NeuroID

Summer Research Program Evaluation Report

Students & Mentors Experience

2014

Neuroscience Research Opportunity to Increase Diversity (NeuroID)
2014 Summer Research Program
External Evaluation Report

Prepared by

Nicole M. Ortiz Vega, M.S.

Sharon M. Alvalle Velez, MS.

DSC-Center for Evaluation and Sociomedical Research

Acknowledgment

Thanks to the Mentors, NeuroID students Class 2013 and Class 2014

Division of Community Services

Introduction

The primary goal of the Neuroscience Research Opportunity to Increase Diversity (NeuroID) Program is to foster and enhance the interest of undergraduate students to pursue a research career in neuroscience through the integration of formal courses, community outreach opportunities, and mentored research experience. The summer research program is an important component of the NeuroID program. Students in their junior year are required to participate in a summer research program at the State. Students can apply for a summer program that is a laboratory of a mentor's close collaborator, a laboratory based on specific techniques that may need to be transferred for the benefit of their research project or a potential institution to pursue graduate school. Students in their first year in NeuroID participate as well in a summer program at the mainland. As part of their first summer program, students received trainings and workshops on: how to keep a laboratory notebook, laboratory techniques and ethical conduct.

Evaluation Purpose and Scope

The Center for Evaluation and Sociomedical Research (CIES) of the Graduate School of Public Health, University of Puerto Rico Medical Sciences Campus partnered with the NeuroID Program of the University of Puerto Rico to perform a process and outcome evaluation for the project. This report summarizes the evaluation of the ***Summer Research Program*** experience of the NeuroID Class 2013 and Class 2014 and their mentors. The evaluation focused on students' satisfaction with the mentor and the laboratory experience.

Methods and Procedure

Students' satisfaction with the summer research program was evaluated through an online questionnaire. The Surveymonkey.com website was used to design the instrument and allow students access to the questionnaire. Students were invited to participate by email. Students email addresses were provided by the program staff. Weekly reminders

were sent to those who had not completed the questionnaires. Approximately, four reminders were sent to the participants. All of the NeuroID students completed the evaluation survey.

The students' questionnaire includes 32 questions through which socio-demographic information, as well as information pertaining to general satisfaction and specific satisfaction with various aspects of the summer research program was gathered. The surveys were designed to be completed in 10 to 15 minutes.

Mentors' satisfaction with the summer research program was also evaluated through an online questionnaire. The Surveymonkey.com website was used to design the instrument and allow mentors access to the questionnaire. Mentors were invited to participate by email. NeuroID students provided mentors email addresses. Weekly reminders were sent to those who had not completed the questionnaires in order to increase participation.

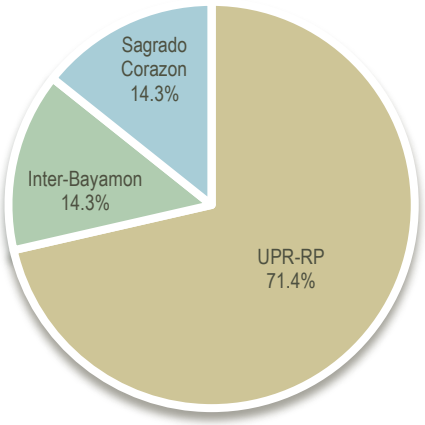
Approximately, seven reminders were sent to the participants. An acceptable response rate was obtained (90.0%-Mentors Class 2013, 70.0%-Mentor Class 2014).
The mentor questionnaire was designed to gather information about general satisfaction, experience with the NeuroID students, self-assessment and recommendations for improvement. The mentor questionnaire was designed to be completed in 10 to 15 minutes, the document includes 16 questions.

Students Experience

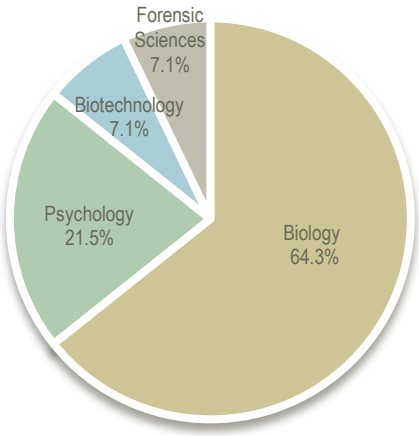
Demographics

There were a total of 14 participants that completed the questionnaire. The majority of the students were female (64.3%) while (35.7%) were male. The majority of the students (71.4%) were affiliated to the University of Puerto Rico, Rio Piedras Campus (see Graph 1). Most of the students (85.7%) reported Biology or Psychology as their major (see Graph 2). More than half of the surveyed (57.1%) were NeuroID students from class 2014.

Graph 1. Academic Institution Affiliation



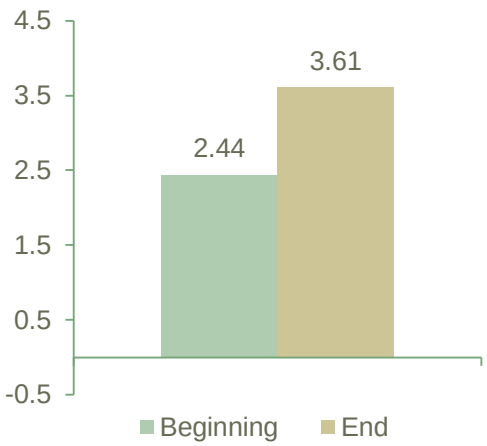
Graph 2. Academic Concentration



Skills Self-Assessment: Scientific Method

Students were asked to rate their research skills at the beginning and end of the summer program. At the beginning of the summer program, most of the students described their skills as “medium” or “low” (see Table 1). The skill with the highest level of proficiency at the end of the summer was ‘identification of gap in knowledge’. It is important to highlight, there was a statistically significant

