



Working With A Scientist Program (WWASP):
A Summative Evaluation of Cohort 3

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Table of Contents

EXECUTIVE SUMMARY	3
BACKGROUND	3
METHODS.....	5
RESULTS.....	5
Academic Results Cohort 3	5
Discussion Group Survey	6
Undergraduate Research Student Self-Assessment (URSSA)	28
DISCUSSION	41
Appendix A	42
Appendix B	39

EXECUTIVE SUMMARY

This report comprises the third part of a 4-year evaluation assessing the impact of the Working with a Scientist Program (WWASP) at the University of Texas at El Paso (UTEP) had on its student-participants. This report includes an assessment of the program's impact on the third cohort of student-participants. To assess the students' overall performance, several measures were used. First, a review of participant's academic performance before and after their involvement in the program was conducted. Second, the impacts that the programs' cogenerative dialogues (cogens) had in the third cohort of students' perceptions of their 'self', 'others' and the 'group' as a whole during discussion (cogens) was assessed using the results of the Group Discussion Survey. Lastly, data from the Undergraduate Research Student Self-Assessment (URSSA), which measures perceptions of gains related to science, were analyzed. A summary of results is included below.

Evaluation of the results show that:

Academic Progress

- WWASP student-participants have maintained their good standing grade point average.
- Student-participants all seem to be on track to graduate on time, with one student having already graduated.

Group Discussion (Cogens) Survey

- Students reported higher perceptions of 'self,' 'others,' and the 'group' in post-surveys; however, few of the items showed a statistically significant increase
- Perceptions of 'self' were higher at post-survey measurement with 14 out of 15 items showing an increase in post- measurement. Two items showed statistically significant gains.
 - *'I try to get others to contribute to what is being discussed.'* $t(22)=-3.95$, $p.01$
 - *'When I talk, I build on what others have to say.'* $t(22)= -2.577$, $p<.05$
- Perceptions of 'self' were also analyzed by Lab
 - Labs 1, 2, and 3 showed a general trend of gains from pre- to post-surveys
 - Lab 1 had a significant increase in 1 item
 - *'I try to get others to contribute to what is being discussed.'* $t(7)= -5.0$, $p<.01$
 - Lab 4 showed decreases in perceptions of 'self' for almost every item, though no differences were statistically significant.
- Perceptions of "others" yielded mixed results, about gains
 - Eight items showed gains, but only one difference was statistically significant
 - *'Others in my group have a sense of solidarity'* $t(22)= -3.13$, $p<.01$
 - Five items showed decreases, but no differences were statistically significant
 - Two items were not analyzable due to small sample size
- Analysis of perceptions of "others" by lab was also conducted, and results were similar to those of perceptions of 'self.'

- Labs 1, 2, and 3 showed general gains, though few significant changes
 - Lab 1 had a significant increase in scores on one item: *'Others set aside their perspective when they listen to me.'* $t(7)=-2.65, p<.05$
- Lab 4 once more showed decreases in most items
 - There was a statistically significant decrease in one item: *'Others in the group maintain focus during dialogue.'* $t(4)=3.21, p<.05$
- Perceptions of the 'group' were mixed
 - Five items showed gains
 - One item increase was statistically significant: *'Dialogue on the group is predictable.'* $t(22)=-2.73, p<.05$
 - There were decreases from pre- to post-survey in 4 items
 - One item could not be analyzed due to sample size
- Perceptions of 'group' by lab were similar to earlier breakdowns
 - Labs 1, 2, and 3 showed a general trend toward gains, with no differences reflecting statistical significance
 - Lab 4 results showed decreases in nearly all items.
 - There was a statistically significant decrease in scores for 1 item: *'Dialogue in the group is timely.'* $t(4)=4.0, p<.05$

Undergraduate Research Student Self-Assessment (URSSA)

- The main reasons for participation in the WWASP indicated by students were to *'Have a good intellectual challenge'* (72.2%), *'Gain hands on research experience'* (63.9%), and *'Participate in a reputable program'* (63.9%).
- The least noted reasons for participation were to *'Clarify whether the college would be a good choice for me'* (36.1%) and *'Clarify whether I wanted to pursue a science research career'* (47.20%).
- Students overwhelmingly noted either 'Good gain' or 'Great gain' in their ability to apply knowledge to research. No students indicated 'A little gain' or 'No gain' for any of the items in this section.
- The majority of students also expressed either 'Good gain' or 'Great gain' about items assessing their ability engage in research.
- WWASP student-participants rated items related to the quality of their research experience. Over 60% of respondents noted that their experience was 'Excellent' for every item. The item with the highest proportion of 'Excellent' ratings was *'The research experience overall'* (85.7%). The item with the lowest proportion of 'Excellent' ratings was *'The amount of time I spend doing meaningful research'* (60.7%).
- Consistent with previous sections, items relating to the effects of students' research experience were highly rated, with the majority of respondents indicating they 'Agree' or 'Strongly agree'.
- Items examining individual levels of satisfaction with research experience characteristics followed the trend of generally high ratings, with the overwhelming majority of participants selecting 'Very Satisfied.'

Survey comments

- Most comments for both Discussion Group and URSSA surveys were very positive, noting the positive, respectful environment fostered by the Working with a Scientist Program.
- Criticisms/suggestions in survey comments focused on time management, lunches, and graduation tassels to highlight participation in the program.

BACKGROUND

The goal of the WWASP program is to develop the effectiveness of science education using the *cogenerative dialogues* (cogens) approach. Cogens are essentially conversations amongst individuals used to explore their similar experience. The program applies this approach with the students, who at the end of their lab time discuss their experience during the lab with one another. The second goal of WWASP program is to increase the participants' interest in STEM disciplines by providing students the early-research opportunities. Students from regional high schools were encouraged to apply during the fall of 2015. As in previous years of WWASP funding, 36 students were selected from three different high schools in El Paso to make up the program's third cohort. Each lab was led by scientists, UTEP STEM faculty, and assisted by student research assistants. During the first year and a half of program, the students are arranged into labs that engage in the cogen discussions.

METHODS

As in previous reports, to assess the continued performance of WWASP through the third cohort of student-participants, different methods were implemented. These methods included a review and analysis of the 1st, 2nd and 3rd cohort of students' academic performance. Students in the 3rd cohort were also surveyed using two instruments. The first instrument is the Discussion Group Survey, a pre- and post-assessment administered at the beginning of the program during the spring semester and once again at the end of the program, during the summer. This instrument surveys students on their perception of their 'self,' 'others' and the 'group' during the cogenerative dialogues (see Appendix A). The third component was a survey, taken primarily from the Undergraduate Research Student Self-Assessment (URSSA), but modified for the high school students. The Group Discussion Survey was administered on Saturday, February 20, 2016, and once again at the end of the program on Friday, July 22, 2016. Students in the 1st and 2nd cohort were also surveyed with the same instruments during their participation in program activities; those results were presented in a previous evaluation reports.

RESULTS

Academic Results Cohort 3

Participants in cohort 3 engaged in the research internship during the 2016 Spring and Summer semesters. Similar to the first cohort of participants who engaged in the research internship cogens group, at the post-program stage they had maintained their high GPA, and 100% were

enrolled during their expected graduation term (1 student graduated fall 2016). The findings suggest that all students from this cohort are on course to graduate by the end of the term.

Table 1. Academic Performance Cohort 3

Group	Fall 2015 Mean GPA	SD	Fall 2016 Mean GPA	SD	Spring/Fall Program Mean Difference
WWASP Students (n=36)	89.78	5.81	89.77	6.81	0.01

GPA's are based on a 100-point scale.

Discussion Group Survey

Students were surveyed using the Discussion Group Survey which is part of a Cogenerative Dialogue Heuristic instrument developed by Dr. Kenneth Tobin. The survey questions asked students how they perceive themselves, others and their groups during cogenerative discussions. Items relating to the perceptions of 'self' and the 'others' in group discussions are similar but are modified to fit each category. Statements related to the 'group' are slightly different because they pertain to the perception of the group overall. To assess all items under these three categories, respondents used a scale ranging from 1 ('Never') to 5 ('Always'). There was a total of 15 items each for perceptions about the 'self,' 'others' and ten items for the 'group' section.

Pre- and post- Discussion Group Surveys were administered once two weeks into the spring semester's internship and again during the last day of the summer internship. WWASP students engaged in cogens once every two weeks during the spring and weekly during the summer semester.

To examine the differences in group discussion perceptions between the pre- and the post-assessments, paired sample t tests were conducted. Group means scores obtained for each item in the pre-assessment were subtracted from mean scores for each item of the post-assessment. A negative mean difference thus signifies that the post-survey score obtained on any particular item was greater than the score obtained for that item on the pre-survey, while a positive mean difference signified that the post-survey score obtained on an item was less than the score obtained for that item on the pre-survey. Though Cohort 3 was made up of 36 student-participants, analyses of Discussion Group Surveys are based on the responses of n=23 respondents who completed both pre- and post-surveys. Some items had less than 23 respondents at both necessary points (see table notes). It is thus not recommended to generalize the following results to other groups, as the tests of mean differences may be underpowered, thus rendering the results unreliable across groups.

