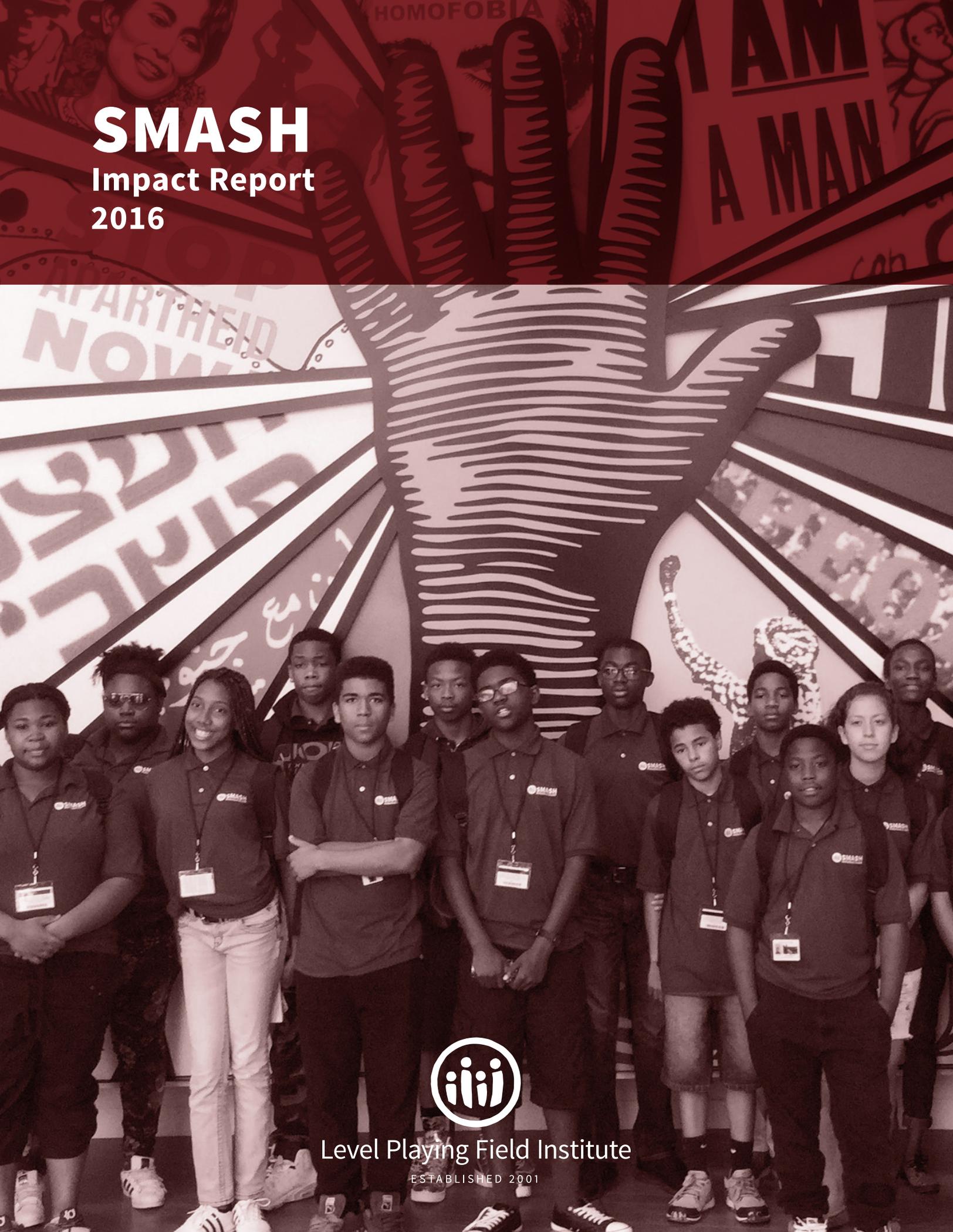


SMASH

Impact Report
2016

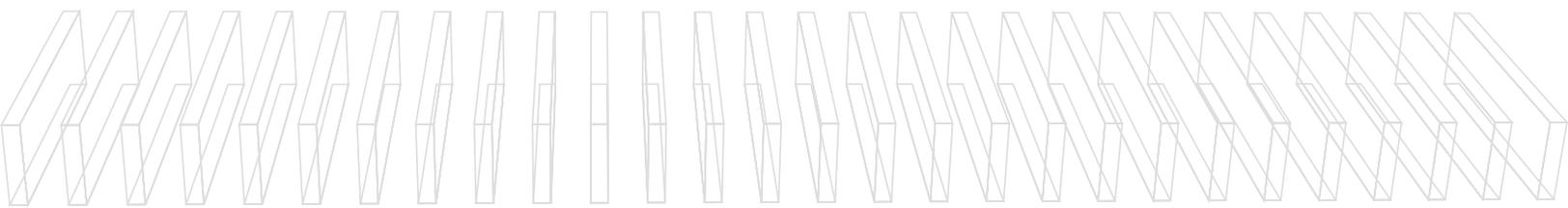


Level Playing Field Institute

ESTABLISHED 2001

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The Challenge: Diversity in STEM

Across the United States, participation in science, technology, engineering and mathematics (STEM) education and the workforce varies significantly by race/ethnicity and gender. Disparities start early in math and science proficiency (NAEP, 2015) and continue through high school in STEM course participation and passage rates (College Board, 2016). By the end of college, women account for 50% of the United States population but just 18% of all computer science and engineering degree earners. African Americans and Latinos combined account for 30% of the U.S. population but just 16% of STEM Bachelor's degree earners (NSF, 2015).

The underrepresentation of women, African Americans, and Latinos in STEM is of significant concern given the lack of supply of professionals to keep pace with the projected job growth in STEM fields, the rapidly changing racial landscape of the nation, and the lack of access to economic mobility through participation in the fastest-growing and highest-paying sector of the U.S. economy for diverse communities (Bureau of Labor Statistics, 2015; CEW, 2011; U.S. Census Bureau, 2014). STEM education programs and initiatives play a key role in increasing access, opportunities, and outcomes for underrepresented students in STEM education and the workforce.



SMASH Program Summary

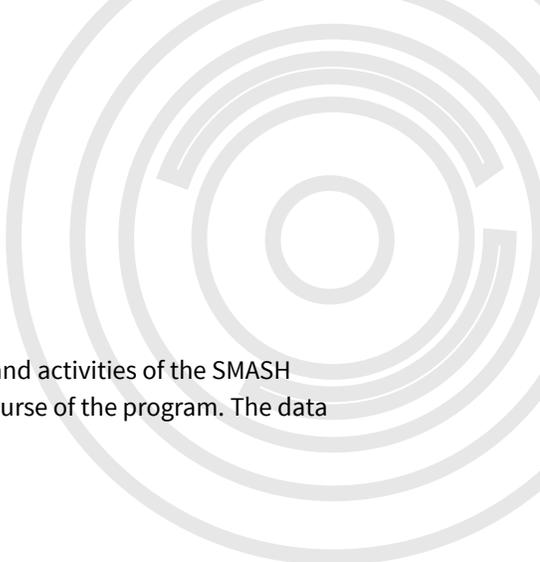
The Summer Math and Science Honors Academy (SMASH) is a rigorous and immersive 3-year STEM education program specifically targeting low-income high school students of color, operated by the Level Playing Field Institute (LPFI). Students enroll in SMASH after completing the 9th grade and remain with the summer program for three consecutive years. For five weeks, scholars attend the SMASH program on college campuses (University of California, Berkeley; University of California, Davis; University of California, Los Angeles; and Stanford University) and participate in more than 100 hours of STEM instruction. SMASH math courses range from Algebra II to Calculus; the science course sequence includes Biology, Chemistry, and Physics; the Computer Science sequence includes 3 courses preparing students for Advanced Placement computer science courses in high school. Students also take an Engineering Design Challenges course which is a project-based sequence that prepares and motivates each scholar to design the future. In addition, students learn public speaking skills, college readiness and engage in community-building activities with residential staff including field trips and engagement from diverse corporate volunteers. (See SMASH Logic Model Below)

In addition to the SMASH summer program, LPFI delivers computer science education through the Computer Science Saturday Academy (CS²) to prepare juniors and seniors for the AP CS exams. LPFI offers two courses to current SMASH scholars on Saturdays during the school year at UC Berkeley (for both SMASH: Berkeley and Stanford scholars) and at UCLA.

