year expressed increased interest in a health-related career following participation in EXPLOREHCC, with an overall increase in the percentage of students with such an interest from 38.0% to 46.5%. It is interesting to note that the percent of the population with a baseline interest in a health-career prior to program participation also increased from 36.8% in 2015-16 to 38.4% by completion of the third pilot year. It is also important to note that the curriculum included an effort to redefine for students what constitutes a “health-related career,” expanding the definition to include health and safety contributions from disciplines such as computer engineering, community planning, food science etc... Such a definition may have therefore contributed to an expanded population identifying themselves as having an interest in a “health-related career.” This would represent a step forward in what we at HLN include under the category of “health literacy.”

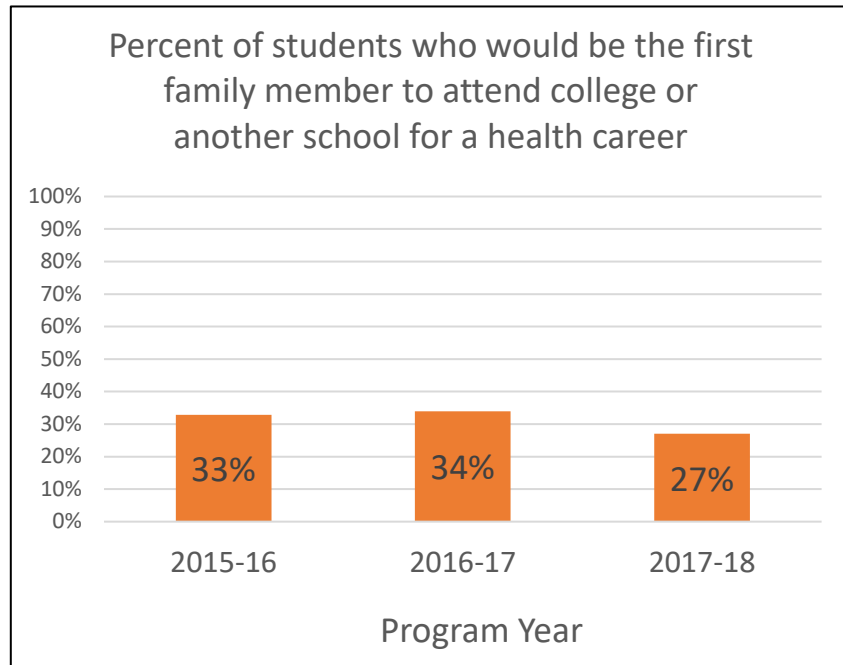
### 3) If so, what health-related jobs interest you?

The percentage of students who listed specific job titles as a career of interest after participation in EXPLOREHCC increased from 36% in the Pre-Survey to 40% in the Post-Survey, suggesting a more specific interest in or awareness of additional “health-related jobs,” using the expanded definition of health-related work described in the previous section. A wide range of health-related occupations were listed, as noted in the following table.

