2016

2016 UCUES Report on Undergraduate Student Participation in Research and Creative Activity

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Undergraduate Student Participation in Faculty's Research and Creative Activity

This report examines participation by UCSC graduating seniors'[1] in research and creative projects under faculty guidance, as well as the value they place on research. It is based on the University of California Undergraduate Experience Survey (UCUES) conducted in spring 2016. A representative sample of 50% of the senior student population responded to the survey (see Table 1 at the end of the report).

Methodology

Student participation in research and/or creative projects was measured based on a series of survey questions about whether or not they were involved in at least one of the following during their studies at UCSC:

1. Assisted faculty in conducting research[2]
2. Assisted faculty with their creative project[3]
3. Completed a research or creative project under the guidance or supervision of a faculty member. [4]

Other sections of the report discuss course-based training in research, value of research, and students' self-rated proficiency in research or creative projects (see Appendix B for survey questions).

Student participation and opinions are analyzed by academic division, entry status, first generation, gender, and race/ethnicity. The terms "similar" or "comparable" rates of participation between groups of students mean that the statistical significance of group difference did not meet $p < 0.05$ in Chi-square analyses.

1.Participation in research and creative projects

Over a third (37%) of graduating seniors reported having assisted in faculty's research and/or creative projects during their studies at UCSC. Moreover, 45% of students reported having completed a research and/or creative project under faculty's guidance (referred as "student-led" thereafter).

Overall, 56% of graduating seniors assisted in faculty-led research and/or creative projects and/or conducted student-led research or creative project under faculty guidance.

Compared to the other eight UC campuses with undergraduate students, the proportion of UCSC graduating seniors who assisted faculty in research was significantly lower in 2016 (32% at UCSC and 36% at other UCs, $p<0.05$). At the same time, UCSC had a significantly higher proportion of graduating seniors who assisted faculty with their creative projects (15%) compared to other UCs (13%) ($p<0.05$). UCSC also reported a significantly higher proportion of students who completed a research and/or creative project under faculty's guidance (45% at UCSC vs. 42% at other UCs, $p<0.05$). Subsequently, the overall rates of participation in research/creative work with faculty were significantly higher among UCSC seniors (56%) compared to the other UCs (53%) ($p<0.05$).

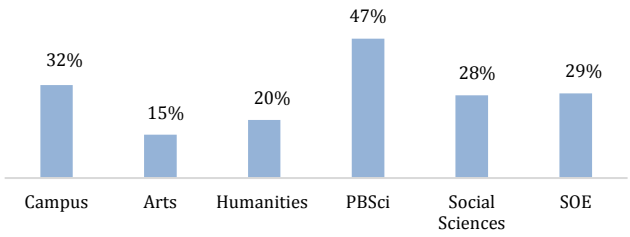
By Division

About one in two graduating seniors in the PBSci Division reported having assisted faculty in research

[1] "Graduating seniors" were survey respondents who answered "probably yes" to the UCUES question: "Will you complete a bachelor's degree this spring or summer?"
[2] This question included research for course credit, pay, or on a volunteer basis in both 2014 and 2016 surveys but the wording was slightly changed in 2016.
[3] This question included creative projects completed for course credit, pay, or on a volunteer basis in both 2014 and 2016 but the wording was significantly changed in 2016.
[4] This question was added to the 2014 UCUES at UCSC to include information about students whose projects have not been part of the faculty's research program.

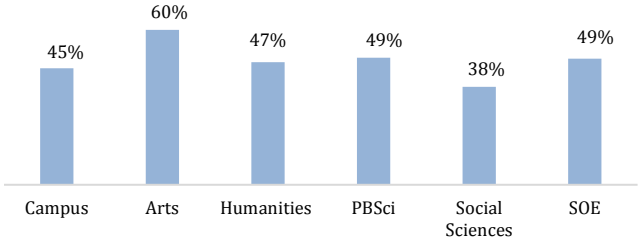
(see Figure 1a). PBSci students' participation in faculty research was significantly higher than in the other four divisions.