LPFI has also partnered with the Management Leadership for Tomorrow (MLT) to support SMASH alumni through college and into their careers. In 2016, a cohort of 50 SMASH alumni from UCLA, Berkeley, and Stanford received coaching and college “mapping” from MLT, and were paired with juniors and seniors as part of the MLT Career Prep program.

Table 1. SMASH logic model

Activities	Approaches	Short-Term Outcomes	Medium-Term Outcomes	Long-Term Outcomes
• STEM Exposure Experiences	• Promote Excellence in STEM Education	• STEM-focused College Path Preparation	• Rate of declaring STEM major in college	• Entrance to and persistence in STEM career
• College Readiness Experiences	• Cultivate Leadership	• STEM-focused College and Career Aspirations	• Graduation from college with STEM major	• Sense of belonging and connection to STEM community
• Community Building Experiences	• Embrace Social Justice	• Peer and Adult Networks	• Concrete STEM career goals	• Sense of positive STEM identity
• Health & Wellness Experiences	• Sustainability	• Sense of Positive Identity	• Sense of positive STEM identity	
• Cultural Navigation Experiences	• Strengthen Community/ Teamwork			



Report Methodology

Overview

The purpose of the yearly SMASH impact evaluation is to examine the goals, objectives, and activities of the SMASH program and measure growth in attitudes, aspirations, and academic growth over the course of the program. The data and findings are utilized to inform SMASH program growth and development.

Evaluation Questions

1. To what extent has SMASH increased scholars’ STEM knowledge, skills and preparation for STEM studies in higher education?
2. To what extent has SMASH developed scholars’ STEM interests, attitudes, and aspirations and increased their access to role models and support networks?
3. To what extent does SMASH increase self-efficacy and increase familiarity with the college admissions process?
4. What are the post-secondary outcomes of SMASH scholars and what are the longitudinal impacts associated with attending SMASH?

Data Collection

The SMASH impact evaluation included three forms of data collection: (1) Academic assessments examining growth in mathematics, science, and computer science knowledge, (2) SMASH scholar impact survey examining students’ attitudes and aspirations, (3) SMASH alumni survey tracking post-secondary data of SMASH alumni. All data were collected at both pre- and post-SMASH program. Survey items and scales are listed in Appendix A.

Analytical Procedures

For SMASH impact data, reliability analyses were conducted with all item and scales, using Cronbach’s alpha. For all reliable scales, individual items were summed into scales (e.g., Self-Efficacy, Math Engagement). The mean of each scale (pre- and post) was then calculated, and paired-samples T-tests were run to determine if the mean values changed significantly from pre- to post- condition. Pre-post changes are reported by examining the p-values for statistical significance; in the social sciences, $p < .05$, $p < .01$, and $p < .001$ are considered to be statistically significant. Statistical significance levels for scholars were calculated using effect size benchmarking (a way of quantifying the size of a difference between two means after identifying that there is a statistically significant difference between the scores pre-program and post-program). All item percentages reported reflect the percent of students who strongly agreed and/or agreed with the corresponding item. Descriptive statistics were calculated for the alumni data. All quantitative data were analyzed using SPSS statistical package. All qualitative data were analyzed using qualitative data analysis software.

“I had previously imagined college life as very stressful, but SMASH made me comfortable in class and ready for any college professor that I may encounter in the near future.”

–3rd year UCLA scholar

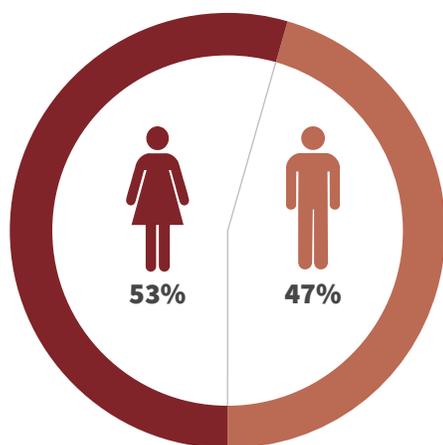


SMASH 2016 Scholar Demographics

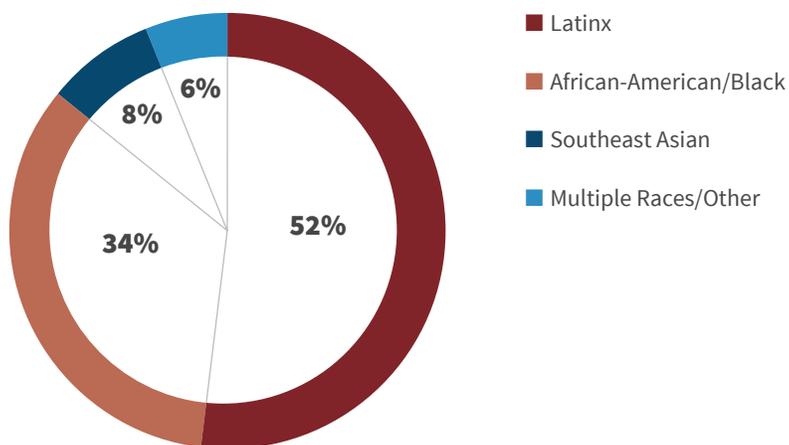
SMASH Scholars, by Year and Site

	1st year (rising 10th graders)	2nd year (rising 11th graders)	3rd year (rising 12th graders)	Total Current Scholars	Total Alumni	Total Scholars + Alumni
University of CA, Berkeley	28	28	23	79	241	320
Stanford University	28	28	19	75	128	203
University of CA, Los Angeles	24	23	33	80	90	170
University of CA, Davis	30	0	0	30	0	30
Total Students	110	79	75	264	459	723

Gender



Ethnicity

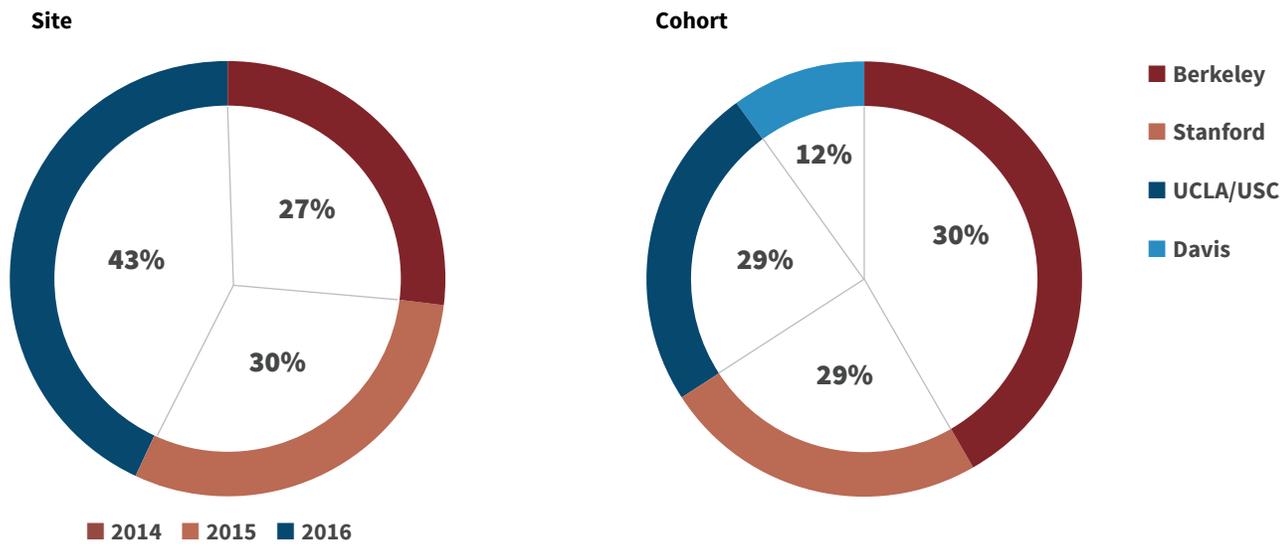


“A skill that I developed this summer was knowing how to create projects using a computer and overall knowledge of computer science since I literally had never taken a course like this before.”