**Table 1. Health-related Jobs Considered by Students**

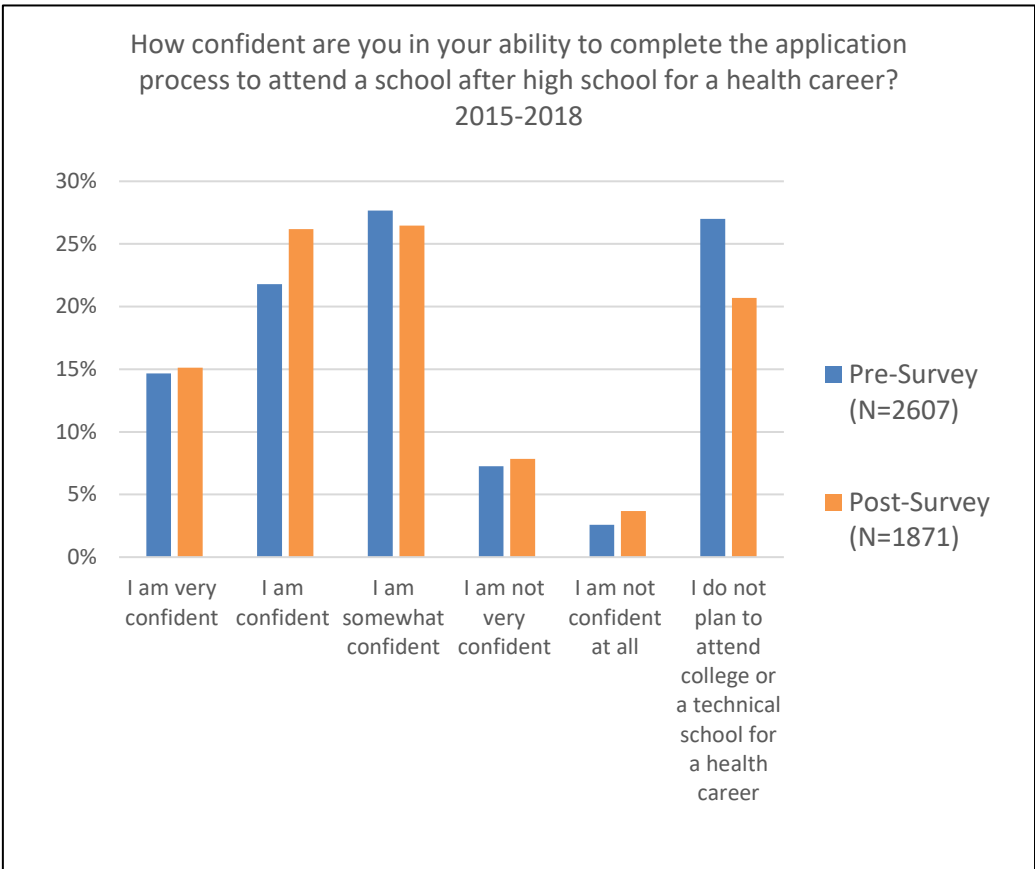
Adoption Agent	Doctor (continued)	Paramedic
Air Force	Immunologist	Pharmacist/“Medication”
Animal Behaviorist	Emergency Room	Phlebotomy/“Blood Draw”
Animal Caretaker	Dermatologist	Physical Education or Coach
Animal Health and Nutrition	Emergency Medical Technician	Physical Therapist
Athletic Trainer	Emergency Room Technician	Physiologist
Athletic Umpire or Referee	Engineer	Pilot
Audiologist	Fire Response/Fire Fighter	Police Officer/“a cop”/CHP
Biochemical Engineer	Fitness Instructor	Political Science
Biochemist	Food Science	Private Investigator
Biologist	Forensic Anthropology	Psychologist
Cannabis Industry	Forensic Scientist/Medical Examiner	Radiology/“X-ray” Technician
Cat rescue	Game Designer	Receptionist
Certified Nursing Assistant	Geneticist	Respiratory Therapist
Chemist	Health Educator	Robotics/Medical Robotics
Chiropractor	Holistic Health/“Body Healing”	Search and Rescue
“Cooking”/Chef	Home Health Worker/Personal Care	Social Worker
Coroner	Homicide Detective	Sonographer
Counselor or Therapist	Laboratory Research	Speech Therapist
Dental Hygienist	Laboratory Technician	Sports Medicine
Dentist	Lifeguard	Teacher
Orthodontist	Marine Biology/Oceanographer	Vaccinator
Dietician	Massage Therapist	Veterinarian
Doctor/“med student”	Medic/US Army or Military Medic	Veterinary Technician
Pediatrician	Medical Assistant	Yoga Instructor
Surgeon	Medical Engineer/Bioengineer	
Anesthesiologist	Mental/Behavioral Health Worker	“A garden or a nursery for plants”
Radiologist	Midwife	“BMX”
Infectious Disease Specialist	Nurse or RN	“CPR”
Diabetologist/Diabetes Specialist	Labor and Delivery	“Disabled children”
Trauma Specialist	Pediatric or “Children’s”	“Growth in humans”
Ophthalmologist/“Eye Doctor”	Nurse Anesthetist	“Help find cures”
Neurosurgeon	Cardiac	“Help kids with ADHD like me”
Psychiatrist	Travelling	“Helping kids in need.”
“Brain”/Neurologist	Flight or Emergency Care	“Helping old people”
Cardiologist	“Cancer”	“Helping people with meds”
Orthopedist	Neonatal ICU	“Inspector”
Oncologist	School	“Kaiser”
“Primary”	Nurse Practitioner	“Over the Counter”
Radiation Therapy	Nutritionist	“pediatric electrophysiology”
OB/GYN	Occupational Therapy	“pediatric music therapist”
Plastic Surgeon	Operating Room Technician	