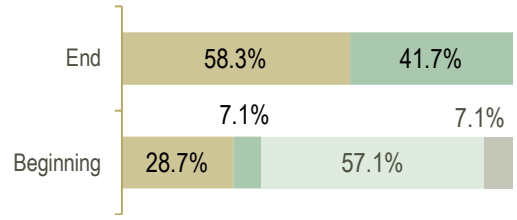
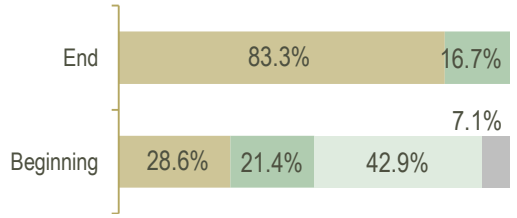
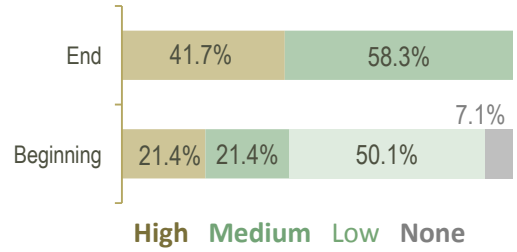
Graph 3. Mean Scientific Method Skills



**Paired samples T-test: t(11)= -4.98, p<.000

improvement in scientific skills after the summer research program from 2.44±0.79 to 3.61±0.37 (see Graph 3)

Table 1. Scientific Method

Determine the appropriate laboratory protocols to conduct experiments	
Identification of gap-in-knowledge	
Development of plausible hypothesis	

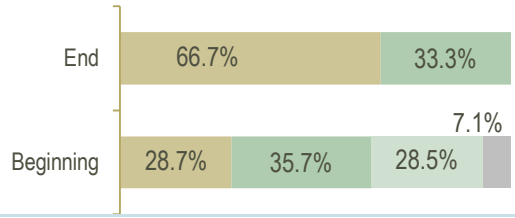
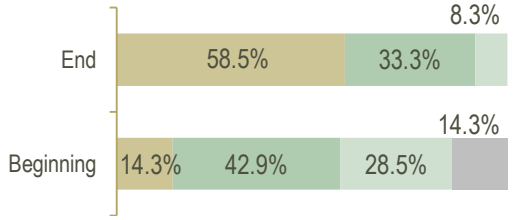
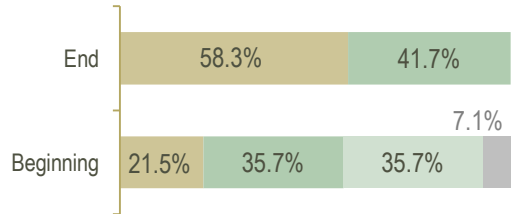
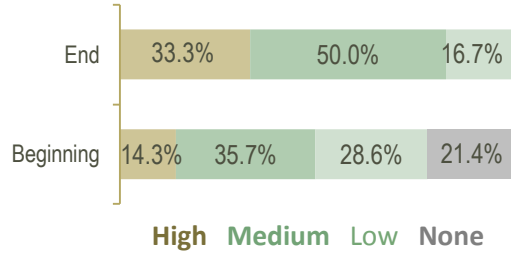
Skills Self-Assessment: Technical Proficiency

Students were also asked to rate their technical proficiency at the beginning and end of the summer program. At the beginning of the program, most of the students described their skills as "medium" or "low" (see Table 2). The skill with the highest level of proficiency at the end of the summer program was '*manipulate the laboratory instruments and equipment properly*' and '*critical interpretation of scientific literature*'. It is important to highlight, there was a statistically significant

Graph 4. Mean Technical Proficiency Skills

improvement in the technical proficiency after the summer research program from 2.47±0.74 to 3.47±0.48 (see Graph 4).

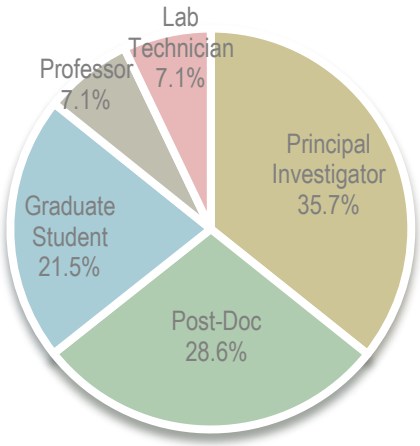
Table 2. Technical Proficiency

Manipulate the laboratory instruments and equipment properly	
Data analysis	
Critical interpretation of scientific literature	
Prepare reports about the investigation work	

Mentoring Experience

NeuroID students also evaluated the support received by their mentor during the summer research program. Less than half of the students (35.7%, n=5) were mentored by the principal investigator (see Graph 4).

Graph 4. My primary supervisor was...



Moreover, students evaluated the support received by the mentor (see Table 3). In general, all of the students were satisfied with the performance of their primary supervisor. The majority of the students were satisfied with the **feedback** and the **technical support** provided by their mentors. However, some students were unsatisfied with the performance of their summer mentor.

