Impact Report

This summer I arrived into JFK at around 7pm, I took the E train from the airport to 53rd and 7th and walked up out of the subway station to a scene from a movie. I couldn't stop looking upwards, and I had no wifi nor sense of where I was going but I was determined to make the most of the experience ahead of me.

I hope that I have done that. It is still so strange to me that I spent my summer in New York doing science outreach and interacting with scientists, entrepreneurs and students from around the globe. My first few days at the World Science Foundation (WSF) were filled with meetings and introductions, everyone was very welcoming and I was happy to find that I was given almost total control of my own projects. Towards the end of the week, having met the students partaking in the World Science Scholars programme, I became aware of multiple areas I could impact.

First I was interested in broadening the experience of the scholars, whilst they are given world class lectures and experience in science, studying astrophysics, mathematics or neuroscience from leading experts in those fields, they have no programming including soft skills, teamwork or leadership. Secondly there was the lack of any alumni connection, once students have spent one or two years in the programme, they leave without much connection to WSF or other scholars. Some alumni had reached out personally to current scholars and offered advice, help to find summer research opportunities or assisted with college applications, however these students did this on their own initiative, rather than any formal alumni programme. Another obvious area where I could have an impact was the festival itself, in which the scholars are brought from all over the world to New York. The education team were designing a new scholarship targeted at even younger gifted children and I thought this would be an excellent way of learning how projects like these come to fruition. Finally I was also very interested in helping to design and create a course that would be offered to next year's cohort of scholars in my field of 'expertise', astrophysics.

These initial ideas formed the basis of the deliverables that I presented to my supervisor:

1. To design a soft skills/non academic workshop to host for 45 minutes during the festival
2. To assist with the current Scholars module and help to create a new module for next year
3. To assist with the intake of new scholars (including for the Junior programme) for the next cohort
4. To reach out to alumni in order to find what resources they need to feel supported by the WSF after graduating

I got started straight away on the most time sensitive goal, the presentation and workshop. This would be during the first morning of the festival, and so while I wanted it to be informative about a non-academic subject, I also felt it important to get as much interaction between the scholars who would be meeting in person the first time. One aspect of this was to include a team based competition for the final 10/15 minutes of my timeslot. Narrowing down the topic for the talk was quite difficult. It was hard for me to think of what I could offer to these incredibly gifted children from such diverse backgrounds.

During my time at WSF I interacted with the scholars between once and twice a week when they would have zoom calls to discuss their current module, problem solving in mathematics by Professor Cumrun Vafa, with a postdoctoral student as their teaching fellow. They would spend their time during the week watching lectures and answering the questions posed by Prof. Vafa and then come to the office hours. These hour long zoom calls were delightful,

hearing the scholars discuss the problems, their interpretations and solutions to them. I was particularly happy when I was able to solve a problem that was left unfinished during the zoom and upload it to the scholars portal. I really got an understanding of how the course was delivered to the scholars and how they learned. The course which I helped design was about the James Webb Space Telescope, telescope design and the next generation of astrophysics research. It was delivered by John Mather, a Nobel Laureate. It was an honour to meet him and discuss the course that would be offered. We recorded the course and it will be delivered in May of next year, including problem sets and projects to be completed alongside the lectures that I will be the teaching fellow for.

During this time I helped in accepting the next cohort of scholars. This was extremely difficult, not only because it was very labour intensive to read applications that were sometimes 30+ pages long, but also because the applicants were all of such high quality. I felt somewhat unqualified to grade these applications, however after doing many with oversight I gradually became comfortable with the process. Having it as a rule that all submissions must be graded at least twice also eased my worries, however looking at my gradings versus those of another member of the education team, there were almost none which were inconsistent overall.

One issue which was discussed heavily within the education team was that the opportunities available to each applicant were very different. This is why, although gender and name were excluded from the application when viewing, the country of origin was not. Some applicants directly expressed their difficulties, including girls from Afghanistan who had been excelling in school and extracurricular activities, only to be banned from all education. I found it very important to understand the situation in which each applicant was making their application from, and the opportunities they were presented with. It was less about what they had specifically done, but had they taken advantage of the opportunities they did have, and shown initiative to explore areas of science and mathematics that interest them.

This year's applications were the most ever received, from every continent and over 40 countries. After grading them and deciding which to make scholars, we talked extensively about the process and how it could be improved. There were over 10 paragraph answer style questions which had no word limits, meaning that applications, when taken along with the recommendation letters, resulted in very long applications. I recommended that next year the application will include only one or two long form essays, along with MCQ questions pertaining to the level of mathematics/science that has been studied. What surprised me was how much Large Language Models (eg ChatGPT) were used to generate answers to the questions, dozens of answers were the same verbatim, for example their favourite mathematical proof being the pythagorean theorem, or the reason they love maths being because there is always a right answer to questions. We found it hard to think of ways to combat this, except that maybe one large essay would be more likely to be answered by the student, rather than lots of similar, short paragraph style questions. The requirement that none of the work be completed by a language model will also be added to the terms of the application for next year.