**4) Would you be the first person in your immediate family to attend college or school for a health career?**



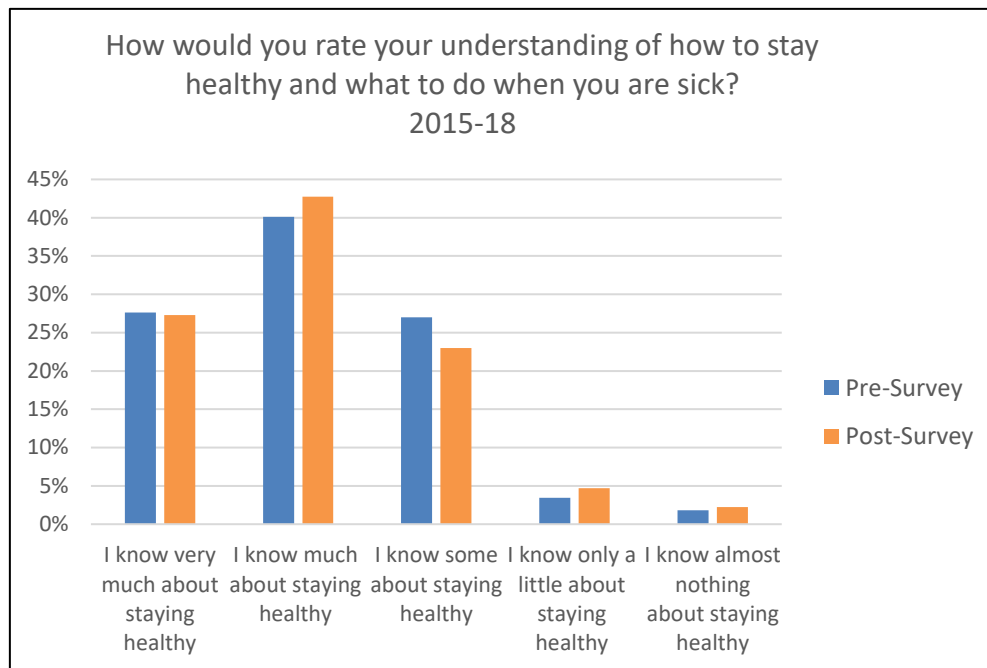
Approximately a third of students indicated that they would be the first in their family to seek an education in the direction of a health career. While it is unlikely that the number of students recognizing others in their families who work in a health career would change over the three years of the EXPLOREHCC program, it is possible that the decrease from 33% in 2015-16 to 27% in 2017-18 in those who would be the first in their families to seek a health-career education may represent, as noted in the previous section, an expanded definition in the minds of the students about what constitutes a “health-related career.”

**5) How confident are you in your ability to complete the application process to attend a school after high school for a health career?**



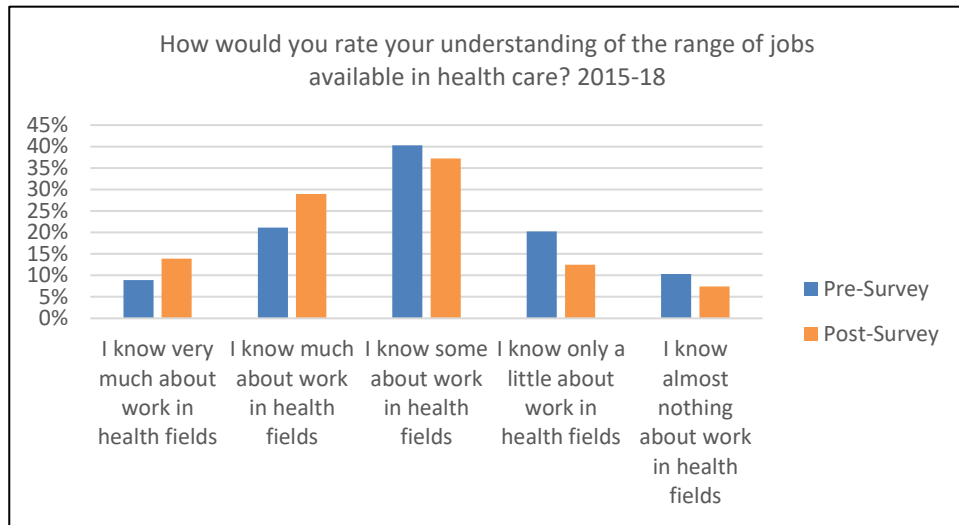
There was a clear shift suggesting increased students' confidence in their ability to complete applications for further education in a health career after participation in EXPLOREHCC. During the program introduction, the point was made that decisions to select curricula in high school should be affected by future career considerations and that these decisions were not so far in the future for these 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> grade students. In some schools, professional HLN staff who had attended the school hosting the program spoke to students about their own career paths to help mentor and inspire students.

