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When faced with the news that school closures were taking place across Canada due to the Covid-19 pandemic, the small Discover the Universe team knew they wanted to support young families. Within 48 hours, Discover the Universe started an initiative to help entertain and educate youth through daily astronomy content. After 11 weeks of content, more than 50 twice-daily episodes in English and French were presented by science communicators, astronomers, physicists and an astronaut! In the first week, we saw 6,000+ live viewers. Each day, hundreds of families joined us on YouTube where all episodes are still available. The Astro at Home series is now a legacy astronomy educational resource designed for a young audience, in both official languages of Canada.

Introduction

At its roots, Discover the Universe¹ is an astronomy training programme for teachers. We offer workshops, webinars, and educational guides for elementary and secondary teachers and informal educators. For the past ten years, we have been working in support of astronomy for all learners. After a decade of training teachers, we saw the need to shift our focus last spring.

In early March 2020, the national government announced that due to the global Covid-19 pandemic, businesses would close and schools would not reopen following the March break. As an education-based organisation, we immediately understood the effect this would have on the school year, parents, and teachers. While we all were reeling at the impact of the pan-Canadian shutdowns, we felt compelled to be of service.

At the time, we believed the lockdown would last three or four weeks and we wanted to bridge this gap in learning. We decided we would create content directly geared to students. We also wanted to provide some relief to teachers and parents by delivering fun and engaging content that would keep students' attention. So, over the course of a weekend, Discover the Universe reimagined its approach to

disseminating astronomy education. Our small team meant we were able to mobilise quickly, and six days following the initial lockdowns, we launched Astro at Home.

Over the eleven weeks, we surprised even ourselves with the reach and impact our programming would have; not just in terms of educating youth, but in bringing the Canadian astronomy outreach community closer together, propelling us into new forays previously unimagined.

Regularly Scheduled Programming

Astro at Home was designed for students aged 8-12 years. We knew that parents of children in this age range would also benefit from our programming by diverting their now at-home children with educational content. Being familiar with the national curricular content, we knew this age-range would be well served by what we could offer; most astronomy-related curriculum across Canada happens in Grade 6 (ages 10-12) when students learn about our Solar System. We planned two



Figure 1. Screen capture of one French-language Astro At Home presentation on YouTube. Credit: Discover the Universe

half-hour livestreaming sessions twice a day. The morning session would be in French and the afternoon would be in English, continuing our mission to provide training in Canada's two official languages. We hosted our sessions on Zoom and broadcast to the Discover the Universe YouTube page² for maximum engagement.

The day before launch, we emailed our network of educators announcing Astro at Home, hoping they would get the message to their students. We really were not sure how successful it would be given the short notice. Some of our colleagues and peers also shared the news with their network, gaining the interest of parents in their circles. Eventually, news outlets also promoted our programming. We also applied to be listed on provincial and national educational programming lists for at-home learning.

Despite only having one day to spread the news of our new initiative, Julie Bolduc-Duval and Lindsay Mann hosted an unbelievable number of people for our first lesson. We saw nearly 6,000 audience members populate the YouTube stream for the French morning session. This was way more than we could have ever anticipated, and it speaks to the power of our network. Later, when we hosted our second stream in English, just over 3,000 people attended. Our numbers did dwindle over time when some schools reopened and virtual

learning started in earnest, but these inaugural videos alone have now been seen more than 20,000 times (live views and replays). Interestingly, we consistently had about three-times the participants in French than we did in English. We believe this is due to a lack of educational materials offered in French online.

Participants came back every day to take in the lesson and engage with their peers. And, while we geared content to students aged 8-12, we saw some precocious 6-year-olds really connecting with the lessons. We also had teens and adult amateur astronomers joining us regularly. At the conclusion of the series, we heard a story of one child and their grandparents watching the programme together but apart, who would later chat on the phone to share what they had learned.

Challenges

Pivoting our delivery after more than 10 years of presenting only to teachers was an adjustment. We found that being relaxed, open and honest went a long way to engender a sense of intellectual safety so the kids were comfortable asking any question. We also encouraged them to interact by using emojis or sharing anecdotes in the YouTube chat. We found that some of the students were understanding faster than others, and they

would help explain concepts to each other. They were so supportive and patient with one another.

Interestingly, we had no issues with bullying. We witnessed the opposite: a bonded community of young astronomy enthusiasts developed over the course of the programme. The only issue we had was with some kids spamming the chat (sending several messages in a row) making it difficult to read everyone's messages and questions. We simply undertook a no-nonsense approach by laying out the rules at the beginning of each presentation and temporarily blocking anyone who broke those rules. This strongly discouraged others from doing the same, and it became a rare event after a short time.