Figure 1a: Graduating seniors who assisted faculty in research, 2016



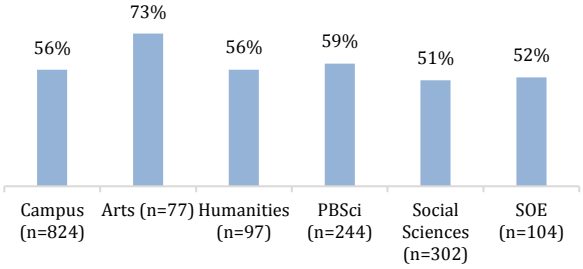
Graduating seniors also reported about whether they conducted research/creative projects under faculty guidance. Figure 1b shows that the rates of conducting research/creative project under supervision of faculty were significantly lower among graduating seniors in the Social Sciences (38%) compared to the Arts Division (60%) and PBSci (49%) ($p<.0.05$). Of note, rates of participation of SOE and Humanities students were not statistically different from other divisions. Also, across all five divisions rates of student-led research/creative work in 2016 were similar to those reported in 2014.

Figure 1b: Graduating seniors who completed student-led research/creative project under the guidance/supervision of faculty, 2016



The overall measure of student participation in research/creative projects shows that across all divisions, more than one in two (56%) graduating seniors engaged in research and/or creative projects with faculty involvement (see Figure 1c). Due to the relatively high rate of student-led research/creative projects in the Arts division, their overall rates (73%) were also significantly higher compared to the other four Divisions (between 51% and 59%).

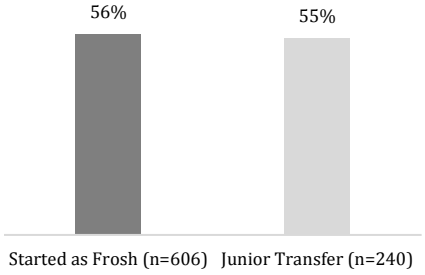
Figure 1c. Graduating seniors who assisted in conducting faculty-led research and/or creative projects and/or conducted student-led research or creative projects under faculty guidance by Division, 2016



By Entry Status

Rates of participation in research or creative projects, both faculty- and student-led, were similar among students who started at UCSC as freshmen and who were junior transfers (based on the overall measure, see Figure 2).

Figure 2. Graduating seniors who assisted in conducting faculty-led research and/or creative projects and/or conducted student-led research or creative projects under faculty guidance by entry status, 2016



Comparable rates of assisting faculty in research were reported by both students who started at UCSC as freshmen and who were junior transfers (31% and 33% respectively).

At other UC campuses, transfer students reported having assisted faculty in research at significantly lower rates than students who started as freshmen (29% of transfers and 39% of students who started as freshmen).

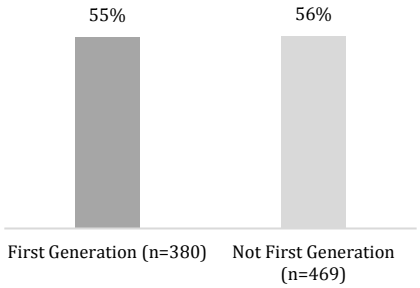
In other words, the proportion of transfer students at UCSC who assisted faculty in research was significantly higher than at other UCs (33% at UCSC and 29% at other UCs). But UCSC seniors who started as freshmen reported significantly lower rates of assisting faculty in research (31% at UCSC and 39% at other UCs).

In each academic division seniors who started at UCSC as frosh and as junior transfers reported similar rates of overall participation in faculty- and student-led research/creative projects.

By First Generation Status

The overall measure of student participation in research/creative projects shows similar rates for first generation students (whose parents did not complete a 4-year degree) and their non-first generation peers.

Figure 3. Graduating seniors who assisted in conducting faculty-led research and/or creative projects and/or conducted student-led research or creative projects under faculty guidance by first generation status, 2016



Comparable rates of assisting faculty in research were reported by first generation students and their non-first generation peers at UCSC (30% and 33% respectively).

At other UC campuses, first generation students reported having assisted faculty in research at significantly lower rates than their non-first generation peers (31% and 40% respectively).

UCSC first generation graduating seniors were similarly likely to assist faculty in their research project as their first generation peers at other UCs.

Moreover, at UCSC first generation seniors assisted faculty with their creative projects at significantly higher rates compared to their first generation peers at other UCs (16% at UCSC vs. 14% at other UCs, $p<0.05$).

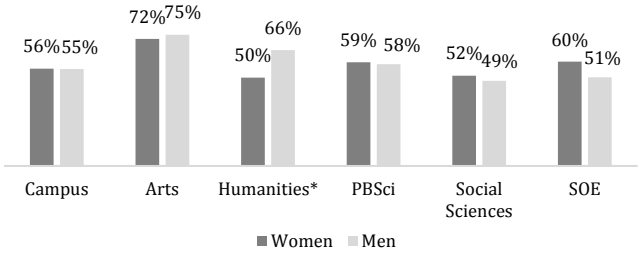
In each academic division, first generation students and their peers reported comparable rates of experience in research or creative projects (faculty- or student-led).

