NIMBioS

Evaluation Report
Summer Research Experiences at NIMBioS for Undergraduates and Teachers
June 9-August 1, 2014

Pamela Bishop
Program Evaluation Manager

National Institute for Mathematical and Biological Synthesis
September, 2014

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Respondent Satisfaction

Overall Satisfaction

Figure 1. Overall satisfaction with the research experience
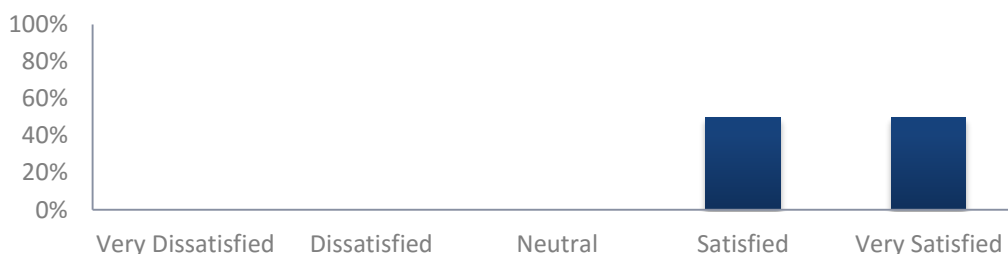
Figure 2. Would you recommend the NIMBioS SRE program to others?

Please explain why you would or would not recommend to program to others:

> Everyone should have some experience with the quantitative methods that are being increasingly used within the fields of biology.

> Everyone was incredible helpful, the mentors were amazing, and the research was interesting!

> I believe the small-group setting and the overall atmosphere are a fantastic way to gain some valuable knowledge about how the research process works and get hands-on experiences with research itself. While I will say that it was a fantastic experience or me and I have almost no complaints, I feel that as a Math major, if I had done this REU program after doing mathematical research in other contexts (such as a prior summer program), I might be slightly disappointed that I didn't end up using math in this project-- it would have been accurately characterized as 'computational biology' rather than 'mathematical biology'. That being said, the project description clearly states that the intention was to develop an agent-based model and I am not suggesting i any way that

such projects with less of an explicit mathematical focus be discouraged. Overall I had a fantastic time and I am certain that this summer has developed my skillset and mindset as a researcher and will be invaluable to success in my future career paths, whether they be in academia or industry.

I had an amazing experience and learned a lot. We will also be looking to get a publication out of this work so it is very exciting. The REU was also nice because it didn't consume my entire summer!

I thought it was a great experience to branch out and see the world in different perspectives. Often times, majoring in one thing only makes you look at the way in a very specific, defined manner. However, the program really opened my eyes.

I would recommend it if one is interested in graduate school. The projects are challenging but it gives a taste of what graduate school is like. The faculty is supportive and always willing to help. The connections you make at the NIMBioS REU program re extremely valuable academically and socially.

Interesting, pleasant experience

It is ideal for any student that wants to pursue research in any way.

Mentors are great and the experience is exceptional.

NIMBioS has been one of the greatest experiences of my life. It was a small taste of grad school and a great opportunity to meet new people from different places. For the small time our lives intersected, it was an amazing 8 weeks.

Program was well run, projects were engaging, people were great, and Knoxville was a wonderful place

The NIMBioS REU program was a great opportunity to conduct mentored research. It was a great learning experience both personally and academically. The atmosphere and the people were wonderful.

The program confirmed my interests in applied mathematics. Working with a biologist and a biochemist was interesting in that we had varied interests and skills, but when putting them all together, we were able succeed as a team. Living with aspiring mathematicians and biologists after work was an incredible experience as well.

The REU program not only serves as a research avenue, it also helps one in understanding or improving on how to work as a group.

This experience was a really valuable experience and I feel like I have gained a lot from it.

Figure 3. To what extent did this research experience meet your expectations?
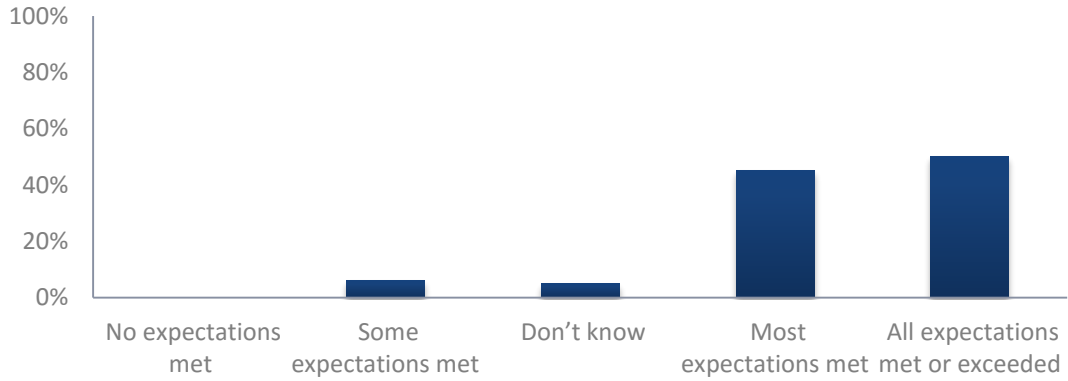
Figure 4. How did you feel about your workload overall?
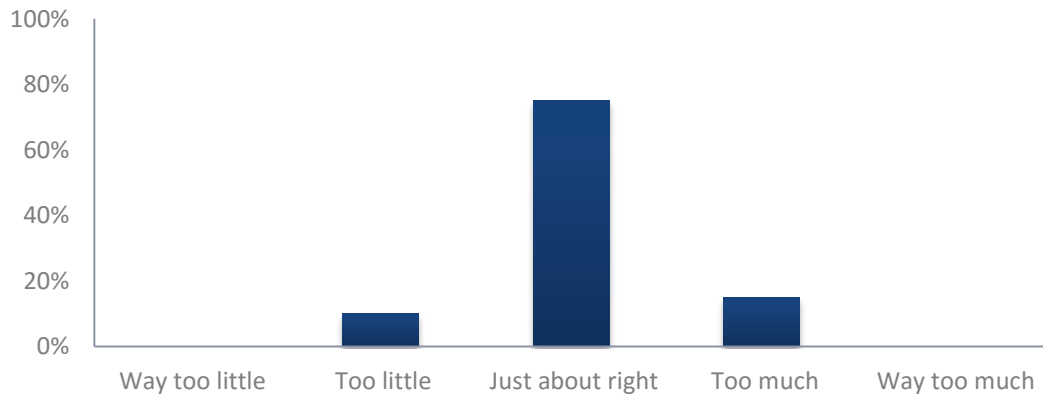
Satisfaction with Accommodations

