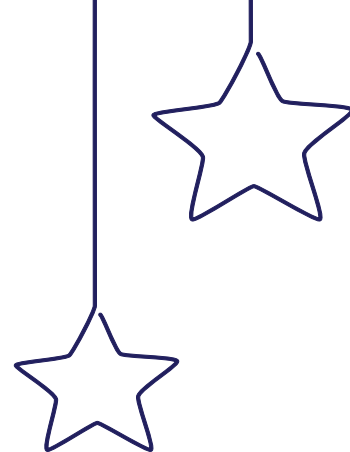


The Wonder Initiative:

Introducing complex space science to Leicester's Somali community through its teenagers



The 'Space Science Celebration' has introduced around 700 people in Leicester's Somali community to some of astronomy's most complex topics, from auroras to magnetopause.

The project aims to enthuse young people about space science, using their new-found skills, knowledge and confidence to engage the wider community – boosting STEM capital in a disadvantaged area.

'Space Science Celebration' is a collaboration between partners who met at an STFC Wonder Match event in Leicester in 2018 – science activities provider [Sphere Science](#), STFC-funded researchers from the Universities of Leicester and Cambridge and the [Somali Community Parents Association \(SOCOPA\)](#), which hosts clubs to help its children thrive academically.

Wonder Initiative grants totalling close to £30,000 have contributed to solar system discovery sessions for various ages, visits to the National Space Centre and teenager-led activities. These included young people presenting virtual sessions on complex research findings to 235 children and 29 families during the Covid-19 lockdown.

University scientists also worked with the teenagers on topics such as the sun and Alfvén waves, preparing the young people to lead presentations, practical activities and a solar system show during a community family day attended by around 200 people in March 2022.

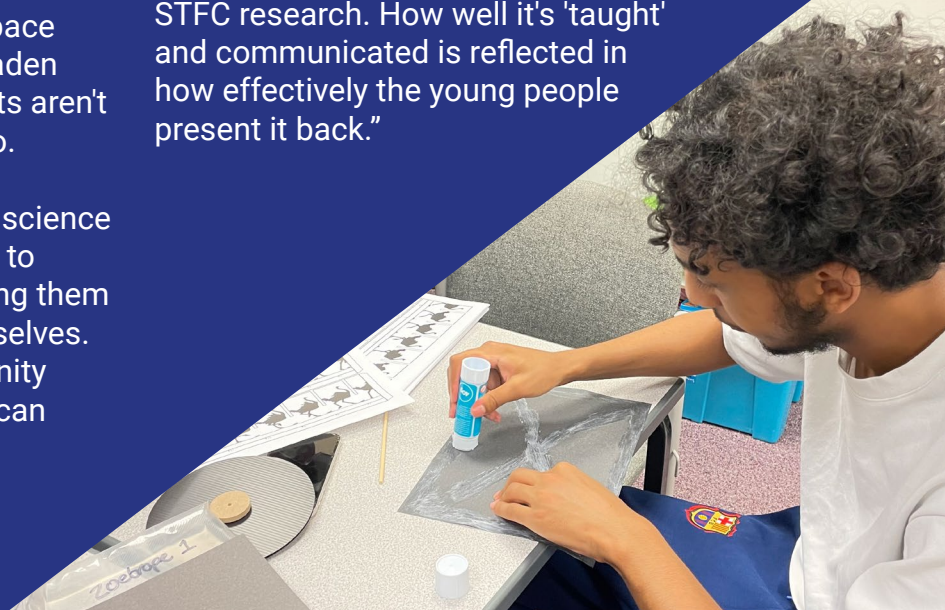
Sphere Science STEM practitioner Sarah Sisson is the project lead for 'Space Science Celebration:'

What were the aims of this community-based Wonder Initiative project?

"For the teen presenters, it was about building their confidence – something that comes with knowing you've presented high-level space science to others! It also aimed to broaden their experience, showing that scientists aren't aliens but real people they can relate to.