The first section of the survey examined the student's perceptions of 'self' in group discussions (Table 2). The findings indicate that, though the post-scores were higher than the pre-scores in all but 1 item, only two items differed by a statistically significant amount. The first item with a gain in mean difference stated the following: *'I try to get others to contribute to what is being discussed.'* This item was found to be statistically significant, $t(22)=-3.95, p < .01$, indicating that

the students showed gains from the pre- to post-survey. Moreover, there was a second item with a statistically significant increase. This item reads, '*When I talk, I build on what others have to say,*' $t(22) = -2.58, p < .05$. One item saw a decrease from pre- to post-survey. This item reads, '*When others talk, I listen to what they have to say.*' This difference was not statistically significant. These findings suggest that the participants' self-perception did not generally increase from the pre- to the post- test, though areas involving the ability to elicit contributions from other group members and build on these contributions may have benefited from the WWASP program.

Table 2. Perception of Self during Group Discussions

Items	Pre Mean (n=23)	Post Mean (n=23)	Mean Diff	SD Diff	t	p
<i>I strive to make sense of what others are saying.</i>	4.61	4.74	-0.13	0.626	-1	0.328
<i>I try to get others to contribute to what is being discussed.</i>	3.74	4.52	-0.783	0.951	-3.945	0.001
<i>I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.</i>	4.61	4.74	-0.13	0.626	-1	0.328
<i>My talk is respectful.</i>	4.78	4.83	-0.043	0.562	-0.371	0.714
<i>When others talk, I listen to what they have to say.</i>	4.91	4.83	0.087	0.515	0.81	0.426
<i>When I talk, I build on what others have to say.</i>	4.39	4.74	-0.348	0.647	-2.577	0.017
<i>I try to learn from other's talk.</i>	4.57	4.74	-0.174	0.576	-1.447	0.162
<i>I try to understand different perspectives.</i>	4.7	4.78	-0.087	0.417	-1	0.328
<i>I value different perspectives of those in my group.</i>	4.7	4.78	-0.087	0.596	-0.699	0.492
<i>I feel as if I belong with this group.</i>	4.48	4.61	-0.13	0.694	-0.901	0.377
<i>I maintain focus during dialogue.</i>	4.39	4.48	-0.087	0.9	-0.463	0.648
<i>My oral contributions are thoughtful.</i>	4.43	4.59	-0.217	0.6	-1.738	0.096
<i>As I listen to others, I attempt to put aside my own perspectives and understand theirs.*</i>	4.32	4.59	-0.273	0.767	-1.667	0.11
<i>I am willing to consider others' ideas.</i>	4.7	4.74	-0.043	0.562	-0.371	0.714
<i>I value different perspectives.</i>	4.7	4.83	-0.13	0.626	-1	0.328

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

*n=22

The next section of this report examined the differences in the perceptions of 'self' in group discussions by lab (Table 3, Table 4). Students in Cohort 3 were assigned randomly to one of four labs. The labs included the following: Lab 1: Immunology; Lab 2: Engineering; Lab 3: Chemistry; and Lab 4: Immunology.

In Lab 1: Immunology, 8 group members responded to both pre- and post-surveys. Thirteen of the 15 items had negative mean differences among these respondents. This indicates that the post-scores were greater than the pre-scores and the perceptions of 'self' were higher in the post-survey for those 13 items. However, only 1 item was found to be statistically significant: *I try to get others to contribute to what is being discussed* $t(7) = -5.0, p < .01$. One item, *When others talk, I listen to what they have to say,* was lower in post-survey responses, though the difference was not significant. Another item, *I value different perspectives of those in my group,* had no mean difference between pre- and post-survey.

The outcomes of Lab 2: Engineering were based on the responses of 6 individuals who completed both pre- and post-surveys. Though 11 of the 15 items were arithmetically higher after the WWASP program, none of the items reflected statistically significant gains in the post-survey. One item, *I am willing to consider others' ideas,* decreased in post-survey, though the difference was not statistically significant. Another item, *I maintain focus during dialogue,* had the same score in both pre- and post-surveys. Two other items, *I feel like I have the opportunity to speak as much as others to contribute to what is being discussed* and *When others talk, I listen to what they have to say*, could not be included in statistical analyses because the standard error of their respective mean difference scores was 0.

The results of Lab 3: Chemistry were based on only four respondents who completed both pre- and post- surveys. The outcomes were similar to the outcomes of Lab 1. Twelve items showed gains, though it should be noted none were found to have statistically significant. The remaining three items showed no difference between pre- and post- tests and could not be analyzed with a small sample size. These items included the following: *My talk is respectful,* *I try to understand different perspectives,* and *I value different perspectives.* It is important to note that these items all had an average of 5, the scale's maximum, for both pre- and post-surveys.

Five individuals from Lab 4: Immunology completed both pre- and post- measures. Results were starkly different than those of other labs. Only two items, *I try to get others to contribute to what is being discussed* and *When I talk, I build on what others have to say,* showed gains, though neither were statistically significant. One item did not differ from pre- to post-survey and could not be analyzed. This item was, *I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.* The remaining 12 items were lower at post-survey measurement, but none of these differences were significant.

Table 3. Perception of Self during Group Discussion by Lab 1 & 2

Items	Lab 1: Immunology (n = 8; df = 7)						Lab 2: Engineering (n = 6; df = 5)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
<i>I strive to make sense of what others are saying.</i>	4.5	4.75	-0.25	0.46	-1.53	0.17	4.67	4.83	-0.17	0.41	-1	0.36
<i>I try to get others to contribute to what is being discussed.</i>	3.25	4.5	-1.25	0.71	-5	0.002	4.33	4.83	-0.5	0.55	-2.24	0.08
<i>I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.</i>	4.13	4.63	-0.5	0.76	-1.87	0.10	4.83*	4.83*	-	-	-	-
<i>My talk is respectful.</i>	4.63	5	-0.38	0.52	-2.05	0.08	4.83	5	-0.17	0.41	-1	0.36
<i>When others talk, I listen to what they have to say.</i>	4.88	4.63	0.25	0.71	1	0.35	5*	5*	-	-	-	-
<i>When I talk, I build on what others have to say.</i>	4.13	4.5	-0.38	0.74	-1.43	0.197	4.67	5	-0.33	0.52	-1.58	0.18
<i>I try to learn from other's talk.</i>	4.25	4.5	-0.25	0.89	-0.798	0.45	4.67	4.83	-0.17	0.41	-1	0.36
<i>I try to understand different perspectives.</i>	4.38	4.63	-0.25	0.46	-1.53	0.17	4.67	4.83	-0.17	0.41	-1	0.36
<i>I value different perspectives of those in my group.</i>	4.63	4.63	0	0.76	0	1	4.67	4.83	-0.17	0.41	-1	0.36
<i>I feel as if I belong with this group.</i>	4.13	4.25	-0.125	0.64	-0.55	0.598	4.5	5	-0.5	0.84	-1.46	0.21
<i>I maintain focus during dialogue.</i>	4.13	4.38	-0.25	1.04	-0.68	0.52	4.67	4.67	0	0.63	0	1
<i>My oral contributions are thoughtful.</i>	4.25	4.5	-0.25	0.71	-1	0.35	4.67	5	-0.33	0.52	-1.58	0.18
<i>As I listen to others, I attempt to put aside my own perspectives and understand theirs.</i>	4	4.5	-0.5	0.93	-1.53	0.17	4.33	4.67	-0.33	0.52	-1.58	0.18
<i>I am willing to consider others' ideas.</i>	4.38	4.75	-0.38	0.52	-2.05	0.08	4.83	4.67	0.17	0.41	1	0.33
<i>I value different perspectives.</i>	4.5	4.75	-0.25	0.89	-0.798	0.45	4.5	4.83	-0.33	0.52	-1.58	0.18

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

* t cannot be computed because standard error of the difference is 0

Table 4. Perception of Self during Group Discussion by Lab 3& 4

Items	Lab 3: Chemistry (n = 4; df = 3)						Lab 4: Immunology (n = 5; df = 4)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
<i>I strive to make sense of what others are saying.</i>	4.5	4.75	-0.25	0.96	-0.52	0.63	4.8	4.6	0.2	0.84	0.54	0.62
<i>I try to get others to contribute to what is being discussed.</i>	4	4.75	-0.75	0.96	-1.57	0.22	3.6	4	-0.4	1.53	-0.59	0.59
<i>I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.6	0.4	0.55	1.63	0.18
<i>My talk is respectful.</i>	5*	5*	-	-	-	-	4.8	4.2	0.6	0.55	2.45	0.07
<i>When others talk, I listen to what they have to say.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.8	0.2	0.45	1	0.37
<i>When I talk, I build on what others have to say.</i>	4.75	5	-0.25	0.5	-1	0.39	4.2	4.6	-0.4	0.89	-1	0.37
<i>I try to learn from other's talk.</i>	4.75	5	-0.25	0.5	-1	0.39	4.8*	4.8*	-	-	-	-
<i>I try to understand different perspectives.</i>	5*	5*	-	-	-	-	5	4.8	0.2	0.45	1	0.37
<i>I value different perspectives of those in my group.</i>	4.5	5	-0.5	0.58	-1.73	0.18	5	4.8	0.2	0.45	1	0.37
<i>I feel as if I belong with this group.</i>	4.5	4.75	-0.25	0.5	-1	0.39	5	4.6	0.4	0.55	1.63	0.18
<i>I maintain focus during dialogue.</i>	4.25	4.5	-0.25	1.5	-0.33	0.76	4.6	4.4	0.2	0.45	1	0.37
<i>My oral contributions are thoughtful.</i>	4.5	5	-0.5	0.58	-1.73	0.18	4.4	4.2	0.2	0.45	1	0.37
<i>As I listen to others, I attempt to put aside my own perspectives and understand theirs.</i>	4.25	4.75	-0.5	0.58	-1.73	0.18	5	4.5	0.5	0.58	1.73	0.18
<i>I am willing to consider others' ideas.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.6	0.4	0.55	1.63	0.18
<i>I value different perspectives.</i>	5*	5*	-	-	-	-	5	4.8	0.2	0.45	1	0.37