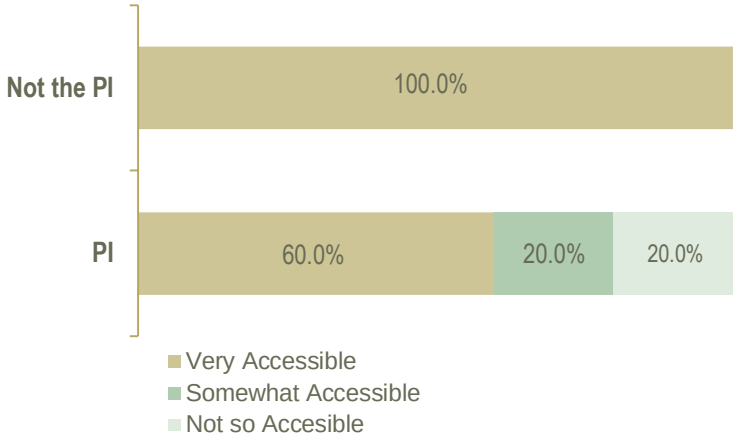
Table 3. Performance Comparison between PI and other Mentor in the Laboratory

Type of Support	Mentor	Very satisfied	Satisfied	Unsatisfied	Very Unsatisfied
Feedback provided by your mentor to aid your research project during summer	PI	60.0%	20.0%	-	20.0%
	Not PI	66.7%	22.2%	-	11.1%
Scientific and **technical support** offered by your mentor to aid the development of your research project during summer	PI	60.0%	-	20.0%	20.0%
	Not PI	66.7%	22.2%	-	11.1%

Mentor Accessibility

Additionally, students evaluated how accessible were their mentor (see Graph 5). In general, most of the students reported that their mentors were ‘very accessible’.

Graph 5. Accesibility of the PI and other Mentor (not the PI) to meet and provide reccomendations



Students also described how much time the primary supervisor spend mentoring. Most of the students (80.0%) reported the principal investigator spends 1-3 hours weekly mentoring them (see Table 4). Similarly, students that their primary supervisor was a graduate student or a post-doc were mentored more between 2 to 4 hours weekly.

Table 4. Student evaluation of weekly mentoring hours

Mentor	Mentoring Hours (weekly)						
	0	Less than 1 hour	1 hour	2 hrs.	3 hrs.	4 hrs.	5 hrs. >
PI (n=5)	-	-	20.0%	20.0%	40.0%	-	20.0%
Mentor not the PI (n=9)	-	11.1%	-	11.1%	11.1%	11.1%	55.6%

Additionally, students were asked to describe why they were satisfied with the performance of the mentor. The majority of the comments described the support received from their mentors (see Figure in next page). Most of the students were satisfied with the support provided by their mentors.

I am very satisfied with my primary supervisor because he/she was...

Mentor PI

- *"I am very satisfied with the principal investigator because he was always there for me whenever I had questions, he **gave me feedback** and prepared me for what's coming next"* ***Female student***
- *"I am very satisfied with the principal investigator because he was very **attentive**, helped me a lot to understand what was going on, and he always took his time to help me"* ***Female student***
- *"I am very satisfied with the principal investigator because he was very good. He **always asks me** about my assignments and my research project and he help me with them"* ***Female student***