**6) How would you rate your understanding of how to stay healthy and what to do when you are sick?**



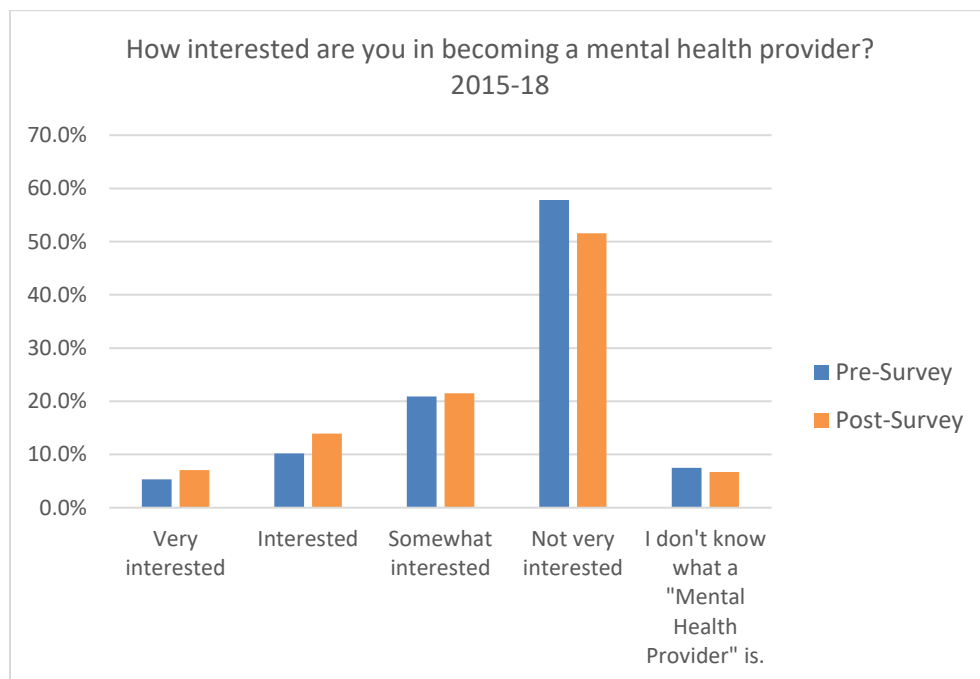
While it did not appear that any highly significant increase in this self-perceived measure of health literacy was experienced by students, there may be some sense of increased knowledge based upon the shift towards “knowing much about staying healthy.” Considering that the EXPLOREHCC program was not intended to increase student knowledge about how to stay healthy or how to care for specific illnesses, minimal outcome improvement here is not surprising. The program, instead, sought to increase interest in further health-related study by students.

**7. How would you rate your understanding of the range of jobs available in health care?**



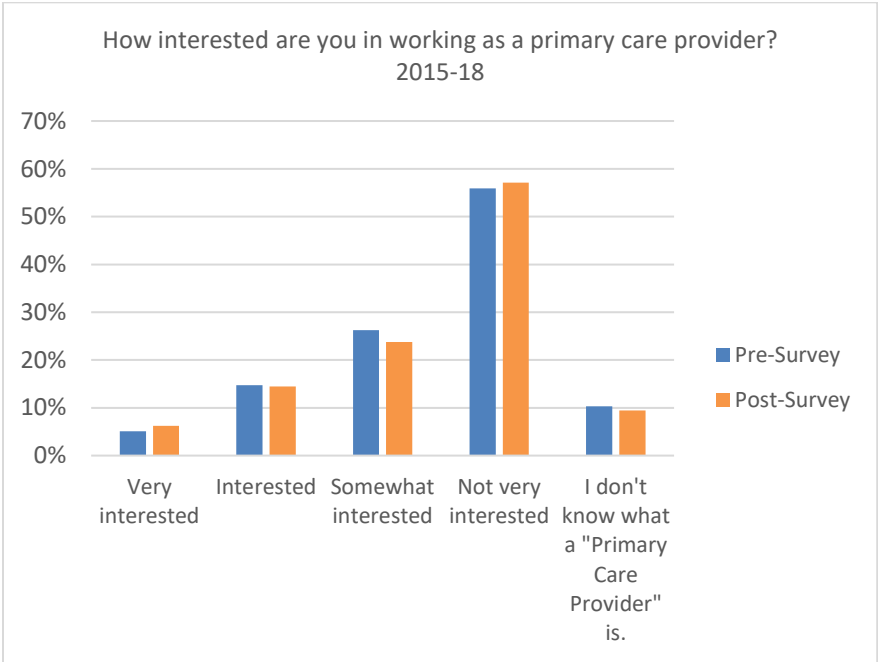
The increase in self-perceived knowledge about the range of jobs available in health care achieved by the EXPLOREHCC program in each pilot year and with each year of curriculum was significant. As this was a primary goal of the program, this provides strong evidence of the success of EXPLOREHCC in meeting its primary goal.