By Gender

No gender differences were found in UCSC students' participation in research or creative projects, both faculty- or student-led. Similarly, both women and men assisted faculty in research at comparable rates.

In each academic division women and men reported comparable rates of participation in research or creative projects, both faculty- and student-led, except in the Humanities Division (based on test of statistical significance, see Figure 4).

Figure 4. Graduating seniors who assisted in conducting faculty-led research and/or creative projects and/or conducted student-led research or creative projects under faculty guidance by Division and gender, 2016



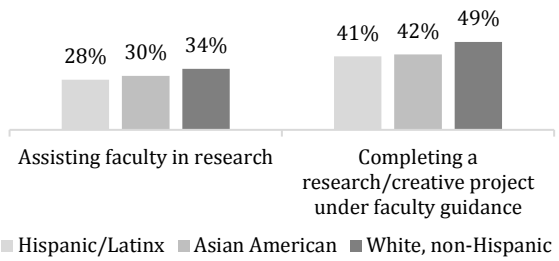
By Race/ethnicity

We found no significant differences in student participation in faculty research based on students' race/ethnicity. Specifically, we similar rates of participation among Asian American, underrepresented minorities (URM), and White, non-Hispanic students.[5] Also, Hispanic/Latinx students reported comparable rates of participation in faculty research to their Asian American, or White, non-Hispanic peers at UCSC.[6]

At other UCs, URM students as a group reported significantly lower rates of assisting faculty in research compared to both Asian American and White, non-Hispanic peers (30% vs 38% respectively, $p<0.05$). Hispanic/Latinx students (30%) reported significantly lower rates compared to Asian American and White, non-Hispanic students (both 38%, $p<0.001$).

We found that at UCSC the rates of conducting research/creative projects under supervision of faculty were significantly lower among URM students (42%) compared to White, non-Hispanic students (49%), and similar to Asian American students (see Figure 5). Also, Hispanic/Latinx students at UCSC were significantly less likely to have participated in a research/creative project under faculty supervision compared to their White, non-Hispanic peers (41% vs 49%, $p<0.05$).

Figure 5: Graduating seniors who assisted faculty in research, or completed a research/creative project under faculty guidance by race/ethnicity, 2016



At the other UCs, URM students (37%) and Asian American students (41%) reported significantly lower rates of completing a research/creative project under faculty's guidance compared to White, non-Hispanic peers (45%, $p<0.001$). Hispanic/Latinx (38%) and Asian American students (40%) at other UCs reported significantly lower rates of completing a research/creative project under faculty's guidance compare to White, non-Hispanic students (45%, $p<0.001$).

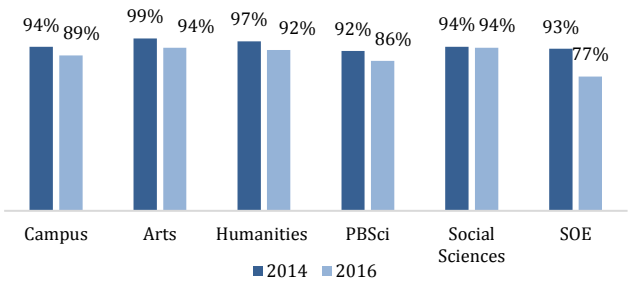
2. Course-Based Training

Most (89%) graduating seniors reported having completed a research project, research paper, or a creative project as part of coursework (see Figure 6a). With the exception of the Social Sciences, all other divisions experienced a decrease in the proportion of graduating seniors reporting completion of a research project, research paper, or creative project as a part of their coursework in 2016 compared to 2014. In SOE, this proportion decreased by 16%.

[5] The URM group included African American/Black, American Indian/Alaska Native, Hispanic/Latinx, and Native Hawaiian/Other Pacific Islander students.

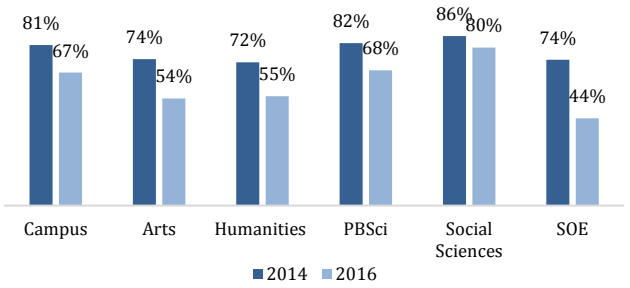
[6] Due to a relatively small number of students, we could not conduct statistical comparison analysis for each of the following groups: African American/Black, American Indian/Alaska Native, and Native Hawaiian/Other Pacific Islander students.

