Working With A Scientist Program (WWASP): A Summative Evaluation of Cohort 2

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EXECUTIVE SUMMARY

This report is part of a four-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 impact on the first two cohorts of student-participants. This program selected participants from local high schools to take part in research activities for the spring and summer semester. 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 had on the second cohort of students' perceptions of their 'self', 'others' and the 'group' as a whole was assessed using the results of the Group Discussion Survey. Next, data from the Undergraduate Research Student Self-Assessment (URSSA), which measures perceptions of gains related to science, were analyzed. Finally, results from a third survey that was administered to the family members of the WAASP students were also assessed.

Evaluation results show that:

In relation to the first cohort participants

- Students who were part of the Experimental Internship Group had a greater increase in average GPA than students in other groups after their participation in the program.
- Students in the Experimental Internship Group had a 100% graduation rate.

In relation to the second cohort of student participants
- The academic outcomes of the WWASP students were analyzed by high school. WWASP students from Chapin High School had a slight increase in their cumulative 2015 GPA.
- The findings suggest that the participants' self-perception did not increase from the pre- to the post- test and students had higher perceptions of 'self' during interactions with others during group discussions at the beginning of the WWASP program.
  - The outcomes were significantly larger for only one item (p < .05): *I value different perspectives.*
- An analysis on 'the perceptions of 'self' was conducted by lab. Labs 1, 3 and 4 showed an increase in post-scores in several of the items measured. Lab 2 showed a decrease in the 'perception of self' in every item measured.
- The analysis indicates that the perceptions of 'Others' were higher in most items in the pre-survey at the onset of the program. Although, three items showed statistically significant gains in the post-survey.
  - Three items showed gains and were statistically significant: *Others in my group try to make sense of what I am saying t(33) = -2.260, p < .05; Others in my group try to get me to contribute during discussion t(33) = -2.727, p < .05*, and *Others in my group have a sense of solidarity t(33) = -2.104, p < .05.*
- No significant differences were found between pre- and post-discussion survey scores on most items related to the 'group'
- The 'perception of others' by lab were very similar to the results for the perception of 'self' in Lab 2.
  - Lab 2: Neurochemistry was the only lab where all the items were higher during the pre-survey.
- A significant difference between the pre- and post-survey scores was only noted in one item when measuring the 'perceptions of the group' in group discussions: *Dialogue in the group is timely t(33) = -2.222, p < .05.*

- The majority of students indicated that they joined the program to gain hands on experience and have a good intellectual challenge.
- The outcomes of the Family Member Survey indicate that the WWASP students have shown interest science since their 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. Further, a second goal of WWASP program is to increase the participants' interest in STEM disciplines by providing students the early-research opportunities. Junior-level students from regional high schools were encouraged to apply during the fall of 2014. A total of 36 students were selected as part of Cohort 2 and were placed into one of the four labs in the University of Texas at El Paso (UTEP). 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. All of the students in Cohort 2 participated in cogens. Students' research impacts on their academic performance and school retention were assessed by using a quasi-experimental design.

METHODS

To assess the continued performance of WWASP through the second cohort of student-participants, several methods were implemented. First, a review and analysis of the 1st and 2nd cohort of students' academic performance was conducted. Next, students in the 2nd cohort were 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 February 21, 2015 and once again at the end of the program on July 24, 2015. The participants in the 1st cohort were also surveyed with the same instruments during their participation in program activities; those results were presented in a previous evaluation report. Finally, the family members of student-participants were also surveyed to learn if there were any differences in the interest in STEM displayed by the student-participants as a result or program participation. Note that three participants from the 2nd cohort dropped from the program less than mid-way through program activities. Therefore, data presented for the 2nd cohort focus on the 33 program participants who remained in the program.

RESULTS

Academic Results Cohort 1

The academic performance data for student participants was provided by the El Paso Independent School District from which all participants were recruited. The first dataset examined the academic performance of the first cohort. The data included participants cumulative 2013 GPA, the year prior to program participation, cumulative 2014 GPA, the year the students in cohort 1 participated in the program and the cumulative 2015 GPA, which was the post-program participation year.

The first cohort of the WWASP program included the following four students groups: Experimental Internship Group (research experience with cogens); Control Internship Group (research experience with traditional discussions); Un-retained Internship Groups (started with research experience with traditional discussion or cogens but dropped from the program); and Non-internship Control Group (had no research experience or dialogues/discussions). Note that the attrition rate was quite high in the first cohort of students, and that an attempt was made to replace some of the students who dropped from the program early on; yet, the number did not reach the 36 participants that the program initially intended to train and support. Note also that data for the fall of 2015 was available and analyzed for all four groups. In order to establish a valid comparison, the data was only reported for those students that had academic data for all the three years analyzed.

The results of the descriptive analysis for cohort 2 indicate that in the fall of 2015 the student group with the highest GPA was the Experimental Internship Group (n =13) with an average cumulative GPA of 87.68 (based on a 100-point scale). In the academic year after the students in the Experimental Internship Group completed the program (from fall 2014 to fall 2015) their cumulative GPAs dropped 1.57 points. However, the GPA of the Experimental Internship Group increased 3.1 points from the onset of the program (from the fall of 2013 to the fall of 2014). The Control Internship Group (n=12) had an average cumulative GPA of 85.91 in the fall of 2015 and experienced a drop of 3.25 points from the fall of 2014. The Un-retained Internship Group (n =12) had a slight drop in GPA of 0.39 points a year after their participation in the program. The only group that experienced an increase in their GPA for the fall of 2015 was the Complete Control Group (n =16), 1.51 increase. It is important to note, that the Complete Control Group did not participate in any of the activities offered by the WWASP program. These findings suggest that there was an academic benefit for students in the Experimental Internship Group. However, it is important to note, that the only group that showed an increase in GPA a year after the program was the Complete Control Group. Table 1 highlights the data discussed above.

Table 1. Academic Performance Cohort 1

Group	Fall 2013 Mean GPA	STD	Fall 2014 Mean GPA	STD	Fall 2015 Mean GPA	STD	2014 - 2015 Program Mean Difference
Experimental Internship Group (n = 13)	86.15	7.74	89.25	4.65	87.68	8.43	-1.57
Control Internship Group (n = 12)	90.08	4.45	89.16	5.89	85.91	7.18	-3.25
Un-retained Internship Group (n = 12)	87.36	5.65	85.39	7.68	85.00	8.14	-0.39
Complete Control Group (n = 16)	81.73	7.33	81.26	8.15	82.77	6.79	1.51

GPAs are based on a 100-point scale.

Graduation Rates

The program graduation rate for participants was also examined by group. The graduation rates were available for 60 of the student participants who were either the Experimental Internship Group, Control Internship Group, Un-retained Internship Group or Complete Control Group. It is important to highlight that the students assigned to the Experimental Internship Group (n =14), which received all the benefits of the WWASP program, had a 100% graduation rate. The next highest graduation rate was for students in the Un-retained Internship Group (n = 15) with a graduation rate of 93.3%. Students in the Control Internship Group (n = 14) had a graduation rate of 92.9%. The lowest graduation rate was for students in the Complete Control Group (n = 18). The graduation rate for these students was 83.3%, almost 10-percentage points below the Control Internship Group. These findings suggest that students that were involved in some aspect of the WWASP program had higher success rates in graduation that those students that did not

participate in any of the activities. Thus, while the program may not impact academic performance, it may positively impact graduation rates. The graduation rates are highlighted in Table 2.

Table 2. Graduation Rates of Cohort 1

Group	Graduation Rate
Experimental Internship Group (n = 13)	100%
Control Internship Group (n = 14)	92.9%
Un-retained Internship Group (n = 15)	93.3%
Complete Control Group (n = 18)	83.3%

Academic Results Cohort 2

As noted previously, the academic performance data for the student participants was provided by the El Paso Independent School District. The dataset for the second cohort included participants' cumulative GPA for the fall of 2014, their GPA prior to WWASP participation, and cumulative GPA for the fall of 2015, the year the students in Cohort 2 participated in the WWASP program. Additionally, the dataset included the student's current campus and if they qualified for free and/or reduced lunch. The WWASP program's Cohort 2 only had an Experimental Internship Group. The WWASP students participated in all the program's events and the cogens. The data was analyzed for all students in Cohort 2 and by campus and economically disadvantaged status.

The average GPA for Cohort 2 (n= 33) prior to participation in the program was 91.88 with a mean standard deviation of 4.97. The year the students participated in the WWASP program their cumulative GPA slightly dropped to 90.45, which is a decrease of approximately -1.43 points. The same data was analyzed by the student's home campus. Students attending Andress High School (n= 17) had a cumulative an average GPA of 93.04 in the fall prior to their participation in the WWASP program. Their average cumulative GPA while in the program was 91.59 (fall 2015) which represented a decrease of -1.45 points. Students in Chapin High School (n= 10) had an average cumulative GPA of 89.31 (fall 2014) prior to their participation in the program and an average cumulative GPA of 89.51 (fall 2015) while in the program. The Chapin High School students had a slight increase of 0.20 in their average cumulative GPA. The last high school represented was Irving High School with six students participating in WWASAP Program. The average cumulative GPA for these students in the fall of 2014 was 93.08 and while in the program the students' average cumulative GPA dropped to 89.31. This was the highest drop in average GPA for the three high schools. Thus, the only high school with an increase in average GPA was Chapin High School.

The WWASP participants were coded into two categories: Economically Disadvantaged and non-Economically Disadvantaged. The data was disaggregated by these two categories. The WWASP students that were not coded as Economically Disadvantaged had an average cumulative GPA of 92.07 in the fall of 2014 and an average cumulative GPA of 91.81 the year they participated in the program. These students had a slight drop of -0.26 in their cumulative GPA. Student that were coded as Economically Disadvantaged had an average GPA of 91.67 in the fall of 2014 and 89.10 in the fall of 2015. These students had a drop of -2.57 in their cumulative GPA.