**8. How interested are you in becoming a mental health provider?**



A significant increase in the percentage of students who were somewhat interested, interested or very interested in becoming a mental health provider was associated with a decrease in the percentage who were not interested or were not familiar with the definition of a “mental health provider.” Several workstations explored new frontiers of neuropsychiatry and central nervous system physiology and imaging technology in such a way that future opportunities in the fields of mental and behavioral health were highlighted. The apparent correlation between an increase in interest in a mental health care career after exploring the vast contemporary frontiers of neuropsychiatric research supports a central tenant of EXPLOREHCC, namely that the intrinsic fascination of the scientific horizon is itself a most attractive tool for recruitment of tomorrows scientists.

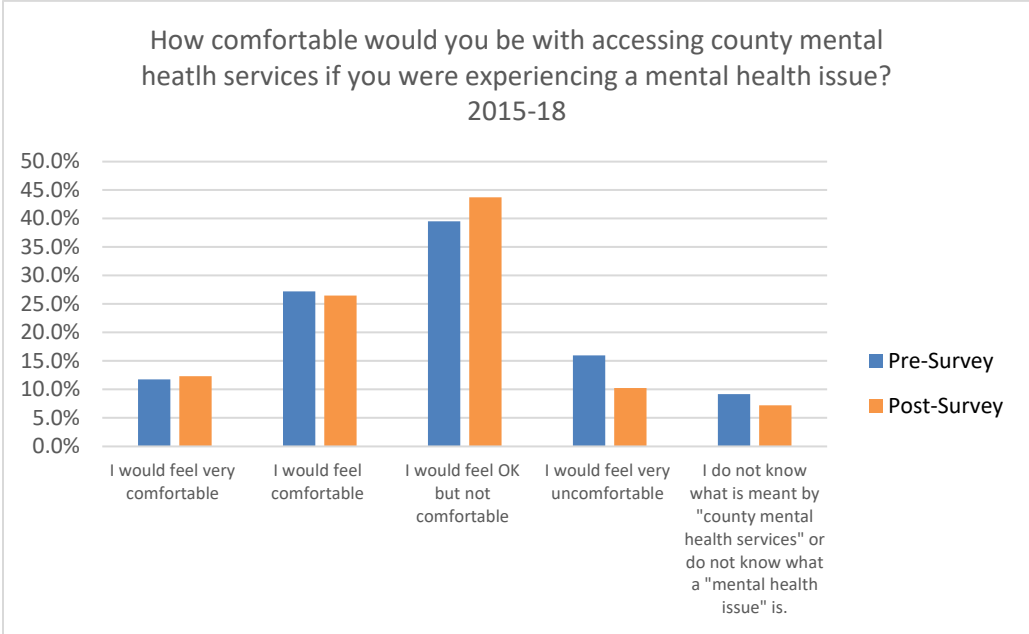
**9. How interested are you in working as a primary care provider?**



In contrast to work as a mental health provider, students did not appear to be significantly more interested in a potential career in primary care after participation in the EXPLOREHCC program. Interestingly, fewer students were familiar with the definition of a “primary care provider” than were familiar with the definition of a “mental health provider.” This suggests a topic for future focused efforts towards improving health literacy.