Figure 6a: Graduating seniors who completed a research project, research paper, or creative projects as part of coursework by Divison



In 2016, two-thirds of students (67%) took at least one course in which they learned research methods (Figure 6b). Compared to 2014, a decrease in the proportion of graduating seniors who took a research methods course was seen in each division, the largest drop was in SOE from 74% to 44%. The Social Sciences continued to remain the highest proportion - 80% of students who took a research methods course.

Figure 6b: Graduating seniors who completed a research methods course by Division



3. Value of research

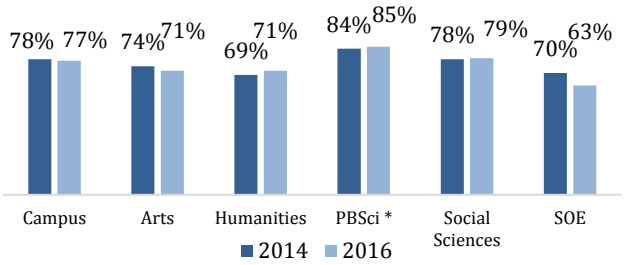
Most students value the importance of being an undergraduate student at a research university such as UCSC based on both 2016 and 2014 surveys.

The majority of graduating seniors (83%) across the academic divisions agreed[7] that "attending a university with world-class researchers" was important to them in 2016.

[7] "Agree" includes those who selected "strongly agree," "agree" and "somewhat agree" on a 6-point scale from strongly agree to strongly disagree.

Learning research methods was important or essential to the majority of UCSC students (77% in 2016).[8] (Figure 7a).

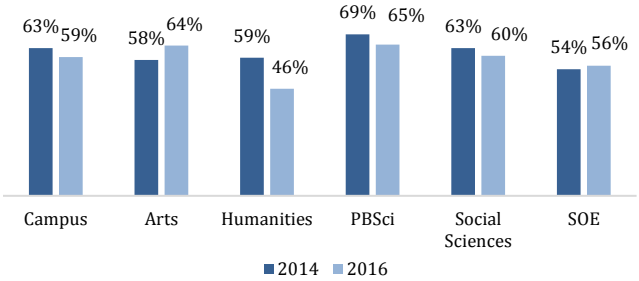
Figure 7a. Graduating seniors who value learning research methods



PBSci students reported statistically higher levels of importance of learning research methods compared to students in the other divisions in both 2014 and 2016 ($p<0.05$).

Over half (59%) said that it was important to take courses from faculty who incorporate their current research into the lectures and discussions (Figure 7b).

Figure 7b. Graduating seniors who value having courses w/ faculty who refer to their own reserach as part of the course



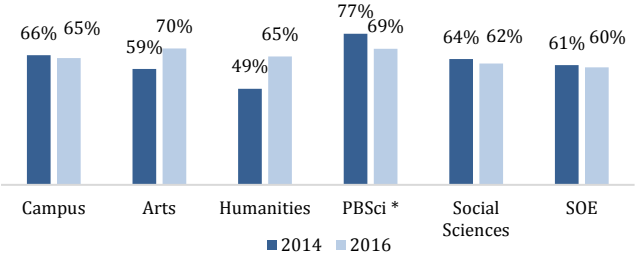
Of note, importance of having courses with faculty who talk about their research has declined on the campus-level since 2014 and especially in the Humanities.

[8] "Important" includes those who selected essential, very important, and important on a 6-point scale from essential to not important.

Furthermore, 70% of graduating seniors were satisfied with the opportunities for research experience or to produce creative products at UCSC. No significant differences in student satisfaction with research opportunities were found among the academic divisions.

Two thirds of graduating seniors at UCSC valued their participation in faculty research (Figure 7c). They were significantly more likely to rate it as "essential" compared to their UC peers.