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

* t cannot be computed because standard error of the difference is 0

Students were also offered the opportunity to provide any comments they had concerning any of the statements or anything related to their discussions of ‘self’ (Table 5). Comments were nearly entirely positive and showed that students have good perceptions about their cogenerative groups and discussions. Further, several comments focused on how respectful the lab environments were, and feelings of security this fostered. Accordingly, student participants seem to feel that the group discussions are a safe and respectful environment to effectively communicate. These comments include: “Throughout the discussion, I feel as if I can speak out my opinion without being ridiculed”, “I strongly feel as if I’m apart [sic.] of the group because [sic.] everyone is nice and not judgemental [sic.]” and “I enjoy how my group can listen to different perspectives of each discussion”. One respondent explained that they felt “disadvantaged” because other group members had a pre-existing relationship.

Table 5. Perception of Self during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
I feel as I consider others ideas as much as others, and the list of cogen applies to all.	I don't have any concerns about anything, everything was great.	My group and I get along very well.	N/A
I don't have any comments or concerns.	I have no concerns with my group or anything in that manner.	It's still new, and I think as time goes on we'll get together and be closer than we are now.	I strongly feel as if I'm apart of the group because everyone is nice and not judgemental.
Throughout the discussion, I feel as if I can speak out my opinion without being ridiculed.	N/A	None.	Honestly, I love my group, I truly appreciate them.
I enjoy how my group can listen to different perspectives of each discussion	Discussions are great and productive		My group is always very positive.
A lot of the participants in my group know each other already, so I feel disadvantaged in being on the same social level as then.			I always strive to be open-minded and thoughtful. I hope this explains my extremely high ratings. (a-o)
I think that sopen is really effective because we talked about all of the problems we had and how to solve it.			
Our discussions are very good in my group.			
When I speak and have conversation, I will speak my opinion but back it up with logical facts of the time.			

The next section of the survey examined the students' perception of 'others' during group discussions (Table 6). Results from this section of the pre- and post-survey indicate 8 out of the 15 questions had increased scores. However, only 1 item, *'Others in my group have a sense of solidarity,'* was statistically significant, $t(21) = -3.13, p < .01$. Five items showed decreases from pre- to post- surveys, including: *'When I talk, others in my group listen to what I have to say'*, *'When others in my group talk, they build on what I have to say'*, *'Others in my group try to understand different perspectives'*, *'Others in the group maintain focus during dialogue'*, and *'Others' oral contributions are thoughtful'*. Though these items were lower at post-survey, they did not differ significantly. Two items, *'Others in my group show respect for one another'* and *'Others in my group value my perspective'* did not differ from pre- to post-survey measurement. These findings indicate that the perceptions of 'others' were generally not statistically different between pre- and post-survey measurements, though participation in the WWASP program seemed to increase perceptions of group solidarity.

Table 6. Perceptions of Others during Group Discussions

<i>Items</i>	<i>Pre Mean (n=23)</i>	<i>Post Mean (n=23)</i>	<i>Mean Diff</i>	<i>SD Diff</i>	<i>t</i>	<i>p</i>
<i>Others in my group try to make sense of what I am saying.</i>	4.35	4.39	-0.04	0.88	-0.24	0.81
<i>Others in my group try to get me to contribute during discussions.</i>	3.78	4.17	-0.39	1.12	-1.68	0.11
<i>Others in my group have the opportunity to speak as much as I do.</i>	4.65	4.7	-0.04	0.77	-0.27	0.79
<i>Others in my group show respect for one another.</i>	4.7	4.7	0	0.80	0	1
<i>When I talk, others in my group listen to what I have to say.</i>	4.7	4.52	0.17	0.83	1	0.33
<i>When others in my group talk, they build on what I have to say.</i>	4.61	4.35	0.26	0.86	1.45	0.16
<i>Others in my group strive to learn from my oral contributions.</i>	4.35	4.52	-0.17	0.94	-0.89	0.38
<i>Others in my group try to understand different perspectives.</i>	4.57	4.43	0.13	0.82	0.77	0.45
<i>Others in my group value my perspective.*</i>	4.57	4.57	0	0.63	0	1
<i>Others in my group have a sense of solidarity.**</i>	4.18	4.82	-0.64	0.95	-3.13	0.005
<i>Others in the group maintain focus during dialogue.</i>	4.55	4.27	0.27	0.94	1.37	0.19
<i>Others' oral contributions are thoughtful.</i>	4.7	4.65	0.04	0.77	0.27	0.79
<i>Others set aside their perspective when they listen to me.</i>	4.3	4.43	-0.13	0.63	-1	0.33
<i>Others in my group are willing to consider my ideas.</i>	4.48	4.7	-0.22	0.67	-1.55	0.14
<i>Others value different perspectives.</i>	4.57	4.7	-0.13	0.63	-1	0.33

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

*n=21

**n=22

Similar to the previous section discussing the perceptions of 'self,' this section examined the perception of 'others' by lab (Table 7, Table 8). As noted previously, students in Cohort 3 were assigned randomly to one of four labs. The labs included the following: Lab 1: Immunology; Lab 2: Engineering; Lab 3: Chemistry; and Lab 4: Immunology. The results of the analyses were very similar to the results for the perceptions of 'self', as few differences between pre- and post-survey measurements were statistically significant. The number of respondents from each lab for these items were identical to previous analyses. As mentioned previously, this is likely due to the small sample sizes available for analysis. Below is a discussion of the analysis for each lab.

For Lab 1: Immunology, 8 of the 15 items had negative mean differences among these respondents indicates that the post-scores were generally greater than the pre-scores for those eight items. However, only 1 item was found to be statistically significant: *'Others set aside their perspective when they listen to me,'* $t(7) = -2.65, p < .05$. Five items were lower in post-survey responses, though no differences were statistically significant. Two items, *'Others in my group show respect for one another'* and *'Others' oral contributions are thoughtful'* did not differ from pre- to post-survey.

The outcomes of Lab 2: Engineering were based on the responses of 6 individuals who completed both pre- and post-surveys. Though 8 of the 15 items were also arithmetically higher after the WWASP program, none of the items reflected statistically significant gains in the post-survey. One item, *'When I talk, others in my group listen to what I have to say,'* decreased in post-survey, though the difference was not statistically significant. The remaining six items did not differ from pre- to post-measurement, 5 of which could not be included in statistical analyses because the standard error of their respective mean difference scores was 0.

The outcomes of Lab 3: Chemistry were similar to the outcomes of Lab 1. Twelve items showed gains, though it should be noted none were found to have statistically significant. The remaining five items showed no difference between pre- and post- tests, 3 of which could not be analyzed due to mean difference standard errors being 0.

Results from Lab 4: Immunology were starkly different than those of other labs, though similar to the Lab 4 responses for 'self' items. Only 1 item, *'Others in my group are willing to consider my ideas,'* showed a gain from pre- to post-survey, though it was not statistically significant. Twelve items showed decreases at post-survey measurement. Only 1 item, *'Others in the group maintain focus during dialogue,'* showed a statistically significant change, $t(4)=3.21, p<.05$. Two items did not differ from pre- to post-survey and could not be analyzed. These results indicate that perceptions of 'others' among students in this lab were lower after participation in the WWASP program. Further, respondents seem to indicate they feel that dialogue became less focused toward the end of the program. It must again be stated, however, that generalizations from these data are not recommended due to the small sample sizes utilized.