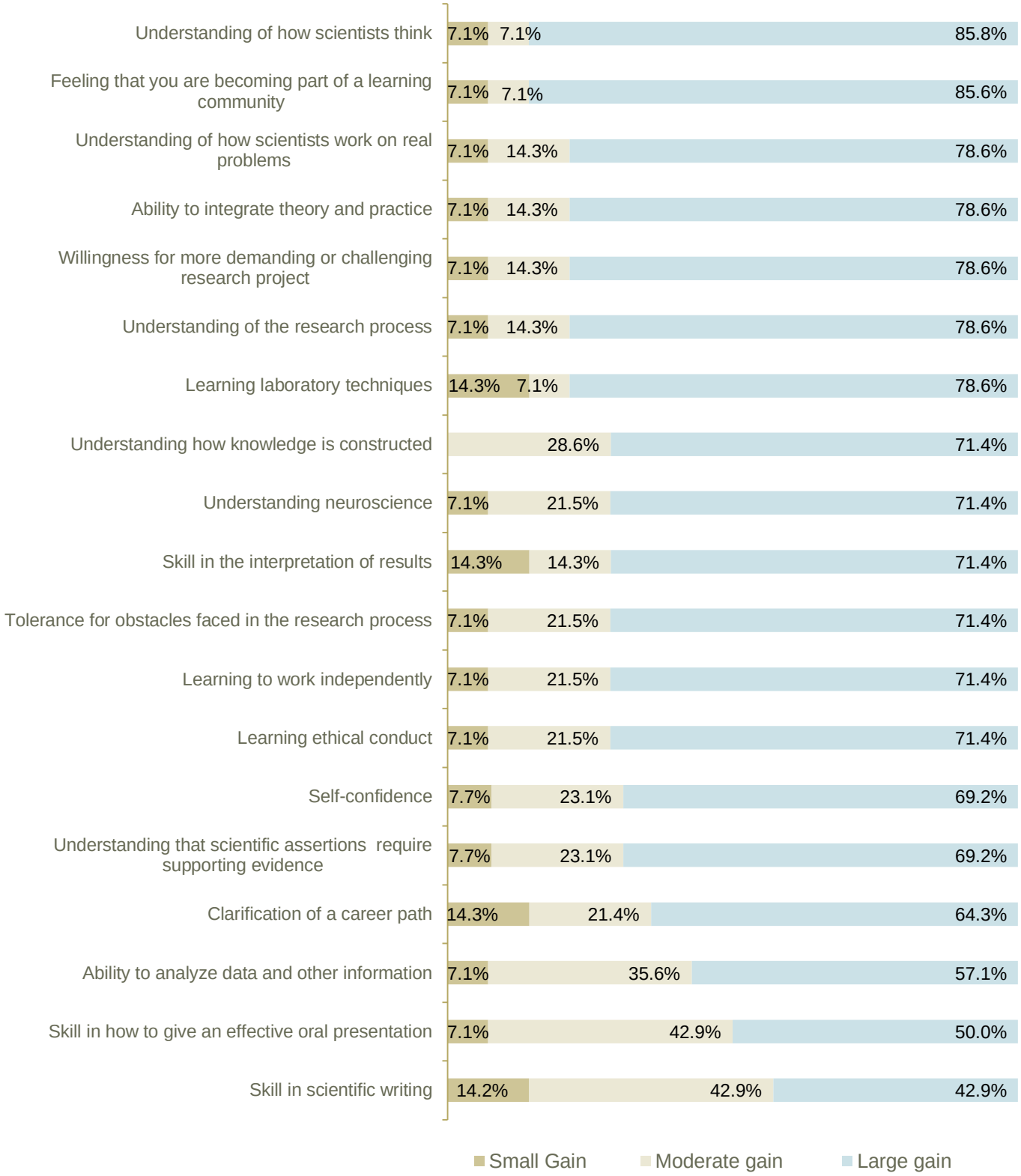
Mentor Not PI

- *"She was very attentive to my work and explained well every procedure and technique used in the laboratory"* ***Female student***
- *"He trained me in everything I proposed myself to be trained in. Also, he was a great mentor explaining me things that were not clear to me, teaching me new techniques and also giving me advice about grad school and other important information"* ***Male student***
- *"My primary supervisor was always available to help me and answer any questions about the experiment. She is an excellent teacher and mentor, and I've learned a lot from her"* ***Female student***
- *"She demostrated patience, kindness and compassion. She made me feel comfortable and showed me that it was "ok" if I've never worked in a laboratory before, that she was willing to teach me everything that she could during this summer experience"* ***Male student***
- *"He has helped me through all my lab experience directing me through different experimental procedures, scientific reading and writing"* ***Male student***
- *"I am satisfied because I felt I could count on her to guide me"* ***Male student***
- *"She essentially taught me how to approach a problem with critical thinking and gave me the tools necessary to work independently and conduct my own projects after the initial mentoring stage"* ***Female student***
- *"I am very satisfied with my primary supervisor because he helped me through out the process. He answered every question I had and was always accessible"* ***Female student***

Research Program: Impact

NeuroID students were asked to evaluate how the summer program contributed or advanced their scientific career (see Graph below). The two aspects the students rated as the **"major gain"** were the following: *understanding how scientist work and feeling that are becoming part of a learning community*. In other hand, the aspect with the **"lower gain"** was *'skills in scientific writing'*.

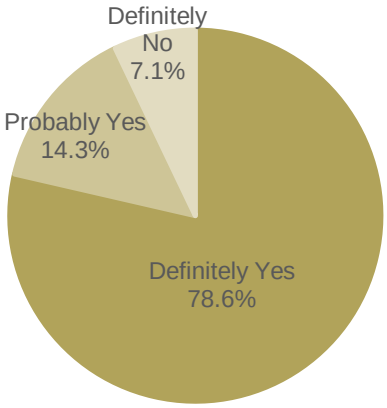
Graph 6. How the research experience contributes to the improvement of the following?



Students Comments & Recommendations

Most of the students agreed that they would recommend the laboratory where they had the summer research experience to another NeuroID student (see Graph 7).

Graph 7. Would you recommend the laboratory where you participated this summer to another NeuroID student?



Finally, students provided recommendations and comments about their research experience (see Figure 1). The following recommendations were made by the students:

> *"Add more summer workshops, and add more activities were participants get to exchange ideas and knowledge".*
>
> *"… because not all labs are "dynamic" NeuroID should have provided a more specific plan for us participants in our development as trainees"*

Figure 1. Students Comments about the Research Experience

"I am satisfied with the research experience and the opportunity to work in a laboratory. Even though I wish my summer investigation was different I am still glad that I chose the laboratory that I am in. I've learn a lot during these few months working there and also by attending the weekly program meetings" ***Female student***

"This has been of the greatest learning experiences I've ever had in my life. I could learn not only technical, academic, or research stuff, but also how is the life of a graduate student in a very demanding and competitive lab … which is one of my top choices for grad school. Having weekly seminars and meeting with other grad students and PI's made me understand that I really like this field and I would hardly recommend this program to anyone who would like to have a not only a great but the best summer research experience ever" ***Male student***

"My summer research experience was good, I learned a great deal and spent time getting acquainted with life in a laboratory" ***Female student***

"I am extremely satisfied with the summer research experience because it provided a real research experience where one had to essentially develop one's research project with the tools given. At the same time, the environment was an enriching one where my mentors treated me as a peer and discussed research ideas with me" ***Female student***

"I am very satisfied with the summer research experience because it has given my direction regarding the path to take with my graduate studies and career interests" ***Female student***

"I'm very satisfied because I performed several projects and got to know different techniques" ***Female student***

"I am very satisfied with the summer research experience because it prepared me for my lab work during the semester and made me be on track for what's coming next" ***Female student***

"I am very satisfied with the summer research experience because I had the chance to learn more about the topics that I'm interested in" ***Female student***

"I am very satisfied with the summer research experience because it was an amazing experience. I learn so much" ***Female student***

"I liked this experience because it showed me how a lab runs. It helped me developed more knowledge about science and it was a very interesting experience." ***Male student***

"I am very satisfied with the summer research experience because it helped to decide whether I wanted to pursue a MD or PhD career" ***Male student***

Mentor Experience (Class 2013)

Demographics

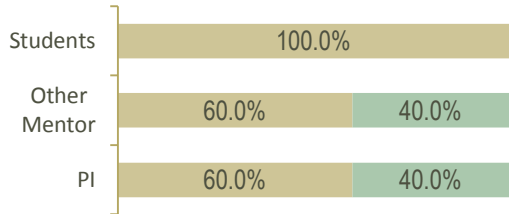
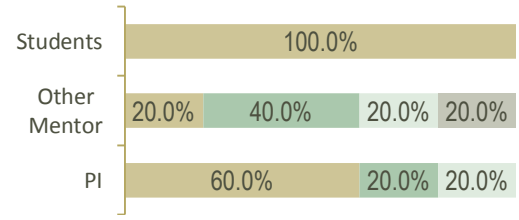
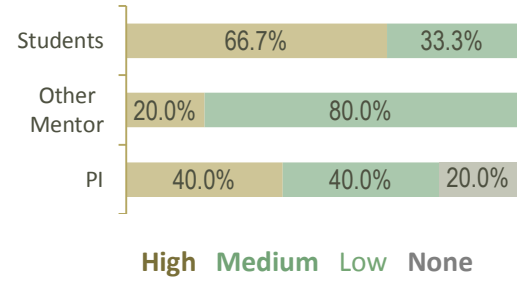
There were a total of **10 mentors** that completed the questionnaire. Half of the mentors were male (50.0%). The average age of the mentors was 38.4 years. Half of the mentors (n=5, 50.0%) described their current position as *'principal investigator'*, followed by *'graduate student'* (n=3, 30.0%) and 'post-doctoral student' (n=2, 20.0%). It is important to highlight that most of the NeuroID students (n=4, 66.0%) were directly supervised by the principal investigator (Figure 2).