Figure 7c. Graduating seniors who value assisting faculty in their research, for pay or as a volunteer by Division

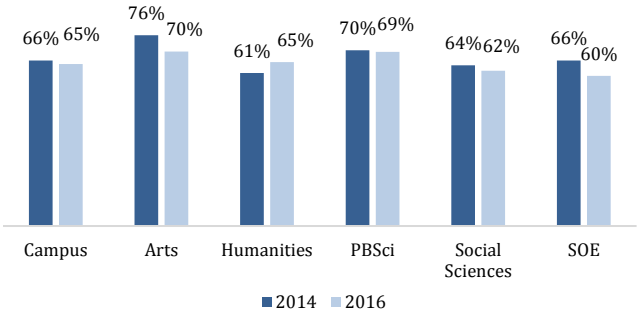


*Statistically significant at p<.05

There were some changes in how students rated the importance of participating in faculty research in 2016 compared to 2014 in some divisions. The importance of assisting faculty members in their research was significantly higher in the PBSci Division than in any other division in 2014 (77%). It decreased to 69% in 2016 while more students in the Arts and Humanities evaluated their participation as important or essential to them.

Across the academic divisions, about two-thirds (65%) of UCSC students said that it was important to them to pursue their own research (see Figure 7d). UCSC graduating students were statistically more likely to place a higher value of importance on pursuing their research compared to other UC peers (65% compared to 58%, p<.001).

Figure 7d. Graduating seniors who value pursuing their own research by Division



4. Self-rated ability to participate in research or creative projects specific to student's field of study (major)

Students rated their current ability to participate in research or creative projects in their field of study as well as their ability when they started at UCSC.

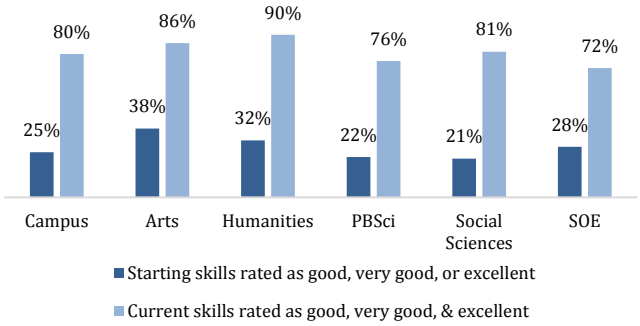
The majority (80%) of graduating seniors reported having a good, very good, or excellent current ability to participate in research or creative projects in their field of study.

The majority of graduating seniors (79%) reported having made gains during their studies at UCSC in their ability to participate in research or creative projects in their major.

By Academic Division

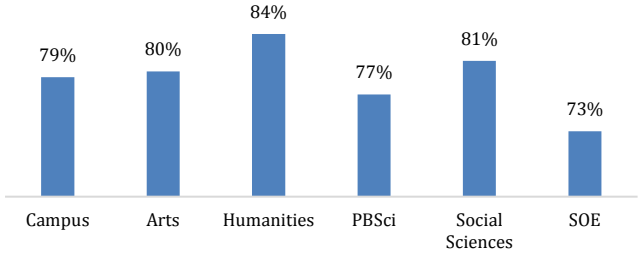
The highest proportion of students who reported graduating with a good, very good, or excellent ability to participate in research or creative projects specific to their major was in the Humanities Division (90%) and the Arts (86%) (Figure 8a).

Figure 8a. Graduating seniors' ability to participate in research or creative projects specific to their major by Division



Across the divisions, similarly high proportions of students have reported *gains* in their abilities to participate in research or creative projects in their major (Figure 8b).

Figure 8b. Graduating seniors who have improved their ability to participate in research/creative projects specific to their major during their studies at UCSC by Division



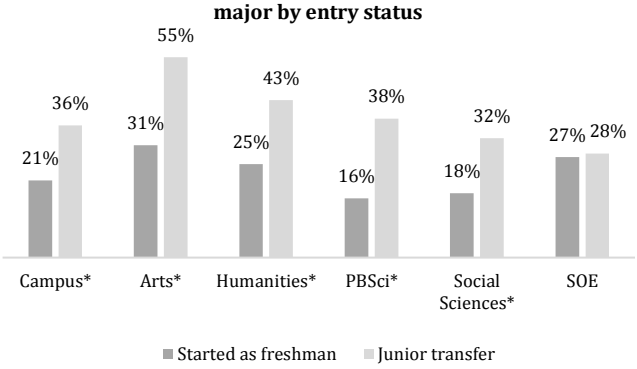
By Entry Status

Campus-wide, both junior transfers and students who started as freshmen reported comparable ***final*** abilities to participate in research or creative projects specific to their major.

As expected, graduating seniors who started as transfer students at UCSC reported significantly higher ***starting*** abilities to engage in research or creative projects specific to their major compared to seniors who evaluated their starting skills as freshmen (36% vs 21%, see Figure 9).