Figure 5. Satisfaction with accommodations

Scale:1 = Very dissatisfied to 5= Very satisfied
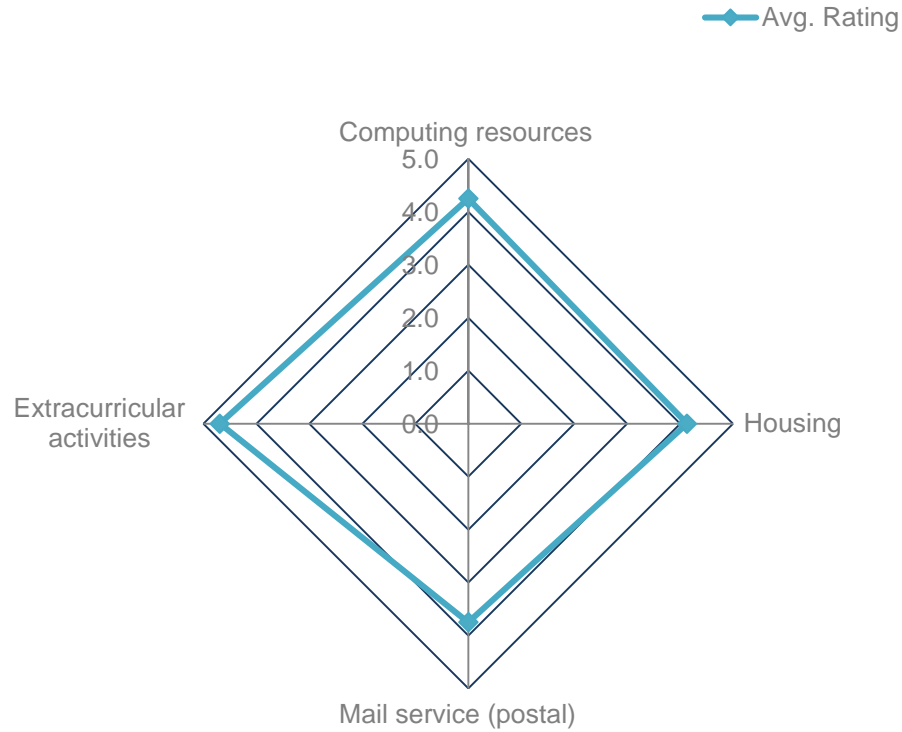
Please describe any accommodations/supports you needed that were not supplied (if any):

I feel like there could have been more bonding experiences!

Need-based travel support would be nice. Many people did not use all of their travel money, while others were flying from a great distance and therefore had money taken away from their paycheck. If the money isn't used by one individual, it should be give to someone else who can use it.