My work on the alumni project was less successful. I had thought a lot about what the alumni would want from WSF and what they could offer it and its current scholars. I thought the best way to make my recommendations to the team would be to interview alumni, this was scheduled for after the festival. I wrote a series of questions, to be asked in both an initial email and also in more depth during an interview, I even wrote a python script to email all of the alumni from the excel sheet, however I never got the chance to complete this project. Whilst this disappointed me, I am glad that the least important or time sensitive project was the one that I didn't have time to complete, my recommendations would not have been taken

into account until next year when the WSF website is redone. I am glad that I passed on everything that I worked on to the rest of the team for them to complete.

The lasting impact of this project is that the WSF team will include more non-scientific modules and resources to the scholars, including an entrepreneurship module which they have begun to design. The changes to the application process implemented will hopefully create the opportunity for applicants to showcase their aptitude whilst reducing the burden on the education team so that they can do more of the important work they do. Finally the Astrophysics course with Dr. Mather will be used for the next few years to both educate and inspire the scholars, and I will be directly involved in its delivery this summer.

Reflective Report

I became interested in the Laidlaw programme initially because of its funding for research. I wanted to find a way I could do physics research without having to volunteer my time and lose out on earnings from a job during that time. The leadership and development was almost an afterthought, however over the last two years it has impacted me in more ways than I can imagine. I am truly grateful for all of the training that I have received, and the chance to put that training into practice. The soft skills part of this programme is in my opinion more important than the more practical research skills, I feel that if I had not begun my Laidlaw journey, I would never have explored or improved these skills myself.

I thoroughly enjoyed the days we spent learning about different aspects of leadership. Some of the lessons I draw from the most are the networking lesson, which led me from initial cynicism to a more nuanced view, and the public speaking workshop with the Lir academy which was daunting but necessary to have. I have tried to really push myself in both of these skills, and I have seen a drastic improvement over the course of the programme.

My perception of leadership has evolved greatly over the programme. Rather than a system within a formal environment such as a sports team, leadership has become the way in which you can bring an idea into reality. It is how you work and motivate others to work, addressing a need and enabling teammates to take on leadership roles themselves. I like that I have become more comfortable leading without any formal authority in a group, and this has improved the outcomes of my undertakings, whether they be as small as an assignment in college or as large as starting my own mentorship programme for undergraduates.

One of the biggest challenges I have faced over the course of the programme is imposter syndrome. I sometimes feel that I am either undeserving of the opportunities I have been given, or that I am not making the most of them. I felt this throughout the whole 18 months, from the LEAD days where I felt that my voice or opinions were not as important to vocalise or were less well thought out than other scholars, to the days in my research project where I felt that I was not making any progress and could not do anything worthwhile. Again during my LiA when designing the presentation I would make to the scholars I felt a lot of imposter syndrome. These children were truly exceptional and the more I learnt about them, the less I felt qualified to teach them anything at all. Some of them had published in scientific journals in mathematics, biology or physics, most had a college level understanding of calculus and competed regularly in maths olympiads. One scholar was the youngest published author in the field of palaeontology, publishing a full book at the age of 7 and currently working part time for the NASA Jet Propulsion Laboratory. The other speakers during the festival were

experts esteemed in their fields, one among them had a Nobel prize in physics. It took a long time and a lot of support from the whole education team to overcome this and realise that my talk would truly have value for the scholars. I am glad that while I am still improving in this regard, I have come a long way from where I started almost 2 years ago.

My LIA at the World Science Foundation (WSF) put everything I had learnt about leadership over the course of the programme into practice. To even get the opportunity to do this incredible work I had to overcome my networking fears and cold email one of the most famous physicists in the world, something I never would have done before our LEAD sessions. Whilst my LiA improved all aspects of what we had covered, such as public speaking, careful consideration of stakeholders needs or equity and inclusion, the one topic I made the most progress on was reflection. I made it one of my main personal goals to journal my experience everyday, along with goal writing and reflection and succeeded in this almost completely. I did notice that during times when I was working late and under pressure that I did not do my journaling, I did not prioritise it as I should have. In actuality the times when I am working the hardest is when I should be the most purposeful with my work.

Another area I would like to work on is my communication of boundaries and responsibilities. During the week of the festival I would work from around 8am until 9/10pm, either with the scholars bringing them to events or setting up workshops or handling logistics. This was fine as I always knew that everyone really has to really pull together while the scholars are in New York to ensure they have the most beneficial experience. However I never knew exactly what was expected of me from my supervisor during this time, I felt it would be awkward to clarify when I am required to be somewhere because it would look like I am not committed to the goals of the organisation or that I am trying to get out of work. This is something I would like to work on so that I can communicate clearly with a superior or others in a team about everyone's responsibilities.

My current goal is really to figure out what I want to do in the coming years. I have always been interested in pursuing a phd in physics and to go into academia, but I am concerned by what I hear from academics about their work life balance and how cutthroat it is. I have been employing some of the lessons I learnt in the programme to try to tackle this question, by reaching out to physics alumni and thinking about how I want to impact the world. I think that the Laidlaw Scholarship has made it apparent to me that I should try to focus on my place in the world, rather than just striving for a goal of a research career in physics. I think that I can have a really beneficial impact whilst being a physicist but as of recently I am having second thoughts.

Having the ability to dedicate time to learn about leadership and how to implement it, has changed both my college experience and my life. I now think so much more about impacting the world and how I can play my role in shaping the future I want. I am more confident in my ability to do so and am more purposeful about how I go about it. Thank you so much to the entire Laidlaw team at Trinity for this spectacular opportunity and for helping me progress so much.