In the School of Engineering, transfer students as a group evaluated their ***starting*** abilities the same as their non-transfer peers. Moreover, transfer SOE students reported significantly lower ***final*** levels than their peers (59% of transfer students and 77% of their peers who started as freshmen evaluated their final skills as good, very good, or excellent).

Figure 9. Graduating seniors with good, very good or excellent starting abilities to participate in research or creative projects specific to their major by entry status



*Statistically significant at p<.05

Overall, graduating seniors who started as freshmen were similarly likely to improve their research skills by at least one level compared to those who started as transfer students.

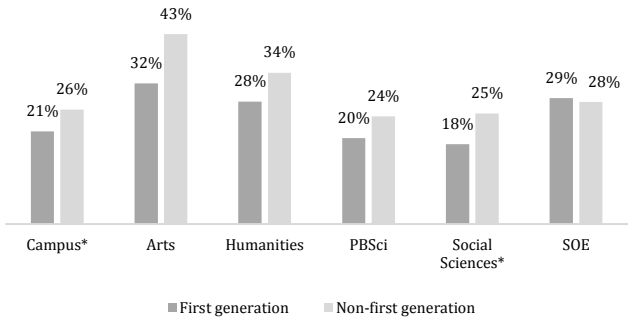
By First Generation Status

Statistically significant differences were seen between first generation and non-first generation seniors when comparing starting skills (see Figure 10a). Seniors who were first generation students reported lower ***starting*** abilities to participate in research or creative projects specific to their field of study compared to their peers (21% compared to 26% reported good, very good, or excellent skills, $p<0.05$).

Specifically, in the Social Sciences, first generation seniors were more likely to rate their ***starting*** ability lower than their peers (18% compared to 25%, reported good, very good, or excellent skills, $p<0.05$). During their studies at UCSC, the majority experienced

improvement, resulting in comparable proportions of first generation students and their peers reporting ***final*** levels to be good, very good, or excellent.

Figure 10a. Graduating seniors with good, very good or excellent starting abilities to participate in research or creative projects specific to their major by Division and first generation status

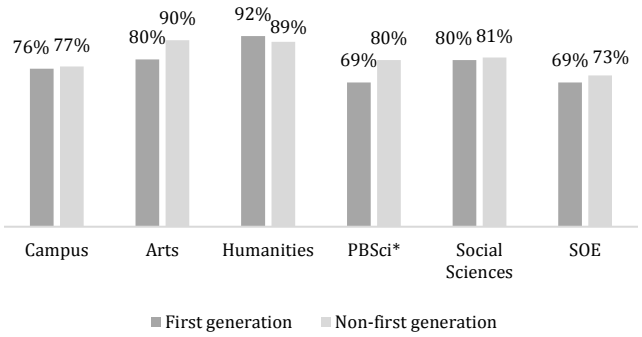


*Statistically significant at p<.05

First generation students reported comparable ***final*** abilities to participate in research or creative projects specific to their major to their non-first generation students, with the exception of PBSci seniors (see Figure 10b).

First generation PBSci seniors were less likely to rate their ***final*** ability to participate in research or creative projects specific to their major as good, very good, or excellent, compared to their non-first generation peers (69% and 80% respectively, p<0.05). There was no difference in their ratings of starting abilities.

Figure 10b. Graduating seniors with good, very good or excellent final abilities to participate in research or creative projects specific to their major by Division and first generation status

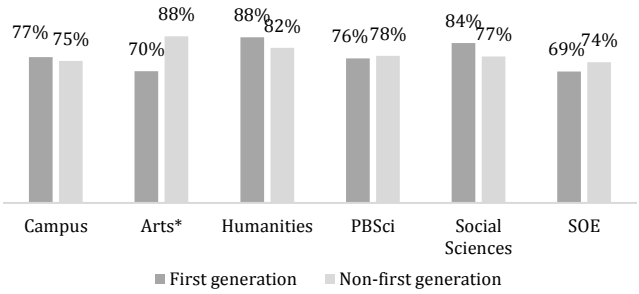


*Statistically significant at p<.05

Overall, first generation students and their peers reported comparable rates of ***improvement*** in their research skills during their time at UCSC, with the exception of Arts seniors.

In the Arts division, 70% of first generation seniors and 88% of their non-first generation peers reported improvement by at least one level (p<0.05, see Figure 10c).