Satisfaction with Lectures and Sessions

Figure 6. Ratings for Lectures and sessions

Scale: 1 = Not useful to 5 = Very useful
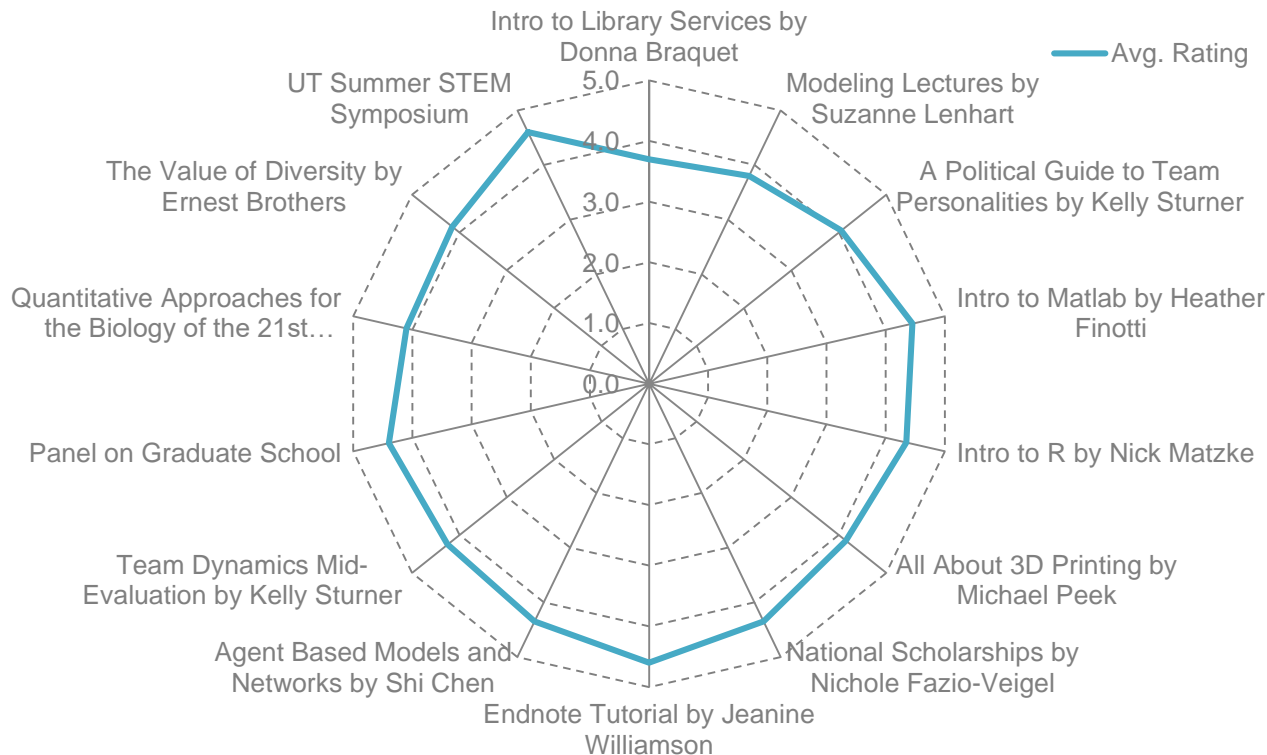
Other lectures or sessions you found valuable:

> *All the sessions were valuable to me because I've learned a lot.*
>
> *Dr. Adam Petrie gave my group a presentation on maximum likelihood techniques in the context of our problem.*
>
> *Dr. Armsworth's willingness to speak to students regarding graduate school was fantastic.*
>
> *Exit meeting with Lou*
>
> *The exit meeting with Lou Gross was very valuable.*
>
> *The graduate talk given by Dr. Gross was very informative.*

Other comments about lecture or sessions:

> *I enjoyed the fact that they were placed in the front half of the program, so that in the latter half when we knew what we were doing we could spend more time focused on working on our project.*

I would like to go to more lecture about science; I felt like the seminars were very mathematically based.

The graduate school panel could have been run a little bit better. It wasn't really moderated, we were just asked if we had any questions. It would have been nice to have some questions already prepared that they all would have answered. It would have also been nice to have someone pursuing a master's on that panel.

The lecture was very useful even though we didn't have time to implement this technique. I hope to keep in touch with my mentors and include this technique in our paper.

Satisfaction with Mentors

Figure 7. Average rating by mentor characteristic

Scale: 1 = Strongly disagree to 5= Strongly agree
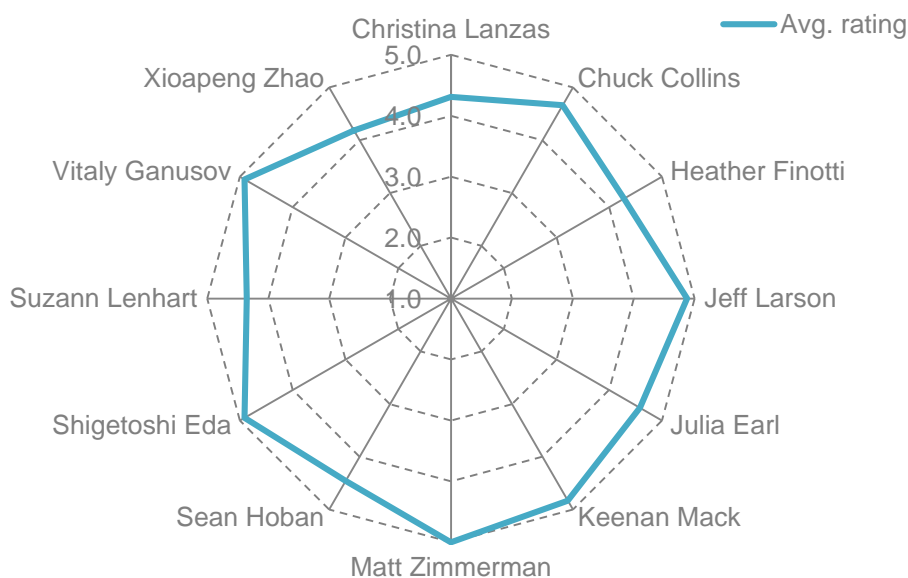
My mentor:

Figure 8. Average rating for all characteristics, by mentor

Scale: 1 = Strongly disagree to 5 = Strongly agree with each characteristics from Figure 7

Please use this space for additional comments about your mentors:

Dr. Shi Chen was a great mentor as well. He was a part of this group. To be honest all my mentors were exceptional, I've learned a lot and they are very helpful.

One mentor often took too much control of the situation and did not let us do our own work. Rather than giving us comments, he would often just change something by himself. Additionally, another mentor was often unavailable to meet due to her busy schedule. This was unfortunate, because she was the bridge between the group and the group leader.