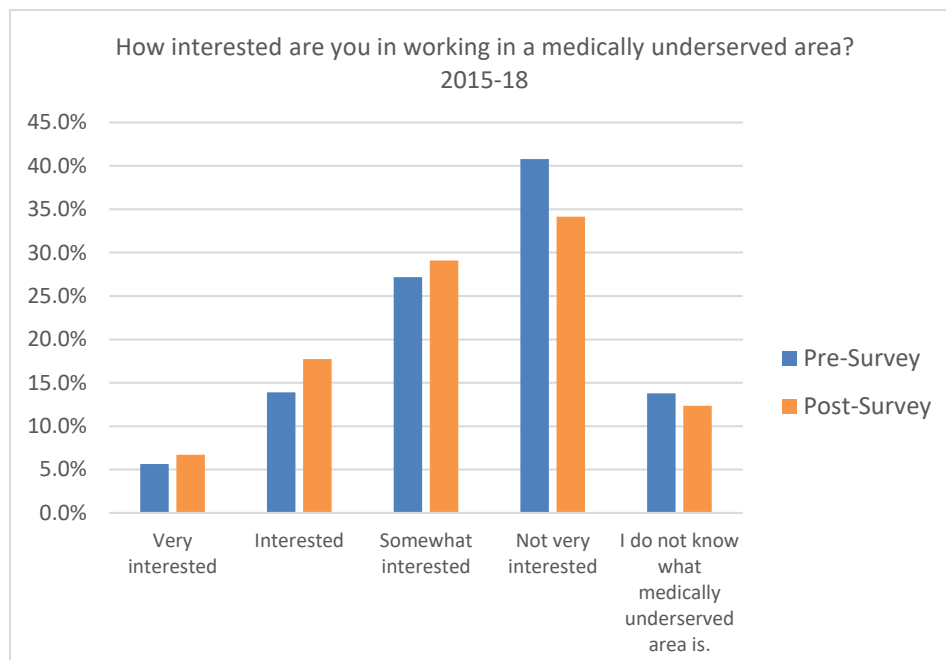
**10. How comfortable would you be with accessing county mental health services if you were experiencing a mental health issue?**



A significantly increased percent of students perceived a higher sense of comfort with accessing county mental health services after participating in the EXPLOREHCC program. Some of this may have resulted simply from a clearer understanding of what is meant by “county mental health services” or “mental health issues,” but some of this improved comfort level was experienced by students who had previously felt very uncomfortable with utilizing “county mental health services.” Addressing stigma in mental health care, and for that matter all fields of personal health care, has been a goal of the California Department of Mental Health<sup>5</sup> and is an important challenge to achieving improved health literacy. This measure therefore suggests that the EXPLOREHCC approach to broadening student familiarity with the mental/behavioral health segment of the health care industry successfully improves public utilization of existing resources in that sector.

<sup>5</sup> <http://www.dhcs.ca.gov/services/MH/Pages/StigmaandDiscriminationReduction.aspx>