In general, students that participated in the WWASP program in the fall of 2015 experienced a drop in their average cumulative GPA. The only exception were the WWASP students from Chapin High School that had a slight increase in their cumulative GPA. This comparison will be analyzed once more in the 2017 Evaluation Report to determine the impact of the program after the

student's participation in the program in the fall of 2016. Table 3 below highlights the above referenced findings.

Table 3. Academic Performance Cohort 2

Group	Fall 2014 Mean GPA	STD	Fall 2015 Mean GPA	STD	2014/2015 Program Mean Difference
WWASP Students (n= 33)	91.88	4.97	90.45	6.62	-1.43
Andress High School (n= 17)	93.04	4.81	91.59	7.26	-1.45
Chapin High School (n= 10)	89.31	4.30	89.51	5.66	0.20
Irving High School (n= 6)	93.08	5.49	89.31	7.00	-3.77
No Economically Disadvantaged (n= 17)	92.07	5.04	91.81	6.69	-0.26
Economically Disadvantaged (n= 16)	91.67	5.05	89.10	6.44	-2.57

GPAs 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 'other' in group discussions are similar but are modified to fit each category. Statements related to the 'group' are slightly different because they pertain to perception of the group overall. To assess all items under these three categories, respondents used a scale ranging from 'Never' (1) to 'Always' (5). There were a total of 15 items each for perceptions about the 'self', 'others' and 10 items for the 'group' section.

Pre- and post- Discussion Group Surveys were administered once a couple of 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, a paired sample t test was conducted. Group means scores obtained for each item in the pre-assessment were subtracted from mean scores for each item of the post-assessment. Accordingly, a negative mean difference signifies that the post-survey score obtained on the 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.

The first section of the survey examined the student's perceptions of 'Self' in group discussions. The findings indicate that the post- scores were higher than the pre-scores in only one item. The item with the gains in mean difference stated the following*: I try to get others to contribute to what is being discussed.* Further, this item was found to be statistically significant, $t(33)=-2.07$, $p < .05$, which indicates that the students showed gains from the pre- to post-survey. Moreover, there was a second item with a statistically significant decrease. This item reads, *I value different* p*erspectives*, $t(33)= 2.26$, $p < .05$. In general the findings suggest that the participants' self-perception did not increase from the pre- to the post- test and students had higher perceptions of 'self' during interactions with others during group discussions at the beginning of the WWASP program. Table 4 highlights the findings.

Table 4. Perception of Self during Group Discussions

Items	Pre Mean (n=33)	Post Mean (n=33)	Mean Diff	SD Diff	t	p
I strive to make sense of what others are saying.	4.45	4.27	.18	.727	1.43	.160
I try to get others to contribute to what is being discussed.	3.61	3.94	-.33	.924	-.006	*.046*
I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.	4.64	4.58	.06	.998	.415	.730
My talk is respectful.	4.73	4.58	.15	.619	.371	.169
When others talk, I listen to what they have to say.	4.78	4.53	.25	.718	1.96	.058
When I talk, I build on what others have to say.	4.58	4.39	.18	.727	1.43	.160
I try to learn from other's talk.	4.73	4.58	.15	.667	1.30	.201
I try to understand different perspectives.	4.64	4.52	.12	.600	1.16	.254
I value different perspectives of those in my group.	4.67	4.48	.18	.769	1.35	.184
I feel as if I belong with this group.	4.64	4.58	.06	1.029	.338	.737
I maintain focus during dialogue.	4.31	4.22	.09	.893	.594	.557
My oral contributions are thoughtful.	4.42	4.36	.06	.788	.442	.662
As I listen to others, I attempt to put aside my own perspectives and understand theirs.	4.33	4.33	.00	.791	.000	1.00
I am willing to consider others' ideas.	4.70	4.58	.12	.696	1.00	.325
I value different perspectives.	4.70	4.45	.24	.614	2.26	*.030*

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

The next section of this report examined the differences in the perceptions of 'self' in group discussions by lab. Students in the second cohort were assigned randomly to one of four labs. The labs included the following: Lab 1: Biochemistry of Plants; Lab 2: Neurochemistry; Lab 3: Immunology, and Lab 4 Immunology.

In Lab 1: Biochemistry eight of the fifteen items had negative means. This indicates that the post-scores were greater than the pre-scores, thus the perceptions of 'self' were higher in the post-survey for those eight items. A sampling of the items with higher scores included: *I feel like I have the opportunity to speak as much as others to contribute to what is being discussed, My talk is respectful, When others talk, I listen to what they have to say, When I talk,* and *I build on what others have to say.* Moreover, one item was found to be statistically significant: *I try to get others to contribute to what is being discussed t(8)* = -2.401, p < .05. Approximately, 53% of the items the post-scores were higher than the pre-scores.

The outcomes of Lab 2: Neurochemistry were somewhat different than the results for Lab 1: Biochemistry of Plants. None of the items had gains in the post-survey which indicates that the perceptions of 'self' decreased from the pre-survey to the post-survey, thus the perceptions of 'self' were lower in the post-survey. One item, *I try to contribute to what is being discussed*, had the same score in the pre- and post-survey. Five items decreased and were found to be statically significant in the perceptions of 'self' in group discussions: *When others talk, I listen to what they have to say t(7) = 3.240, p < .05, I feel like I have the opportunity to speak as much as others to contribute to what is being discussed t(7) = 2.500, p < .05, My talk is respectful t(7) = 2.500, p < .05, I feel as if I belong with this group t(7) = 2.500, p < .05,* and *I am willing to consider others' ideas t(7) = 2.521, p < .05.* As noted previously, in this lab there were no gains in the post-survey for any of the items measured.

The outcomes of Lab 3: Immunology were more similar to the outcomes of Lab 1. Seven items showed gains included the following: *I try to get others to contribute to what is being discussed, I feel like I have the opportunity to speak as much as others to contribute to what is being discussed, I feel as if I belong with this group, I maintain focus during dialogue, As I listen to others, I attempted to put aside my own perspectives and understand theirs, I am willing to consider others' ideas* and *I value different perspectives.* It should be noted, that although seven items showed gains none were found to have statistically significant.

In Lab 4: Immunology only four items had gains indicating that the post-scores were higher than the pre-scores. These items included: *I try to get others to contribute to what is being discussed, I maintain focus during dialogue, My oral contributions are thoughtful,* and *As I listen to others, I attempt to put aside my own perspectives and understand theirs.* Similar to Lab 3 none of the gains were found to be statistically significant. Moreover, the majority of items for this lab did not show gains. Tables 5 and 6 highlight the findings for the four labs.

Table 5. Perception of Self during Group Discussion by Lab 1 & 2

Items	Lab 1: Biochemistry of Plants (n = 9; *df* = 8)						Lab 2: Neurochemistry (n = 7; *df* = 6)					
	Pre Mean	*Post Mean*	*Mean Diff*	*SD Diff*	*t*	*p*	*Pre Mean*	*Post Mean*	*Mean Diff*	*SD Diff*	*t*	*p*
I strive to make sense of what others are saying.	4.33	4.33	.00	.500	.000	1.00	4.14	3.57	.57	.787	1.922	.103
I try to get others to contribute to what is being discussed.	3.11	3.89	-.78	.972	-2.401	*.043*	3.57	3.57	.00	.816	.000	1.000
I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.	4.67	4.89	-.22	.833	-.800	.447	4.86	4.14	.71	.756	2.500	*.047*
My talk is respectful.	4.56	4.67	-.11	.601	-.555	.594	4.86	4.14	.71	.756	2.500	*.047*
When others talk, I listen to what they have to say.	4.56	4.78	-.22	.667	-1.000	.347	4.86	3.86	1.00	.816	3.240	*.018*
When I talk, I build on what others have to say.	4.44	4.56	-.11	.601	-.555	.594	4.29	4.00	.29	.756	1.000	.356
I try to learn from other's talk.	4.56	4.67	-.11	.782	-.426	.681	4.57	4.00	.57	.787	1.922	.103
I try to understand different perspectives.	4.44	4.67	-.22	.667	-1.000	.347	4.57	4.00	.57	.787	1.922	.103
I value different perspectives of those in my group.	4.67	4.56	.11	.782	.426	.681	4.43	4.00	.43	.976	1.162	.289
I feel as if I belong with this group.	4.67	4.44	.22	1.20	.555	.594	4.86	4.14	.71	.756	2.500	*.047*
I maintain focus during dialogue.	4.33	4.33	.00	1.00	.000	1.00	4.14	3.43	.71	.951	1.987	.094
My oral contributions are thoughtful.	4.44	4.44	.00	.707	.000	1.00	4.14	3.71	.43	1.134	1.000	.356
As I listen to others, I attempt to put aside my own perspectives and understand theirs.	4.44	4.33	.11	.928	.359	.729	4.00	3.57	.43	.787	1.441	.200
I am willing to consider others' ideas.	4.56	4.67	-.11	.601	-.555	.594	4.71	3.86	.85	.900	2.521	*.045*
I value different perspectives.	4.78	4.44	.33	.500	2.000	.081	4.57	3.86	.71	.756	2.500	*.047*