Table 7. Perceptions of Others during Group Discussions by Lab 1 & 2

Items	Lab 1: Immunology (n = 8; df = 7)						Lab 2: Engineering (n = 6; df = 5)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
<i>Others in my group try to make sense of what I am saying.</i>	3.75	3.88	-0.13	1.13	-0.31	0.76	4.83	5	-0.17	0.41	-1	0.36
<i>Others in my group try to get me to contribute during discussions.</i>	3.13	3.88	-0.75	1.04	-2.05	0.08	4.17	4.83	-0.67	0.82	-2	0.10
<i>Others in my group have the opportunity to speak as much as I do.</i>	4.5	4.25	0.25	0.89	0.80	0.45	4.5	5	-0.5	0.84	-1.46	0.20
<i>Others in my group show respect for one another.</i>	4.5	4.5	0	1.07	0	1	4.67	5	-0.33	0.52	-1.58	0.18
<i>When I talk, others in my group listen to what I have to say.</i>	4.38	4.25	0.125	0.99	0.36	0.73	4.83	4.67	0.17	0.75	0.54	0.61
<i>When others in my group talk, they build on what I have to say.</i>	4.5	4	0.5	1.20	1.18	0.28	4.83*	4.83*	-	-	-	-
<i>Others in my group strive to learn from my oral contributions.</i>	4	4.25	-0.25	1.58	-0.45	0.67	4.67	4.83	-0.17	0.41	-1	0.36
<i>Others in my group try to understand different perspectives.</i>	4.25	3.88	0.38	1.30	0.81	0.44	4.67	4.83	-0.17	0.41	-1	0.36
<i>Others in my group value my perspective.</i>	4.14	4.29	-0.14	1.07	-0.35	0.74	4.83*	4.83*	-	-	-	-
<i>Others in my group have a sense of solidarity.</i>	3.86	4.57	-0.71	1.11	-1.70	0.14	4.5	5	-0.5	0.55	-2.24	0.08
<i>Others in the group maintain focus during dialogue.</i>	4.5	4.25	0.25	1.04	0.68	0.52	4.67*	4.67*	-	-	-	-
<i>Others' oral contributions are thoughtful.</i>	4.5	4.5	0	1.07	0	1	4.83*	4.83*	-	-	-	-
<i>Others set aside their perspective when they listen to me.</i>	3.75	4.25	-0.5	0.54	-2.65	0.033	4.5	4.5	0	0.63	0	1
<i>Others in my group are willing to consider my ideas.</i>	4.25	4.38	-0.13	0.84	-0.42	0.69	4.67	5	-0.33	0.82	-1	0.36
<i>Others value different perspectives.</i>	4.13	4.5	-0.38	0.92	-1.16	0.29	4.83*	4.83*	-	-	-	-

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

* t cannot be computed because standard error of the difference is 0

Table 8. Perceptions of Others during Group Discussions by Lab 3 & 4

Items	Lab 3: Chemistry (n = 4; df = 3)						Lab 4: Immunology (n = 5; df = 4)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
<i>Others in my group try to make sense of what I am saying.</i>	4.5	4.75	-0.25	0.5	-1	0.39	4.6	4.2	0.4	1.14	0.78	0.48
<i>Others in my group try to get me to contribute during discussions.</i>	3.75	3.75	0	1.83	0	1	4.4	4.2	0.2	0.84	0.54	0.62
<i>Others in my group have the opportunity to speak as much as I do.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.8	0.2	0.45	1	0.37
<i>Others in my group show respect for one another.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.4	0.6	0.55	2.45	0.07
<i>When I talk, others in my group listen to what I have to say.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.4	0.6	0.89	1.5	0.21
<i>When others in my group talk, they build on what I have to say.</i>	4.75	4.75	0	0.82	0	1	4.4	4	0.4	0.89	1	0.37
<i>Others in my group strive to learn from my oral contributions.</i>	4.5	4.75	-0.25	0.5	-1	0.39	4.40*	4.40*	-	-	-	-
<i>Others in my group try to understand different perspectives.</i>	4.75*	4.75*	-	-	-	-	4.8	4.6	0.2	0.45	1	0.37
<i>Others in my group value my perspective.</i>	4.75*	4.75*	-	-	-	-	4.75	4.5	0.25	0.5	1	0.39
<i>Others in my group have a sense of solidarity.</i>	3.5	5	-1.5	1.29	-2.32	0.10	4.80*	4.80*	-	-	-	-
<i>Others in the group maintain focus during dialogue.</i>	4	4.67	-0.67	0.58	-2	0.18	4.8	3.6	1.2	0.84	3.21	0.033
<i>Others' oral contributions are thoughtful.</i>	4.75	5	-0.25	0.5	-1	0.39	4.8	4.4	0.4	0.89	1	0.37
<i>Others set aside their perspective when they listen to me.</i>	4.75*	4.75*	-	-	-	-	4.6	4.4	0.2	0.84	0.54	0.62
<i>Others in my group are willing to consider my ideas.</i>	4.75	5	-0.25	0.5	-1	0.39	4.4	4.6	-0.2	0.45	-1	0.37
<i>Others value different perspectives.</i>	4.75	5	-0.25	0.5	-1	0.39	4.8	4.6	0.2	0.45	1	0.37

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

* t cannot be computed because standard error of the difference is 0

Comments made by the student participants regarding these ratings also show that the majority had positive ‘perceptions about others’ in their teams (Table 9). The comments, for example, indicate that students were respectful the discussions and opinions of others in their groups. Notable comments included: “My group is truly respectful!”, “I think that the people in my group 1 lab are very respectful and listen to what I have to say and I listen to what they have to say as well.” and “The group is already quite close-knit and friendly while maintaining a focused and professional attitude.

Table 9. Perceptions of Others during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
The group is understanding of what we all have to say, or our opinion is similar to what we all feel.	I have no comments or concerns about anything related to the discussions that apply to my ratings.	My group members pay very close attention to what is being discussed.	N/A
You don't always know what your other members are thinking and have to assume from what you see.	N/A	None.	My group is truly respectful!
I don't have any comments or concerns.	I have no concerns.	N/A	Almost everyone was able to build on what someone said.
Others in my group show respect when others are talking	N/A		The group is already quite close-knit and friendly while maintaining a focused and professional attitude.
I'm not actually sure how they feel during discussions			
I think that the people in my group 1 lab are very respectful and listen to what I have to say and I listen to what they have to say as well.			
I think we all try to understand where others may come from, however, we will provide why we believe certain things.			
During the discussion, I feel as if everybody is respectable with one another and open to many ideas. However, we are still quite shy.			

The next section of the survey examined the students’ perception of the ‘group’ itself during group discussions (Table 10). Results from the pre- and post-survey scores on items listed on perception of the ‘group’ showed greater mean differences on 4 out of 10 items. These items include: *‘There is a shared mood in the group,’ ‘There is harmony with discussions in the group,’ ‘Dialogue in the group is timely,’* and *‘Dialogue on the group is predictable.’* Only one of these items showing gains and was found to be significant: *‘Dialogue in the group is predictable,’* $t(21) = -2.273, p < .05$. Five items showed decreased post-survey scores about the pre-survey, but none of these

differences were statistically significant. One item, '*Different perspectives from members of the group have contributed to my own learning,*' did not change from pre- to post-survey measurement. These results indicate that no major differences in perceptions of the group in the early and late periods of group interactions. Only the perception that discussions were predictable increased significantly from pre- to post-measurement.

Table 10. Perceptions of the Group during Group Discussions

Items	Pre Mean (n=23)	Post Mean (n=23)	Mean Diff	SD Diff	t	p
<i>The group strives to have all voices heard.</i>	4.74	4.52	0.22	0.85	1.23	0.23
<i>Different perspectives are valued by the group.</i>	4.78	4.7	0.09	0.67	0.62	0.54
<i>The group strives to incorporate all perspectives.</i>	4.74	4.65	0.09	0.9	0.46	0.65
<i>There is a shared mood in the group.</i>	4.3	4.48	-0.17	0.83	-1	0.33
<i>There is harmony with discussions in the group.</i>	4.39	4.48	-0.09	0.79	-0.53	0.60
<i>Dialogue in the group is timely.</i>	4.17	4.35	-0.17	1.23	-0.68	0.51
<i>Dialogue on the group is appropriate.*</i>	4.86	4.64	0.23	0.69	1.56	0.14
<i>Dialogue on the group is predictable.*</i>	3.41	4.09	-0.68	1.17	-2.73	0.012
<i>During group discussions, there is at least one review of what was accomplished.</i>	4.83	4.7	0.13	0.76	0.83	0.42
<i>Different perspectives from members of the group have contributed to my learning.</i>	4.7	4.7	0	0.74	0	1

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

*n=22

In this section the perceptions of the 'group' during group discussions is presented by lab (Table 11, Table 12). As noted previously, students were assigned randomly to one of four labs. The results are similar to other sections in this report.

There were three items that showed an increase in the post-survey scores in Lab 1: Immunology. These items included: *'There is a shared mood in the group,' 'Dialogue in the group is timely,'* and *'Dialogue on the group is predictable.'* It should be noted, that none of the items had an increase in scores that was statistically significant. In this lab, the remaining seven items showed a decrease in the perception of the 'group' during group discussions, though none of these differences were statistically significant.

The results of Lab 2: Engineering shows that there were increases in scores for 9 of the items. One of the items, *'Dialogue on the group is appropriate,'* showed a decreased between pre- and post-survey measurements. It is important to note that none of these item score changes were statistically significant.

In Lab 3: Chemistry, 6 out of 10 items noted gains from the pre- to the post-survey. However, none of these gains were statistically significant. The remaining four items did not differ between pre- and post-surveys, 3 of which were not analyzed due to standard error in mean differences being equal to 0. These three items included the following: *'The group strives to have all voices heard,' 'Different perspectives are valued by the group,'* and *'The group strives to incorporate all perspectives'.* It is important to note that these items averaged the scale maximum of 5 ('Always') in both pre- and post-surveys.