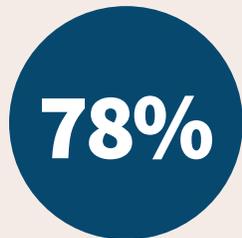
—2nd year UCLA scholar



SMASH Scholar Demographics, (Cont.)



Free and Reduced Price Lunch (FRPL)



1st Generation College



FRPL & 1st Generation College



“The SMASH staff and instructors saw in us what we didn’t see in ourselves.”

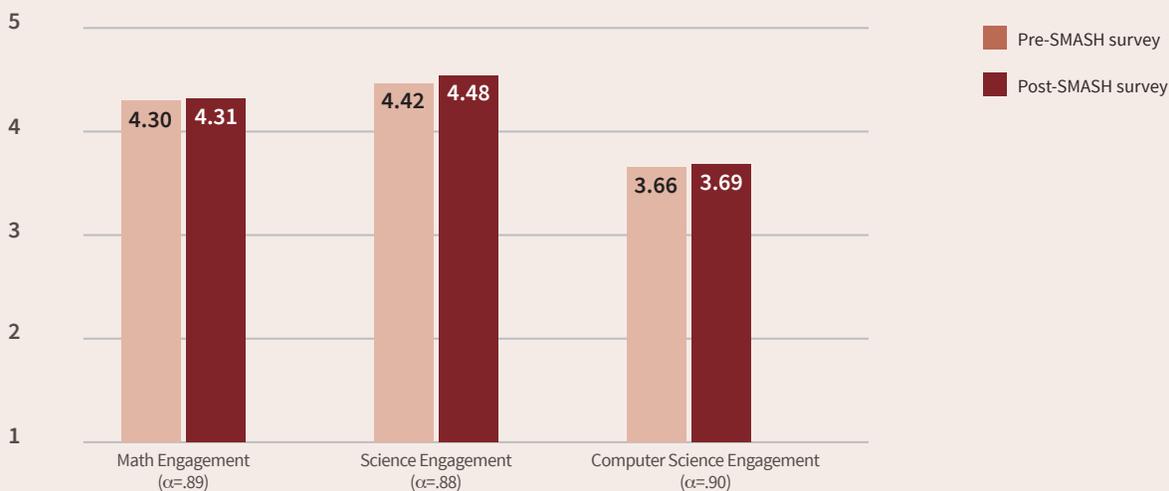
—1st year Berkeley scholar



SMASH Summer Outcomes

SMASH Academy's comprehensive and rigorous evaluation process is based on classroom observations, scholar assessments, pre- and post-program surveys for scholars and all site staff, and student focus groups.

- **The Math, Science, and Computer Science Engagement** scales measure the extent to which scholars enjoyed, expressed interest in, and indicated an interest in further engagement within the domain.

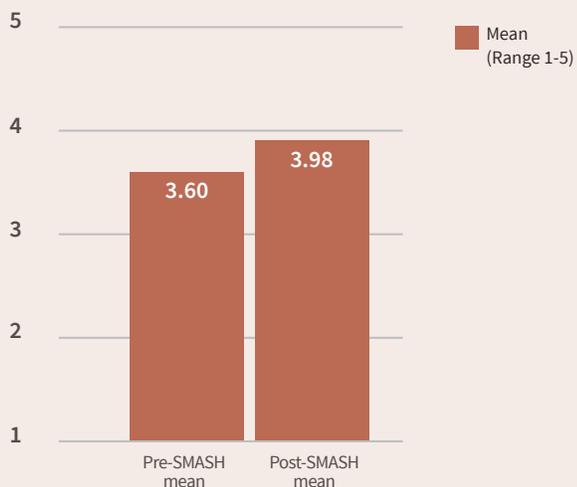


- Scholars came into SMASH with high engagement in math, science, and computer science, and demonstrated no statistically significant growth from pre to post.
- 60% of students viewed computer science as enjoyable and 69% indicated that being successful in science was an important part of who they are.



STEM CAREER EXPLORATION

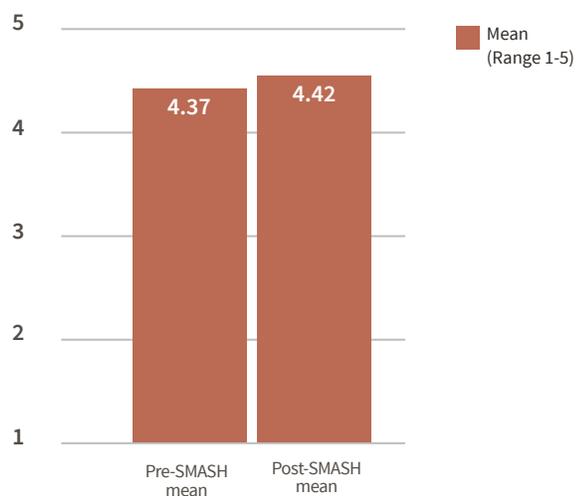
- The **STEM Career Exploration** scale measures the extent to which scholars have explored STEM fields. This encompasses exploring careers, understanding connections between the STEM field and their own lives, and having peer networks and role models.



- On average, scholars gained significant growth in access to role models and developed support networks over the course of the program.
- 53% of students grew significantly in STEM career exploration from pre- to post.

STEM ASPIRATIONS

- The **STEM Aspirations** scale measures the extent to which scholars intend to major in a STEM field in postsecondary education and the extent to which they can imagine themselves working in a STEM career.



- Scholars came into SMASH with high STEM aspirations, leaving little room for growth.
- 83% of scholars intended to major in a STEM field of study in college.
- 89% of scholars could imagine themselves working in a STEM career.

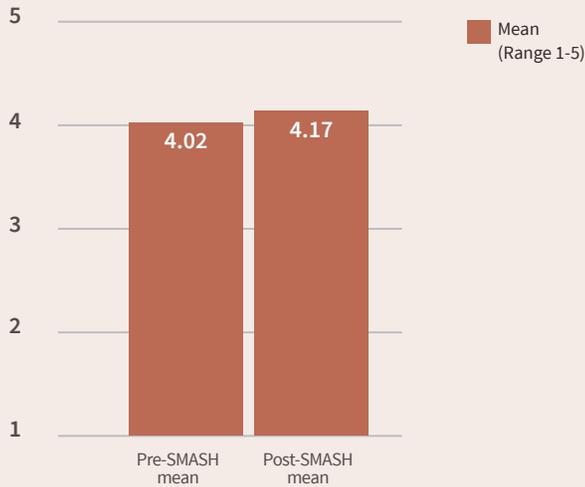
“SMASH helped me develop a stronger self-confidence in my potential as a Latina and woman in the STEM field. The rigorous math and science classes allowed me to learn of my abilities for understanding and applying physics and math concepts. Group participation, presentations and public speaking classes taught me to have a voice in the community and know that my opinion matters. I am the first woman in my family to graduate with an engineering degree. No one really had talked to me about engineering. Now looking back at why I chose engineering and felt very confident my decision is due to the people I met at SMASH.”

-INGRID VERASTEGUI, SMASH ALUMNA

SMASH Summer Outcomes (Cont.)