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

Table 6. Perception of Self during Group Discussion by Lab 3& 4

Items	Lab 3: Immunology (n = 8; df = 7)						Lab 4: Immunology (n = 9; df = 8)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
I strive to make sense of what others are saying.	4.50	4.25	.25	.707	1.00	.351	4.78	4.78	.00	.866	.000	1.000
I try to get others to contribute to what is being discussed.	4.00	4.13	-.12	.835	-.424	.685	3.78	4.11	-.33	1.00	-1.000	.347
I feel like I have the opportunity to speak as much as others to contribute to what is being discussed.	4.38	4.63	-.25	1.282	-.552	.598	4.67	4.56	.11	.928	.359	.729
My talk is respectful.	4.63	4.63	.00	.535	.000	1.00	4.89	4.78	.11	.333	1.000	.347
When others talk, I listen to what they have to say.	4.71	4.57	.14	.378	1.00	.356	5.00	4.78	.22	.441	1.512	.169
When I talk, I build on what others have to say.	4.63	4.38	.25	.707	1.00	.351	4.89	4.56	.33	.866	1.155	.282
I try to learn from other's talk.	4.88	4.75	.12	.354	1.00	.351	4.89	4.78	.11	.601	.555	.594
I try to understand different perspectives.	4.75	4.63	.12	.354	1.00	.351	4.78	4.67	.11	.333	1.000	.347
I value different perspectives of those in my group.	4.88	4.63	.25	.463	1.528	.170	4.67	4.67	.00	.866	.000	1.000
I feel as if I belong with this group.	4.25	4.88	-.62	1.061	-1.657	.140	4.78	4.78	.00	.707	.000	1.000
I maintain focus during dialogue.	4.38	4.50	-.12	.354	-1.00	.351	4.38	4.50	-.12	.991	-.357	.732
My oral contributions are thoughtful.	4.50	4.50	.00	.756	.000	1.00	4.56	4.67	-.11	.601	-.555	.594
As I listen to others, I attempt to put aside my own perspectives and understand theirs.	4.50	4.63	-.12	.354	-1.00	.351	4.33	4.67	-.33	.866	-1.155	.282
I am willing to consider others' ideas.	4.75	4.88	-.12	.354	-1.00	.351	4.78	4.78	.00	.500	.000	1.000
I value different perspectives.	4.50	4.75	-.25	.463	-1.528	.170	4.89	4.67	.22	.441	1.512	.169

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

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'. Comments were mostly positive, and showed that students have good perceptions about their discussions. Further, the majority of comments focused on how "respectful" the lab environments were. Accordingly, student participants seem to feel that the group discussions are a safe and respectful environment to effectively communicate. These comments include: "*Everyone always had their time to speak*", "*I loved my group, there's respect*" and "*We had great discussion and everyone felt comfortable in the atmosphere we created (super friendly)*". Table 7 below provides the feedback for this set of statements.

Table 7. Perception of Self during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
Everyone always had their time to speak.	Make them more neutral environment.	My lab and I have the ultimate level of compatibility which made our experience better than all the rest!	Enjoyed my group and group members.
I loved my group, there's respect.	Most of the time I am completely focused but sometimes I am tired,	Our cogen and any overall conversation was a valuable one and we never had a dull moment. Every dialogue was one we learned from and because of that, I feel successful.	Some people spoke too much and just went in circles with their dialogue.
My group was very respectful when conducting cogenerative dialogues.		We had great discussions and everyone felt comfortable in the atmosphere we created (super friendly).	Sometimes I feel like I do not belong because my way of thinking is much different than those of my group.
My lab was very respectful and super motivational! Lab 1 is the best lab! #Team John Bearden			We might as well have been family.

The next section of the survey examined the 'perception of others' during group discussions. Results from this section of the pre- and post-survey show three out of the fifteen questions had gains. The items that obtained the highest gains included: *Others in my group try to make sense of what I am saying, Others in my group try to get me to contribute during discussions,* and *Others in my group have a sense of solidarity.* Additionally, the three items showing gains were also statistically significant: *Others in my group try to make sense of what I am saying* $t(33) = -2.260$, $p < .05$; *Others in my group try to get me to contribute during discussion* $t(33) = -2.727$, $p < .05$, and *Others in my group have a sense of solidarity* $t(33) = -2.104$, $p < .05$. Moreover, five items showed statistically significant decreases from the pre- to the post-survey: *Others in my group show respect for one another* $t(33) = 4.177$, $p < .01$; *When I talk, other sin my group listen to what I have to say* $t(33) = 4.977$, $p < .01$; *Others in my group try to understand different perspectives* $t(33) = 3.645$, $p < .05$; *Others in the group maintain focus during dialogue* $t(33) = 2.101$, $p < .05$; and *Others' oral contributions are thoughtful* $t(33) = 2.179$, $p < .05$. These findings indicate that the perceptions of 'Others' were higher in most items in the pre-survey at the onset of the program. The table below highlights the findings of this analysis.

Table 8. Perceptions of Others during Group Discussions

Items	Pre Mean (n=33)	Post Mean (n=33)	Mean Diff	SD Diff	t	p
Others in my group try to make sense of what I am saying.	4.15	4.55	-.39	.864	-2.620	*.013*
Others in my group try to get me to contribute during discussions.	3.73	4.42	-.69	1.468	-2.727	*.010*
Others in my group have the opportunity to speak as much as I do.	4.64	4.39	.24	.969	1.437	.160
Others in my group show respect for one another.	4.85	4.27	.57	.792	4.177	*.000*
When I talk, others in my group listen to what I have to say.	4.91	4.18	.72	.839	4.977	*.000*
When others in my group talk, they build on what I have to say.	4.48	4.39	.09	.765	.683	.500
Others in my group strive to learn from my oral contributions.	4.36	4.36	.00	.829	.000	1.000
Others in my group try to understand different perspectives.	4.36	3.70	.66	1.051	3.645	*.001*
Others in my group value my perspective.	4.67	4.18	.48	.712	3.909	*.000*
Others in my group have a sense of solidarity.	3.88	4.38	-.50	1.344	-2.104	*.044*
Others in the group maintain focus during dialogue.	4.45	4.09	.36	.994	2.101	*.044*
Others' oral contributions are thoughtful.	4.55	4.27	.27	.719	2.179	*.037*
Others set aside their perspective when they listen to me.	4.27	4.27	.00	1.031	.000	1.000
Others in my group are willing to consider my ideas.	4.64	4.27	.36	.929	2.248	*.032*
Others value different perspectives.	4.52	4.27	.24	.902	1.543	.133

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

Similar to the previous section discussing the 'perceptions of self', this section examined the perception of 'Others' by lab. As noted previously, students in the second cohort were assigned randomly to one of four labs. The labs included the following: Lab 1: Biochemistry of Plants; Lab 2: Neurochemistry; Lab 3: Immunology, and Lab 4 Immunology. Interestingly, the results of the analysis were very similar to the results for the perception of 'self' where Lab 2: Neurochemistry was the only lab where all the items were higher during the pre-survey. Below is a discussion of the analysis for each lab.

In the Biochemistry of Plants lab five out of the fifteen items had improved scores in the post-survey. These items included: *Others in my group try to make sense of what I am saying, Others in my group try to get me to contribute during discussions, When others in my group talk, they build on what I have to say, Others, in my group strive to learn from my oral contributions* and *Others in my group have a sense of solidarity.* However, none of these items were statistically significant. On the other hand, four items in this section were found to have a statistically significant decrease: *Others in my group show respect for one another* $t(9) = 3.162$, $p < .05$; *Others in my group value my perspective* $t(9) = 2.828$, $p < .05$; *Others' oral contributions are thoughtful* $t(9) = 3.162$, $p < .05$, and *Others in my group are willing to consider my ideas* $t(9) = 4.000$, $p < .05$. These findings indicate that there was a significant difference in scores of the pre-survey when compared to the post-survey in four items indicating the perceptions of 'Others' decreased. Although post-survey scores made gains in five items, the gains were not statistically significant.

In Lab 2: Neurochemistry none of the items had any gains in the post-survey. This indicates that the survey scores were higher in the pre-survey than in the post-survey, to be precise the perceptions of others decreased from the pre-survey to the post-survey. Furthermore, three items showed statistically significant decreases. These items included the following: *Others in my group have the opportunity to speak as much as I do* $t(7) = 4.382$, $p < .05$; *Others in my group show respect for one another* $t(7) = 4.382$, $p < .05$, and *When I talk, others in my group listen to what I have to say* $t(33) = 4.500$, $p < .05$.

Lab 3: Immunology had the highest number of items with gains in the post-survey of all the labs. Notable items: *Others in my group try to make sense of wat I am saying, Others in my group try to get me to contribute during discussions*; *When others in my group talk, they build on what I have to say, Others' oral contributions are thoughtful*, and *Others in my group are willing to consider my ideas.* It is important to note that only two items were found to be statistically significant: Others in my group try to make sense of what I am saying $t(8) = -5.292$, $p < .05$ and *Others in my group try to get me to contribute during discussion* $t(8) = -3.416$, $p < .05$. Table 4 highlight the items above.

The outcomes of Lab 4: Immunology showed gains in four of the items measured. These items included: *Others in my group try to make sense of what I am saying, Others in my group try to get me to contribute during discussions, Others in my group have a sense of solidarity*, and *Others set aside their perspective when they listen to me.* Moreover, two items showed to be statistically significant gains: *When I talk, others in my group listen to what I have to say* $t(9) = 3.411$, $p < .05$ and *Others in my group value my perspective* $t(9) = 3.500$, $p < .05$. Though, four items showed gains the majority of items had a decrease in scores from the pre- to the post-survey. Tables 9 and 10 further illustrates the findings of this analysis.