Lab 4: Immunology had outcomes in perceptions of the 'group' similar to previous items. One item, *'Dialogue in the group is predictable,'* showed a gain from pre- to post-survey, though this difference was not statistically significant. One item, *'Different perspectives from members of the group have contributed to my own learning,'* could not be analyzed. The remaining eight items showed decreases from pre- to post-survey measurements; however, only 1 item showed a statistically significant difference. *'Dialogue in the group is timely'* reflected a significant decrease in the post-survey measurement, $t(4)=4.00$, $p<.05$. These results seem to indicate that perceptions of the 'group,' timely discussion, in particular, may have decreased after WWASP participation. However, it must once more be noted that the authors discourage generalization based on these results due to small sample size.

Table 11. Perceptions of the Group during Group Discussions by Lab 1 & 2

<i>Items</i>	Lab 1: Immunology (n = 8; df = 7)						Lab 2: Engineering (n = 6; df = 5)					
	<i>Pre Mean</i>	<i>Post Mean</i>	<i>Mean Diff</i>	<i>SD Diff</i>	<i>t</i>	<i>p</i>	<i>Pre Mean</i>	<i>Post Mean</i>	<i>Mean Diff</i>	<i>SD Diff</i>	<i>t</i>	<i>p</i>
<i>The group strives to have all voices heard.</i>	4.75	4.00	0.75	1.04	2.05	0.08	4.50	4.83	-0.33	0.82	-1.00	0.36
<i>Different perspectives are valued by the group.</i>	4.63	4.50	0.13	0.99	0.36	0.73	4.67	4.83	-0.17	0.41	-1.00	0.36
<i>The group strives to incorporate all perspectives.</i>	4.50	4.13	0.38	1.41	0.75	0.48	4.67	5.00	-0.33	0.52	-1.58	0.18
<i>There is a shared mood in the group.</i>	4.00	4.25	-0.25	0.89	-0.80	0.45	4.17	4.83	-0.67	0.82	-2.00	0.10
<i>There is harmony with discussions in the group.</i>	4.25	4.00	0.25	1.04	0.68	0.52	4.33	4.83	-0.50	0.55	-2.24	0.08
<i>Dialogue in the group is timely.</i>	3.63	4.25	-0.63	1.85	-0.96	0.37	4.33	4.50	-0.17	0.41	-1.00	0.36
<i>Dialogue in the group is appropriate.</i>	5.00	4.71	0.29	0.49	1.55	0.17	4.83	4.33	0.50	0.84	1.46	0.20
<i>Dialogue in the group is predictable.</i>	3.13	3.88	-0.75	1.28	-1.66	0.14	3.33	4.00	-0.67	1.63	-1.00	0.36
<i>During group discussions there is at least one review of what was accomplished.</i>	4.88	4.50	0.38	1.06	1.00	0.35	4.67	4.83	-0.17	0.41	-1.00	0.36
<i>Different perspectives from members of the group have contributed to my own learning.</i>	4.75	4.38	0.38	1.06	1.00	0.35	4.67	4.83	-0.17	0.41	-1.00	0.36

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

Table 12. Perceptions of the Group during Group Discussions by Lab 3 & 4

Items	Lab 3: Chemistry (n = 4; df = 3)						Lab 4: Immunology (n = 5; df = 4)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
<i>The group strives to have all voices heard.</i>	5.00*	5.00*	-	-	-	-	4.8	4.6	0.2	0.45	1	0.37
<i>Different perspectives are valued by the group.</i>	5.00*	5.00*	-	-	-	-	5	4.6	0.4	0.55	1.63	0.18
<i>The group strives to incorporate all perspectives.</i>	5.00*	5.00*	-	-	-	-	5	4.8	0.2	0.45	1	0.37
<i>There is a shared mood in the group.</i>	4.5	4.5	0	0.816	0	1	4.8	4.4	0.4	0.55	1.63	0.18
<i>There is harmony with discussions in the group.</i>	4.25	4.75	-0.5	0.58	-1.73	0.18	4.8	4.6	0.2	0.45	1	0.37
<i>Dialogue in the group is timely.</i>	4.5	5	-0.5	0.58	-1.73	0.18	4.6	3.8	0.8	0.45	4	0.016
<i>Dialogue on the group is appropriate.</i>	4.75	5	-0.25	0.5	-1	0.39	4.8	4.6	0.2	0.84	0.54	0.62
<i>Dialogue on the group is predictable.</i>	4	5	-1	0.82	-2.45	0.09	3.5	3.75	-0.25	0.50	-1	0.39
<i>During group discussions there is at least one review of what was accomplished.</i>	4.75	5	-0.25	0.5	-1	0.39	5	4.6	0.4	0.55	1.63	0.18
<i>Different perspectives from members of the group have contributed to my own learning.</i>	4.5	5	-0.5	0.58	-1.732	0.18	4.80*	4.80*	-	-	-	-

Note: Mean scores are based on a 5-point scale that ranged from 'Never' (1) to 'Always' (5)

* t cannot be computed because standard error of the difference is 0

The comments offered by the student participants in this section were overwhelmingly positive (see Table 13). Participants nearly all used this space to express their enjoyment of the program and thanks for being included. Notable responses included: “Once I come I don't ever want to leave I feel like I found my place in the world”, “Please continue the success and welcoming of the program for future students”, and “The program was a great experience, and I was able to gain many new skills that will really help in the long run. I wish [sic.] there was more time to continue researching”. The one criticism involved the lack of dining options: “The only issue I had was that it would've been convenient to have snack machines or stores that sell snacks nearby so that If I forget to eat luch [sic.], I can quickly get something to eat so that being hungry doesn't become too much of a distraction...”.

Table 13. Perceptions of the Group during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
I would like to thank everyone who helped with wwasp. I was so happy & still am happy with this.	I really hope that this program continues, because it has a very interesting program.	The only issue I had was that it would've been convenient to have snack machines or stores that sell snacks nearby so that If I forget to eat lunch, I can quickly get something to eat so that being hungry doesn't become too much of a distraction, although remembering to eat lunch would've solved that problem. Not much of an issue.	The program has progressed very smoothly, and I am quite satisfied with the productive and friendly nature of our interactions.
The program was a great experience and I was able to gain many new skills that will really help in the long run. I wish there was more time to continue researching.	Please continue the success and welcoming of the program for future students.	No comments as of this time.	Once I come I don't ever want to leave I feel like I found my place in the world.
The Working With A Scientist developed and enhanced many skills that I had learned and already had, respectively, as well as learned a lot along the way. It was also a way to open up more and create new friendships outside the lab.	No this was a great program.	No	My group has given me a very comforting welcome into the program I'm very excited to work with everyone.
No.		N/A	I really enjoy the program and feel like I am settling in very comfortably.
N/A			So far, the program is great! I love my instructor and group members!
No.			The work with a Scientist program is a very fun learning experience. I only wished I was able to come more often than two weeks. Thank you!

Students were asked if they had any other comments or concerns about the Working with a Scientist Program, or suggestions for improving the program. In general, the student comments that they had very positive attitudes about the program and their experience within it (Table 14). Suggestions for improving the program focused on improving time management skills and the lunches provided. One student indicated a desire for graduation tassels – a sentiment reflected in earlier comments as well.

Table 14. Do you have any other comments or concerns about WWASP, or suggestions for improving the program?

Lab 1	Lab 2	Lab 3	Lab 4
<p>The program was a great experience and I was able to gain many new skills that will really help in the long run. I wish there was more time to continue researching.</p>	<p>Please continue the success and welcoming of the program for future students.</p>	<p>The only thing I was wondering was about getting tasels for graduation from this program and maybe a logo for lether jackets for school that would be cool</p>	<p>I wish things went a little differently than what it did. We had issues in the lab as far as time. We started our projects the Wednesday before the final presentation, we had six weeks and only used two days!</p>
<p>The Working With A Scientist developed and enhanced many skills that I had learned and already had, respectively, as well as learned a lot along the way. It was also a way to open up more and create new friendships outside the lab.</p>	<p>I really hope that this program continues, because it has a very interesting program.</p>	<p>It was an amazing experience, Dr. Noveron was a great scientist and my lab members were cool. My TA Abril Chavez was a great mentor, she made the program a little easier to cope with.</p>	<p>Really nice program, I have learned a lot from this internship.</p>
<p>I would like to thank everyone who helped with wwasp. I was so happy & still am happy with this.</p>	<p>No this was a great program.</p>	<p>N/A</p>	<p>More time would be nice.</p>
<p>No.</p>			
<p>No.</p>			
<p>N/A</p>			

At first, glance, results from the pre- and post- Discussion Group Surveys suggest that students' perceptions on the overall social dynamics of the cogens were mixed. The majority of items showed gains across all groups, though decreases in post-survey scores in some labs (e.g. Lab 4) stood in contrast to overall trends. It is important to note that very few items in the survey showed any statistically significant differences between pre- and post-survey measurements. The lack of significance in many of these items is likely due to the small sample size used. In fact, the sample size for Cohort 3 Discussion Group Survey was more than 30% smaller than Cohort 2 (n=33). Thus, generalizing these findings to other WWASP groups is not recommended.

Undergraduate Research Student Self-Assessment (URSSA)

To assess the effects of the research experience, the students who took part in the research internship and engaged in research activities were asked to complete a modified shorter version of the Undergraduate Research Student-Self Assessment (URSSA). Development and testing of URSSA were funded by the National Science Foundation through its Divisions of Chemistry and Undergraduate Education, the Biological Sciences Directorate, and the Office of Multidisciplinary Affairs, under grant #CHE-0548488. Additional support was provided by the Biological Sciences Initiative and the NIH Scholars program, both at CU Boulder, through their grants from the Howard Hughes Medical Institute and the National Institutes of Health. The instrument has been validated in assessing student outcomes related to student research (for more information on the instrument, please visit the URSSA website hosted at <http://www.colorado.edu/eer/research/undergradtools.html>).