SELF-EFFICACY

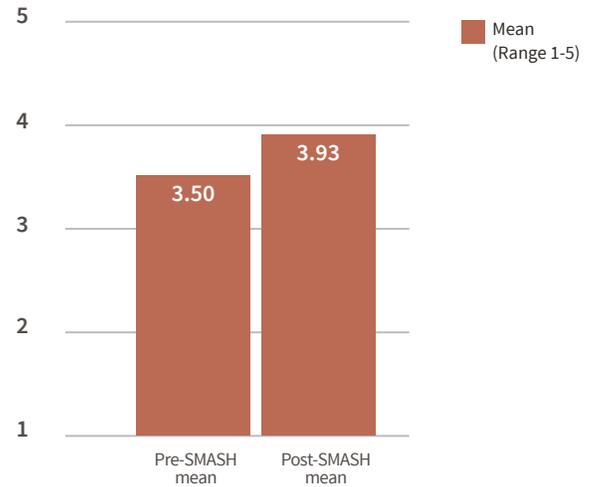
- The Overall Self-Efficacy scale measures the extent to which scholars feel confident in their abilities to succeed in specific situations or tasks.



- Scholars came into SMASH with high self-efficacy, leaving little room for growth.
- 44% of scholars demonstrated statistically significant growth in self-efficacy from pre- to post-SMASH.
- 92% of scholars reported that they feel capable of doing well in science.

COLLEGE APPLICATION NAVIGATION

- The **College Application Navigation** scale measures the extent to which scholars are confident in their abilities to navigate the college application process, such as financial aid, college application process, and college entry exams.



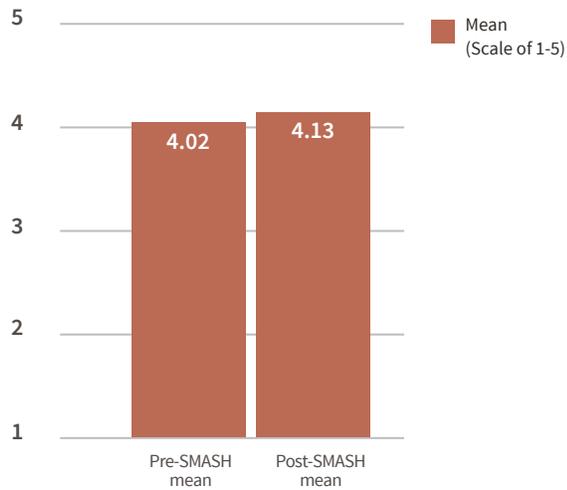
- Overall, scholars demonstrated statistically significant growth in their ability to successfully navigate college and financial aid application processes.
- 58% of scholars reported statistically significant growth in college application navigation from pre- to post-SMASH.



SMASH Summer Outcomes (Cont.)

ETHNIC IDENTITY

- The Ethnic Identity scale measures the extent to which scholars have positive associations with their ethnic group.



- On average, scholars entered SMASH with a high level of positive association with their ethnic group. This scale increased significantly over the course of SMASH.
- 23% of scholars increased the positive association with their ethnic identity from pre- to post-SMASH.

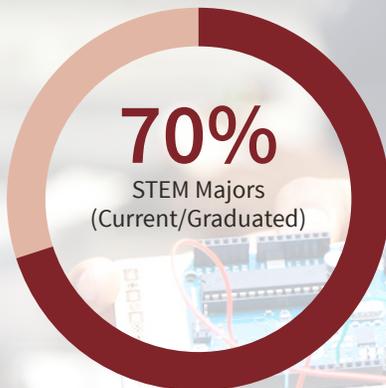
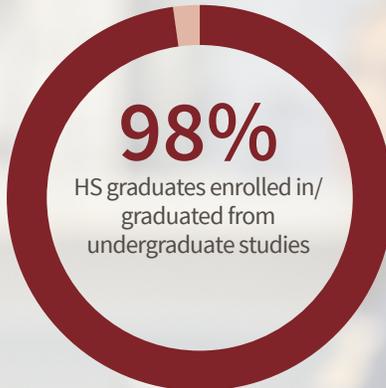
“SMASH inspires me to be the best I can be. It inspires me to give back because so many people have given to me in these five weeks. Because of SMASH, because of the teachers here and because of the other scholars and the community I have, it’s given me a level of confidence that I never would have had before.”

—HARRISON HARVEY, SMASH ALUMNUS



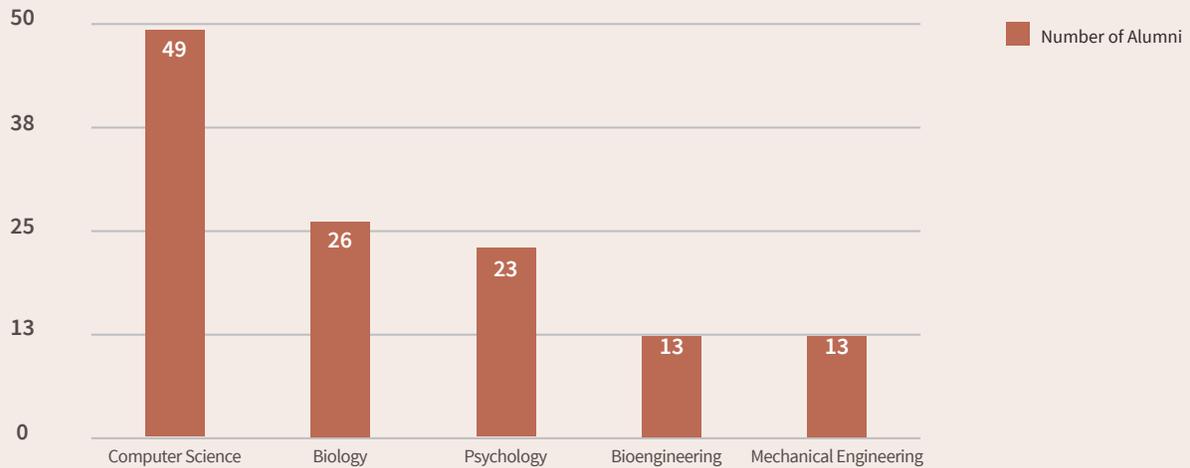
(High school graduating classes 2007-2016)

Alumni of the SMASH program have entered post-secondary education and careers, and are tracked annually via an online survey. To-date, 459 alumni have completed the SMASH program and 370 were tracked in 2016.



SMASH Alumni Outcomes (Cont.)

Top 5 STEM Majors Declared



Highest Frequency Undergraduate College Attendance



“SMASH provided me an environment of ambitious students from similar socio-economic status that not just wanted to go to college, but also wanted to go back to their communities and make a difference.”

—Precious Listana, SMASH Alumna

APPENDIX A: Survey Scales and Items

Academic Identity Scale

- Doing well in school is important to me.
- Being a successful student is an important part of who I am.

College Application Navigation Scale

- How familiar are you with how college admissions committees select applicants and the types of information they are looking for?
- How prepared are you to perform well on the college entry exams (ACT/SAT/SAT2)?
- I know how to research and apply for student loans, scholarships, and grants.
- How familiar are you with the college entry exams (ACT, SAT, SAT2)?
- I know how to apply for financial aid.
- How prepared are you to successfully complete a college application?
- How familiar are you with which courses you should take in high school if you want to major in STEM in college?
- How familiar are you with California A-G graduation requirements?
- I feel confident in my ability to obtain financial aid to help pay for college.

Computer Science Engagement Scale

- How much do you like or dislike computer science?
- I think computer science is interesting.
- I want to continue learning new computer skills.
- Do you think computer science is fun or boring?
- I am likely to pursue a career in or related to computer science.
- I am likely to major in computer science in college.

Ethnic Identity Scale

- I feel a strong attachment to my ethnicity.
- My ethnicity forms a major part of my identity.
- I am connected to my ethnic heritage.
- I value my ethnic background.

Math Engagement Scale

- I think my math skills are: ...
- Do you think math is fun or boring?
- How much do you like or dislike math?
- How important is math to you?
- How well do you think you will do in math next year?
- If you were to take a math test right now, how would you expect to do?
- Being successful in math is an important part of who I am.
- How important is it for you to have a strong math background?
- I am capable of doing well in math.
- How much do you care about doing well in math?
- In my math and science classes I feel like I belong.