Table 9. Perceptions of Others during Group Discussions by Lab 1 & 2

Items	Lab 1: Biochemistry of Plants (n = 9; df = 8)						Lab 2: Neurochemistry (n = 7; df = 6)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
Others in my group try to make sense of what I am saying.	4.33	4.67	-.33	.707	-1.414	.195	4.29	4.29	.00	.577	.000	1.000
Others in my group try to get me to contribute during discussions.	3.56	4.78	-1.22	1.641	-2.234	.056	3.86	3.71	.15	1.464	.258	.805
Others in my group have the opportunity to speak as much as I do.	4.44	4.44	.00	1.000	.000	1.000	4.86	3.71	1.15	.690	4.382	***.005***
Others in my group show respect for one another.	5.00	4.44	.56	.527	3.162	***.013***	4.71	3.57	1.14	.690	4.382	***.005***
When I talk, others in my group listen to what I have to say.	5.00	4.44	.56	.726	2.294	.051	4.86	3.57	1.29	.756	4.500	***.004***
When others in my group talk, they build on what I have to say.	4.44	4.56	-.11	.601	-.555	.594	4.29	3.71	.57	.787	1.922	.103
Others in my group strive to learn from my oral contributions.	4.44	4.56	-.11	.601	-.555	.594	3.86	3.57	.29	.951	.795	.457
Others in my group try to understand different perspectives.	4.56	3.67	.89	1.167	2.286	.052	4.14	3.57	.57	.976	1.549	.172
Others in my group value my perspective.	4.78	4.11	.67	.707	2.828	***.022***	4.29	4.00	.29	.951	.795	.457
Others in my group have a sense of solidarity.	3.67	4.67	-1.00	1.936	-1.549	.160	3.83	3.83	.00	.632	.000	1.000
Others in the group maintain focus during dialogue.	4.89	4.33	.56	.726	2.294	.051	3.71	3.57	.14	.690	.781	.604
Others' oral contributions are thoughtful.	4.78	4.22	.56	.527	3.162	.013	4.29	3.71	.57	.535	2.828	***.030***
Others set aside their perspective when they listen to me.	4.56	4.33	.22	.833	.800	.447	4.14	3.57	.57	1.134	1.333	.231
Others in my group are willing to consider my ideas.	4.89	4.22	.67	.500	4.000	***.004***	4.43	3.71	.71	1.113	1.698	.140
Others value different perspectives.	4.78	4.33	.44	.726	1.835	.104	4.14	3.57	.57	.976	1.549	.172

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

Table 10. Perceptions of Others during Group Discussions by Lab 3 & 4

Items	Lab 3: Immunology (n = 8; df = 7)						Lab 4: Immunology (n = 9; df = 8)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
Others in my group try to make sense of what I am saying.	3.63	4.63	-1.00	.535	-5.292	*.001*	4.33	4.56	-.22	1.202	-.555	.594
Others in my group try to get me to contribute during discussions.	3.63	4.88	-1.25	1.035	-3.416	*.011*	3.89	4.22	-.33	1.414	-.707	.500
Others in my group have the opportunity to speak as much as I do.	4.63	4.88	-.25	.463	-1.528	.170	4.67	4.44	.22	1.093	.610	.559
Others in my group show respect for one another.	4.75	4.63	.12	.835	.424	.685	4.89	4.33	.56	.882	1.890	.095
When I talk, others in my group listen to what I have to say.	4.75	4.50	.25	.886	.798	.451	5.00	4.11	.89	.782	3.411	*.009*
When others in my group talk, they build on what I have to say.	4.50	4.63	-.12	.641	-.552	.598	4.67	4.56	.11	.928	.359	.729
Others in my group strive to learn from my oral contributions.	4.50	4.88	-.37	.744	-1.426	.197	4.56	4.33	.22	.972	.686	.512
Others in my group try to understand different perspectives.	4.50	4.25	.25	.707	1.000	.351	4.22	3.33	.89	1.269	2.101	.069
Others in my group value my perspective.	4.75	4.63	.12	.354	1.000	.351	4.78	4.00	.78	.667	3.500	*.008*
Others in my group have a sense of solidarity.	4.38	4.63	-.25	.886	-.798	.451	3.67	4.22	-.56	1.333	-1.250	.247
Others in the group maintain focus during dialogue.	4.63	4.25	.37	1.188	.893	.402	4.44	4.11	.33	1.323	.756	.471
Others' oral contributions are thoughtful.	4.63	4.75	-.12	.641	-.552	.598	4.44	4.33	.11	.928	.359	.729
Others set aside their perspective when they listen to me.	4.50	4.75	-.25	.886	-.798	.451	3.89	4.33	-.44	1.130	-1.180	.272
Others in my group are willing to consider my ideas.	4.63	4.75	-.12	.835	-.424	.685	4.56	4.33	.22	1.093	.610	.559
Others value different perspectives.	4.50	7.75	-.25	.886	-.798	.451	4.56	4.33	.22	.972	.686	.512

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

Comments made by the student participants also show that the majority had positive 'perceptions about others' in their teams (Table 11). The comments, for example, indicate that students were respectful the discussions and opinions of others in their groups. Two student participants pointed out that although they didn't always agreed with the comments or opinions of others their groups maintained their respect for others in their discussion groups. The most notable comments included: "*There were no issues concerning different perspectives. Everyone respected one another!*", "*Although compatible, we were all still very different & not only close, but WANTED to respect one another*" and "*My group members were very respectful and engaging*".

Table 11. Perceptions of Others during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
I always contribute.		Although compatible, we were all still very different & not only close, but WANTED to respect one another.	All group members don't have the same manners.
For the most part my group always listens to one another.		Everyone makes it a point to listen out for everyone and make value out of everyone's words.	My group members were very respectful and engaging.
There were no issues concerning different perspectives. Everyone respected one another!			Some group members would talk before they think and get off track of what we were talking about.
			Some of us had very strong opinions.
			We tended to joke around a lot, but hey it was fun.

Results from the pre- and post-survey scores on items listed on 'perception of the group' showed greater mean differences on four 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 timely t(33)* = -2.222, *p* < .05. Moreover, there was one item that showed a statistically significant decrease in the perceptions of the group during group discussions: *Dialogue in the group is appropriate t*(33) = 3.136, p < .05. As in other sections of the survey, there were was a higher number of items indicating a decrease in the 'perception of the group' during group discussion than gains. The table below highlights the findings of this analysis.

Table 12. Perceptions of the Group during Group Discussions

Items	Pre Mean (n=33)	Post Mean (n=33)	Mean Diff	SD Diff	t	p
The group strives to have all voices heard.	4.64	4.45	.182	.846	1.234	.226
Different perspectives are valued by the group.	4.76	4.55	.212	.740	1.647	.109
The group strives to incorporate all perspectives.	4.73	4.45	.273	.911	1.720	.095
There is a shared mood in the group.	4.27	4.39	-.121	1.023	-.680	.501
There is harmony with discussions in the group.	4.48	4.55	-.061	.864	-.403	.690
Dialogue in the group is timely.	3.82	4.27	-.455	1.175	-2.222	*.033*
Dialogue on the group is appropriate.	4.88	4.42	.455	.833	3.163	*.004*
Dialogue on the group is predictable.	3.52	3.67	-.152	1.202	-.724	.474
During group discussions there is at least one review of what was accomplished.	4.64	4.58	.061	.788	.442	.662
Different perspectives from members of the group have contributed to my own learning.	4.55	4.48	.061	.788	.442	.662

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

In this section the 'perceptions of others' during group discussions was analyzed by lab. As noted previously, students were assigned randomly to one of four labs. The results are similar to other sections in this report.

There were five items that showed an increase in the post-survey scores in Lab 1. These items included: *The group strives to have all voices heard, 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.* It should be noted, that none of the items had an increase in scores that was statistically significant. In this lab half of the items showed an increase and the other half showed a decrease in the 'perception of others' during group discussions.

The results of Lab 2 show that there were decreases in scores on all of the items. To be exact, the pre-survey scores were higher than the post-survey scores in all the items measured. Moreover, four of the items were found to have statistically significant differences: *The group strives to have all voices heard* $t(9) = 2.521$, $p < .05$, *Different perspectives are valued by the group* $t(9) = 3.286$, $p < .05$, *The group strives to incorporate all perspectives* $t(9) = 3.240$, $p < .05$ and Dialogue in the group is timely $t(9) = 3.361$, $p < .05$. These findings indicate that the 'perceptions others' during group discussions were higher during the pre-survey.

For Immunology lab 3 all but one of the ten items noted gains from the pre- to the post-survey. The item with the highest average difference from pre- to the post-survey was *Dialogue in the group is timely*. It should be noted that while the difference was not statistically significant, it was trending towards significance ($t(7) = -1.986$, $p = .087$). No other increase in post-survey scores was found to be statistically significant; however, it is possible that the small group number did not allow for sufficient statistical power.

Finally, for lab 4, the other Immunology lab, five out of the ten items had gains from the pre- to the post-survey; however, none of the gains were statistically significant. The items showing gains were the following: *There is a shared mood in the group, There is harmony with discussion in the group, Dialogue in the group is timely*, and *During group discussion there is at least one review of what was accomplished.* As in labs 1 and 3, the findings were equal, where half the items indicated gains and the other half showed a decrease from the pre- to the post-survey. The table below highlights the findings of this analysis.

Table 13. Perceptions of the Group during Group Discussions by Lab 1 & 2

Items	Lab 1: Biochemistry of Plants (n = 9; df = 8)						Lab 2: Neurochemistry (n = 7; df = 6)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
The group strives to have all voices heard.	4.44	4.67	-.22	.972	-.686	.512	5.00	4.14	.86	.900	2.521	*.045*
Different perspectives are valued by the group.	4.78	4.67	.11	.601	.555	.594	4.86	4.00	.86	.690	3.286	*.017*
The group strives to incorporate all perspectives.	4.78	4.56	.22	.667	1.000	.347	4.86	3.86	1.00	.816	3.240	*.018*
There is a shared mood in the group.	3.89	4.11	-.22	.972	-.686	.512	4.29	3.86	.43	1.397	.812	.448
There is harmony with discussions in the group.	4.44	4.56	-.11	1.054	-.316	.760	4.29	4.00	.29	1.113	.679	.522
Dialogue in the group is timely.	4.33	4.56	-.22	1.202	-.555	.594	4.29	4.00	.29	.756	1.000	.356
Dialogue on the group is appropriate.	4.78	4.44	.34	.866	1.155	.282	5.00	3.86	1.14	.900	3.361	*.015*
Dialogue on the group is predictable.	3.44	4.00	-.56	1.740	-.958	.366	3.57	3.14	.43	.535	2.121	.078
During group discussions there is at least one review of what was accomplished.	4.78	4.78	.00	.500	.000	1.000	4.57	4.00	.57	1.272	1.188	.280
Different perspectives from members of the group have contributed to my own learning.	4.67	4.56	.11	.601	.555	.594	4.57	3.86	.71	.951	1.987	.094