In this section, students were asked to rate seven statements regarding their application of knowledge to research work as a result of their participation in the program (Table 15). Participants were provided with a 5-point Likert-type scale showing the following points: ranging from 1 ('No gain') to 5 ('Great gain'). In every item, over half of respondents indicated 'Great gain', and no respondents indicated less than 'Moderate gain' on any items. In general, the survey respondents indicated to have gained in the application of knowledge to research.

Table 15. Application of Knowledge to Research (n =28)

Items	No gain	A little gain	Moderate gain	Good gain	Great gain	Not applicable
<i>Analyzing data for patterns</i>			7.10%	35.70%	53.60%	3.60%
<i>Figuring out the next step in a research project</i>			5.60%	28.60%	64.30%	
<i>Problem-solving in general*</i>			22.20%	11.10%	66.70%	
<i>Formulating a research question that could be answered with data</i>				25.00%	75.00%	
<i>Identifying limitations of research methods and designs</i>			7.10%	21.40%	71.40%	
<i>Understanding the theory and concepts guiding my research project</i>			14.30%	10.70%	75.00%	
<i>Understanding the connections among scientific disciplines</i>			3.60%	28.60%	67.90%	
<i>Understanding the relevance of research to my coursework</i>			14.30%	14.30%	67.90%	3.60%

Note: 5-point scale ranging from No Gain (1) to Great Gain (5)

*n=27

Using the same scale described above, the participants were then asked to indicate the personal gains they made in connection to their research experience (Table 16). Results, again showed that at least 50% of survey respondents reported ‘Great gains’ for every item in this section. For example, when rating the following statement, ‘*Understanding what every day research is like,*’ 78.60% of respondents indicated ‘Great gains.’ Moreover, ‘A little gain’ was only reported in 1 statement. To be exact, approximately 3% of respondents indicated ‘A little gain’ in the following statements: ‘*Confidence in my ability to contribute to science*’ was selected by 3.6% of respondents. Other than this statement, no other items had any scores less than ‘Moderate gain.’

Table 16. Personal Gains Related to Engagement in Research (n = 28)

Items	No gain	A little gain	Moderate gain	Good gain	Great gain	Not applicable
<i>Confidence in my ability to contribute to science</i>		3.60%	10.70%	32.10%	50.00%	3.60%
<i>Comfort in discussing scientific concepts with others</i>			10.70%	28.60%	60.70%	
<i>Comfort in working collaboratively with others</i>			7.10%	28.60%	64.30%	
<i>Confidence in my ability to do well in future in future science courses</i>			10.70%	21.40%	67.90%	
<i>Ability to work independently</i>			3.60%	32.10%	64.30%	
<i>Developing patience with the slow pace of research</i>			10.70%	21.40%	67.90%	
<i>Understanding what every day research is like</i>				21.40%	78.60%	
<i>Taking greater care in conducting procedures in the lab or field</i>			7.10%	39.30%	53.60%	

Note: 5-point scale ranging from 'No gain' (1) to 'Great gain' (5)

In relation to skills gained from the research experience, results show a similar trend to that of the sections discussed above, though more variability is reflected (Table 17). Like the items described previously, the majority of scores fell between 'Moderate gain' and 'Great gain,' with at least 50% of respondents selecting the latter option for every statement. However, in this section, several items saw a small selection of the 'A little gain' option. The item with the highest proportion of this option selected was '*Calibrating instruments needed for measurement,*' in which 10.70% of respondents selected 'A little gain.' One item, '*Working with computers,*' had 3.6% of respondents select 'No gain.' It is important that this percentage translates to 1 respondent in the current sample.

Table 17. Gains in Skills (n = 28)

Items	No gain	A little gain	Moderate gain	Good gain	Great gain	Not applicable
<i>Writing scientific reports or papers</i>		3.60%	3.60%	25.00%	67.90%	
<i>Making oral presentations</i>		3.60%	10.70%	21.40%	64.30%	
<i>Defending an argument when asked questions</i>		3.60%	7.10%	28.60%	60.70%	
<i>Explaining my project to people outside the field</i>			3.60%	35.70%	60.70%	
<i>Preparing a scientific poster</i>			14.30%	21.40%	64.30%	
<i>Keeping a detailed lab notebook</i>		7.10%	21.40%	17.90%	50.00%	3.60%
<i>Conducting observations in the lab or field</i>			17.90%	25.00%	53.60%	3.60%
<i>Using statistics to analyze data</i>			25.00%	14.30%	57.10%	3.60%
<i>Calibrating instruments needed for measurement</i>		10.70%	7.10%	25.00%	50.00%	7.10%
<i>Working with computers</i>	3.60%	7.10%	14.30%	17.90%	50.00%	7.10%
<i>Understanding journal articles</i>			14.80%	22.20%	59.30%	3.70%
<i>Conducting database or internet searches</i>			3.60%	28.60%	67.90%	
<i>Managing my time</i>			21.40%	21.40%	57.10%	

Note: 5-point scale ranging from ‘No gain’ (1) to ‘Great gain’ (5)

Participants were then asked to indicate how much they thought and behaved in ways related to being a scientific researcher (Table 18). Participants were provided with a 5-point Likert-type scale ranging from 1 (‘None’) to 5 (‘A Great Deal’), to indicate their answers. Results were similar to the gains in skills described above. Continuing with the same trend as above, results show that at least 50% of respondents indicated that they behaved in researcher-like behaviors ‘A great deal’. The lower end of the scale was endorsed more frequently for these items, though. Two items, ‘*Try out new ideas or procedures on your own*’ and ‘*Work extra hours because you were excited about the research*’ saw 10.70% of respondents selecting the ‘None’ option.

Table 18. Frequency of Research Attitudes and Behaviors (n =28)

Items	None	A little	Some	A fair amount	A great deal	Not applicable
<i>Engage in real-world science research</i>			7.10%	17.90%	75.00%	
<i>Feel like a scientist</i>		3.60%	3.60%	28.60%	50.00%	14.30%
<i>Think creatively about the project</i>		3.60%		17.90%	78.60%	
<i>Try out new ideas or procedures on your own</i>	10.70%		10.70%	14.30%	64.30%	
<i>Feel responsible for the project</i>	3.60%		3.60%	25.00%	67.90%	
<i>Work extra hours because you were excited about the research</i>	10.70%		10.70%	21.40%	50.00%	7.10%
<i>Interact with scientists from outside your lab</i>	3.60%	3.60%	10.70%	21.40%	60.70%	
<i>Feel a part of a scientific community</i>			14.30%	25.00%	60.70%	

Note: 5-point scale ranging from 'None' (1) to 'A great deal' (5)

In the next section, participants were also asked to rate the quality of different elements of their research experience (Table 19). Participants were provided with a 4-point Liker-Type scale ranging from 1 ('Poor') to 4 ('Excellent'). Similar to other sections of this survey report, the participations mostly rated their research experience as 'Excellent.' The ratings for 'Excellent' made up at least 50% for each item and ranged from 60.7% to 85.7%. *The research experience overall* was most favorably endorsed. Every item also had some proportion of respondents endorsing the 'Fair' option; however, no respondents selected the 'Poor' option for any of the items.

Table 19. Quality of Research Experience (n =28)

Items	Poor	Fair	Good	Excellent	Not applicable
<i>My working relationship with my research lab scientist*</i>		3.7%	18.50%	77.80%	
<i>My working relationship with research group members</i>		7.10%	10.70%	82.10%	
<i>The amount of time I spend doing meaningful research</i>		7.10%	32.10%	60.70%	
<i>The amount of time I spend with my research lab scientists</i>		10.70%	10.70%	78.60%	
<i>The advice my research lab scientists provide about college</i>		7.10%	10.70%	82.10%	
<i>The research experience overall</i>		3.60%	10.70%	85.70%	

Note: 4-point scale ranging from 'Poor' (1) to 'Excellent' (4)

*n=27

The next section of the URSSA asked participants to provide their level of agreement or disagreement with various statements about the effects of their research experience (Table 20). Participants were provided with a 4-point Likert-type scale ranging from 1 ('Strongly disagree') to

4 ('Strongly agree') to indicate their level of agreement. Results for this section were somewhat similar to previous sections. For almost every item, the majority of respondents indicated a high level of agreement with the statements presented, with at least 50% of respondents selecting 'Strongly agree.' Respondents did not indicate any disagreement with the following items: 'My research experience has prepared me for advanced coursework in science' and 'My research experience has motivated me to attend college.' The remaining two items did see some disagreement. One respondent (3.6%) selected 'Disagree' for the item 'My research experience has prepared me for college.' The item with the lowest levels of the agreement also showed the most variability. The 'Strongly agree' response was endorsed by 46.4% of respondents for this item: 'Doing research clarified for me which field of study I want to pursue.' Over 10% of respondents disagreed with this item: 3.6% selected 'Disagree' and 7.10% selected 'Strongly disagree.' It is important to note that a large proportion of respondents (21.40%) indicated that this item was 'Not applicable' to them.