APPENDIX A:

Survey Scales and Items [cont.]

Self Efficacy Scale

- I feel confident in my ability to question what I read and challenge assumptions.
- I believe that my leadership skills are...
- I feel comfortable leading planning and decision-making when working with my peers.
- I am capable of doing well in science.
- I am persuasive and assertive when working with my peers.
- I am able to examine different viewpoints and sources of evidence before reaching conclusions.
- I would rate my cultural competence or the ability to interact effectively with people from diverse backgrounds as...
- In my math and science classes, I feel like my ideas count.
- How confident are you in your ability to write a successful application essay/personal statement?

Science Engagement Scale

- How much do you like or dislike science?
- Do you think science is fun or boring?
- How much do you care about doing well in science?
- How important is science to you?
- Being successful in science is an important part of who I am.
- How important is it for you to have a strong science background?

STEM Aspirations Scale

- I plan to major in a STEM field when I enter college.
- In the future I can imagine myself working in the field of STEM.

STEM Career Exploration Scale

- I have role models in computer science who are people of color.
- I have met people with careers in STEM who have had an impact on future careers I might want to pursue.
- I have role models in computer science who are female.
- Computer science can be used to solve problems facing my community.
- I understand what computer science is.
- I know professionals who have careers in STEM.
- I know a lot about careers people can have with degrees in STEM.
- I know a lot of students like me who are interested in STEM.
- I have met people with careers in STEM who have had an impact on future careers I might want to pursue.
- I know people who have careers in computer science.
- I have role models within the fields of STEM who are people of color.
- I see examples of how computer science applies to my everyday life.
- I have role models within the fields of STEM who are female.
- I know about careers that people can have with computer science degrees.
- I have role models in computer science who are people of color.

STEM Knowledge Scale

- STEM Knowledge is calculated based on scholar assessment scores, not on survey items.

APPENDIX B : Detailed Alumni Outcomes

SMASH Alumni (HS Graduation Class 2007-2016)		% of Alumni
High School Completion Data	Graduated from HS with Diploma	100%
High School A.P. Coursework	Took A.P. STEM course during HS	88%
College Enrollment Status	Enrolled in undergraduate studies	68%
	Enrolled in graduate studies	9%
	Not enrolled in any college (completed Bachelor's degree)	21%
	Not enrolled in college (did not complete degree)	2%
Type of College/University Currently Attending (Enrolled Undergraduates Only)	4-year college/university	83%
	2-year college	12%
	Other/blank	5%
College Graduation Data	Graduated with Bachelor's degree within five years (High school graduating classes of 2007- 2011)	78% (47/60)
	% of college graduates currently attending graduate school	30%
	% of college graduates working in STEM fields	50%
Top 50 University*	% enrolled in/graduated from top 50 highest ranked university	46%
Current Declared Major (All Current Students)	STEM Major	69%
	Non-STEM Major	26%
	Undecided	5%
Current Declared Major (Freshmen Only)**	STEM Major	78%
	Non-STEM Major	15%
	Undecided	7%
Persistence in STEM***	Intended to Major in STEM while in HS	74%
	Intended to Major in STEM in HS and did in Year 1 of college	70%
	Declared STEM major as freshman and persisted beyond Year 1 in STEM (current sophomores)	79% (37/47)

*According to U.S. News and World Report university rankings.

**By comparison, only 23% of all U.S. college freshmen declare STEM majors (including high-income, non first generation college students) (U.S. Dept. of Education, Percent of Bachelor's Degrees Conferred in STEM Fields, 2009).

***Persistence rates were calculated by examining year one, year two, and year three majors for alumni who declared STEM as a freshman. By comparison, non-SMASH Latino and African-American students who enter college as STEM majors have 4-year STEM degree completion rates of just 15%, and 13%, respectively (Higher Education Research Institute, Bachelor's Degree Completion Rates among Initial STEM Majors, 2010).

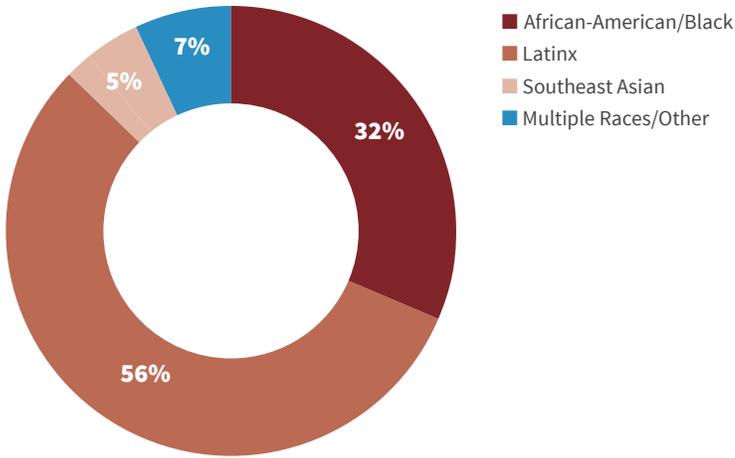
Note: Data are based on the 370 alumni who responded to the alumni survey. The above include responses for only those alumni for whom there are available data. Due to the variation in denominator by question, percentages are reported within this table.

APPENDIX C: SMASH 2016 Site Reports

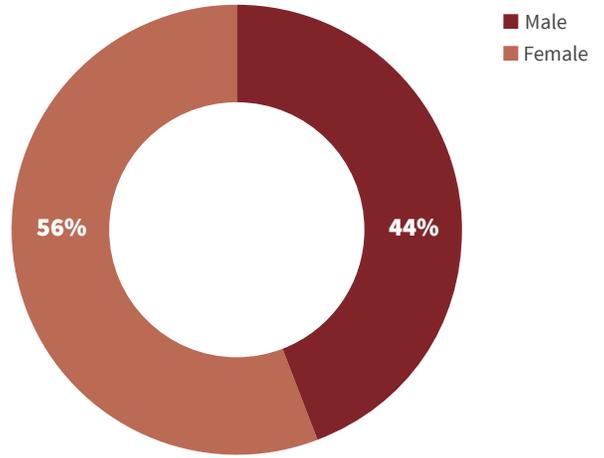
University of California, Berkeley

Demographics [N=75]