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

Table 14. Perceptions of the Group during Group Discussions by Lab 3 & 4

Items	Lab 3: Immunology (n = 8; df = 7)						Lab 4: Immunology (n = 9; df = 8)					
	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p	Pre Mean	Post Mean	Mean Diff	SD Diff	t	p
The group strives to have all voices heard.	4.50	4.50	.00	.535	.000	1.000	4.67	4.44	.22	.667	1.000	.347
Different perspectives are valued by the group.	4.63	4.88	-.25	.707	-1.000	.351	4.78	4.56	.22	.667	1.000	.347
The group strives to incorporate all perspectives.	4.50	4.88	-.38	.744	-1.426	.197	4.78	4.44	.33	1.000	1.000	.347
There is a shared mood in the group.	4.50	4.88	-.38	.744	-1.426	.197	4.44	4.67	-.22	.972	-.686	.512
There is harmony with discussions in the group.	4.75	4.88	-.13	.354	-1.000	.3.51	4.44	4.67	-.22	.833	-.800	.447
Dialogue in the group is timely.	3.50	4.38	-.88	1.246	-1.986	.087	3.22	4.11	-.89	1.167	-2.286	.052
Dialogue on the group is appropriate.	4.75	4.88	-.13	.354	-1.000	.351	5.00	4.44	.56	.726	2.294	.051
Dialogue on the group is predictable.	3.50	3.88	-.38	1.061	.1.000	.351	3.56	3.56	.00	1.000	.000	1.000
During group discussions there is at least one review of what was accomplished.	4.50	4.63	-.13	.641	-.552	.598	4.67	4.78	-.11	.601	-.555	.594
Different perspectives from members of the group have contributed to my own learning.	4.63	4.75	-.12	.354	-1.000	.351	4.33	4.67	-.33	.866	-1.155	.282

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

The comments offered by the student participants in this section were mixed. Several of the student participants indicated some level of conflict during the cogen discussions: "*Group dialogue might become monotonous but the positive are always different*" and "*At times arguments arose*". Other comments offered indicated animosity between the group members for example, "*Some group members in my lab were immature*" and "*Some people who were selected for this program I knew were going to drop, and they did*". The comments offered by the student participants are highlighted in the table below.

Table 15. Perceptions of the Group during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
Group dialogue might become monotonous but the positives are always different.	At time arguments arose.	I was put in a group of great intelligent people, which made answering these questions easy.	Some group members in my lab were immature.
I've learned so much about other's perspectives and am attempting to listen to other's perspectives as well as my own.	Don't record EVERYTHING!	My lab was full of great, original & genuine people who kept me on my toes and allowed for me to enjoy every moment of this program.	Some people who were selected for this program I knew were going to drop, and they did.
My group respects different perspectives.	No concerns		We were serious and fun at the same time.

Students were asked if they had any other comments or concerns about the Working with 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 16). Suggestions for improving the program focused on improving time management skills and the lunches provided. One student noted that the cogens discussions could be expressed in memos which would allow more time for their time in the lab.

Table 16. Perceptions of the Group during Group Discussions Comments

Lab 1	Lab 2	Lab 3	Lab 4
Everything is great	Do not use cameras in the lab! Manage your time wisely.	Lunch should be better and more time to work on projects because some of the students had problems with time.	Be more selective when choosing students for the program. 1 day for cogen/cogen is over when there are no more issues/positives, no more than 30 min end-of the-day meetings for what can be put in an email.
I don't know how you could improve the program.	For cogen to be a bit short or less frequent.	More pay. Better time management. More professors like Dr. Moore! More TA's & RAs like in Lab 3 (great, caring, genuinely good people)	Extend time to complete project. I love the program, but I wish we had more time because we couldn't test a lot of our predictions and we couldn't finish our experiment. I loved everything about this program. I really enjoyed the program very much! It was a great experience, amazing! It also helped me realize I don't want to be a scientist. It's not for me: thankful for the fact that I found out. Great program very great. Let us come back next summer to work with the new kids, I would love that even if only for a time. The structure of the program has to be more lab oriented instead of wasting time gathering to be told something that could've been said in a memo.
It was all great, awesome experience!	Graduation cord?	Not at all, except better lunches.	
Keep doing what you're doing.	It would be great if we could be great if we could be more punctual and did more experiments.	Stoles for graduations?	
The program was great overall. Adding more students thought wouldn't be a very good idea. The numbers of students here is good enough. P.S. This program is a great way for students to learn more about learning and truly expands their way of thinking.	People should know the rules before doing something.	The only thing I will suggest to make the program better is time.	
This program has helped me build confidence within myself and others. I hope I can be able to work with my lab sometime soon once again. I love what this program has provided and I definitely recommend this to others!	Work on the lunch for the students, and work with students or attendance. Make to discuss protocols issues pre hand to make more time for experiments.	Work on time management. Fix the outline structure	

Findings from the pre- and post- Discussion Group Surveys suggest that students' perceptions on the overall social dynamics of the cogens were mixed. The gains in each section of the Discussion Group Survey when compared to the previous year were much lower. In order to portray a more complete picture of the results an analysis was conducted by lab for each section measuring the 'perceptions of self, others and group'. In all three analyses, the outcomes were consistent. Labs 1, 3 and 4 had similar results noting some increases in the post-survey means. These findings indicate that gains were made in the scores of the 'perception of self, others and the group' in some items. However, significant differences were found only for a limited number of items. Moreover, there were specific items in each section that did not follow the same trend as the other items. In Lab 3 none of the items showed gains, on the contrary, the differences between the pre- and post-survey were significant. This indicates that the students 'perceptions of self, others and group' were higher at the onset of the program when students were surveyed and decreased by the time the post-survey was administered. Due to these findings, items in each section merit individual attention in order to determine areas of need and areas of best practice.

Undergraduate Research Student Self-Assessment (URSSA)

In order 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 was 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. Participants were provided with a 5-point scale showing the following points: No Gain (1), A Little Gain (2), Moderate Gain (3), Good Gain (4), and Great Gain (5), to indicate their answer. In two statements 69.7% of respondents reported to have 'Great gains': *Understanding the theory and concepts guiding my research project and Understanding the connections among scientific disciplines*. The lowest percentage reported for 'Great gains' was 42.4% for *Analyzing data for patterns*. Approximately, 3% of respondents indicated 'No gains' in three of the statements: *Understanding the theory and concepts guiding my research project, Understanding the connections among scientific disciplines* and *Understanding the relevance of research to my coursework*. In most of the statements the respondents reported 'Moderate gains' to 'Great gains'. In general the survey respondents indicated to have gains in the application of knowledge to research. Table 16 provides detailed information on the responses to this section.

Table 16. Application of Knowledge to Research (n =33)

Items	No Gain	A little Gain	Moderate Gain	Good Gain	Great Gain	Not Applicable
Analyzing data for patterns		6.1%	15.2%	30.3%	42.4%	6.1%
Figuring out the next step in a research project			15.2%	27.3%	57.6%	
Problem-solving in general			18.2%	15.2%	66.7%	
Formulating a research question that could be answered with data		3.0%	9.1%	24.2%	63.6%	
Identifying limitations of research methods and designs		6.1%	12.1%	27.3%	54.5%	
Understanding the theory and concepts guiding my research project	3.0%		6.1%	21.2%	69.7%	
Understanding the connections among scientific disciplines	3.0%		6.1%	21.2%	69.7%	
Understanding the relevance of research to my coursework	3.0%		15.2%	27.3%	54.5%	

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

Using the same scale described above, the participants were then asked to indicate the personal gains they made in connection to their research experience. Results, again showed that, the majority of survey respondents reported 'Great gains' in this section. For example, when rating the following statement, *Comfort in discussing scientific concepts with others*, 78% of respondents indicated 'Great gains'. Moreover, 'A little gain' was reported in six of the eight statements in this section. To be exact, approximately 3% of respondents indicated 'A little gain' in the following statements: *Confidence in my ability to contribute to science, Comfort in discussing scientific concepts with others, Confidence in my ability to do well in future science course, Ability to work independently, Developing patience with the slow pace of research* and *Taking greater care in conducting procedures in the lab or field.* In two statements 'No gains' were reported: *Ability to work independently* and *Developing patience with the slow pace of research*. Table 17 highlights the data distribution for this section.

Table 17. Personal Gains Related to Engagement in Research (n = 33)

Items	No Gain	A little Gain	Moderate Gain	Good Gain	Great Gain
Confidence in my ability to contribute to science		3.1%	3.1%	18.8%	75%
Comfort in discussing scientific concepts with others			9.4%	12.5%	78.1%
Confidence in working collaboratively with others		3.1%	6.3%	21.9%	68.8%
Confidence in my ability to do well in future in future science courses		3.1%	6.3%	18.8%	69.7%
Ability to work independently	3.2%	3.2%	6.5%	12.9%	74.2%
Developing patience with the slow pace of research	6.3%	3.1%	6.1%	21.2%	60.6%
Understanding what every day research is like			3.1%	21.9%	75%
Taking greater care in conducting procedures in the lab or field		3.1%	3.1%	25%	68.8%

Five-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 (Table 13 & 14), where survey respondents indicated to have gains that mainly ranged from 'Moderate gains' to 'Great gains'. There were a total of 13 items included in this section. In 12 of the 13 items over 50% of respondents indicated that they had made 'Great gains'. For instance, in three items 68.8% of survey respondents indicated 'Great gains': *Making oral presentations*, *Defending an argument when asked questions* and *Preparing a scientific paper*. Furthermore, the highest percentage of survey respondents indicating that they made 'Good gains' was 37.5%: *Keeping a detailed lab notebook* and *Conducting database or internet searches*. Conversely, in six items respondents reported 'A little gain'. The highest percent reported for 'A little gain' was 6%: *Calibrating instruments needed for measurement* and *Working with computers*. Approximately 3% of respondents reported 'No gains' in three items: *Keeping a detailed lab notebook, Understanding journal articles and Managing my time*. The data frequencies are presented in Table 18.