I could not have asked for better mentors than Matt or Keenan. I loved the way that they encouraged us to ask our own questions and develop our own methods for solving the problems we encountered, and I loved the fact that they always took care not to be overbearing and impose their own preferences / ideas on our creative directions. They were friendly and accessible, and it pains me to think that Keenan is leaving NIMBioS and will be unable to mentor another group here together next year. The fact that they were so willing to continue to work on this project after the completion of the 8-week program also speaks to the quality of their mentorship in terms of how much they invested and will invest in seeing this project through.

It was unfortunate that for over half of the program there was only one mentor available in person at a time but both mentors were quick to answer e-mails and stay in contact with the group. I wish both mentors could have been present more often, there were times in which I felt we were negatively affected because we had to wait for one mentor to respond via e-mail before we could move on and we didn't have one mentor's expertise

to explain a problem. There was a few times in which we suffered a lot of miscommunications in regards to the project because of only being able to speak to one mentor at a time. It was also disheartening that both mentors were not present during the final presentation. However, despite this drawback, both Julia and Sean worked hard to stay involved in the project and make sure the group was progressing at a good pace.

My mentors served as phenomenal guides. Although I did not come into the program equipped with the biological knowledge ready to tackle large-scale problems, the support and guidance they provided helped me understand confusing aspects of my project. When asked them questions, they listened intently and provided feedback.

One of the most positive and encouraging experiences that I have had working with mentors.

Overall, this was a great experience that I would recommend to anyone looking in a similar field. I look forward to seeing everyone again in November!

Shi Chen was a great addition to our group of mentors and really contributed to the experience!

This program taught me that 8 weeks isn't a lot of time to really get deep into a research project. The NIMBioS REU program was a wonderful experience and I hope to stay in touch with the faculty and other students.

Communication and Group Dynamics

Figure 9. Did you find that Basecamp was a useful means of communicating within the SRE group?

Figure 10. How often did you feel your research group worked well together?
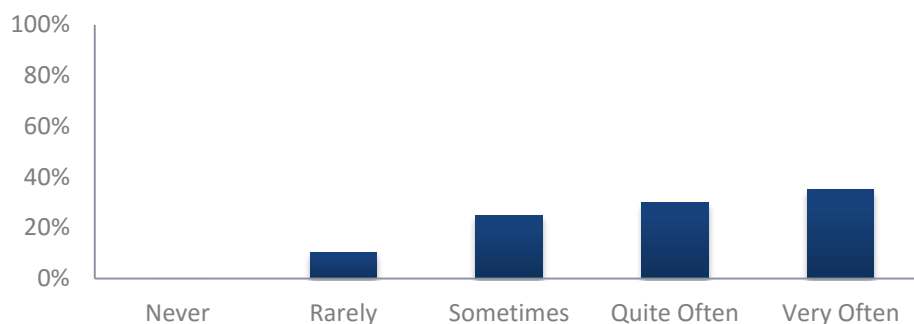
When your group worked well together, what factors do you feel contributed to the group's success?

- Compatibility of personalities - Individuals having expertise in different fields - Extensive use of communication

Clear Objectives were the only factor which contributed to our group's success.

Communication

Communication, sharing work loads

communication, well-defined assignments

Constant communication with one another, willingness to listen and help each other, working on the same schedule and in the same room every day.

Everyone contributed their own strengths

Great communication Allocation of tasks Equal contribution

Keeping a running list of goals, long and short term, helped everyone stay focused and made sure we were all on the same page.

My group worked well together when the disruptive element (a nonparticapatory group member) was removed and put on their own project.

Our personalities all worked very well together and we all had our own expertise which we could use when attacking a problem.

Overall, our group worked well because we did not step on each other's toes. We all understood different parts of the project which really made us work together.

People were willing to put the project first and accept they might not be right

Proper communication and respecting each other's opinion.

Understanding tasks at hand, understanding each other's skills

We divided the workload according to our strengths. We respected each other and we were open to each other's ideas.

We each had strengths where others had weaknesses and understood this. We valued each other's comments and criticisms on the work we did together and never got upset with each other.

We had a focused task at hand and everyone was able to contribute to the discussion.

When people took initiative to do things and when people were open with their ideas and feelings the group worked best.

Working together at the same place and time; talk to each other about our progress and ideas quite often; not judgmental about each other's ability and contribution

If/when your group was not functioning well, what were some barriers that prevented your group from working well together? How were these barriers overcome (or how do you feel they could have been overcome)?

Redundancy in working on tasks, caused by not allocating tasks properly / efficiently

At times group members would not listen to suggestions by others but it was overcome by everyone patiently explaining their viewpoint and everyone coming to a conclusion on what was best for the group/project.

Geographical/time barriers. Not all of us lived together and so it was sometimes difficult to meet up together.

Honestly, I believe the biggest factor in our group not working together was lack of work ethic and humility. Communication was a big hindrance to overcoming these barriers and helped some but did not completely solve the problems. If anything could have been done differently I think the root of the problem could have been addressed in a more straight forward fashion.

If we were unclear what exactly we were supposed to be doing or not sure about the next step to take we were usually pretty unproductive. Miscommunications also caused uncertainty.

Ineffective communication (could be solved by timely communication when problems arise); In a group of three or four, if two members are more closely related either during work or after work, the other member(s) would feel excluded. That was where problems arose. A healthy group should avoid this as much as possible by including all members when making decisions or even hanging out.

Lack of communication between the students Unspoken expectations Lack of trust between the students   The team dynamics helped a lot; it served as an avenue to open up and communicate more effectively

Lack of technical skills, lack of understanding concepts

My group felt a little disconnected since a couple members lived an hour away. It was hard to meet up with them on a regular basis. We tried to meet twice per week.