## 11. How interested are you in working in a medically underserved area?

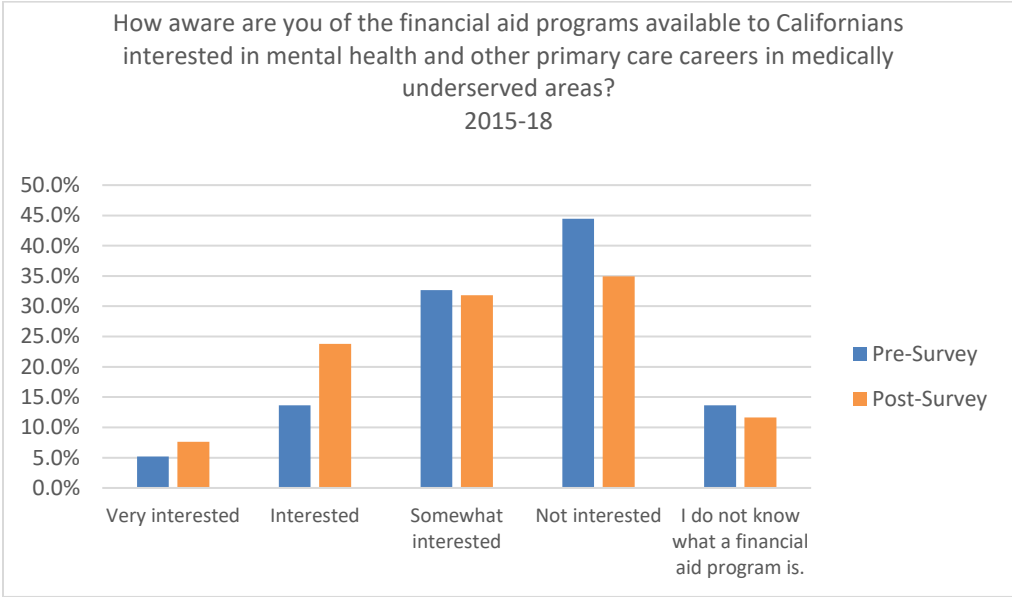


Students participating in the EXPLOREHCC program expressed greater interest in working in a medically underserved setting after participation in the program. This result directly addresses the distinction between personal health literacy – understanding the range of personal health decisions that improve individual health outcomes, such as addressed by question #10 – and public health literacy – understanding public health decisions that benefit the community. Issues that motivate students to utilize specific personal health care services, such as measured by responses to question #10, are quite different from issues that might motivate students to improve the availability, equity and quality of health care services that would benefit the community in general, such as measured by question #11 (and, perhaps, questions #8 and #9).<sup>67</sup> One of the significant goals of the U. S. Department of Health and Human Services (HHS) Health Literacy Workgroup is to “support and facilitate engaged and activated health consumers.” These survey metrics suggest that the EXPLOREHCC strategies effectively promote this goal.

<sup>6</sup> U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2010). National Action Plan to Improve Health Literacy. Washington, DC: Author. [www.health.gov/communication/initiatives/health-literacy-action-plan.asp](http://www.health.gov/communication/initiatives/health-literacy-action-plan.asp)

<sup>7</sup> Hemenway, D *Why We Don't Spend Enough on Public Health* N Eng J Med 362;18 1657- May 6, 2010

**12. How aware are you of the financial aid programs available to Californians interested in mental health and other primary health care careers in medically underserved areas?**



Program participants felt considerably more aware of opportunities available to Californian students to qualify for financial aid programs to assist with pursuing mental and primary health care careers after participation in EXPLOREHCC. Because these segments of the health care industry are currently experiencing enormous shortfalls in available workforce,<sup>89</sup> lessening the economic obstacles for education in these career paths is important. Thanks to community sponsors of the EXPLOREHCC program, scholarships have been made available in both Tuolumne and Calaveras counties for graduating high school seniors interested in pursuing careers in health-related occupations. Candidates for these scholarships include students interested in non-traditional health-related occupations such as food science, community planning, information technology and bioengineering as well as many others. The first disbursements of these scholarships occurred in 2018.

**C. Anecdotes**

A lengthy list of examples of “light-bulb” moments experienced by students and workshop presenters would be more appropriate for an informal discussion of the EXPLOREHCC program. However, several specific incidents seem worth sharing in the

<sup>8</sup> U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. 2016. National and Regional Projections of Supply and Demand for Primary Care Practitioners: 2013-2025. Rockville, Maryland.

<sup>9</sup> Health Resources and Services Administration/National Center for Health Workforce Analysis; Substance Abuse and Mental Health Services Administration/Office of Policy, Planning, and Innovation. 2015. National Projections of Supply and Demand for Behavioral Health Practitioners: 2013-2025. Rockville, Maryland.

interest of highlighting the unanticipated opportunities that can arise while opening the door to scientific exploration, particularly in the realm of personal and public health science.

One 9<sup>th</sup> grade blind student was participating in the “Skin” workshop, a part of the Year Two curriculum. The student was being assisted by a fellow student and the presenter was describing the anatomy of the skin using an intricate model of skin architecture. Because the discussion focused upon visual cues from the model, the blind student was not able to meaningfully participate, so an assistant presenter took the blind student aside, placed his hand on a textured latex model of a rash and asked the student if he could identify anything about the rash from its feel. The student contemplated for a moment while feeling the latex model and correctly identified it as an “allergic rash.” When asked what kind of causes might there be for such a rash, the student again correctly identified the rash as “poison oak,” based upon the linear distribution of the bumps. Impressed, the presenter then placed the student's hand on a latex model of chicken pox lesions. The blind student rapidly and correctly identified the rash as chicken pox, all the more inspiring because the latex model of chicken pox was on skin with African pigmentation and the student was white. This latter point was not lost on the observing students, some of whom were African American.

Because of concerns regarding the confidentiality of health information, students were not asked or expected to share personal stories related to personal health conditions. However, students fairly frequently shared personal experiences with family illnesses and health care that brought the subject matter to life. In the colonoscopy workstation, students often indicated that an adult family member had recently undergone a colonoscopy procedure, and many students shared experiences with broken bones or other injuries. One student spontaneously described a sibling who suffered a traumatic brain injury during his military service and the recovery process that ensued.

In the third year curriculum, we were fortunate to have the participation as a workstation coordinator the cultural outreach coordinator and his team from the local Tuolumne Band of the Me Wuk Indians. Student feedback was enthusiastically positive for the information shared by the Me Wuk team members, information that was delicately presented and received with great respect by the students. In collecting feedback from the students, one teacher shared that a student expressed surprise that “living Indians still existed.” While reflecting a regrettable lack of knowledge of the local community, it is critical that building such bridges within different communities becomes a priority. The EXPLOREHCC program provides a unique opportunity to do so.