Figure 10c. Graduating seniors who reported improvement in ability to participate in research or creative projects specific to their major by Division and first generation status



*Statistically significant at p<.05

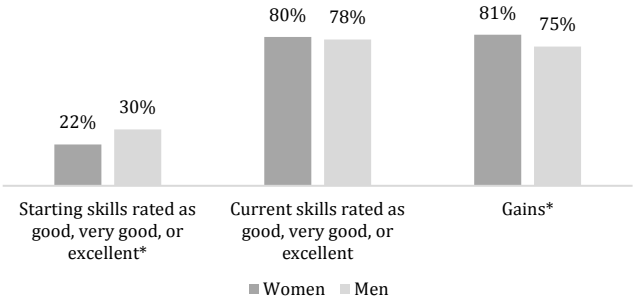
By Gender

No gender differences were found in seniors' ratings of their ***final*** abilities to participate in research or creative projects specific to their major at UCSC (see Figure 11a).

Within every division, men and women reported comparable ***final*** abilities to participate in research or creative projects specific to their major. Even though in the Social Sciences, women as a group evaluated their starting levels significantly lower than men (18% v 29% rated their skills good, very good, or excellent skills, p<0.05, see Figure 11b), they rated their final skills similarly to men.

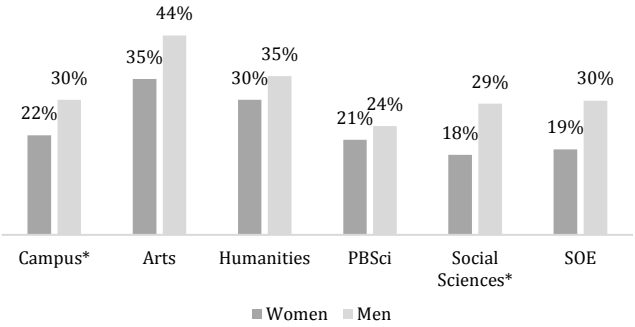
Within every division, the majority of men and women improved their abilities to participate in research during their time at UCSC.

Figure 11a. Graduating seniors' ability to participate in research or creative projects specific to their major by gender



*Statistically significant at p<.05

Figure 11b. Graduating seniors with good, very good or excellent starting abilities to participate in research or creative projects specific to their major by Division and gender



*Statistically significant at p<.05

By Race/Ethnicity

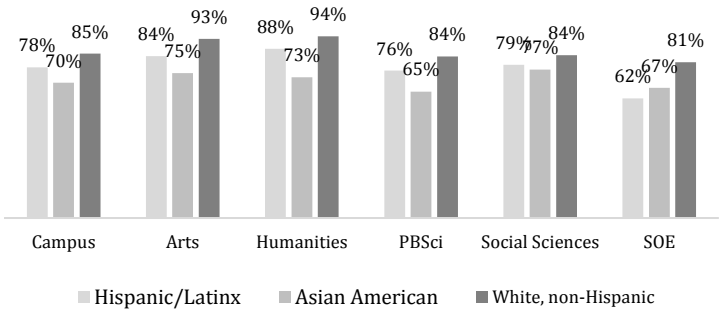
We found no significant differences in seniors' ratings of their ***starting*** abilities to participate in research or creative projects specific to their major at UCSC based on students' race/ethnicity. Specifically, we found similar rates among Asian American, underrepresented minorities (URM), and White, non-Hispanic students. Also, Hispanic/Latinx students reported comparable ***starting*** abilities to participate in research or creative projects specific to their major to their Asian American, or White, non-Hispanic peers at UCSC.

On average, graduating seniors reported comparable rates of ***improvement*** in their research skills regardless of their race/ethnicity in each Division, with the exception of PBSci seniors.

Specifically, in PBSci we found rates of ***improvement*** significantly higher among Hispanic/Latinx students (81%) and White, non-Hispanic students (84%), compared to Asian American students (63%). Cultural group differences in how people evaluate themselves in terms of natural ability versus effort. This may partially explain why we see lower proportions of Asian American students rating their ***final*** skills as good, very good, or excellent. Nevertheless, lower self-ratings of Asian American students are particularly evident in PBSci, Arts, Humanities and SOE (Asian American and Hispanic/Latinx students). See Figure 12.

Please note that even though we found differences between students of color and White, non-Hispanic students' assessment of their research skills, there were no differences in student participation in faculty research in any Division.