One of my group members refused to put effort into the group work or contribute if the topic was something they were not already familiar with. As most topics were new this particular member did not contribute to the team work. Finding a separate task for this member led to the division of the group, but it also lent itself to more productivity overall.

One partner was significantly less motivated than the other two, and lacked the initiative to learn new materials. Because of this, the more important work was done by the other two partners, which went well but was very stressful at times. Mentors and NIMBioS staff did speak with this student, although it did not help in the sense that he managed to contribute very little the entire summer but got full benefits of the program. I wish it had been made clearer that this student was here to learn new things and complete a full time job (he was often late to scheduled meetings and lectures).

One person wanted to make all decisions. We decided majority vote.

People not communicating effectively and some group members don't trust others work. There was a little improvement after we had a meeting with our members.

People were stubborn and unwilling to compromise. It would have been beneficial if everyone would have compromised more and let the past be the past.

Poor communication, no specific tasks

Poor scheduling. Misunderstanding of the material. We sometimes simply had to meet without certain members of our group due to scheduling conflicts. After the first two weeks we were more intentional about asking for help and making it clear when we didn't' fully understand the material and/or the task at hand.

Sometimes we would tackle problems that not everyone in the group could contribute equally to, due to the varying skill levels we had in certain aspects of our research, but we would always find ways to help. For instance, I struggled with programming while my two group mates were experienced with it, so I would handle other problems like reading literature and writing reports for them if I couldn't help much in their coding struggle.

There were times when miscommunication stopped our progress. During these times we would just take a small break and regroup later.
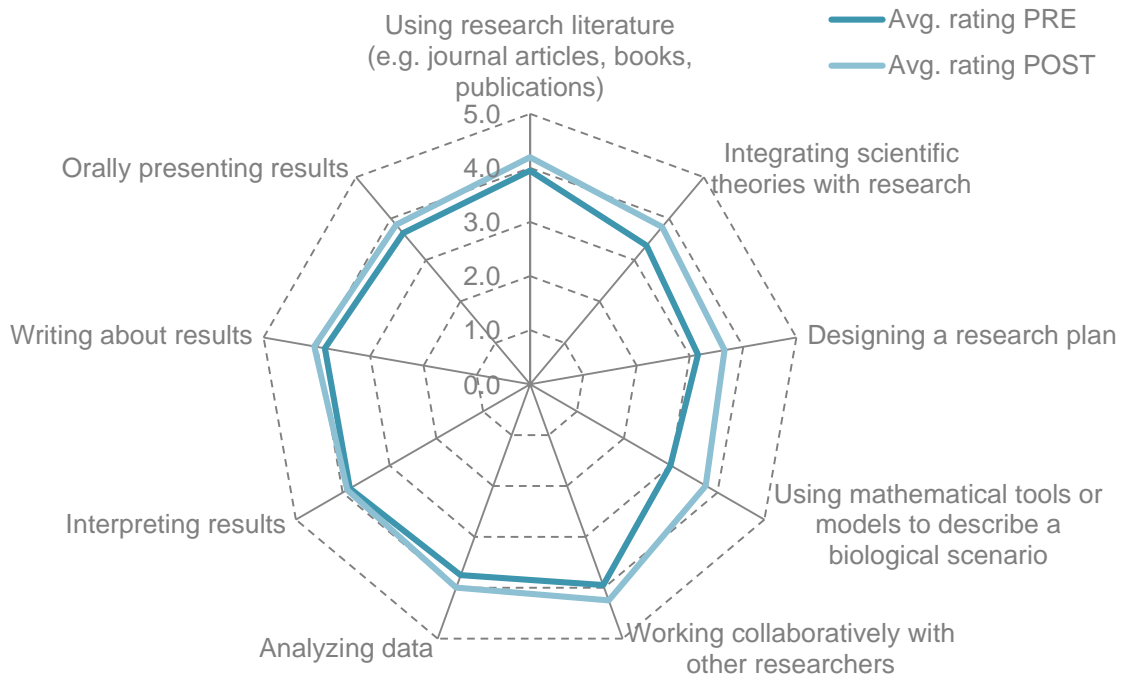
We were either hungry, or did not have clear instructions when my group was not performing optimally. This rarely happened as there was no shortage of food at NIMBioS.
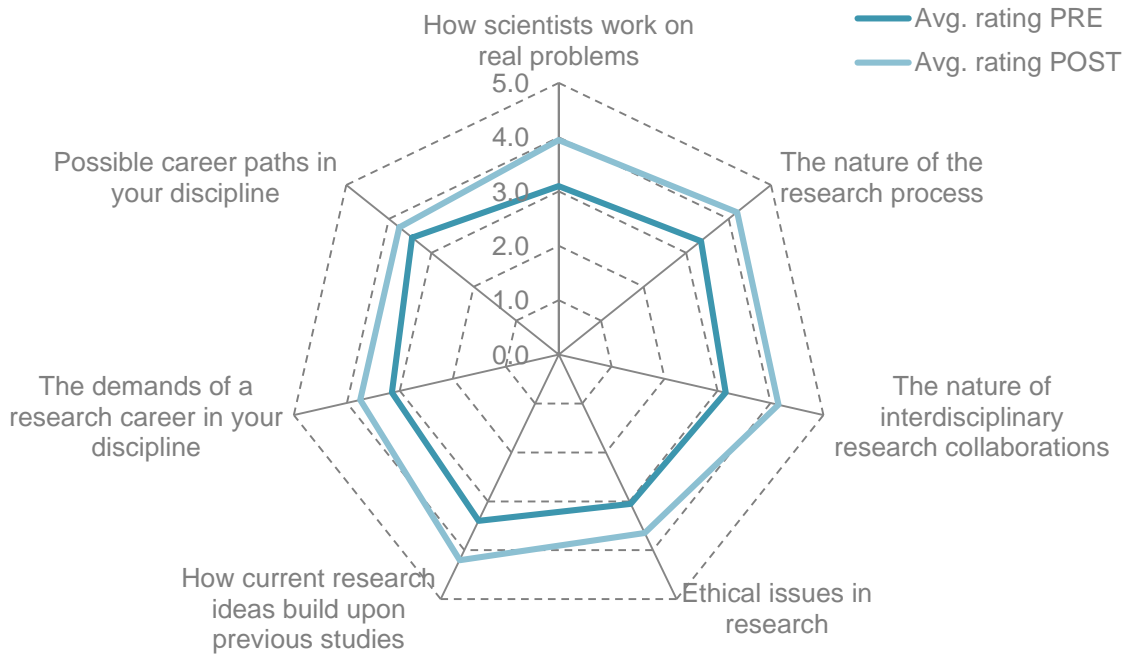
Program Impact