Figure 2. A total of **11 mentors** received the evaluation survey

- 5 of 6 Principal Investigators (83.5%) completed the NeuroID student evaluation.
- 100% of the primary supervisors (*other than the PI*) completed the evaluation.
- 3 of 6 students were evaluated by two or more of their Mentors.

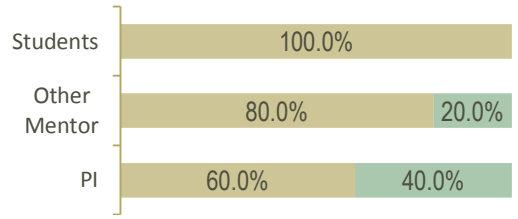
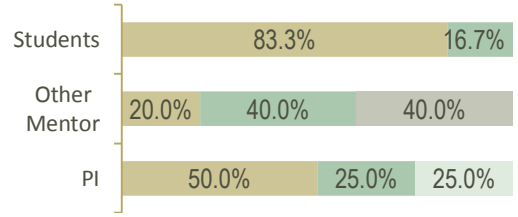
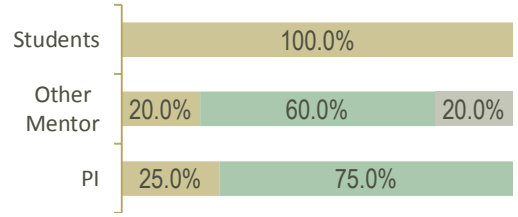
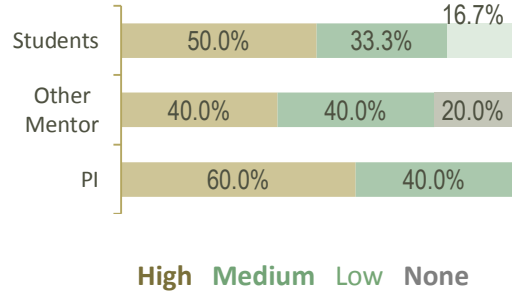
Skills Development: Scientific Method

Mentors were asked to evaluate the improvement of the students' research skills during the summer research program. Table 5 shows a comparison between the mentors' evaluation and the students' self-assessment at the end of the summer program. Most of the mentors described the NeuroID student's skills as "high" or 'medium". The skill with the highest level of proficiency at the end of the summer was 'determine the appropriate laboratory protocols to conduct experiment'.

Table 5. Scientific Method Skills <u>at the end</u> of the Summer Program	
Determine the appropriate laboratory protocols to conduct experiments	
Identification of gap-in-knowledge	
Development of plausible hypothesis	

Skills Development: Technical Proficiency

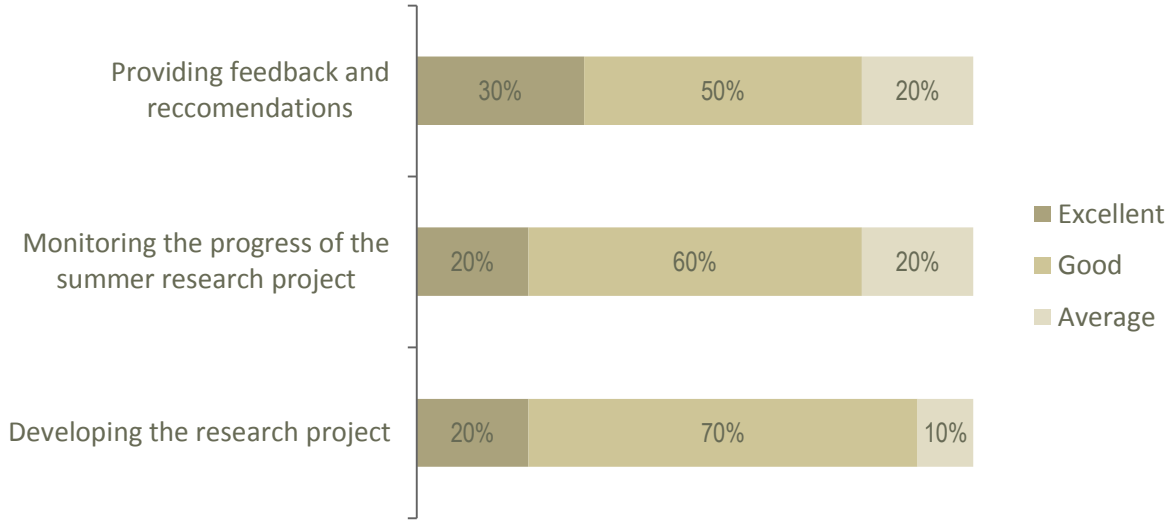
Mentors were also asked to rate students' technical proficiency at the end of the summer program. Most of the mentors rated students' skills as "medium" or 'high" (see Table 6). The skill with the highest level of proficiency identified by the Principal Investigator was 'manipulate the laboratory instruments and equipment properly' and 'prepare reports about the investigation work'. However, students identified the skill of 'manipulate the laboratory instruments' and 'critical interpretation' as their major gain and 'prepare report' as **area for improvement** (see Table 6).