## VII. Summary

Survey data reflected an average 22.3% increase in the percentage of students interested in a career in healthcare following the workshop experience, with the average percent of students interested in a healthcare career increasing from 38.0% to 46.5% over the three pilot years of the program. This outcome illustrates the success of the EXPLOREHCC program.

In addition to what the students absorb from the EXPLOREHCC program, students carry their learning experience home to their families. It is not unusual for HealthLitNow to receive emails from schools and parents expressing their appreciation for the program and conveying the excitement experienced by their students/children following their participation. The strategy of employing the public education system to disseminate health information to youth which is, in turn, distributed to homes throughout the country by those students has been a strategy encouraged by the burgeoning field promoting health literacy.

The EXPLOREHCC program, as developed and implemented in Tuolumne and Calaveras counties, is a pilot program. It has been the intent of these pilot years to identify assets and challenges facing communities interested in reaping the economic and community health benefits of promoting health careers to local youth while simultaneously enhancing personal and public health literacy in their communities. The specific strengths and vulnerabilities of different communities around the country are likely to modify the findings reported herein, but it is the adaptability of this model that makes such an approach so promising. This report is prepared in hopes that it may be of value to other communities interested in taking tangible, evidence-based steps towards addressing their own similar interests.



**VIII. Appendix**

**I. Pre-Survey and Post-Survey for Healthcare Education**  
**Workshops**

**School**

Please select the school you attend:

- Belleview Elementary School
- Columbia Elementary School
- Curtis Creek Elementary School
- Jamestown Elementary School
- Sonora Elementary School
- Soulsbyville Elementary School
- Summerville Elementary School
- Tenaya Elementary School
- Twain Harte Elementary School
- Connections Academy
- Gold Rush Charter School
- Mountain Oak Charter School
- Foothill Leadership Academy
- Sonora High School
- Summerville High School
- Tioga High School
- Other:

**Grade**

- 7<sup>th</sup>
- 8<sup>th</sup>
- 9<sup>th</sup>

**Teacher**

Please type your teacher's last name.

**I am**

- Male

- Female

Are you interested in working at a job in a health field some day?

- Yes
- No

If so, what health-related jobs interest you?

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Would you be the first person in your immediate family to attend college or school for a health career?

- Yes
- No

How confident are you in your ability to complete the application process to attend a school after high school for a health career?

- I am very confident that I can complete the application process for a health career
- I am confident that I can complete the application process for a health career
- I am somewhat confident that I can complete the application process for a health career
- I am not very confident that I can complete the application process for a health career
- I am not confident at all that I can complete the application process for a health career
- I do not plan to attend college or a technical school for a health career

How would you rate your understanding of how to stay healthy and what to do when you are sick?

- I know very much about staying healthy and taking care of myself when I am sick
- I know much about staying healthy and taking care of myself when I am sick
- I know some about staying healthy and taking care of myself when I am sick
- I know only a little about staying healthy and taking care of myself when I am sick
- I know almost nothing about staying healthy and taking care of myself when I am sick

How comfortable would you be with accessing county mental health services if you were experiencing a mental health issue?

- I would feel very comfortable accessing county mental health services.
- I would feel comfortable accessing county mental health services.
- I would feel OK but not comfortable accessing county mental health services.
- I would feel very uncomfortable accessing county mental health services.
- I do not know what is mean by "county mental health services" or do not know what a "mental health issue" is.

How would you rate your understanding of the range of jobs available in health care?

- I know very much about work in the fields of health
- I know much about work in the fields of health
- I know some about work in the fields of health
- I know only a little about work in the fields of health
- I know almost nothing about work in the fields of health

How interested are you in working as a mental health provider?

- Very interested
- Interested
- Somewhat Interested
- Not very interested
- I do not know what a mental health provider is.

How interested are you in working as a primary care provider?

- Very interested
- Interested
- Somewhat Interested
- Not very interested
- I do not know what a primary care provider is.

How interested are you in serving in a medically under-served area?



- Very interested
- Interested
- Somewhat interested
- Not very interested
- Not interested at all
- I do not know what medically underserved area is.

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How aware are you of the financial aid programs available to Californians interested in mental health and other primary care careers in medically underserved areas?

- Very interested
- Interested
- Somewhat interested
- Not very interested
- Not interested at all
- I do not know what a financial aid program is.