Participant Skills

Figure 11. Participant pre-and post-program skills, self-reported

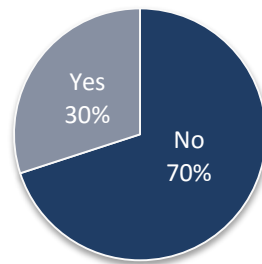Scale : 1 = Extremely poor at the skill to 5 = Excellent at the skill

Participant Knowledge

Figure 12. Participant pre- and post-program knowledge, self-reported

Scale : 1 = Extremely poor understanding to 5= Excellent understanding

Graduate School Plans

Figure 13. Did this research experience impact your plans to go to graduate school?

Please explain how the research experience impacted your plans for graduate school:

> *After experiencing research integrated in multiple fields, I've become more inclined to get involved with interdisciplinary work in the future, and not just stick strictly to the field I was most familiar with at the beginning of this summer.*

> *Before attending NIMBioS I thought I wouldn't make it at grad school. Now I'm excited for the challenge it presents.*

Dr. Lenhart recommended a few schools that I should apply to.

I am more confident in my decision to attend graduate school.

I am now applying to a graduate program.

I came in wanting to go to graduate school and I still would like to go to graduate school but the program made me comfortable in possibly taking a year off and figuring out what exactly I would like to study. It also helped me learn how to properly look at schools.

I definitely want to attend graduate school but this research experience has made me lean towards a more quantitative and research oriented course of study.

I got hands on experience and the seminars\ workshops that were prepared for us were very informative. Our mentors were great and the overall experience was awesome.

I have a new interest in systems biology and biochemistry.

I initially thought I would simply be applying for graduate school in a Biomath department. I now realize that my options are much broader, and that I could feasibly enter either Biology or an Applied Math program. General knowledge about the admission process and what is considered to be a good application profile was also very helpful.

I was not sure whether I would like to study mathematics in graduate school. This program assures me that studying applied math is likely to be a wise choice.

It made me consider an md-PhD program.

My experience at the SRE program has confirmed my interest in computational mathematics and applied mathematics. Although the implications of mathematical biology are, at the end, the most important results, I enjoy applying the computational methods used to solve real world problems.

This research experience has shown me that grad school is something that I want to pursue.
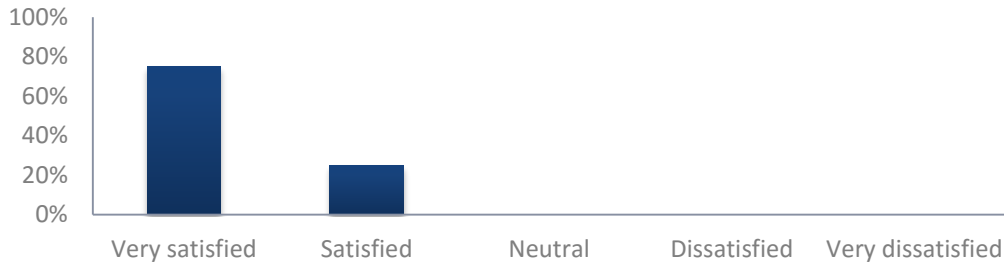
Table 1. Participant pre- and post-program degree plans

		End of Program				
		Master's	Ph.D.	MD	MD/PhD	Total
Start of program	Master's	2	1			3
	PhD	4	10	1		15
	MD				1	1
	MD/PhD				1	1
	Total	6	11	1	2	20

Mentor Evaluation Survey Data

Overall Satisfaction

Figure 14. Overall, how satisfied were you with the NIMBioS SRE program?

