

# **Final Reflection on My 2017 Summer Enrichment Experience in the Students and Teachers as Research Scientists (STARS) Program**

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This summer, I took part in the Students and Teachers as Research Scientists (STARS) Program in St. Louis. Hosted by the University of Missouri-St. Louis (UMSL), STARS pairs high school students with research mentors from various universities and research facilities around the St. Louis area. I was paired with Dr. Scott Sell in Biomedical Engineering at Saint Louis University and worked on developing a new type of gel mold fabricated from 3D-printed polylactic acid.

## **Research Seminars**

One of the integral aspects of the STARS Program was the seminars held at UMSL a few times a week. A diverse array of speakers, including experts in technology, medicine, and other fields, presented on cutting-edge research in their respective field. Listening to these presentations not only enlightened us about interesting topics, but it also helped us understand what it takes to succeed in different areas of science. In addition, we heard from admissions counselors at selective schools in the region, who cleared up misconceptions about the college admissions process and provided advice on the college application process. The seminars were also an excellent opportunity to interact with the speakers and fellow STARS students, and I had the privilege of meeting many extremely accomplished researchers and peers.

## **Lab Work**

The primary focus of STARS was obviously the laboratory-research component. Five days a week, I presented at Saint Louis University's (SLU) Biomedical Engineering Building to work on my project, entitled "Synthesis and Characterization of Polylactic Acid Mold Chitosan Gelatin Cryogels." Dr. Sell's lab at SLU is a tissue-engineering lab with an emphasis on hydrogels and cryogels. Cryogels are gel matrices that form macroporous, sponge-like structures when frozen at subzero temperatures; they have been successfully used in various biomedical engineering and medical applications. In the Sell Lab, I worked alongside a graduate student, and we focused on creating a new type of mold in which to freeze these cryogels. This novel mold, fabricated from 3D-printed polylactic acid (PLA), a biodegradable material, promised advantages that conventional plastic molds could not, including: the ability to construct cryogels of various shapes and sizes, as well as the ability to create biodegradable bioreactors. To

determine the viability of these molds, they had to be thoroughly characterized alongside conventional molds across various freezing times.

One of the main things that sets the STARS Program apart from other summer enrichment programs in the sciences is the integral involvement of the student as researcher. From day one, I was deeply invested in my project and determined to collect enough data to come to valid conclusions about the hypothesis being tested. This meant that I had to review lots of previously published scientific literature and other resources to gain a solid understanding of the project and the underlying science. Once I had a firm grasp of the concepts underpinning my project, I designed the project's workflow and made sure that data collection was both timely and accurate. Lab work represents a prime example of the adage: "you get out of it what you put into it." To successfully develop and test experiments, I had to work tirelessly in the lab and at the dorms. Before coming to STARS, I had worked on various research projects, but, at STARS, the scientific process became evident, and I was given much freedom to design and optimize experiments.

### **Research Paper and Presentation**

Another fundamental feature of STARS is the scientific paper. STARS students are required to write a paper on their research, and this assignment includes drafting and submitting key sections of the paper to advisors and mentors each week. Conducting research in the lab is one thing, but writing a scientific paper regarding that research is a completely different undertaking. The paper was not only a matter of individual effort and dedication, but it was also one of collaboration among mentor, advisor, and student.

To culminate the robust research experience, we were given a chance to present our research to our mentors, fellow STARS students, and other professors on the last day of the program. This was definitely the climax of the research experience, as every STARS student presented his or her research and appreciated the scientific method employed in other students' projects.

### **Residential Life**

Possibly the most transformative aspect of the STARS Program was the residential portion. Until attending STARS, I had not experienced an extended-stay residential program, and living at the UMSL dorms was a unique opportunity. At the UMSL dorms, there was a lot of unexpected freedom, as we were treated just like college students. In fact, most of the dorm was populated with college students who were taking summer classes or participating in summer internships, yet the dorms also included STARS students who did not live in the St. Louis area. I interacted with some great students at the dorms, and we developed a true sense of teamwork and collaboration throughout the program.

Initially, the freedom at the dorms was difficult to adjust to, yet it became one of the main reasons why the STARS Program was so beneficial. Living in the dorms was a great way to hone my time-management skills that will certainly be advantageous of later in life. Moreover, the freedom that came with the dorms was complemented by freedom in other aspects of the program. For example, I had to thoroughly plan my schedule each day so that I could get to the Metro on time, travel to UMSL or SLU, and be back to the dorms by a reasonable time.

### **Conclusion**

Attending the STARS Program opened a world of possibilities for me in terms of scientific exploration and curiosity. Not only have I learned a ton about biomedical engineering, but the research and inquiry skills I developed at STARS will be helpful in college and throughout my career. The program combined social, residential, and research aspects to form an extremely enjoyable experience that I will cherish for years to come.

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