Table 18. Gains in Skills (n = 33)

Items	No Gain	A little Gain	Moderate Gain	Good Gain	Great Gain
Writing scientific reports or papers			15.6%	21.9%	62.5%
Making oral presentations			9.4%	21.9%	68.8%
Defending an argument when asked questions		3.1%	6.3%	21.9%	68.8%
Explaining my project to people outside the field			3.1%	28.1%	66.7%
Preparing a scientific poster			3.1%	28.1%	68.8%
Keeping a detailed lab notebook	3.1%		6.3%	37.5%	53.1%
Conducting observations in the lab or field		3.1%	12.5%	25.0%	59.4%
Using statistics to analyze data			21.9%	25%	53.1%
Calibrating instruments needed for measurement		6.4%	9.6%	16.5%	67.7%
Working with computers		6.3%	15.6%	21.9%	56.3%
Understanding journal articles	3.1%	3.1%	9.4%	30.3%	51.5%
Conducting database or internet searches			15.6%	37.5%	46.9%
Managing my time	3.1%	3.1%	3.1%	34.4%	56.3%

Five-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. Participants were provided with a 5-point scale that included the following points: None (1), A Little (2), Some (3), A Fair Amount (4), and A Great Deal (5), to indicate their answers. Continuing with the same trend as above, results show that the majority of respondents indicated to behave in ways related to a scientific researcher 'A great deal'. In one item, *Engage in real-world science research,* 84.4% of respondents reported 'A great deal'. Further, in three items the respondents indicated that the statements were not applicable. Moreover, in four items between 3% and 6% of respondents reported 'A little' when asked to rate the following statements: *Feel like a scientist, Try out new ideas or procedures on your own, Interact with scientists from outside your lab,* and *Feel a part of a scientific community.* Moreover, in five items between 3% and 6% of respondents reported 'None' to the frequency of research attitudes and behaviors: *Engage in real-world science research, Try out new ideas or procedures on your own, Feel responsible for the project, Work extra hours because you were excited about the research* and *Interact with scientists from outside your lab.* The table below highlights the findings.

Table 19. Frequency of Research Attitudes and Behaviors (n =33)

Items	None	A little	Some	A fair amount	A great deal	Not Applicable
Engage in real-world science research	3.0%		3.0%	9.1%	84.8%	
Feel like a scientist		3.1%	6.3%	18.8%	71.9%	
Think creatively about the project			3.1%	18.8%	78.1%	
Try out new ideas or procedures on your own	3.0%	3.0%	6.1%	9.1%	78.8%	
Feel responsible for the project	3.0%		9.1%	12.1%	75.8%	
Work extra hours because you were excited about the research	6.1%		12.1%	12.1%	66.7%	3.0%
Interact with scientists from outside your lab	3.0%	3.0%	12.1%	9.1%	69.7%	3.0%
Feel a part of a scientific community		6.1%	6.1%	21.2%	63.6%	3.0%

Five-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 using a 4-point scale that included the following points: Poor (1), Fair (2), Good (3), and Excellent (4). Similar to other sections of this survey report, the participations mostly rated their research experience as 'Excellent'. The ratings for 'Excellent' ranged from 60.6% to 93.9%. The item where 93.9% of respondents rated the quality of their research experience as 'Excellent' was: *My working relationship with my research lab scientist*. Further, in almost all of the items in this section double digit percentages were noted for 'Good'. Moreover, in five of the six items respondents rated the items as 'Fair'. The highest 'Fair' rating (15.2%) was for *The amount of time I spent with my research lab scientist*. Only one item received a 9.1% rating of 'Poor': *The advice my research lab scientist provide about college*. Overall, the findings indicate that quality of the research experience was, for the most part, 'Excellent' (Table 20).

Table 20. Quality of Research Experience (n =33)

Items	Poor	Fair	Good	Excellent	Not applicable
My working relationship with my research lab scientist			6.1%	93.9%	
My working relationship with research group members		3.0%	21.2%	75.8%	
The amount of time I spend doing meaningful research		6.1%	33.3%	60.6%	
The amount of time I spend with my research lab scientists		15.2%	15.2%	69.7%	
The advice my research lab scientists provide about college	9.1%	3.0%	12.1%	69.7%	6.1%
The research experience overall		3.0%	15.2%	81.8%	

Four-point scale ranging from Poor (1) to Excellent (4)

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. Participants were provided with a 4-point scale ranging from Strongly Disagree (1) to Strongly Agree (4) to indicate their agreement/disagreement. Results for this section were somewhat similar to previous sections. The majority of respondents indicated a high level of agreement with the statements presented. Approximately, 72.7% of respondents 'Strongly Agreed' with the following statement: *My research experience has motivated me to attend college*. The lowest percent of 'Strongly Agree' noted was 57.6% when respondents were asked: *Doing research clarified for me which field of study I want to pursue*. Moreover, respondents noted 'Agree' in every statement rated. The highest percent of 'Agree' noted was 33.3% for the following statement: *My research experience has prepared me for advanced coursework in science*. It is important to highlight, that respondents also 'Disagreed' with all the statement provided. For example, 24.2% of respondents 'Disagree' with the following two statement: *My research experience has prepared me for college* and *Doing research clarified for me which field of study I want to pursue*. The findings are presented in Table 21. WWASP student were also given the opportunity to provide comments to any of the statements that were presented in this section. The comments were reviewed by lab. In general the comments were positive. For example, a student participant in Lab 1 noted the following, "As a result of this program, I would love to major in science when I attend college". The same positive feedback was offered by a Lab 3 student, "*The people helped me develop all my skills to make me a better leader, scientist and student. Changed my perspective*". Based on the commentary it may be implied that students benefited from the research experienced gained during their involvement in the program. Table 22 documents the comments provided by lab.

Table 21. Effects of Research Experience (n =33)

Items	Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
My research experience has prepared me for advanced coursework in science		3.0%	33.3%	63.6%	
My research experience has motivated me to attend college		6.1%	18.2%	72.7%	3.0%
My research experience has prepared me for college		9.1%	24.2%	66.7%	
Doing research clarified for me which field of study I want to pursue		18.2%	24.2%	57.6%	

Four-point scale ranging from Strongly Disagree (1) to Strongly Agree (4)

Table 22. Effects of Research Experience Comments

Lab 1	Lab 2	Lab 3	Lab 4
As a result of this program, I would love to major in science when I attend college.	Great experience.	The people helped me develop all my skills to make me a better leader, scientist & student. Changed my perspective	I gained a very valuable experience from this program.
I truly feel I'm better prepared for college and what I want to major in.	My research had no impact it was research and thats it.	Yasss!	I now know that I want to major in one of the sciences.
			Im still unsure about the career I want to pursue

Participants were then asked to indicate their level of satisfaction with various characteristics of the research experience (see Table 19). Results show that about 3% of respondents indicated that the statements were not applicable. Further, between 60.6% and 90.6% of respondents indicated their level of satisfaction to be 'Very satisfied' with the various characteristics of research experience presented. High percentages were also noted for 'Somewhat satisfied' in all items. Only two items had a rating of 'Somewhat dissatisfied': *Information available to help me choose a research project and Support and guidance from program staff.* The results in this section indicate that respondents were mostly satisfied with the various characteristics of the WWASP research experience. Highlights of the findings are illustrated in Table 23. As in the previous section, student were offered the opportunity to include their comments regarding the statements in this section. The majority of comments were positive and focused on the support provided in the research labs. For example, a student from Lab 3 noted, "*Had support from everyone, even those outside the program*", another student from Lab 4 stated the following, "*I was very comfortable asking my lab research scientist about the things I had a question on*". One student from Lab for made the following suggestion, "*Funding for equipment was needed*". The comments are provide in Table 24.

Table 23. Level of Satisfaction with Research Experience Characteristics (n =33)

Items	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied	Not Applicable
Information available to help me choose a research project		3.0%	30.3%	63.6%	3.0%
Ease in asking questions/talking with my lab research scientists			9.1%	87.9%	3.0%
Lab or field equipment			18.2%	78.8%	3.0%
Support and guidance from program staff		3.0%	15.2%	78.8%	3.0%
Support and guidance from my lab research scientists			6.3%	90.6%	3.1%
Support from other research group members			21.2%	75.8%	3.0%
Discussion group meetings			36.4%	60.6%	3.0%
The lab safety training I received			33.3%	63.6%	3.0%

Four-point scale ranging from Very Dissatisfied (1) to Very Satisfied (4)

Table 24. Level of Satisfaction with Research Experience Characteristics Comments

Lab 1	Lab 2	Lab 3	Lab 4
Everyone gave me motivation and guidance since the beginning of the program.		Dr. Jace Moore & the RA's were perfect	Funding for equipment was needed
Everything went smoothly and there were no problems with equipment or communication.		Had support from everyone, even those outside the program	I enjoyed the Research project very much.
			I was very comfortable asking my lab research scientists about anything I had a question on.

To end the survey, participants were asked to indicate the reason(s) for taking part in the program (see Table 20). The main reasons indicated by participants were to: *Explore my interest in science* (93.9%) and *Get good letters of recommendation* (93.9%). Approximately 90.9% of respondents also noted *Gain hands on research experience* as a reason for participating in research. The least noted reason was *Clarify whether college would be a good choice for me* (57.6%). 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 from the interaction with people in the lab to the credits and experienced gained. The results of this question and the comments are presented below.