"For the families, it introduced them to science and research, using practical elements to make complex topics less 'heavy', letting them investigate and be the scientists themselves. Having young people from the community present, rather than unknown experts, can help families feel closer to the project, encouraging engagement.

"And for the researchers, it was having this Wonder community understand STFC research. How well it's 'taught' and communicated is reflected in how effectively the young people present it back."



What advice would you give practitioners engaging Wonder communities?

"You must be pretty relaxed, sensitive to cultural differences and willing to adapt.

"When working with schools, you can count on people turning up and being on time. But working in the community, you have to get comfortable with things being more fluid. We've run online presentation sessions where nobody has turned up, and, in contrast, the family day exceeded our expectations in terms of numbers. You have to roll with it.

"Listening to and treating the community with respect is vital. You must reflect its values and customs in your planning and delivery; it's not about imposing yours. Think about the language and terminology you're using and how that may jar with any religious beliefs, and be clear on expectations. For instance, working with SOCOPA taught us that food isn't just a nice-to-have at an event; the community expects it. If you partner wholeheartedly with a community, there will always be people to guide you and who you can learn from."

What will be your lasting impression of the project?

"How it's helped people to grow. One of the teenagers who presented during lockdown – someone who would never push himself forward – is now a youth worker in the community, being trained to run weekend science clubs!

"Teenagers don't like standing up and presenting; generally, they shy away from it, but we've allowed them to do it in a safe space. We step back in a supportive way and let them go for it. And we've found that often teenagers are better at explaining things. Because they're not confident in a subject like we are, they share their learnings in a very relatable way."

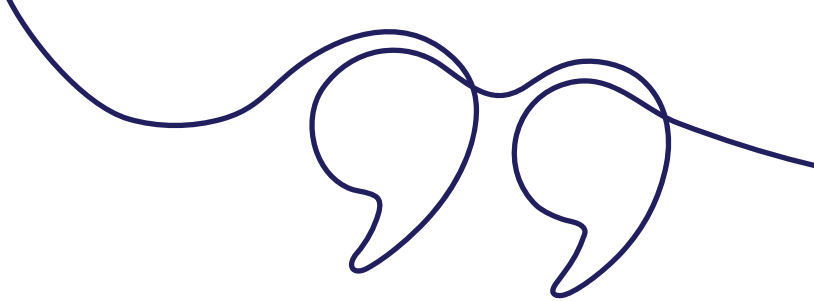
What will be the project's legacy in the community?

"There are three – confidence, connections and opportunity. For the young people who presented, it's something they will always have – an experience they can use to impress potential employers.

"For SOCOPA and the wider community, they've got the connections and the experience to revisit some of the topics and activities to inspire fresh young people coming through.

"And the community's young people can benefit from established relationships. For instance, I'm looking to link up a sixth-form maths and science student with one of the academics from Leicester University who's supported the project. This door would unlikely be open otherwise."

The [Wonder Initiative](#) aims to create exciting and meaningful opportunities for people from areas of socio-economic deprivation, particularly 8-14-year-olds, to show how STEM is relevant to their experiences and futures. It is strategically driven by the Science and Technology Facilities Council (STFC) (part of UK Research and Innovation) and delivered in partnership with engagement specialists and community organisations across the UK.



The Wonder Initiative:

The Wonder Initiative: Creating a flexible art and poetry offer in primary schools to boost STEM enthusiasm, teacher confidence and engagement capacity

Through the [Exploring Extreme Environments Project](#) (EEE), primary school pupils in eight of North East England's most deprived areas explored the sub-zero conditions of Antarctica and the intense heat of the sun's corona, relating these STEM topics to their own lives through poetry and art.

The project led by [NUSTEM](#), the outreach and research group based at Northumbria University, was a natural fit with the Wonder Initiative, focusing on encouraging under-represented groups to see STEM as relevant to their learning experiences and futures.

From September 2018 to November 2021, the STFC-funded project had more than 6,300 interactions with children, over 400 with teachers and almost 500 with parents and carers.