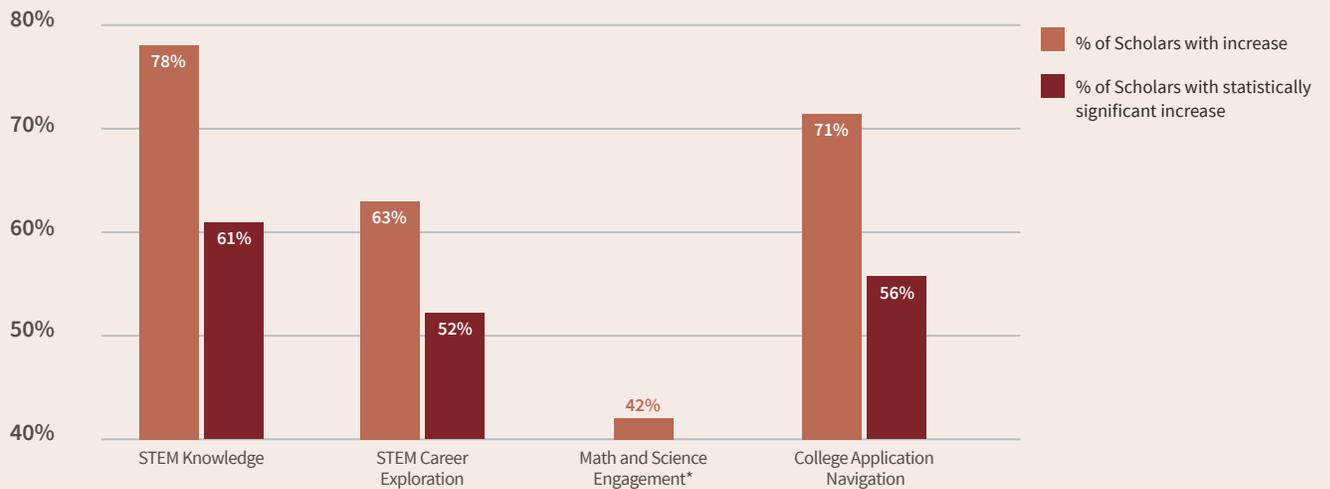
Race/Ethnicity



Gender



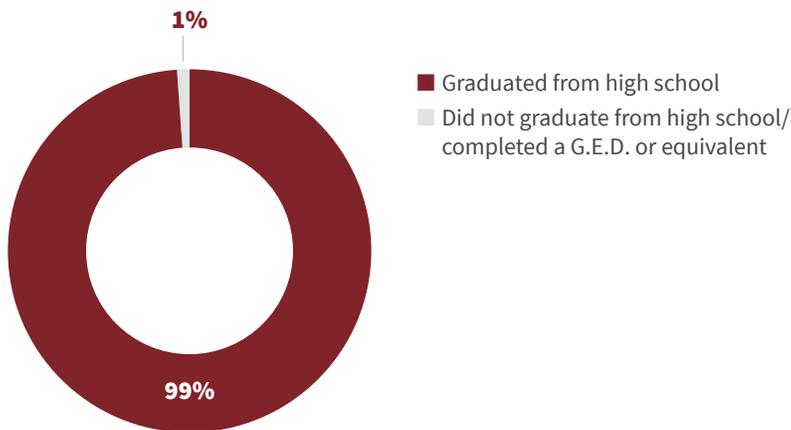
STEM College and Career Readiness (pre to post SMASH)



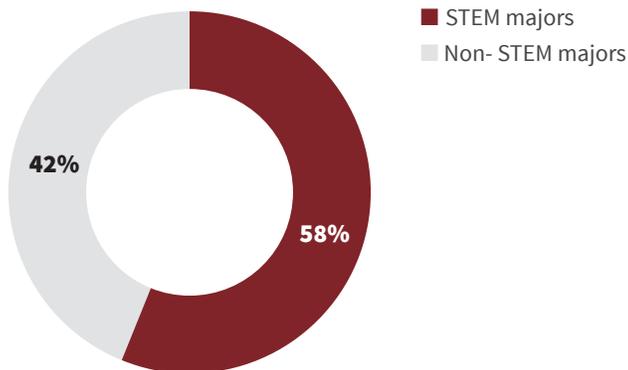
*% of scholars with statistically significant increase could not be calculated because statistical significance was not reached

University of California, Berkeley [cont.]

Alumni High School Graduation [N=151]

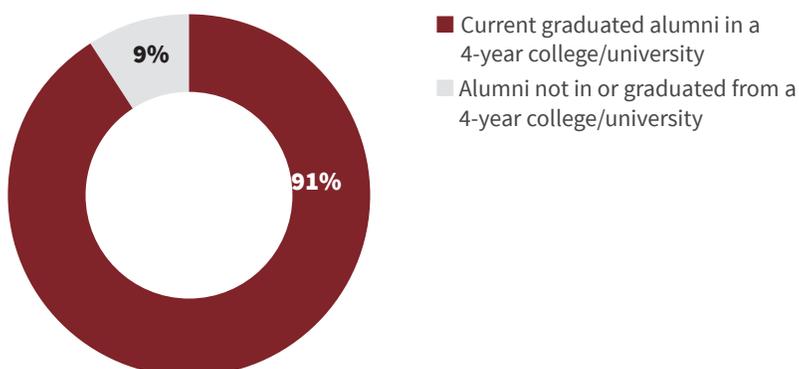


Alumni STEM Majors in a 4-year College/University [N=169]



Alumni College and University Attendance by Highest Frequency	
University of California - Berkeley	18
University of California - Davis	15
University of California - Santa Cruz	13
Stanford University	8
University of California - San Diego	7
University of Southern California	5
Santa Clara University	4
University of California - Los Angeles	4
University of California - Merced	4
University of Pennsylvania	4

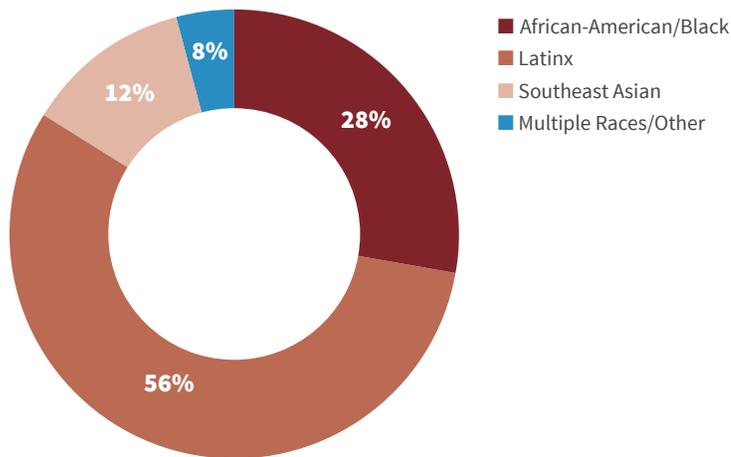
Alumni 4-year College/University Attendance [N=186]



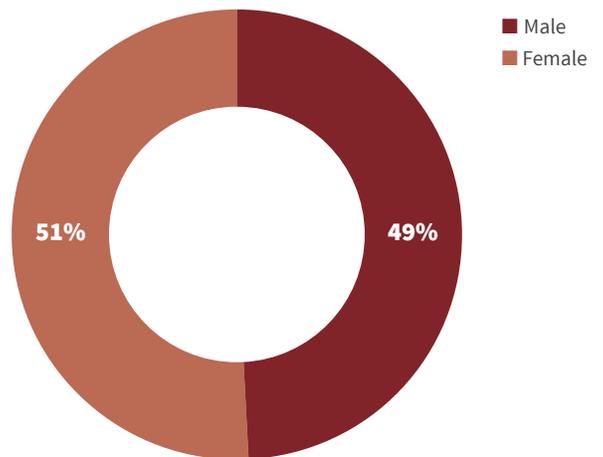
Stanford University

Demographics [N=75]