Overall comments about the program:

> *An informal meeting among mentors once or twice through the program to discuss progress, interactions with students, successes and failures.*

> *I think it would be important to have meetings with mentors regarding selection of projects and what exactly should the students be doing. Sharing experience by good/successful group mentors may be useful.*

> *I think this program is great. The math/science students always seem to benefit by getting experience the research process firsthand, but I thought i was particularly great that we had in-service teachers involved. They both seemed like they gained also in terms of widening their perspective on what is possible career-wise, which they will hopefully certainly pass on to their students. It was hard to find a way for one of them to participate much, as her math background wasn't particularly fresh/strong, but the other seemed to be really on top of things.*

> *The program was fantastic--I'm honored to have been a part. Evaluating a student on the previous page was difficult. He expresses so little that it's hard to assess where he is and how much he's progressed. I'm very pleased that we were able to find a programing need for him to fill for the latter half of the program. He generally did an adequate job, but I still had concerns: (a) He didn't take much initiative--I had to tell him what to do and it was sometimes like pulling teeth. (b) He didn't really seem to treat me as his "boss" (which I didn't want to be but his lack of initiative pretty much required it). For instance. He was passively disrespectful (e.g., when I was trying to persuade him of something based on my years of experience, he would sometimes dismissively respond, "If you say so.") He could really use some career development. He's only a rising sophomore, so that's to be expected. On the other hand, he had a golden opportunity to get that career development this summer and he didn't' exactly grab it.*

> *The SRE project should be a full time job during the 8 week period. I believe overall the experience has been fun and somewhat useful to all students. However, the commitment level of some students is less satisfactory. A few students may have used the SE as a*

side project. I would suggest the students sign a statement when they apply to indicate that they will treat the project as a serious project and devote 100% effort.

Work more on getting students to adapt to different knowledge levels and personalities in their groups. Get students to understand the varying contribution levels in a group.

Application Process

Figure 15. How satisfied were you that the student applications supplied the necessary information needed to choose qualified participants?
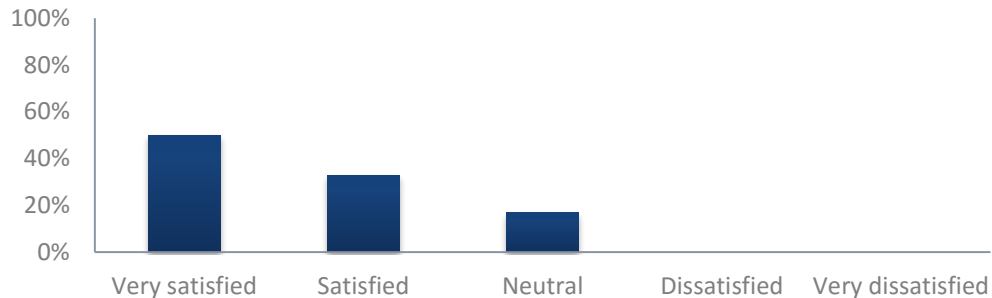

Please provide any suggestions regarding questions or content that might be helpful to include in future applications:

Hard to decide participant suitability based on application. Perhaps more shorter but specific questions?

Student Training and Supports

Figure 16. How satisfied were you with the training provided by NIMBioS to your students (lectures in R, MatLab, modeling, etc.)?
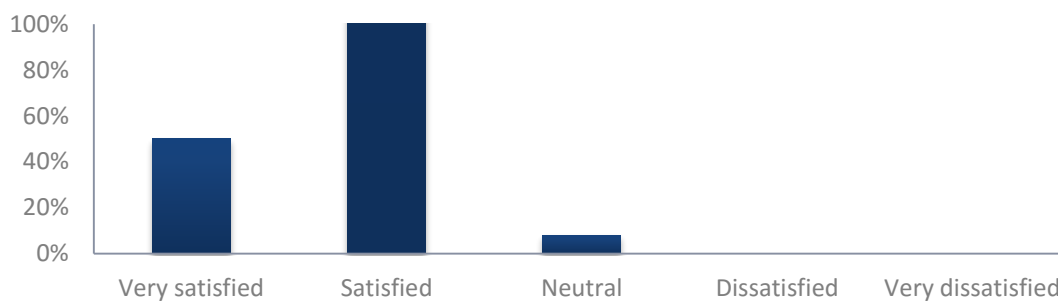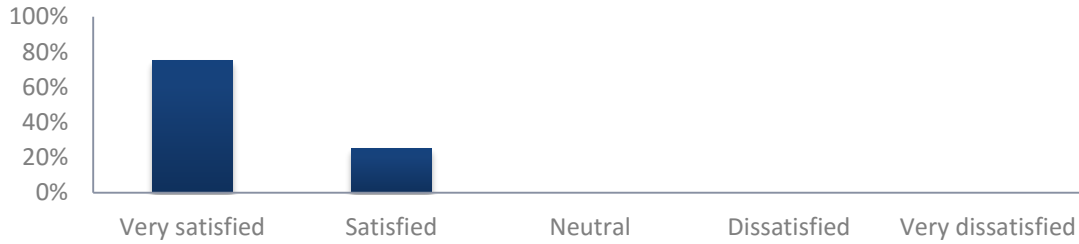

Please let us know if there are any additional training that you feel would have benefitted your students:

As I understood, math modeling part was trivial for my students but given diversity in the student background, the level of the introduction into modeling was probably a necessary compromise.

For those that have some basic knowledge some more advanced training, with maybe some time on software design.

I'm just not more enthusiastic in my response because I'm not 100% familiar with what they are trained in, outside MATLAB which I taught..

Figure 17. How satisfied were you with the other supports provided by NIMBioS to your students (computer resources, social activities, etc.)?