One of our major concerns was the safety of the viewers. We encouraged parents to watch with their children but knew this was not always possible. Some participants were eager to connect with each other outside of Astro at Home and would share private information in the chat. We made a concerted effort to maintain the safety of the children by immediately deleting any messages with personal information, and not saving the chat for replay videos. This worked quite well and kept us in compliance with YouTube's guidelines for young audiences.



Figure 2. A mosaic of all 36 Astro at Home volunteer presenters. Credit: Discover the Universe

Our first significant challenge was the workload. At the beginning of Astro at Home, Discover the Universe had a full-time Director (Julie Bolduc-Duval) and a part-time Coordinator (Lindsay P. Mann). Originally, they managed both sessions as a team; Julie would present while Lindsay moderated and fielded questions. But it soon became challenging to keep up with the pace of it all. We had to come up with content, create a presentation, promote the programme, and then actually deliver the two 30-minute sessions each day. It became a full-time endeavour for both. In an effort to reduce pressure, we reached out to our professional astronomy network, inviting guest speakers who would design and create content they were interested in. Julie continued to manage the programme, coordinating the speakers, while Lindsay took over coordinating the English sessions, and Frédérique Baron was hired to coordinate the French sessions. This system worked wonderfully, in large part because our speakers were passionate about astronomy outreach and could be doubtlessly relied upon to create new and engaging content.

We worked with astrophysicists, amateur astronomers, engineers, STEM outreach professionals, teachers, authors, and astronauts. We hosted a total of 36

speakers, many of whom made repeat appearances. We wanted to represent all people and genders, and by the end of Astro at Home we had several female speakers and people of colour present on their expertise. Topics covered include everything from the basics of our Solar System to gravitational waves and dark matter! As a result of having some unilingual speakers, our content in English and French was not the same most days. This wasn't an issue, and in fact encouraged bilingual children to tune in twice a day. We realised that as we continued to see participants come back time and again that they wanted to know more about niche areas of study. Even when some of the material was difficult to fully understand, our students asked poignant questions and seemed to thrive with the challenge. In total, 51 lessons were delivered in each language during the course of Astro at Home. These videos now live as a legacy on YouTube and are a lasting resource for STEM learning.

In retrospect, the challenges we faced were the things that gave us momentum and pushed us out of our comfort zones. Without adjusting our perceived roles, hiring new staff, and inviting guest speakers we would not have run such a successful programme. If we had not reached out for

help from our peers; we would not have covered so many topics, or been able to answer as many questions; we would not have been able to really focus on the students at all.

Successes

One amazing outcome is the large attendance for our first day, and while it might have been discouraging to see our numbers decline over the weeks, our audience distilled into a group who were truly engaged and excited about astronomy. After about a month, our number had dropped to approximately 200 viewers per session each day and later dipped a bit further to 100 viewers per session each day. But we had audience members from across North America, and of various ages. We know that those who stuck with us were deeply affected by what they learned. Some even shared how they were often bullied at school because of their interest in science, but that through Astro at Home they had found friends who were just like them. They were being encouraged by their peers to pursue their interest in science for the first time; an undeniable benefit to our programming! In the end, the programme had a tremendous impact on the children.