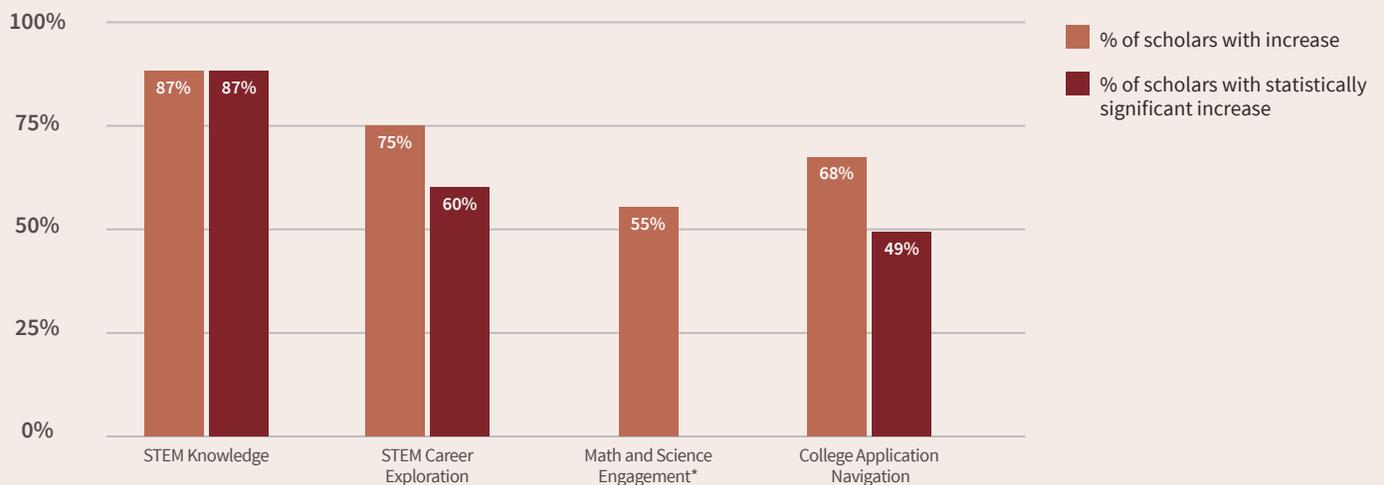
Race/Ethnicity



Gender

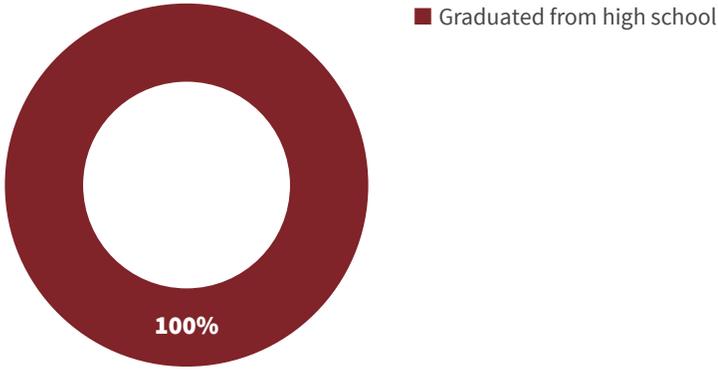


STEM College and Career Readiness

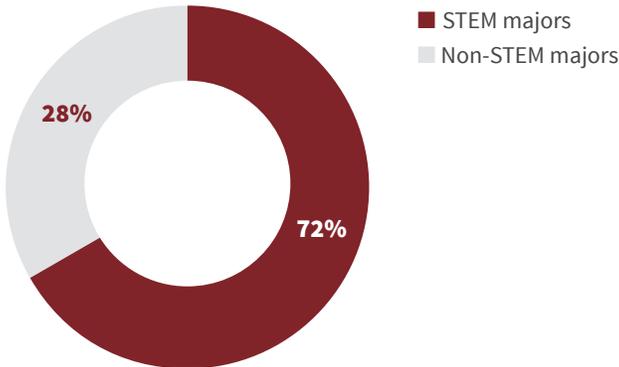


*% of scholars with statistically significant increase could not be calculated because statistical significance was not reached

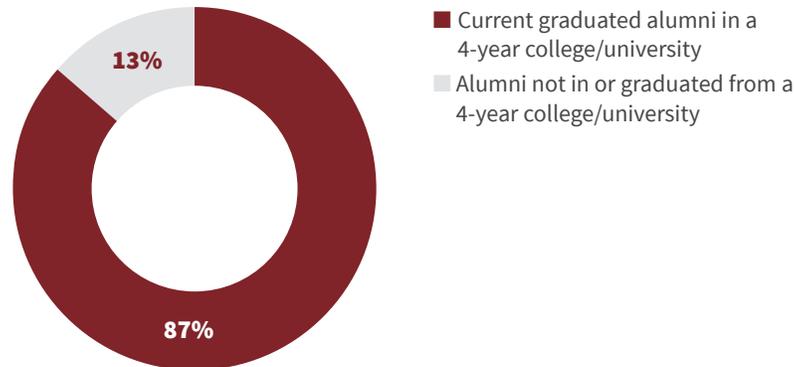
Alumni High School Graduation [N=99]



Alumni STEM Majors in a 4-year College/University [N=97]



Alumni 4-year College/University Attendance [N=112]



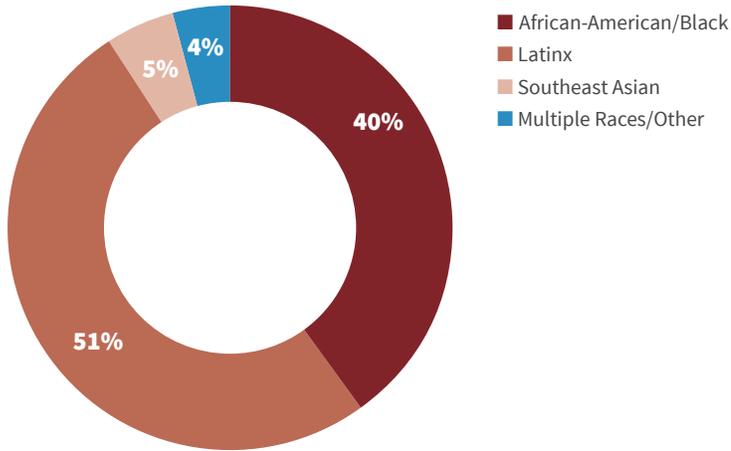
Alumni College and University Attendance by Highest Frequency	
University of California - Berkeley	16
Stanford University	8
University of California - Santa Cruz	8
Santa Clara University	5
University of California - San Diego	4
University of California - Los Angeles	3
University of California - Santa Barbara	3
Brown University	2
California Polytechnic State University - San Luis Obispo	2
Emory University	2



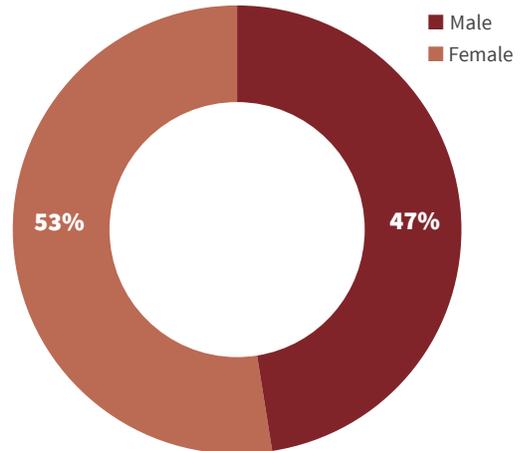
UCLA

Demographics [N=100]

