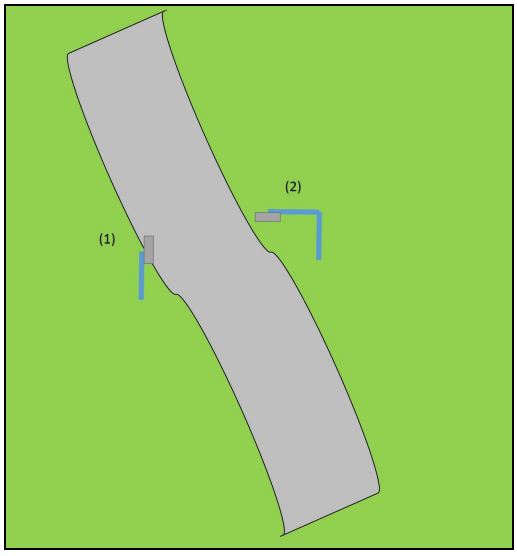
Some make it hot: reflections from our student-scientist partnership on infrastructure heat absorption

This article is written by Stephanie Januchowski-Hartley (scientist) and Emily Seng (student) who worked together in a Student-Scientist Partnership project in the fall of 2016. Below we share about our experiences working together and our work flow, and then end with reflections from our shared experience!

Our Student-Scientist Partnership started with a short email exchange, and all of the partnership interactions were carried out by email throughout the project. Emily introduced herself to Stephanie, and shared her ideas about what she was interested in pursuing for her Science Fair project. Emily was initially interested in three overarching phenomena: sunrises, weather, and landslides, and shared ideas with Stephanie about the types of questions she was interested in. Through several short email exchanges Emily and Stephanie identified several websites with useful and interesting project ideas, and Emily further developed her research question. A few weeks into the project development Emily began to solidify her research ideas, and was very clear on wanting to ask a question that she didn't know the answer to! Who could blame her? That's one of the best parts about science!

"I would like to try to find a question that I could test and not know the answer of."

About three weeks into the partnership, Emily decided on the direction of her research question, which was to evaluate whether dark or light infrastructure let out more heat. She initially wanted to test her question with infrastructure such as parking lots, roads, or sidewalks. With these ideas in mind, we set-off to design the experiment. In the weeks following, we exchanged ideas about refining the research question, about the research design (e.g., what to measure, and how?), and the types of materials needed. We even shared a few schematics about how the design might look! Powerpoint is a great tool for visualizing ideas!



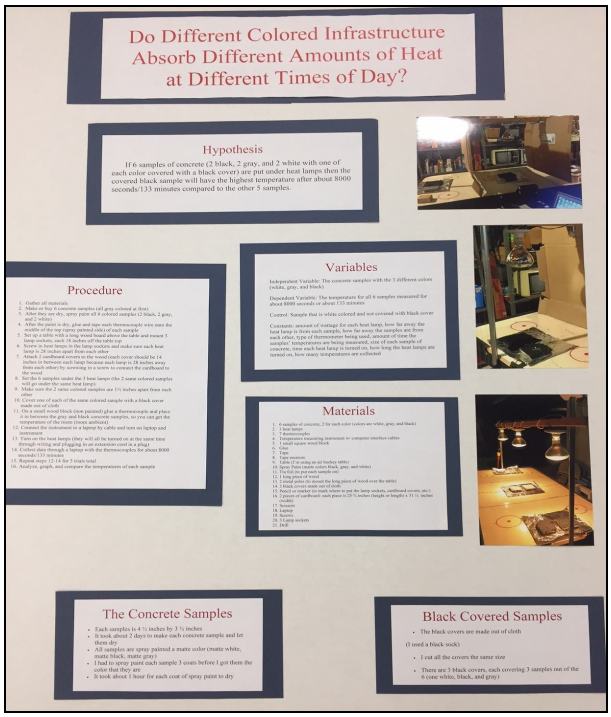
A schematic of potential designs to record infrastructure temperature.

At first we had thought about conducting the experiment outside, but then after some long discussion about the design, decided that inside was best, because the environment could be controlled, and would result in more accurate data. Emily further refined her design, Stephanie offered some additional feedback, and within another few weeks Emily was setting up the experiment! Emily's final project title was: "Do Different Colored Infrastructure Absorb Different Amounts of Heat at Different Times of Day?". Emily trialled a few

different approaches to the research design, and different materials, including a few different types of thermometers for measuring temperature above the infrastructure. By the end of November 2016 Emily had developed her research question, designed the project, ran the experiment and collected her data!

Emily's project design.

We exchanged about 25 emails in total throughout the project. Emily did the hard the work, and Stephanie offered support along the way! On average, Stephanie invested about 30 minutes a week to reading Emily's emails about her project, reflecting on her questions and offering ideas and responses to Emily's questions. Emily collected all of her data, and created graphs, using Google Spreadsheets. Emily did all of the writing, data analyses, and preparation for her presentation at the local Science Fair.



Picture of Emily's project at the Beaumont Middle School Science Fair in the winter of 2017.

Personal reflections about what we gained from our Student-Scientist Partnership

Emily: I really enjoyed having a mentor help me with my science fair project. I didn't really have any idea what to do, but I was given great suggestions and my project turned out to be very successful. I learned a lot about the topic and different ways I can find the answer to my science fair question. I really liked reading Stephanie's emails each week and it improved my project a lot! Stephanie also helped me with certain details my project needed to have and especially what materials I should and shouldn't use. It was a fun and cool experience working with an actual scientist on my project.

Stephanie*:** This was my second year being involved in the Student-Scientist Partnership project, and both of my experiences have been very rewarding! Here are the top three things I took away from my Student-Scientist Partnership experiences! First, I ***learned a lot from Emily and the other students, including a raised awareness about the benefits of open dialogue between scientists at different stages of their research and careers. Second, I ***gained knowledge*** from the students about topics I had never, or not recently, thought about; this was absolutely refreshing and good for my own scientific development. Third, working alongside students brought me joy and a ***sense of fulfillment*** that I believe ***strengthens*** my own interest in science and research.