Table 25. Reasons for Participating in the Program

Reasons	Select all that apply
Explore my interest in science	93.9%
Get good letters of recommendation	93.9%
Gain hands on research experience	90.9%
Clarify whether I wanted to pursue a science research career	87.9%
Have a good intellectual challenge	87.9%
Participate in a reputable program	87.9%
Work closely with scientists	84.8%
Enhance my resume	84.8%
Clarify which field I wanted to study	63.6%
Clarify whether college would be a good choice for me	57.6%

Table 26. Reasons for Participating in the Program Comments

Lab 1	Lab 2	Lab 3	Lab 4
Experience true presentation and verbal skills.	If people knew the rules.	The science credit and college experience	4th year of science credit
Meet new people and create unforgettable bonds.	Learn more.		Gain lab experience and reputation

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. Some of the comments included: "*A more positive attitude, coming from my part, would have made my research experience even better along with working even harder and participating more often*", "*My experience could have been better if we could have done more experiments and hands on activity*", "*To have fix the protocols*", and "*Nothing would have made my research better. My teacher, Dr. Moore had this experience greater than I expected it to be*". Several students noted that more time in the lab and less time in cogens would improve their research experience. 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 less cogens and more time in the labs were encouraged by the students: "*Less cogen/shorter cogen because it disrupts with our experiments & time in the lab*" "*More lab time with less interruptions like cogenerative dialogues*" and "*More structure and more lab time*".

Students also made reference issues concerning the structure of the program, specifically listing time management. Several students also voiced the need for better lunches and several students suggested providing WWASP stoles for graduation. The tables below include the comments provide by lab on how to improve the students research experience and the WWASP program.

Table 27. What would have made your research experience better Comments

Lab 1	Lab 2	Lab 3	Lab 4
A more challenging project.	Being in a diff. lab. I didn't enjoy the fact that we were killing mice	As great as this experience was, I feel like the structure could've been structured better.	Having cogen once a week during the summer. Knowing what I know since the beginning. More time, especially during the summer (7-8 weeks at least)
A more positive attitude, coming from my part, would have made my research experience even better along with working even harder and participating more often.	I feel satisfied with the program.	If I had known exactly what I was getting into & of course more time.	Having the knowledge I have now, in the beginning. As well as have more time.
I could not imagine that it gets any better than this. But it would be a little more lab time.	If people knew the rules.	Lunches & its being longer	If I had managed my time in the lab better.
I feel like just working in the lab more often would make it better	If we could have actually did what we planned and finish our experiments.	More time	Less cogen meeting because they wasted lab time that we clearly needed.
Longer time!	If we were able to continue with our experiments and finish our research it would've been better.	Nothing would have made my research better. My teacher, Dr. Moore had this experience greater than I expected it to be.	Less cogens would have made my research experience better.
Nothing I feel that it was the best it could've possibly been.	My experience could have been better if we could have done more experiments and hands on activity		More time in the lab would be a tremendous gain.
Nothing.	To have fix the protocols.		More time to complete project.
			More time, the research we conducted took longer amounts of time, of which the program schedule was not sensitive to.
			The time we spent working in the lab. We were really close to reaching our goal, due to lack of time we could not finish.

Table 28. What would improve the Working with a Scientist Program overall Comments

Lab 1	Lab 2	Lab 3	Lab 4
I honestly feel that WWASP was the best it could've been	Better grading system. Better group cooperation.	A better lunch	A more stable schedule that does not interrupt lab time, also the short time frame in the summer.
I think just knowing more about science that UTEP offers helps	Don't use cameras in the lab so it doesn't get suspended.	Better lunches. Time constraint, a lot more time to our own project research. Stoles for graduation.	Emphasize more on safety so labs don't ruin the project for every other lab
It was absolutely great!	Get the protocols of every project settled so no issues would occur again.	Better time management & structure of the program.	Getting better lunch. More time. Better questions for our journals.
Shorter co-generative dialogues.	Longer presentation times (710 min)	I believe more time on the projects would make the program better overall. I would work on improving the time management & structure of the program. I would also try to provide in campus transportation.	Less cogen/shorter cogen because it disrupts with our experiments & time in the lab. And to pick better people for the program next year.
This program overall was amazing! The only thing that would improve the program would be more updated equipment and better air-conditioning.	Make sure you know all protocol to avoid disturbances in the lab	More collaboration with others outside of the lab.	Less cogenerative dialogues and less administrative situations taking up lab time.
Truly seeking the best students for this: dedicated, flexible, and mature.	Punctuality.	Structure of how long it is. And having the objective enforced to learn not create a project. Stoles for graduation?	More lab time with less interruptions like cogenerative dialogues
Working more w/ my scientist.		To provide us a good meal journals should have better questions in variety.	More structure and more lab time.
			MORE TIME!! Better lunches

Family Member Survey

Family members were asked to take a survey asking them to respond to a set of statements focused on the level of interest displayed by the WWASP student participants regarding various aspects of the program. Approximately, 35 family members responded to the survey. The survey was analyzed and the results are discussed below.

The first question in the survey asked respondents to identify their relationship to the WWASP participant. The majority of survey respondents, 74% did not specific how they were related to the participants. About, 17% of respondents indicated they were the parents of the WWASP student

participant and 9% reported to be a sibling. Figure 1 below illustrates the distribution for this question.

Figure 1. Relationship to WWASP Participant
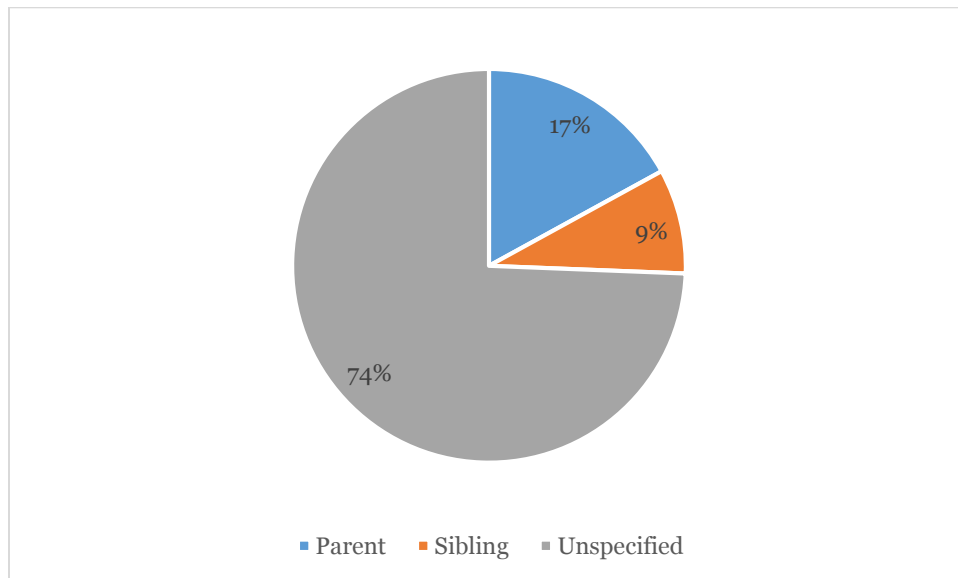
The next several questions asked respondents to rate a series of statements regarding the interested displayed by the WWASP student participants in science. The first statement asked respondents if the WWASP participant *'showed more interest toward homework or school projects"*. The majority of respondents 80% 'Strongly Agree' with the statement. About 11% of respondents 'Somewhat Agree' and 8.6% responded 'Neither'. The next questions asked *"Shows more interest toward science (e.g. scientific topics, scientific research, other science-related activities, etc.)"*. Approximately, 85.7% of respondents indicated that they 'Strongly Agree' with the statement. Moreover, 11.4% of respondents indicated that they 'Somewhat Agree' and 2.9% 'Neither' agreed nor disagreed. Respondents were also asked *"Shows more interest toward scientists (e.g. scientists' stories, scientists' background, scientists' personality)"* to this question 79.4% of survey respondents 'Strongly Agree' and 14.7% 'Somewhat Agree' to the statement. About, 5.9% of respondents indicated to neither agree nor disagree with the statement. In the next two questions, there was a small percentage of respondents that 'Somewhat Disagree' with the statements asked. The questions asked: *Shows more interest in attending a college/university* and *Shows more interest in pursuing a science related career*. Approximately 2.9% of respondents 'Somewhat disagreed' with the two statements. Further, about 8.6% of respondents neither agreed nor disagreed with the statement. Seventy-seven percent of respondents 'Strongly Agreed' with their WWASP relative showing more interest in attending a college/university and 71.4% 'Strongly Agreed' with students' interest in pursuing a science related career. Overall, based on the survey results the relatives of the WWASP participants that responded to the survey indicate that students have shown interest in science. The results of the survey are displayed in Table 29.

Family members were asked to list two (or more) other ways that the Work With a Scientists Program at UTEP has impacted or influenced their family member. The comments provided by the respondents were all positive. Further, the comments illustrate that family members have a positive perception of the program and feel that the program has impacted and influenced their

family member to be more interested in STEM education. One respondent noted the following: "*He is open to the possibility of obtaining a career in working in a medical laboratory*". Another respondent noted, "*Faith has been so excited about what she's learned and is still learning working with scientists. She shares her excitement with the family. We're so grateful she's in the program*". Further, based on the comments offered by the family members the second goal of the program is "to increase the participants' interest in STEM education. The comments were sorted by lab and are illustrated in Table 30.