EEE's 'pick and mix' structure with activities to engage every year group allowed each school to tailor the project for pupils, teachers and families. It included whole school assemblies introducing pupils to STFC scientists, technologies and careers, and confidence-boosting support for teachers who lack confidence in their STEM teaching.

And the project's unique creative sessions included:

- **'Imagining the Sun'** (7-9-year-olds) – an art-led science workshop introducing solar physics, with children developing artwork and pop-up books based on their learnings.
- **'Underneath the Ice'** (9-11-year-olds) – a literacy science workshop co-developed with a poet, introducing earth observation and ice core analysis in the Antarctic. Children created and improved their poetry based on their learnings.
- **'Under the Ice' poetry and sound performance** based on real-life experiences and sounds from the Antarctic – a collaboration between poet Katrina Porteous, composer Peter Zinovieff and researchers from Northumbria University's Cold and Paleo-Environments team.

Associate Professor and Director of NUSTEM Carol Davenport was project lead for Exploring Extreme Environments:

This project had many touchpoints. What were its aims?

"We wanted everyone involved to benefit. For the families and children, it was boosting their science capital by bringing STFC research to life and putting a human face to it, helping challenge the stereotypes around those who work in STEM.



"For primary teachers, it was giving them the confidence to talk about cutting-edge science research, especially when very few have a degree in a STEM subject.

"And for the researchers and academics, it was developing their public engagement skills beyond addressing their usual proactively engaged audiences."

How have schools responded to this flexible engagement model?

"Schools participating in EEE want to continue working with NUSTEM on projects that follow the same model. They see it as a good, workable framework for supporting science in schools. It makes it as easy as possible for them while giving their pupils memorable and beneficial experiences.

"EEE has broadened the appeal of science beyond those who already enjoyed it. We've had some really lovely poems, and anecdotally, the teachers have been impressed with how the pupils have engaged."

What were the outcomes?

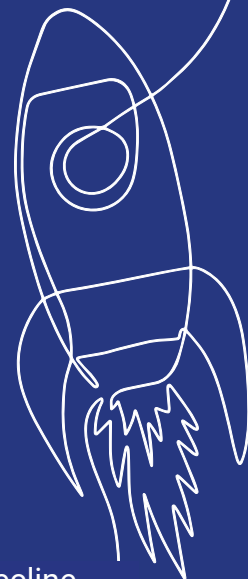
"The results were encouraging. Over the three years, more pupils felt positive about science (+14%), with fewer stereotypical descriptions of scientists (-4%). Teachers felt more confident in teaching science (enjoyment +16%), and our academics reported how it had boosted their communication skills, helped them better understand audiences and informed their public engagement strategies.

"In fact, developing the University's public engagement capacity is the project's most significant legacy. One of our solar physicists is now an STFC Fellow, reflecting his efforts in the EEE project and beyond. He's trained his post-doctoral researcher and others within the Solar and Space Physics Research Group to help children write poetry – something unimaginable just a few years ago.

"One disappointing result was a decline in pupils' confidence in science. However, teachers focusing more on English and maths during lockdown may explain this. Overall, we met our key aims and STFC's generic learning outcomes, from inspiring people to do something new to helping them feel differently about science."

What advice would you give to practitioners engaging Wonder audiences in schools?

"Build good relationships with head teachers and science coordinators. A long-term project, like EEE, helps build trust and momentum. And make it as easy as possible for them to take part. For example, we ran a science coordinator forum straight after school, with an opportunity for food and a chat."



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The Wonder Initiative:

Co-creating content with primary school pupils to answer their compelling space science questions.

- Can you cook in space?
- Who made the Universe?
- What does it look like on the outside of the solar system?

These were just three of 180 questions posed by Year 5 and 6 pupils from Hareclive E-ACT Academy in a space science project focused on exploring what they were interested in rather than assuming what they wanted to know.