Table 6. Technical Proficiency at the end of the Summer Program	
Manipulate the laboratory instruments and equipment properly	
Data analysis	
Critical interpretation of scientific literature	
Prepare reports about the investigation work	

Mentor Self-Assessment

Mentors also were asked to self-evaluate their performance during the summer program (see Graph 8). Most of the mentors described their performance as *"good"*. Specifically, the majority of the mentors (90.0%) described their support provided to NeuroID student for **developing research projects** as "excellent" or "good".

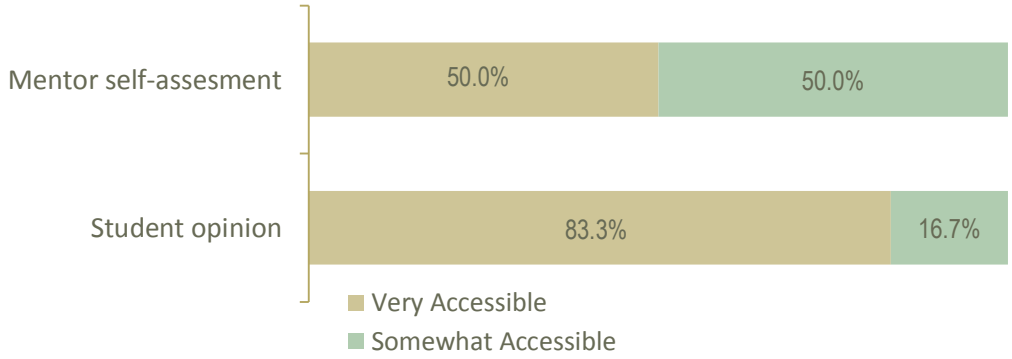
Graph 8. Mentor Performance Self-Assessment



Accessibility

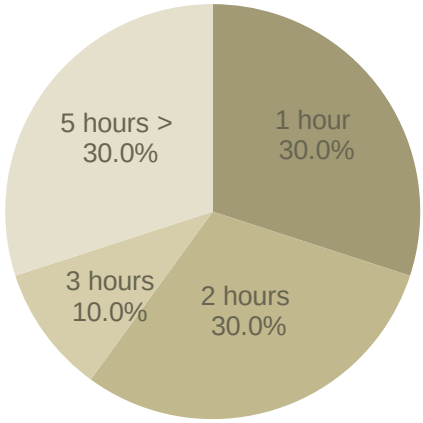
Additionally, mentors evaluated how accessible they were to meet with the NeuroID student to provide recommendations for the research project. Graph 9 shows a comparison among students opinion of the mentors accessibility and the mentors self-assessment. The majority of the mentors evaluated themselves as *"very accessible"*.

Graph 9. Comparison of the Accesibility of the Mentor to meet and provide reccomendations



Moreover, mentors described how much time weekly they spend mentoring the NeuroID students. More than half of the mentors (60.0%) spend 1-2 hours weekly mentoring the students (see Graph 10).

Graph 10. Approximatly, how much time (hours-weekly) did you spend mentoring the NeuroID student?



Mentors Satisfaction

In conclusion, the majority of the mentors (90.0%) were satisfied with the students' performance during the summer program (data not shown in graphic). Moreover, mentors provided comments about their experiences mentoring the students. Figure 3 summarizes the mentors' experiences with the NeuroID students' class 2013.

Figure 3. Mentors comments about NeuroID students performance

"She was a hardworking and reliable Summer Research Opportunities Program student. She completed all scheduled required reports and papers on time. The graduate student who worked with her, and I provided her with considerable support in completing her required reports. In my opinion, she didn't get into the primary literature as much as I anticipated she would. So I was never totally clear if she had an intellectual handle on the study that we got her involved in. Her verbal report to the laboratory at the end of her stay was acceptable but not stellar" ***Principal Investigator***

"I am unsatisfied because the student didn't have the necessary academic knowledge to understand the work we are doing in my lab" ***Principal Investigator***

"She was a very hard -and very skilled- worker" ***Principal Investigator***

"He was motivated, proactive and highly capable. He learned many skills, applied them, collected data and created a beautiful poster that he presented very well" ***Principal Investigator***

"She is incredibly talented and driven. She was a pleasure to work with as she quickly took ownership of her project and learned the background literature and could troubleshoot and strategize experiments at the level of a graduate student" ***Principal Investigator***

"I am extremely satisfied with the student performance. He is very talented, has strong work ethics, and has an insatiable "hunger" for learning and doing new things, which is what every mentor wishes to find in every student" ***Postdoctoral student***

"The student was satisfactory. She was engaged and helpful" ***Postdoctoral student***

"I'm satisfied because she was quick to learn the procedures and could do them independently. I wasn't satisfied with the times she had to miss lab time to work on her paper"
Graduate Student

"She was diligent. She learned quickly and was able to adjust to the pace of lab work really well. She was curious and keen on learning. I was impressed by her ability to understand her project and carry out experiments which led to her accomplishment gathering important data which moved the project forward." ***Graduate Student***

"I am satisfied with the student performance because she showed an in-depth understanding of the procedures she was performing and was extremely hardworking, but very easy-going."
Graduate Student

Mentor Experience (Class 2014)