Please let us know if there are any additional supports that you feel would have benefitted your students:
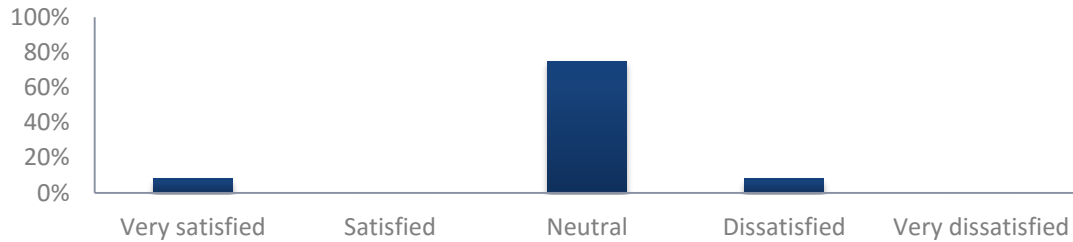
No comments
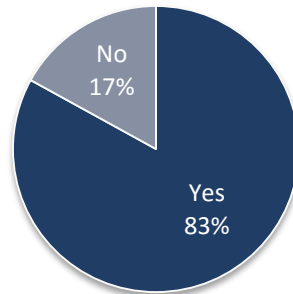
If you answered "No" above, what were the reasons for not attending provided by your students?

Two students attended all sessions. Another missed one meeting and was consistently late to most meetings.

There were only a couple instances where a student needed to miss because of a wedding, and something else (? travel... I don't remember).

Group Communications

Figure 18. How satisfied were you with Basecamp for communicating with others in the program?

Comments about Basecamp and/or communications within the program in general:

Didn't really use Basecamp

Didn't use Basecamp; we used Google Drive for group resources.

I was not signed up for Basecamp for '14 SRE.

I'm not even sure what Basecamp is?

Not sure what is basecamp and how that was used.

We did not use basecamp (we used dropbox)
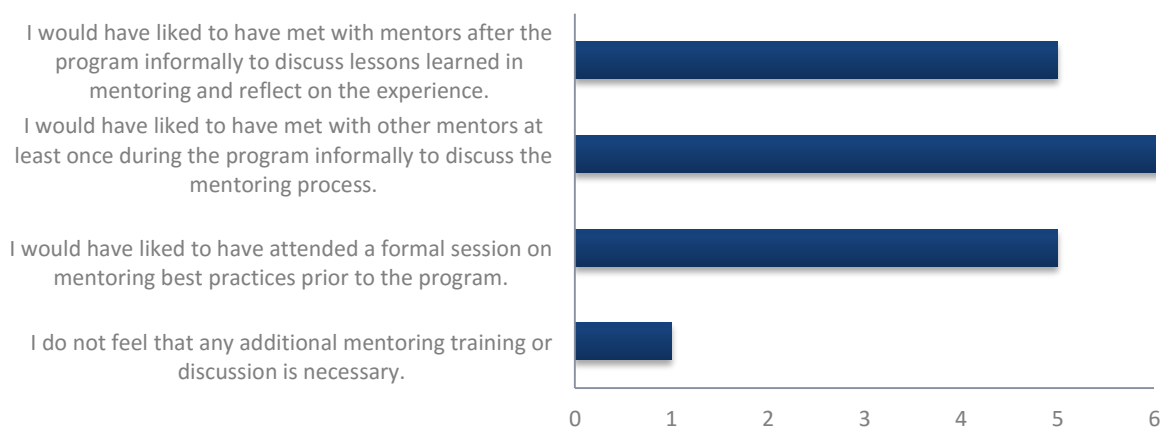
We did not use it.

We didn't use Basecamp at all. Email, text, phone, and Google Drive met/exceeded our needs.

We never used basecamp.

We opted not to use Basecamp and used Google drive instead, which is superior in every possible way.

Mentor Training

Figure 19. Please indicate if you agree with the following statements:

*Comments or suggestions about mentor training:*

I think it is extremely important to have mentors meeting BEFORE the SRE, in fact, during the time when topics are submitted to NIMBioS for selection. I think some groups did not have well defined plans of what needs to be done.

I wouldn't necessarily want a meeting about general mentoring as much as an organizational meeting about specifically what the expectations for the SRE should be.

The phone chat that I (Jeff Larsen) had with Suzanne and Kelly midway through about the group's dynamics and Ben's role in the project was extremely helpful. I suppose a brief check-in like that (either in person, phone, or online) at 2 wk and 6 wk into the program would be helpful.

This was the fourth time for me to act as a mentor for SRE (REU) and I would be happy to share the experience with new mentors

.Figure 20. How satisfied were you with your interaction with the other mentor(s) on your project?
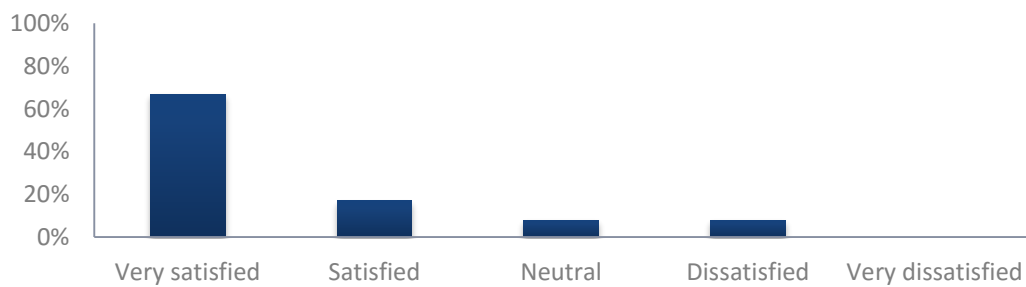
Comments about interactions with other mentors on your project:

Didn't have much interaction with other mentors outside our group

Not many interactions with other mentors.