The 'Hareclive in Space' project (2021-2022) aimed to break down the barriers between communities experiencing social inequity and city-centre institutions to form new spaces for shared learning and collaboration.

Aligning perfectly with the Wonder Initiative, the STFC-funded project is an example of how to successfully co-curate content with community partners, boosting pupils' confidence, skills and agency in the process.

Engagement practitioners from [We The Curious](#) immersed themselves in the school community with support from three space scientists and Room 13, the school's pupil-run, onsite art studio. Activities were structured to encourage children to ask questions, lead conversations with scientists, and use cardboard prototypes to inspire online content for the We The Curious website.

We The Curious inclusion lead, Amanda Colbourne, and digital producer, Adam Richardson, led the project:

Why was this project important to do?

Amanda: "Breaking down barriers is vital for us. There are systemic and societal ones, but we can use a participatory approach to create a more equitable space.

"Room 13 found that many pupils had never been to the city centre partly due to the prohibitive costs of bus travel. It's a place they don't feel represents them or that they feel safe in. They're not going to know about We The Curious. In addition, you've got families with negative experiences of the education system,

and that, combined with the ongoing impact of Covid-19, continues to see people cut off from experiences and opportunities.

"We can support children to have their voice heard, giving them confidence that their questions and interests are valid and something we can explore together."



How did you successfully co-curate content?

Adam: “We involved the children at every stage. They posed the questions, researched them by chatting with space scientists and explored how to communicate the answers. The children’s contributions set the direction of subsequent activities, including an animation workshop, critiquing sessions and the commissioning of ‘A Question in Space’ – a Room 13 video, which the pupils created themselves.

“One example of co-creation is the video we produced to explore the question ‘Can you cook in space?’ I wanted them to have a frank

feedback session on the draft version and see their changes in a new one rather than just tweaking around the edges of something we had already made.

“At the end of every session, we asked the children how they felt, what they would change and what they had learned. We wanted it to be a ‘you said, we did’ approach. And we were good on our word, whether that was giving them another opportunity to visit We The Curious to spend more time with the exhibits or meeting basic needs by providing food.”

How do you ensure all participants are equal?

Amanda: “We built in equity from design to delivery. Everything from introducing female scientists to the children to ensuring all adults involved had ‘authority sharing’ training – focusing on listening and sharing, not telling children about science. We’re also using tools from the [YESTEM project](#), which aims to make informal STEM learning more equitable.

“Our approach is asset-based – valuing the skills, knowledge and potential of those taking part. It involves a lot of trust and relationship building.”

What do you hope the project’s legacy will be?

Adam: “That the children feel listened to and recognise that people appreciate the value they bring. We want them to realise that it’s fun to explore by asking questions.

“The children became increasingly confident about what they wanted as the project evolved, and feedback shows they value those experiences and resources where they could see a direct connection to their inputs and ideas.”

Amanda: “Teachers have commented how valuable it’s been to have approachable people chat casually with the children about life as

a scientist. Some pupils are independently researching space science. Others are disappointed when it’s not a science day.

“The relationship and trust we’ve built with Hareclive and Room 13 has encouraged them to seek our support on a school-led project. This is an excellent endorsement of our approach and how well we’ve all worked together to inspire children and encourage ambition and better outcomes.”

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The Wonder Initiative:

How STFC science can create 'wow' experiences around space, enhancing the curriculum and ambitions

Lancaster University uses its [LUniverse](#) portable inflatable planetarium to bring astronomy to Wonder audiences, encouraging communities with traditionally fewer opportunities to share in science 'wow' moments and relate them to their own lives.

Part-funded by STFC, the hi-tech LUniverse kit can accommodate a whole class of primary school children, taking them on an immersive journey through space and the science of astrophysics.

It's like being outside, inside, as audiences enter the inflatable through a tunnel to see the night sky projected 180 degrees. The University's experts then transport them to different planets in our solar system and beyond through light and sound shows.

And no two shows are the same, with Lancaster University adapting each show and accompanying activities to reflect the audiences' needs, interests and challenges.