Table 20. Effects of Research Experience (n =28)

Items	Strongly disagree	Disagree	Agree	Strongly agree	Not applicable
<i>My research experience has prepared me for advanced coursework in science</i>			46.40%	53.60%	
<i>My research experience has motivated me to attend college</i>			21.40%	71.40%	7.10%
<i>My research experience has prepared me for college</i>		3.60%	28.60%	67.90%	
<i>Doing research clarified for me which field of study I want to pursue</i>	7.10%	3.60%	21.40%	46.40%	21.40%

Note: 4-point scale ranging from 'Strongly disagree' (1) to 'Strongly agree' (4)

Program participants were given the option to give additional comments regarding the above ratings (Table 21). Only six comments were offered. They generally indicated that participating in WWASP had made them consider a future career in science. However, 1 participant stated that the program "Did not exactly clarify my area of study", and another noted that they were "...still kinda confused on my future, however, I am considering a career in science."

Table 21. Effects of Research Experience Comments

Lab 1	Lab 2	Lab 3	Lab 4
	N/A	I came into the program unsure, and now I'm still kinda confused on my future however I am considering a career in science.	Science was never an option to study in college, but this program has made me rethink what I want to do.
			In talking to my RAs and doing Research. I am dead certain what I will major and where.
			Made me realize I still would like to study neurology.
			Did not exactly clarify my area of study.

Participants were then asked to indicate their level of satisfaction with various characteristics of the research experience (Table 22). Results indicate that participants were overwhelmingly satisfied with the program, with at least 50% of respondents choosing ‘Very satisfied’ for every item. Four items did not have any dissatisfaction among participants. The highest rating among these items was for ‘*Ease in asking questions/talking with my lab research scientists,*’ for which 92.9% of respondents selected ‘Very satisfied.’ Three items showed a slight degree of dissatisfaction, as some respondents selected the ‘Somewhat dissatisfied’ option. These items were as follows: ‘*Lab or field equipment,*’ ‘*Support from other research group members,*’ and ‘*Discussion group meetings.*’ Only 1 participant selected the ‘Very dissatisfied’ option for the item ‘*The lab safety training I received,*’ reflecting 3.6%.

Table 22. Level of Satisfaction with Research Experience Characteristics (n =28)

Items	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very satisfied	Not applicable
<i>Information available to help me choose a research project</i>			32.10%	67.90%	
<i>Ease in asking questions/talking with my lab research scientists</i>			7.10%	92.90%	
<i>Lab or field equipment</i>		7.10%	21.40%	71.40%	
<i>Support and guidance from program staff</i>			17.90%	85.70%	
<i>Support and guidance from my lab research scientists</i>			17.90%	82.10%	
<i>Support from other research group members</i>		7.10%	14.30%	78.60%	
<i>Discussion group meetings</i>		10.70%	14.30%	75.00%	
<i>The lab safety training I received</i>	3.60%		7.10%	89.30%	

Note: 4-point scale ranging from 'Very dissatisfied' (1) to 'Very satisfied' (4)

Identical to previous sections, participants were asked to provide further comments on the above ratings (Table 23). Responses were more mixed in these comments compared to previous sections. Some responses were highly positive (e.g. “Research support from scientists was extraordinary.”) while other respondents indicated some level of frustration regarding their fellow group members. These responses included: “My group member Serenity was avsent [sic.] the last week and a half” and “I should have got a different group. Not a different lab, just different research group members.”

Table 23. Level of Satisfaction with Research Experience Characteristics Comments

Lab 1	Lab 2	Lab 3	Lab 4
	Research support from scientists was extraordinary.	My group member Serenity was avsent the last week and a half.	I should have got a different group. Not a different lab, just differerent research group members.
	N/A		Though I did not talk with many other labs, those that I did were very supportive.
			Earned support more from my science RAs than scientist.
			No

To end the survey, participants were asked to indicate the reason(s) for taking part in the program (Table 24). The main reasons indicated by participants were to *‘Have a good intellectual challenge’* (72.2%), *‘Gain hands on research experience’* (63.9%), and *‘Participate in a reputable program’* (63.9%). The least noted reasons were to *‘Clarify whether the college would be a good choice for me’* (36.1%) and *‘Clarify whether I wanted to pursue a science research career’* (47.20%). The comments offered by students in this section were mainly positive, and the reasons given for participating in the program ranged from the bonds created by the interaction with people in the lab to the credits and experienced gained (Table 25).

Table 24. Reasons for Participating in the Program

Reasons	Select all that apply
<i>Explore my interest in science</i>	58.30%
<i>Get good letters of recommendation</i>	61.10%
<i>Gain hands on research experience</i>	63.90%
<i>Clarify whether I wanted to pursue a science research career</i>	47.20%
<i>Have a good intellectual challenge</i>	72.20%
<i>Participate in a reputable program</i>	63.90%
<i>Work closely with scientists</i>	58.30%
<i>Enhance my resume</i>	58.30%
<i>Clarify which field I wanted to study</i>	50.00%
<i>Clarify whether college would be a good choice for me</i>	36.10%

Table 25. Reasons for Participating in the Program Comments

Lab 1	Lab 2	Lab 3	Lab 4
I wanted to understand what working in a lab felt like	To be able to talk and meet new people.	Got a chance to play college student which I am grateful for.	Gain experience w/a science such as immunology to decide a science that would be most beneficial in dental school.
	Meeting new people for a positive work atmosphere.		
	To try something new		

The next two questions were open-ended and provided the WWASP students an opportunity to provide feedback on how to make their research experience better and how to improve the Working with a Scientist Program. Student provided several comments on how to improve their research experience that mostly focused on timing and food. Several students noted that more time in the lab and less time in cogens would improve their research experience. Some of the comments included: “More time would have been nice, been able to plan everything more efficiently.”, “I think time is something I would like to have to continue my research better.”, “More time to do the work.”, and simply “More time”. Students also provide extensive commentary on how to improve the WWASP program. The main themes captured were similar

to the comments provided to the first question, where time and food were emphasized: “Nothing but more time to finish projects & more time to get results.”, “Nothing but more time to finish projects & more time to get results.” And “More time” again. Students also made reference issues concerning the structure of the program, specifically listing time management. Several students also voiced the need for better lunches.

Table 26. What would have made your research experience better?

Lab 1	Lab 2	Lab 3	Lab 4
More time.	More time	N/A	Not procrastinating
Nothing really, it was great.	N/A, nothing	N/A	I'm not really sure if anything could've made it better.
I know the experience was wholesome I only wish I had more of a foundation to have begun with, though that was the whole basis of the challenge.	I do not believe that anything more than this would make it any better.	More time to conduct research	I would manage my time better, and create a better communicatino besause things could have been handed differently.
Working with my partner to get what we had to do and asking questions to help me understand.	The research was amazing istelf. Interactions and connections with professionals made it fun! No changes needed.	More reserach time and preparation time	I think time is something I would really like to have to continue my research better.
More time would have been nice, been able to plan everything more efficiently.	More time to do the work.	I think maybe actually nothing everything was good.	Having our scientist in la more. I understand we had other priorities, but because of that my group members & myself were affected time + quality wise.
I'm very satisfied with the program, it transcending this idea of a summer program.	More innovation and creativity when choosing a project	A little more time would have been fun.	I needed to decide what my project was in the first weeks of the spring semester, instead of the first week of summer semester.m
I feel as if we had more time, our experience would have been better.		More time	

Table 27. What would improve the Working with a Scientist Program overall?

Lab 1	Lab 2	Lab 3	Lab 4
Better schedual, I guess I don't know much how else that can change.	Lunches would need more than a little sandwich.	More chemistry between people or more cooperation and dialogue between people	N/A Great program, aside from issues within the lab.
It was a great experience.	In my opininon, I don't think anything really would. This was a great and wonderful experience for me.	Cogen might be better in the afternoon.	Overall, I'd give this program more time because more time is needed.
Better accesibility to materials and tools needed to conduct experiments.	More options with what lab/science interests to choose from.	Better food	I would improve the lunch, time, and resources (lab sources)
Nothing but more time to finish projects & more time to get results.	Increasing the 1st semester sessions and cut down on the summer.	N/A	I dould like the program to have more time.
The program was great as it is!	Keep doing what your doing and make the journal questions less repetitive.	N/A	It does not matter; we lost our funding for next year.
I cannot think of anything negative affecting my lab; I am very happy working with Dr. Vines.		More fun days where we can all congregate and hang out	It is a great program, more scientists like Dr. Jacen Moore, refined cogens, and more enthusiastic, science-y students. Transparency.
It was great the way it is.		More time	

DISCUSSION

The findings from the Discussion Group Survey data suggest that students, in general, had a positive perception of themselves, others, and the group. This is indicated by the student responses to the survey and by the commentary provided. The students provided comments that were positive and showed appreciation for a learning environment focused on respect for self, others, and the group. These findings were in line with the findings of last year's report for Cohort 2. There is an area of concern noted from the results of the analysis. The outcomes of Lab 4 for each of the areas examined indicated a decrease in the perceptions of self, others and group and in some instances the decrease was significant.