Table 29. Interest in Science Statements (n = 35)

Items	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree
Shows more interest toward homework or school projects.			8.6%	11.4%	80%
Shows more interest toward science (e.g. scientific topics, scientific research, other science-related activities, etc.).			2.9%	11.4%	85.7%
Shows more interest toward scientists (e.g. scientists' stories, scientists' background, scientists' personality).			5.9%	14.7%	79.4%
Shows more interest in attending a college/university (e.g., talk about college applications, majors).		2.9%	8.6%	11.4%	77.1%
Shows more interest in pursuing a science related career (e.g. scientists, doctors, engineers).		2.9%	8.6%	17.1%	71.4%

Table 30. Family Member Comments

Lab 1	Lab 2	Lab 3	Lab 4
Antonio has expressed his desire to do more projects with school as more opportunities are presented. Antonio has displayed more confidence himself expressing his thoughts in a team environment. He realizes the importance of staying committed. I am very proud of him. He requires hardly any help. He has done so much on his own.	He is open to the possibility of obtaining a career in working in a medical laboratory.	Faith has been so excited about what she's learned and is still learning working with scientists. She shares her excitement with the family. We're so grateful she's in the program.	Enriches education, creativity and personal development.
Exposure to science at the college level. Experience working with a group at the college level.	I have noticed that Ebonie does show some interest in the subject that she is studying (the brain function). She also shows interest in letting us know what she has learned.	London has developed an added level of respect and appreciation of the field(s). Involvement in high school 'drama' and irrelevant activities has been minimized. Exposure to the 'college experience' and the professionalism associated with this program has proven beneficial toward her post-high school educational interest. Her overall confidence has increased.	My daughter has always been interested in science and plans to pursue a degree in medicine. She has mentioned possibly pursuing a degree in molecular science. I believe this program helped her to decide that molecular science might be an option and interest for her. She enjoys this program and I do believe that she has developed even more than she already was.
He became more responsible. More interest in the medical.		Ready to go to college, teamwork, motivated.	
He has been enthusiastic in describing what he did in the study. I think he will be more attentive to science programs and news. I would like to influence him to become an engineer. This program has helped him to think and feel comfortable about studying science or engineering in college.	My son has shown a great interest in neuroscience he speaks about the scientific experiments and research all the time. He also is more interested on working with others and interacting with other kids that have the same interests.	If anything this program has helped my daughter reaffirm her wish of becoming an engineer or computer scientist. However, a main change is that she is taking to dedicate more on being innovative and a lead scientist.	My son comes home eager to tell me about what he has learned and the content he is exploring. Work With A Scientist Program has allowed my son to explore the university life while still being in high school. I am so grateful that my son was this opportunity.
It has given her the opportunity to work at a higher level. Challenged her to pursue a higher level of education and to expect more of herself. Learn how and what scientists do for research and development.		She chooses to stay home and study or rest instead of going out. She is finding balance with study and social life. Making her own determination of what's important to her and her future. Exposure to 'college life' prepares her for her post-high school behavior.	She's been able to learn and work at the university lab. Been around science R.A.s - positive experience. Been exposed to university.
John research more on college on his own. Is particular in his own desire to do his best.		She has been more focused on working. She is working with science more and in a way shown more of an interest in science.	
More importance to discover how to cure cancer and has been concentrating in what they are helping with. (translated)		Socializing with people with similar interests. Becoming better organized.	
Pursue in the field of science in college.		Solidify her career plans in the health field.	
She is showing interest in pursuing a degree in science. It has allowed for her to be a confident student and person.		Teamwork, motivated to accomplish his goal.	

DISCUSSION

The evaluation results indicate students benefited academically from participating in the WWASP program. Specifically, students in the Experimental Internship Group showed gains in their grade point average while in the program. Moreover, students in the Experimental Internship Group had a 100% graduation rate.

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 evidenced by the student-participants responses to the survey and by the commentary provided. The students provided comments that were positive and appreciated the learning environment focused on respect of self, others and the group. These findings were in line with the findings of last year's report. Furthermore, these findings suggest that the program implemented effective strategies to better deal with the concerns voiced by participants the past two years. There is an area of concern noted from the results of the analysis. The outcomes of lab 2 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. A recommendation would be gauge the activities taking place in this lab and determine what is hampering the lack of growth of the student-participants.

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 stoles to highlight their participation.

Family members of the WWASP student-participants agreed that their relatives showed an increase interest in the STEM field. Several family members provided extensive examples on how the program impacted their relative. Based on the information collected the WWASP student-participants shared their experiences with their family members while enrolled in the program. A suggestions would be to continue engaging family members in the WWASP program since they are a support system to the WWASP student-participants outside the program.

Appendix A

Undergraduate Research Student Self-Assessment (URSSA)

Working with a Scientist Program: Discussion Group Survey

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

Select the lab that you belong to:

○ Lab 1 - Geology
○ Lab 2 - Chemistry
○ Lab 3 - Chemistry
○ Lab 4 - Engineering

1. While reading the statements below, keep in mind <u>your own thoughts and actions</u> 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

		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 with 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 <u>other group members' behavior</u> 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 - Geology
○ Lab 2 - Chemistry
○ Lab 3 - Chemistry
○ Lab 4 - Engineering

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	O	O	O	O	O	O
b. Figuring out the next step in a research project	O	O	O	O	O	O
c. Problem-solving in general	O	O	O	O	O	O
d. Formulating a research question that could be answered with data	O	O	O	O	O	O
e. Identifying limitations of research methods and designs	O	O	O	O	O	O
f. Understanding the theory and concepts guiding my research project	O	O	O	O	O	O
g. Understanding the connections among scientific disciplines	O	O	O	O	O	O
h. Understanding the relevance of research to my coursework	O	O	O	O	O	O

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	O	O	O	O	O	O
b. Comfort in discussing scientific concepts with others	O	O	O	O	O	O
c. Comfort in working collaboratively with others	O	O	O	O	O	O
d. Confidence in my ability to do well in future science courses	O	O	O	O	O	O
e. Ability to work independently	O	O	O	O	O	O
f. Developing patience with the slow pace of research	O	O	O	O	O	O
g. Understanding what every day research is like	O	O	O	O	O	O
h. Taking greater care in conducting procedures in the lab or field	O	O	O	O	O	O

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	O	O	O	O	O	O
b. Making oral presentations	O	O	O	O	O	O
c. Defending an argument when asked questions	O	O	O	O	O	O
d. Explaining my project to people outside the field	O	O	O	O	O	O
e. Preparing a scientific poster	O	O	O	O	O	O
f. Keeping a detailed lab notebook	O	O	O	O	O	O
g. Conducting observations in the lab or field	O	O	O	O	O	O
h. Using statistics to analyze data	O	O	O	O	O	O
i. Calibrating instruments needed for measurement	O	O	O	O	O	O
j. Working with computers	O	O	O	O	O	O
k. Understanding journal articles	O	O	O	O	O	O
l. Conducting database or internet searches	O	O	O	O	O	O
m. Managing my time	O	O	O	O	O	O

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	O	O	O	O	O	O
b. Feel like a scientist	O	O	O	O	O	O
c. Think creatively about the project	O	O	O	O	O	O
d. Try out new ideas or procedures on your own	O	O	O	O	O	O
e. Feel responsible for the project	O	O	O	O	O	O
f. Work extra hours because you were excited about the research	O	O	O	O	O	O
g. Interact with scientists from outside your lab	O	O	O	O	O	O
h. Feel a part of a scientific community	O	O	O	O	O	O

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	O	O	O	O	O
b. My working relationship with my research group members	O	O	O	O	O
c. The amount of time I spend doing meaningful research	O	O	O	O	O
d. The amount of time I spend with my research lab scientists	O	O	O	O	O
e. The advice my research lab scientists provide about college	O	O	O	O	O
f. The research experience overall	O	O	O	O	O

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	O	O	O	O	O
b. My research experience has motivated me to attend college	O	O	O	O	O
c. My research experience has prepared me for college	O	O	O	O	O
d. Doing research clarified for me which field of study I want to pursue	O	O	O	O	O

Please comment on any of these statements.

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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	O	O	O	O	O
b. Ease in asking questions/talking with my lab research scientists	O	O	O	O	O
c. Lab or field equipment	O	O	O	O	O
d. Support and guidance from program staff	O	O	O	O	O
e. Support and guidance from my lab research scientists	O	O	O	O	O
f. Support from other research group members	O	O	O	O	O
g. Discussion group meetings	O	O	O	O	O
h. The lab safety training I received	O	O	O	O	O

Please comment on any of these aspects.

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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	O
b. Gain hands on research experience	O
c. Clarify which field I wanted to study	O
d. Clarify whether college would be a good choice for me	O
e. Clarify whether I wanted to pursue a science research career	O
f. Have a good intellectual challenge	O
g. Work closely with scientists	O
h. Participate in a reputable program	O
i. Get good letters of recommendation	O
j. Enhance my resume	O
k. Other (please specify in the space below)	O

Other:

_____

9. What would have made your research experience better?

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

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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

Appendix C

My name: _____My child's name:_____

Please answer this survey with honesty. All your answers are confidential.

Please provide your level of agreement or disagreement with the statements below.

	Since my child's participation in the Working With A Scientist Program at UTEP, s/he:	Strongly agree	Somewhat agree	Neither agre disagre
1	*Shows more interests toward **homework or school projects**.*			
2	*Shows more interests toward **science** (e.g. scientific topics, scientific research, other science-related activities, etc.).*			
3	*Shows more interests toward **scientists** (e.g., scientists' stories, scientists' background, scientists' personality).*			
4	*Shows more interests **in attending a college/university** (e.g., talk about college applications, majors).*			
5	*Shows more interests **in pursuing a science related career** (e.g., scientists, doctors, engineers).*			

List two (or more) other ways that the Work With A Scientist Program at UTEP has impacted/influenced your child.

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Nombre: _____ Nombre de mi hijo
(a):_____

Por favor responda las siguientes preguntas con honestidad. Esta encuesta es confidencial.

Por favor comparta su nivel de acuerdo o desacuerdo con las siguientes declaraciones:

	Desde la participación de mi hijo/a en "Work With A Scientist Program" en UTEP, el/ella:	Totalmente de acuerdo	De acuerdo	Ni en acuerdo desacuer
1	_Muestra más interés en tareas y proyectos de la escuela._			
2	_Muestra más interés en relación a la ciencia (por ejemplo: temas científicos, investigación científica, otras actividades relacionadas con la ciencia, etc.)._			
3	_Muestra más interés acerca de los científicos (por ejemplo: historias de los científicos, antecedentes de los científicos, personalidad)_			
4	_Muestra más interés en ir a la Universidad (por ejemplo: habla acerca de las solicitudes para la universidad o licenciaturas)._			
5	_Muestra más interés en seguir una carrera científica (por ejemplo: ciencias, medicina o ingeniería)._			

Liste dos o más situaciones en las que "Work With A Scientist Program" en UTEP ha impactado/influido en su hijo (a):

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