Through the planetarium, STFC science supplements the Key Stage 2 curriculum, which introduces earth and space, bringing to life the movement of planets in the solar system and taking pupils into new areas of learning, like black holes.

Project lead Dr Julie Wardlow is a senior lecturer in Lancaster University's Physics Department:

How did STFC support you with this project?

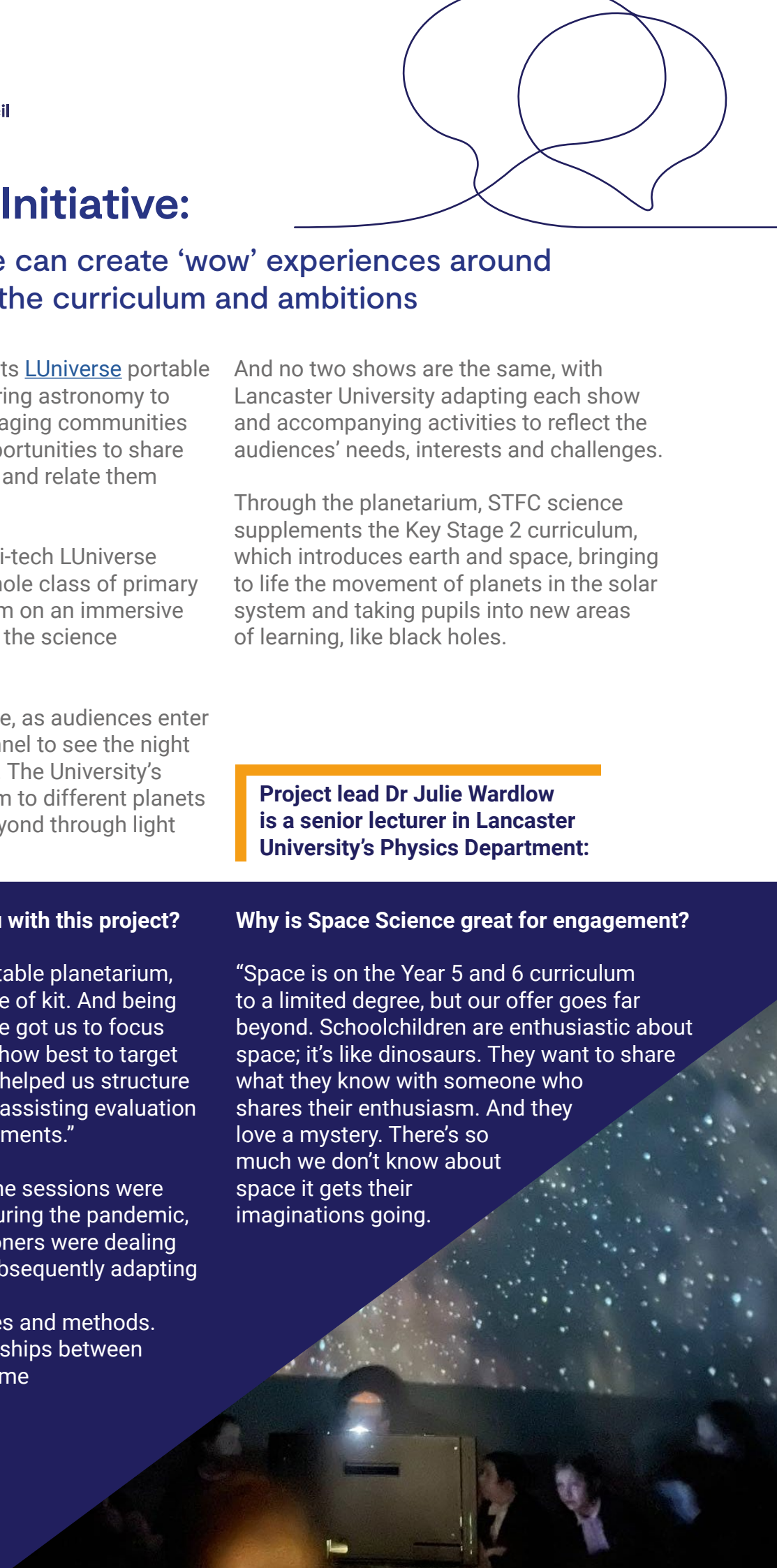
"STFC part-funded our portable planetarium, which is an expensive piece of kit. And being part of the Wonder Initiative got us to focus on Wonder audiences and how best to target them. The 'Wonder toolkit' helped us structure our event feedback forms, assisting evaluation and shaping future engagements."