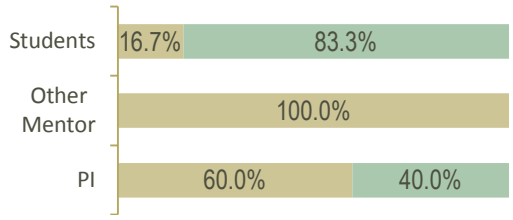
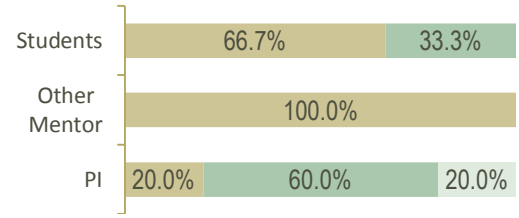
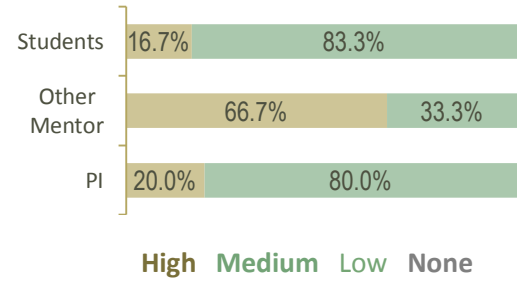
There were a total of **7 mentors** that completed the questionnaire. The majority of the mentors were male (71.4%). The average age of the mentors was 34.7 years. More than half of the mentors (n=4, 57.1%) described their current position as *'principal investigator'*, followed by '*graduate student'* (n=1, 14.3%), 'post-doctoral student' (n=1, 14.3%) and 'lab technician' (n=1, 14.3%).

Figure 4. A total of **10 mentors** received the evaluation survey

- 5 of 7 Principal Investigators (71.4%) completed the NeuroID student evaluation.
- 100% of the primary supervisors (*other than the PI*) completed the evaluation.

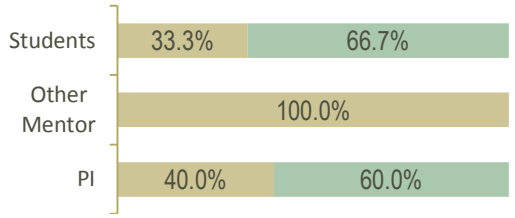
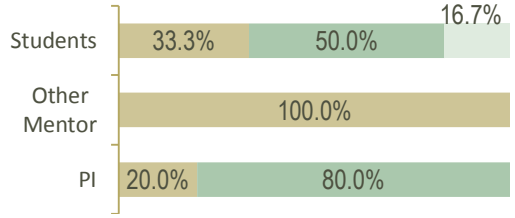
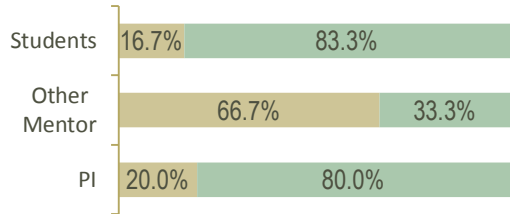
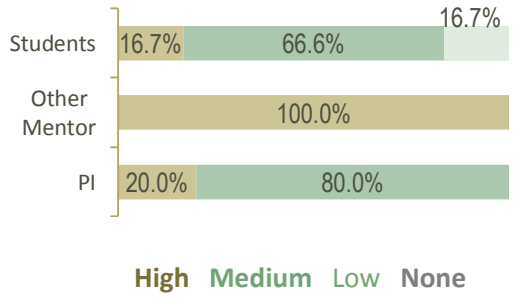
Skills Development: Scientific Method

Mentors were asked to evaluate the improvement of the students' research skills during the summer research program. Table 7 shows a comparison between the mentors' evaluation and the students' self-assessment at the end of the summer program. Most of the mentors described the NeuroID student's skills as "high" or "medium". The skill with the highest level of proficiency at the end of the summer was 'determine the appropriate laboratory protocols to conduct experiment'.

Table 7. Scientific Method Skills <u>at the End</u> of the Summer Program	
Determine the appropriate laboratory protocols to conduct experiments	
Identification of gap-in-knowledge	
Development of plausible hypothesis	

Skills Development: Technical Proficiency

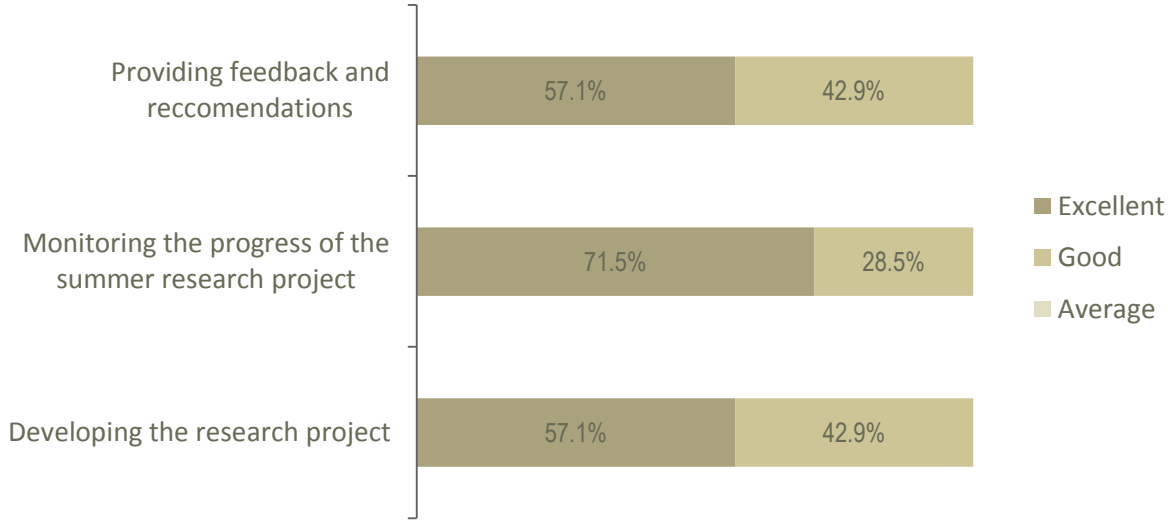
Mentors were also asked to rate students' technical proficiency at the end of the summer program. Most of the mentors rated students' skills as "medium" or "high" (see Table 8). The skill with the highest level of proficiency identified by the Principal Investigator was 'manipulate the laboratory instruments and equipment properly' and 'prepare reports about the investigation work'. However, students identified the skill of 'manipulate the laboratory instruments and equipment properly' as their major gain and 'prepare report' as area for improvement (see Table 8).