The results of the Undergraduate Research Self-Assessment (URSSA) mirror the results of the Discussion Group Survey. Students in most instances gained valuable research experience from their participation in the program. The majority of students highly rated their experience in the program. The comments offered by the students focused on more lab time and less time on cogens discussions. Moreover, students voiced their concerns with the lunches provided and suggested WWASP student receive graduation tassels to highlight their participation. These sentiments are nearly identical to those expressed Cohort 2. It is thus a recommendation to specifically address lab time, lunches, and highlighting participation in future groups.

Appendix A

Working with a Scientist Program: Discussion Group Survey

First Name: _____ Middle Name: _____ Last Name: _____

Select the lab that you belong to:

- Lab 1 - Immunology
- Lab 2 - Engineering
- Lab 3 - Chemistry
- Lab 4 - Immunology

1. While reading the statements below, keep in mind your own thoughts and actions during the after-lab group discussions. Please rate each statement by circling the answer that best reflects your perceptions about the after-lab group discussions (ranging from 'Never' to 'Always').

Statements	Never	Rarely	Sometimes	Most of the Time	Always
a. I strive to make sense of what others are saying.	1	2	3	4	5
b. I try to get others to contribute to what is being discussed.	1	2	3	4	5
c. I feel like I have the opportunity to speak as much as others in my group.	1	2	3	4	5
d. My talk is respectful.	1	2	3	4	5
e. When others talk, I listen to what they have to say.	1	2	3	4	5
f. When I talk, I build on what others have to say.	1	2	3	4	5
g. I try to learn from other's talk.	1	2	3	4	5

h. I try to understand different perspectives.	1	2	3	4	5
i. I value different perspectives of those in my group	1	2	3	4	5
j. I feel as if I belong to this group.	1	2	3	4	5
k. I maintain focus during dialogue.	1	2	3	4	5
l. My oral contributions are thoughtful.	1	2	3	4	5
m. As I listen to others, I attempt to put aside my own perspectives and understand theirs.	1	2	3	4	5
n. I am willing to consider others' ideas.	1	2	3	4	5
o. I value different perspectives.	1	2	3	4	5

2. Please provide any comments you may have concerning any of the statements or anything related to your discussions in the group that applies to your ratings.

3. While reading the statements below, keep in mind other group members' behavior during the after-lab group discussions. Please rate each statement by circling the answer that best reflects your perceptions of occurrence (ranging from 'Never' to 'Always').

Statements	Never	Rarely	Sometimes	Most of the Time	Always
a. Others in my group try to make sense of what I am saying	1	2	3	4	5
b. Others in my group try to get me to contribute during discussions	1	2	3	4	5
c. Others in my group have the opportunity to speak as much as I do.	1	2	3	4	5
d. Others in my group show respect for one another.	1	2	3	4	5
e. When I talk, others in my group listen to what I have to say.	1	2	3	4	5
f. When others in my group talk, they build on what I have to say.	1	2	3	4	5
g. Others in my group strive to learn from my oral contributions.	1	2	3	4	5
h. Others in my group try to understand different perspectives.	1	2	3	4	5
i. Others in my group value my perspective.	1	2	3	4	5
j. Others in my group have a sense of solidarity.	1	2	3	4	5
k. Others in the group maintain focus during dialogue.	1	2	3	4	5
l. Others' oral contributions are thoughtful.	1	2	3	4	5
m. Others set aside their perspectives when they listen to me.	1	2	3	4	5

n. Others in my group are willing to consider my ideas.	1	2	3	4	5
o. Others value different perspectives.	1	2	3	4	5

4. Please provide any comments you may have concerning any of the statements or anything related to your discussions in the group that applies to your ratings.

5. Think back to your group discussion time; please rate each statement below by circling the answer that best reflects your perceptions of occurrence (ranging from 'Never' to 'Always').

Statements	Never	Rarely	Sometimes	Most of the Time	Always
a. The group strives to have all voices heard.	1	2	3	4	5
b. Different perspectives are valued by the group	1	2	3	4	5
c. The group strives to incorporate all perspectives.	1	2	3	4	5
d. There is a shared mood in the group.	1	2	3	4	5
e. There is harmony with discussions in the group	1	2	3	4	5
f. Dialogue in the group is timely.	1	2	3	4	5
g. Dialogue in the group is appropriate.	1	2	3	4	5
h. Dialogue in the group is predictable.	1	2	3	4	5

i. During group discussions there is at least one review of what was accomplished.	1	2	3	4	5
j. Different perspectives from members of the group have contributed to my own learning.	1	2	3	4	5

6. Please provide any comments you may have concerning any of the statements or anything related to your group that applies to your ratings.

7. Do you have any other comments or concerns about the Working with a Scientist Program, or suggestions for improving the program?

Thank you for your time!

Appendix B

Working With A Scientist Program

Research Experience Survey

First Name: _____ Middle Name: _____ Last Name: _____

Select the lab that you belong to:

- Lab 1 - Immunology
- Lab 2 - Engineering
- Lab 3 - Chemistry
- Lab 4 - Immunology
-

Please be as precise as you can in your answers. Please choose 'not applicable' for any activity you did not do. You may find one or more questions at the end of some sections that invite an answer in your own words. Please be open and honest with your answers, keeping in mind that future students who participate in the program will benefit from your thoughtfulness. Remember that all your answers will be kept confidential; the program staff and program scientists will not know what any individual student has answered or written.

1. Gains in Thinking and Working Like a Scientist: Application of Knowledge to Research

How much did you gain in the following areas as a result of your research experience?

	No gain	A little gain	Moderate gain	Good gain	Great gain	Not Applicable
a. Analyzing data for patterns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Figuring out the next step in a research project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Problem-solving in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Formulating a research question that could be answered with data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Identifying limitations of research methods and designs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Understanding the theory and concepts guiding my research project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

g. Understanding the connections among scientific disciplines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Understanding the relevance of research to my coursework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. Personal Gains Related to Engagement in Research

How much did you gain in the following areas as a result of your research experience?

	No gain	A little gain	Moderate gain	Good gain	Great gain	Not Applicable
a. Confidence in my ability to contribute to science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Comfort in discussing scientific concepts with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Comfort in working collaboratively with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Confidence in my ability to do well in future science courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Ability to work independently	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Developing patience with the slow pace of research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Understanding what every day research is like	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Taking greater care in conducting procedures in the lab or field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Gains in Skills

How much did you gain in the following areas as a result of your research experience?

	No gain	A little gain	Moderate gain	Good gain	Great gain	Not Applicable
a. Writing scientific reports or papers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Making oral presentations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Defending an argument when asked questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Explaining my project to people outside the field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Preparing a scientific poster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

f. Keeping a detailed lab notebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Conducting observations in the lab or field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Using statistics to analyze data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Calibrating instruments needed for measurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Working with computers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Understanding journal articles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Conducting database or internet searches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Managing my time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. The following questions ask about your overall research experience and about any changes in your attitudes or behaviors as a researcher.

During your research experience HOW MUCH did you?	None	A little	Some	A fair amount	A great deal	Not Applicable
a. Engage in real-world science research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Feel like a scientist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Think creatively about the project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Try out new ideas or procedures on your own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Feel responsible for the project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Work extra hours because you were excited about the research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Interact with scientists from outside your lab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Feel a part of a scientific community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. These questions ask about your research experience

Please rate the following	Poor	Fair	Good	Excellent	Not Applicable
a. My working relationship with my research lab scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. My working relationship with my research group members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. The amount of time I spend doing meaningful research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. The amount of time I spend with my research lab scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. The advice my research lab scientists provide about college	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. The research experience overall	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. These question continue to ask about your research experience

Rate how much you agree or disagree with the following statements	Strongly disagree	Disagree	Agree	Strongly Agree	Not Applicable
a. My research experience has prepared me for advanced coursework in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. My research experience has motivated me to attend college	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. My research experience has prepared me for college	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Doing research clarified for me which field of study I want to pursue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please comment on any of these statements.

7. These questions also continue to ask about your research experience

How satisfied were you with the following aspects of the research program?

	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very satisfied	Not Applicable
a. Information available to help me choose a research project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Ease in asking questions/talking with my lab research scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Lab or field equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Support and guidance from program staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Support and guidance from my lab research scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Support from other research group members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Discussion group meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. The lab safety training I received	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please comment on any of these aspects.

8. What motivated you to apply to take part in the program?

I wanted to participate in this research experience to:

Select all that apply

a. Explore my interest in science	<input type="radio"/>
b. Gain hands on research experience	<input type="radio"/>
c. Clarify which field I wanted to study	<input type="radio"/>
d. Clarify whether college would be a good choice for me	<input type="radio"/>
e. Clarify whether I wanted to pursue a science research career	<input type="radio"/>
f. Have a good intellectual challenge	<input type="radio"/>

g. Work closely with scientists	<input type="radio"/>
h. Participate in a reputable program	<input type="radio"/>
i. Get good letters of recommendation	<input type="radio"/>
j. Enhance my resume	<input type="radio"/>
k. Other (please specify in the space below)	<input type="radio"/>

Other:

9. What would have made your research experience better?

10. What would improve the Working With A Scientist Program overall?

Please note that this survey is based on the Undergraduate Research Student Self-Assessment (URSSA). Information on URSSA can be found at:

<http://www.colorado.edu/eer/research/undergradtools.html>