"The regular STFC-led online sessions were really useful, particularly during the pandemic, to learn how other practitioners were dealing with the limitations and subsequently adapting

their engagement strategies and methods. They also fostered relationships between practitioners, leading to some bespoke projects."

Why is Space Science great for engagement?

"Space is on the Year 5 and 6 curriculum to a limited degree, but our offer goes far beyond. Schoolchildren are enthusiastic about space; it's like dinosaurs. They want to share what they know with someone who shares their enthusiasm. And they love a mystery. There's so much we don't know about space it gets their imaginations going."



“The planetarium acts as a focal point. Few people live where the sky is dark, and having the opportunity to use a telescope is extremely rare. So, zooming in and out of the night sky in the planetarium, we can bring them views they’d never see otherwise, like the motions and orbits of Jupiter’s moons.

“When you move between planets, you can’t see the children’s faces, but you can hear their gasps, their wonderment. We validate children’s interest in space or encourage them to be open to learning about it, getting them to see it’s not just a topic of interest to people who aren’t like them.”

How do respond to local need?

“The kit is versatile, and so are we. We respond to the needs of our audience on a show-to-show basis, and we’re constantly evolving, whether that’s responding to changing circumstances, the curriculum or feedback we receive.

“During the Covid-19 lockdown, we moved to online interactive sessions. And when the restrictions eased a little, but social distancing and ‘bubbles’ were in place,

we developed craft activities half the class could do while the others were in the planetarium.

“We also adapt on a very local level, such as ensuring we can accommodate wheelchair users and additional staff in the planetarium at special needs schools or responding to a group’s specific emotional or physical needs, which may, for example, lead to a shorter show.”

What is most inspiring about your engagement approach?

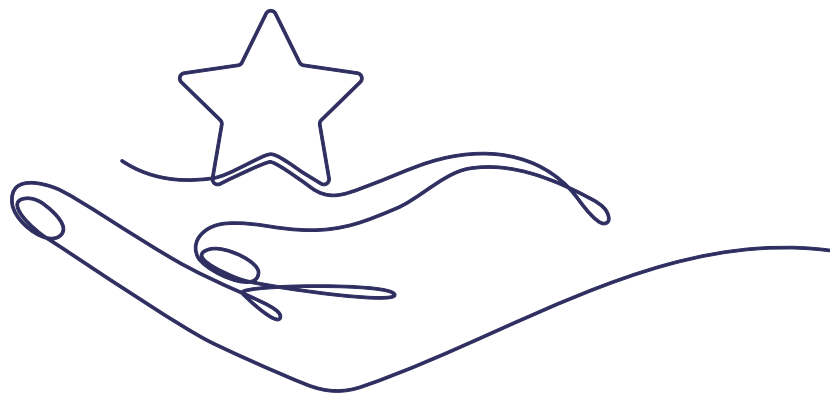
“It’s showing that science and its people are part of the real world, just like our audiences.

“I’ve been to schools, and the pupils say things like, ‘I didn’t know you could be an astronomer’. It’s something that then becomes cool and exciting no matter who they are. It plants a seed, which, for some, will grow.

“It’s also getting them to see themselves in the scientists. We have a variety of ambassadors, and we encourage the children to ask about their lives. You get questions like, ‘What do you

do every day?’ or ‘Do you get to name stars?’ When we say, ‘No, but we get to name galaxies,’ they’re amazed. For us, the wonder of this often gets lost in the everyday, so it’s exciting to see it through their eyes.