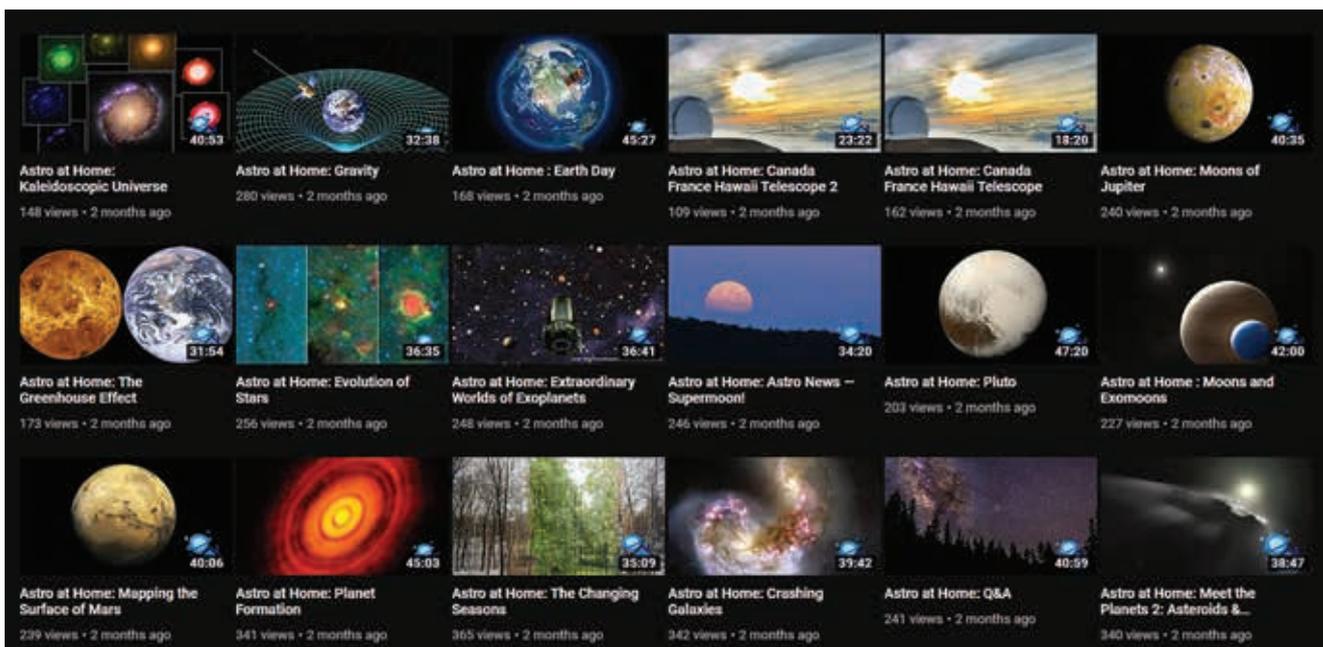


Figure 3. Screen capture of some of the Astro at Home presentations. All Astro at Home videos are available on YouTube. Credit: Discover the Universe

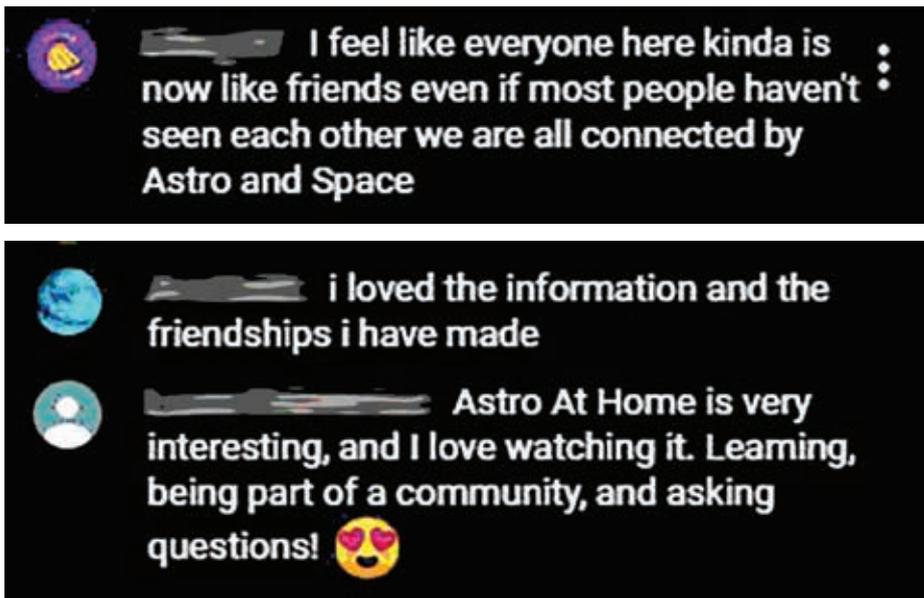


Figure 4. Quotes from young participants on YouTube, creating a community together. Credit: Discover the Universe

After the first couple of weeks, Astro at Home had self-propelled momentum. Speakers were much more comfortable and were happy to present at the last minute if changes were needed. The students became more and more familiar with each other and our guests, so the

conversation in the chat flowed more freely. The moderators had a little less work as the audience diminished or opted to hide the chat function to focus on learning.

We were able to keep the programme running for a total of eleven weeks even

though that seemed impossible in the beginning. Our run time was due in large part to that momentum we built, the amazing pool of volunteer speakers, and the relaxed approach we had taken to managing the series. We believe it was a success because of the passion for astronomy shared among all contributors and participants.

Our greatest success is probably the communities we inadvertently created. The engagement and feedback from our young participants were overwhelming. Many of them said they would pursue careers in astronomy, and thanked us for showing them all the amazing things our universe has to offer and teach us. On the final day, we were all overcome with emotion as these virtual learners said goodbye to us and each other. One viewer even said that she would thank our little programme as the seed that started her career trajectory when she became a famous astrophysicist.