Figure 12. Graduating seniors with good, very good, or excellent final abilities to participate in research or creative projects specific to their major by Division and race/ethnicity



Appendix A

Table 1. Graduating Senior Respondents' Characteristics[9]

		Graduating Seniors who responded to UCUES		All UCSC Seniors, including respondents and non-respondents	
		Count	%	Count	%
Academic Division	Arts	109	7%	411	8%
	Humanities	183	11%	554	10%
	Physical and Biological Sciences (PBSci)	434	28%	1441	27%
	Social Sciences	624	40%	2096	39%
	School of Engineering (SOE)	210	14%	821	15%
Transfer status	Started as frosh	1156	72%	4015	74%
	Junior transfer	453	28%	1388	26%
First Generation Status	First generation	728	55%	3060	57%
	Non-first generation	887	45%	2343	43%
Gender	Women	921	57%	2727	50%
	Men	682	42%	2650	49%
	Unknown	7	0.4%	26	0.5%
Race/Ethnicity	African-American/Black	47	3%	187	3%
	American Indian/Alaska Native	20	1%	66	1%
	Asian American	412	26%	1418	26%
	Hispanic/Latinx	495	31%	1657	31%
	Native Hawaiian/Other Pacific Islander	5	0.3%	20	0.4%
	White, non-Hispanic	612	38%	1965	36%
	Unknown	24	2%	90	2%

[9] Information on academic division (one's major), transfer status, first generation status, gender, and senior status is based on institutional data as of spring 2016.

Appendix B: 2016 UCUES survey questions used for Undergraduate Research Report

Section 1: Participation in research and creative projects		
UCUES Question	**Response Options**	**Categories Used in Analysis**
Are you currently doing or have you assisted faculty in conducting research at UCSC?	1. Yes, doing now or have done 2. No	
Are you currently doing or have you assisted faculty with their creative project?		
Combined two above: "Assisted in faculty-led research and/or creative projects"		
Are you currently doing or have you conducted research or creative project under the guidance or supervision of a faculty member?		
Combined two above: "Assisted in faculty-led research and/or creative projects and/or conducted student-led research or creative project under faculty guidance"		
Section 2: Course-based training		
UCUES Question	**Response Options**	**Categories Used in Analysis**
Are you currently doing or have you completed a research project or research paper as part of your coursework?	1. Yes, doing now or have done 2. No	
Are you currently doing or have you completed a creative project as part of your coursework (e.g., musical or theatrical performance, marketing campaign, curating an art exhibit)?		
Combined two above: "Completed a research project, research paper, or a creative project as part of coursework"		
Are you currently taking or have you taken at least one research methods course?		
Section 3: Value of Research		
UCUES Question	**Response Options**	**Categories Used in Analysis**
Do you agree or disagree that attending a university with world-class researchers is important to you?	1. Strongly disagree 2. Disagree 3. Disagree somewhat 4. Agree somewhat 5. Agree 6. Strongly agree	1. Strongly disagree/ disagree/disagree somewhat 2. Agree somewhat/ agree/strongly agree
How important is it for you to learn research methods as part of your undergraduate experience at UCSC?	1. Not important 2. Not very important 3. Somewhat important 4. Important 5. Very important 6. Essential	1. Not important /not very important/ somewhat important 2. Important/very important/ essential
How important is it to you to have courses with faculty members who refer to their own research as part of the class?		
How important is it to you to assist faculty members in their research, for pay or as a volunteer?		

How satisfied are you with the opportunities for research experience or to produce creative products at UCSC?	1. Very dissatisfied 2. Dissatisfied 3. Somewhat dissatisfied 4. Somewhat satisfied 5. Satisfied 6. Very satisfied	1. Very dissatisfied/ dissatisfied/somewhat dissatisfied 2. Somewhat satisfied/ satisfied/very satisfied
How important is it to you to be able to pursue your own research during your studies at UCSC?	1. Not important 2. Not very important 3. Somewhat important 4. Important 5. Very important 6. Essential	1. Not important /not very important/ somewhat important 2. Important/very important/ essential
Section 4: Self-rated ability to participate in research/creative projects specific to one's field of study		
UCUES Question	**Response Options**	**Categories Used in Analysis**
Starting ability: Rate your level of ability to engage in research or work on creative projects specific to your field of study when you *started* at this campus.	1. Very poor 2. Poor 3. Fair 4. Good 5. Very good 6. Excellent	1. Very poor/poor/fair 2. Good/very good/ excellent
Final ability: Rate your *current* level of ability to engage in research or work on creative projects specific to your field of study.		
Using two above to measure *improvement* in students' ability during their time at UCSC: final ability minus starting ability.		1. Improved 2. Stayed the same 3. Decreased