Table 8. Technical Proficiency at the end of the Summer Program	
Manipulate the laboratory instruments and equipment properly	
Data analysis	
Critical interpretation of scientific literature	
Prepare reports about the investigation work	

Mentor Self-Assessment

Mentors also were asked to self-evaluate their performance during the summer program (see Graph 11). Most of the mentors described their performance as *"good"*. Specifically, the majority of the mentors (90.0%) described their support provided to NeuroID student for **developing research projects** as "excellent" or "good".

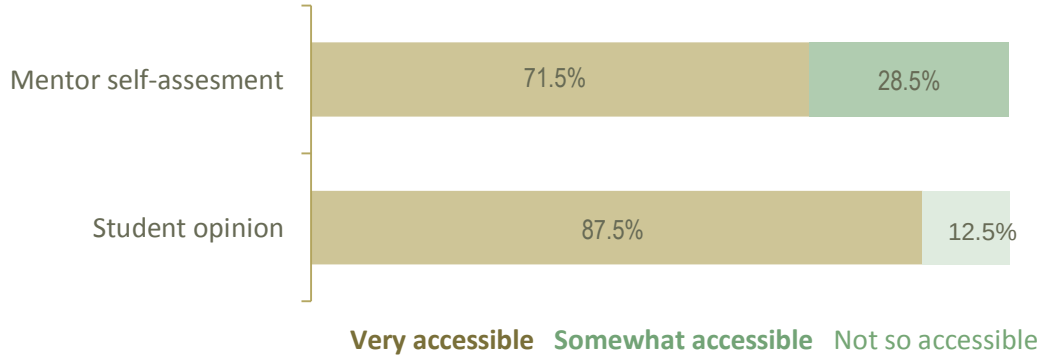
Graph 11. Mentor Performance Self-Assessment



Accessibility

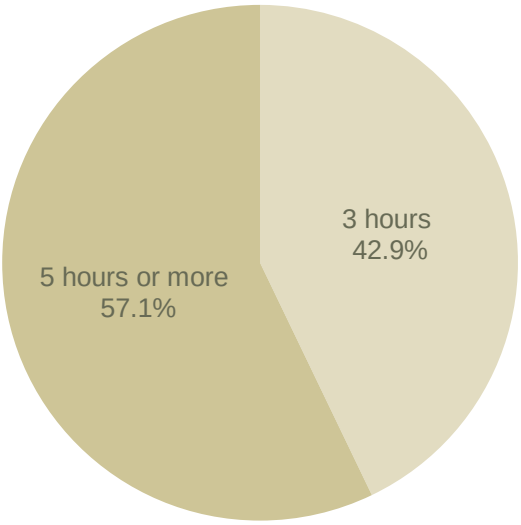
Additionally, mentors evaluated how accessible they were to meet with the NeuroID student to provide recommendations for the research project. Graph 12 shows a comparison among students opinion of the mentors accessibility and the mentors self-assessment. The majority of the mentors evaluated themselves as *"very accessible"*.

Graph 12. Comparison of the Accesibility of the Mentor to meet and provide reccomendations



Moreover, mentors described how much time weekly they spend mentoring the NeuroID students. Approximately, half of the mentors (60.0%) spend 3 hours weekly mentoring the students (see Graph 13).

Graph 13. Approximately, how much time (hours-weekly) did you spend mentoring the NeuroID student?



Mentors Satisfaction

In conclusion, the majority of the mentors (90.0%) were satisfied with the students' performance during the summer program (data not shown). Moreover, mentors provided comments about their experiences mentoring the students. Figure 5 summarizes the mentors' experiences with the NeuroID students' class 2013.

Figure 5. Mentors comments about NeuroID students performance

"She is a brilliant student that is passionate about her project. In less than a year, she was already running experiments wholly in an independent manner. She engages in advanced scientific discussion and is very creative regarding problem solving" ***Graduate student***

"He did an excellent work during the summer. He was totally involved in his project and completed it without any problems" ***Principal Investigator***

"Both student developed research skills and critical thinking during this summer research experience" ***Principal Investigator***

"I am very satisfied with the student performance because he has a lot of initiative and learn very fast. He is already performing neurosurgery and has an initial grasp on the patch clamp electrophysiological technique" ***Principal Investigator***

"I have known her for two months. During her short tenure in my laboratory she has participated and has received training in experimental design and data collection, rudimentary statistical analysis and interpretation, research ethics, care and use of research animals, and laboratory safety (e.g. chemical use and waste management). Through assigned readings, one-on-one interactions, group discussions, and hands-on experiences, she has gained insight into optics; light; principles of image formation; principles of fluorescence and digital imaging; and confocal microscopy. She has begun her first experiments and today I am satisfied with her performance and her abilities" ***Principal Investigator***

Conclusion and Recommendations

The main goal of the Neuroscience Research Opportunity to Increase Diversity (NeuroID) Program is to foster and enhance the interest of undergraduate students to pursue a research career in neuroscience through the integration of formal courses, community outreach opportunities, and mentored research experience. At the end of the summer the majority of the students were highly satisfied with the mentoring experience. Similarly, mentors were very satisfied with the NeuroID students' performance. In order to continue improving the mentored research experience, the following recommendations are made:

- **More training in scientific writing**- Students and mentors at the end of the summer experience evaluated this skill as an area for improvement.
- **Improve students' oral presentation skills**- Similarly, students at the end of the summer evaluated this aspect as an area for improvement.
- **Increase mentors participation** –In order to gain the most information about the experience is highly recommended to continue improving the response rate.

"This an excellent program and should be continue and expanded to provide more financial support to the participating labs in order to conduct more research"

Mentor, Class 2014