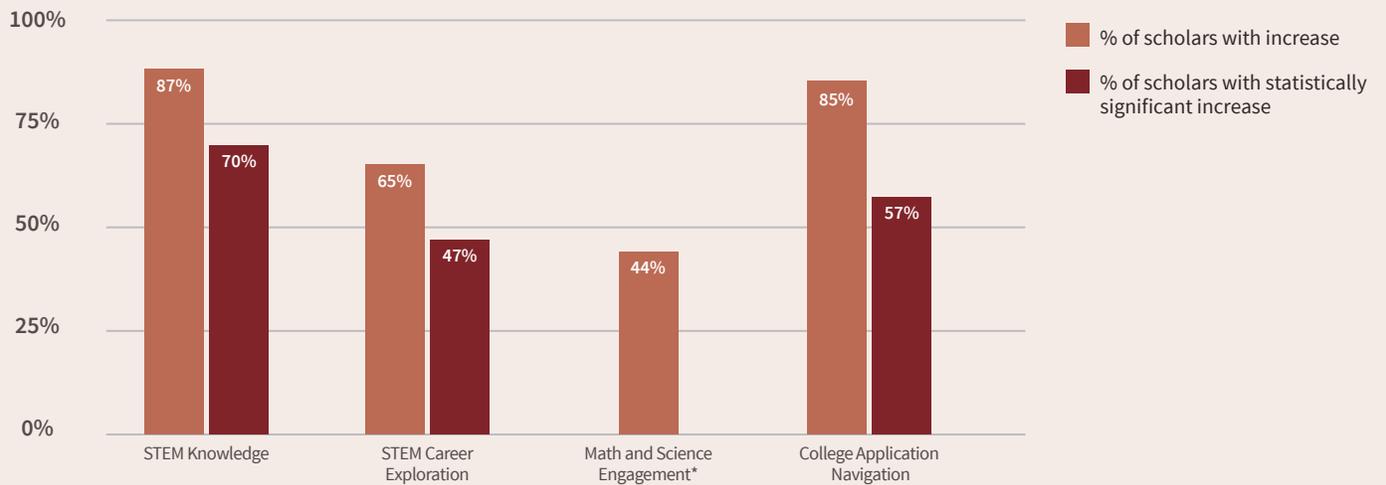
Race/Ethnicity



Gender

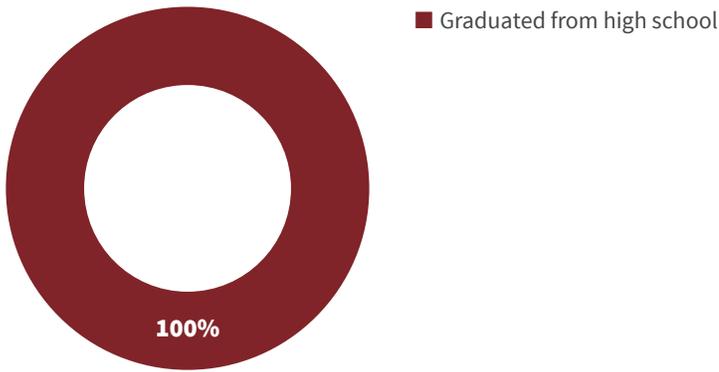


STEM College and Career Readiness

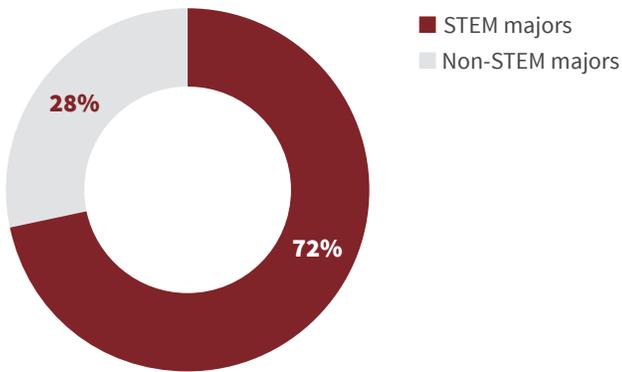


*% of scholars with statistically significant increase could not be calculated because statistical significance was not reached

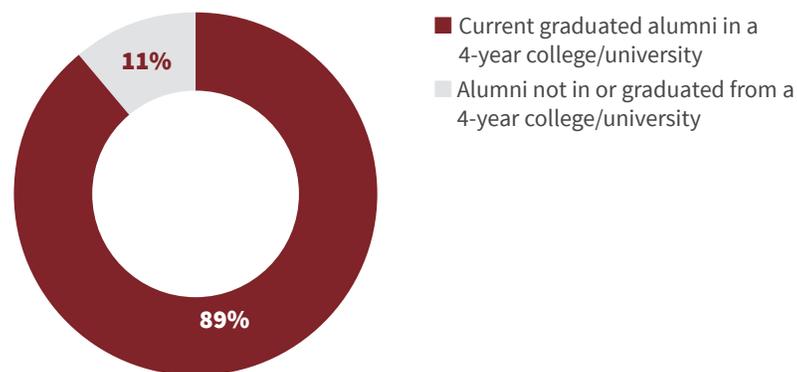
Alumni High School Graduation [N=57]



Alumni STEM Majors in a 4-year College/University [N=32]



Alumni 4-year College/University Attendance [N=36]



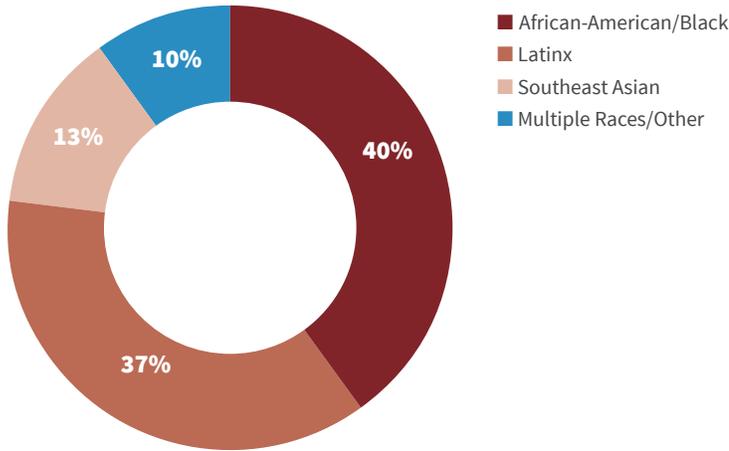
Alumni College and University Attendance by Highest Frequency	
University of Southern California	11
University of California - Irvine	6
University of California - Los Angeles	3
University of California - Long Beach	2
Harvard University	2
Massachusetts Institute of Technology	2
San Diego State University	2
University of California - Berkeley	2
University of California - San Diego	2
University of California - Santa Cruz	2



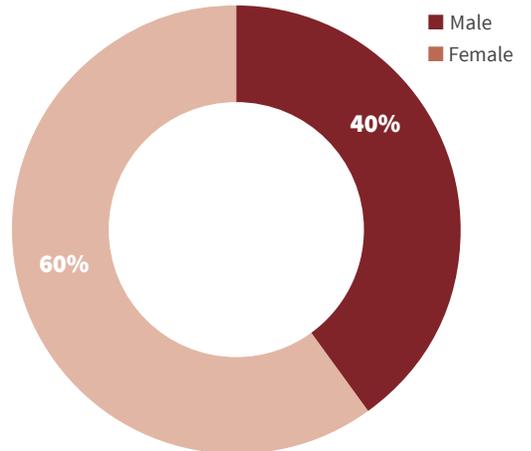
UC Davis

Demographics [N=30]

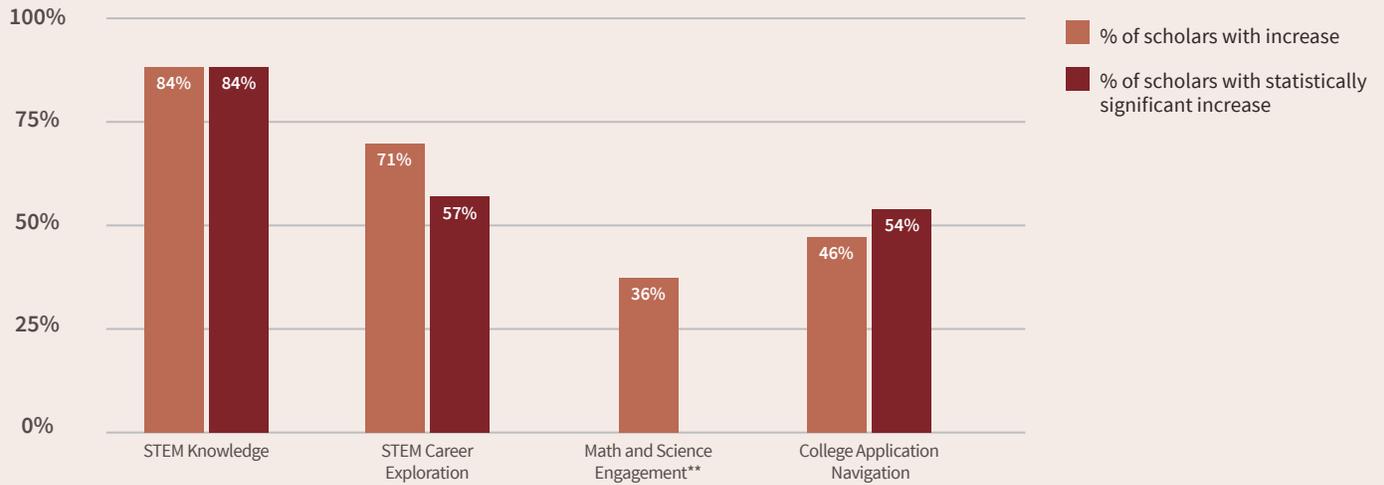
Race/Ethnicity



Gender



STEM College and Career Readiness



*Alumni information not available for UC Davis as 2016 was its first year in operation.

**% of scholars with statistically significant increase could not be calculated because statistical significance was not reached



Level Playing Field Institute

ESTABLISHED 2001