The second community we created was actually with our speakers! For a few weeks, Astro at Home was a central hub for astronomy communicators. We welcomed volunteer speakers from various institutions across Canada: universities, research institutes, science museums,

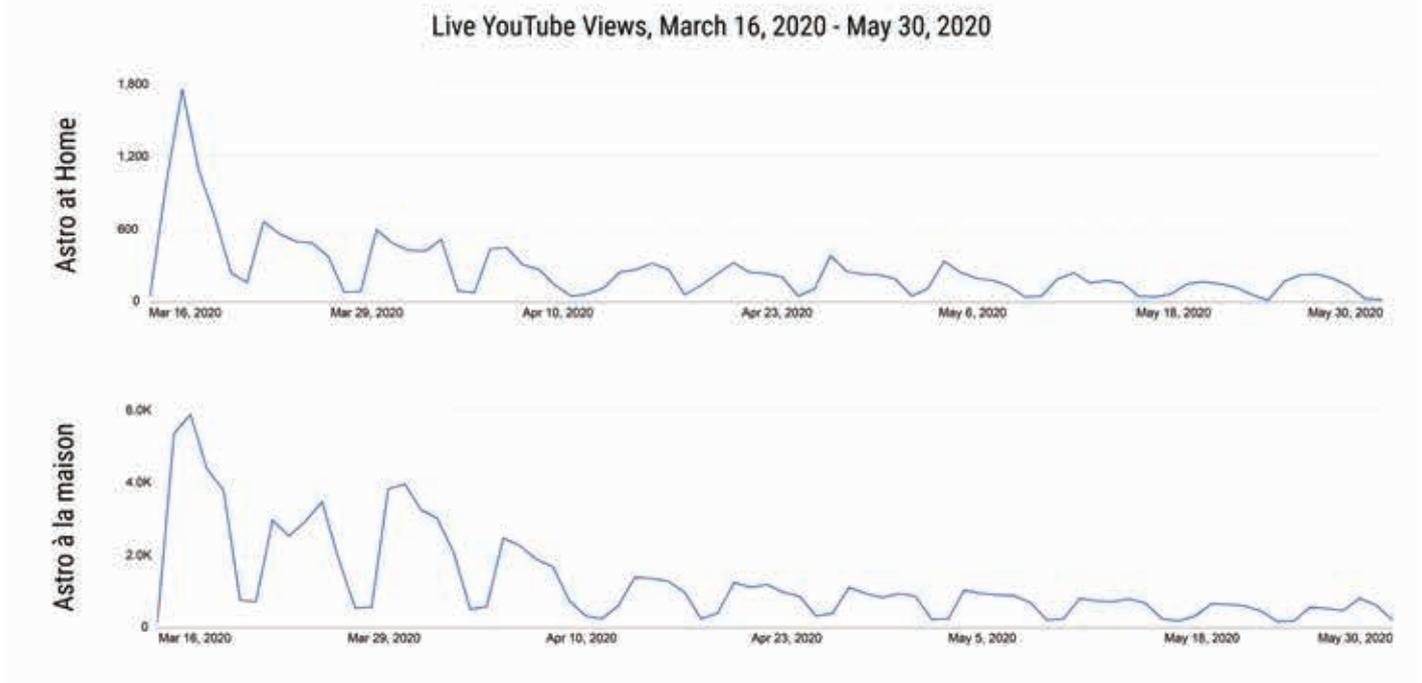


Figure 5. Graph showing the viewership of Astro at Home over the 11-week run. Starting out strong, our numbers declined over time, but interest and engagement never waned. Credit: Discover the Universe

planetariums as well as observatories in Canada and abroad (Hawaii and Chile). We had quickly launched a Slack channel where everyone involved in the planning and presenting could connect with each other. This Slack channel still exists and keeps us all connected.

Conclusion

What might have been an impulsive decision transcended all expectations, becoming a deeply meaningful and impactful experience for all involved. Since Astro at Home, we have seen more parents attending our workshops, and we have partnered with astronomy organisations to develop more teacher training and educational content. Discover the Universe has been presented with so many new opportunities for growth that we have now hired three additional staff members.

Astro at Home helped strengthen the Canadian astronomy community by connecting professionals to one another, and sharing the joy of the sky with young people. The programme also drew the attention of other organisations, who approached us to forge new partnerships for creating new educational content.

We have refocused on teacher training, equipped with new insights into engaging young learners. With the pages of questions they asked, we are inspired to create content that we know they will enjoy. In the next year we hope to publish a few more teacher guides, as well as new webinar content, and more.

We are still feeling the positive impact of our Astro at Home initiative a year later. It ended up being a greater outreach tool than we could have imagined and continues to be a catalyst for growing our reach and impact in astronomy education.

Notes

¹ Discovery the Universe website: <https://www.discovertheuniverse.ca/>

² Discover the Universe YouTube page: https://www.YouTube.com/channel/UCdfR3_eoqih4_VyYnxzQng

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Biographies

Julie Bolduc-Duval is the founder and executive director of Discover the Universe. She has been involved in astronomy education and outreach for more than 20 years.

Lindsay Mann is the communications coordinator for Discover the Universe. With a background in the arts, she has been working freelance for science and heritage non-profits for more than 10 years.

Frédérique Baron is an astrophysicist with a PhD from the University of Montreal. She works as a scientific mediator and project manager for the Institute for Research on Exoplanets and the Mont-Mégantic Observatory. She also helps Discover the Universe on various initiatives, including Astro at Home.