“And some of our ambassadors really do break stereotypes, whether that’s being neurodivergent or non-heteronormative.



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Learning from our communities:

How the Wonder Initiative has influenced the Royal Observatory Edinburgh's engagement approach

From drop-in sessions and crafts in home-delivered food boxes to virtual 'five-minute makes' 'via Facebook, STFC's [Royal Observatory Edinburgh](#) (ROE) is helping the City of Edinburgh Council's [Discover! Programme](#) positively impact some of the city's most deprived areas.

The Council's holiday hunger programme helps feed the most in-need families with nutritious foods and recipes while also seeking to raise aspirations and minimise holiday learning loss.

The Wonder initiative provides a welcomed endorsement for this work by the ROE team.

ROE's engagement manager, Abi Ashton and public engagement officer, Ciaran Fairhurst, are involved with the Discover! programme:

How can you effectively integrate STEM into a broader community programme?

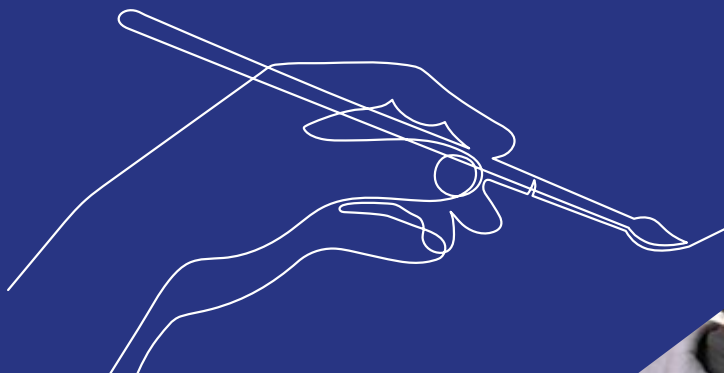
Abi: "We've never been prescriptive about what we put in the activity boxes; we want to reflect what the community needs and wants. For instance, when our community partner wanted more fruit for the boxes, we funded more oranges and linked it to a physics experiment. And when they wanted the boxes to have some festive cheer, we provided fairy lights, including facts and activities about star constellations.

"As a result of ROE's online videos during Covid and participation in Discover! drop-in sessions, we've had more approaches and conversations with community groups. They recognise that we can deliver more than just on-script school activities and are easy to work with."

How has community work influenced your offer?

Abi: "I've seen the team's ability to understand community audiences grow. They recognise that they're not just a direct translation of school audiences; they have their own context and need a bespoke approach."

Ciaran: "For our summer holiday programme, we've moved to more craft-centred activities as they're more creative and free-form and better suited to drop-in sessions than, say, the planetarium. It's about ensuring people are comfortable and making science part of a broader activity that engages them. Discover! is a lot of fun. It can be chaotic, but I've never had a bad session. Meeting young people where they are is never a chore."



What can you achieve through community engagement?

Abi: "We've got to be realistic. We're not trying to encourage people to take qualifications in science. It's more about initiating conversations about science with us and at home. This can make them less avoidant of STEM, less likely to skip science content, more open to considering science-related supporting roles, and potentially make different subject choices at secondary school."

"Graduate engineers and scientists have been supporting our activities, and this allows young people and their families to have normal conversations with people in these jobs and see they're not like the stereotypes! A subtle shift in attitudes can happen slowly over many conversations."

How has working with Wonder Audiences influenced your engagement approach more broadly?

Abi: "We're adapting our wider ROE public programme to be more inclusive, such as putting on minibuses and offering lunch vouchers to attract people from the community groups to our open days. Our public talks programme has historically been in the University lecture theatre, but now we're considering hosting it elsewhere to widen access."

Ciaran: "Our engagement opportunities need to factor in challenges we may have been unaware of at the outset. For instance, some people rarely venture out of their immediate neighbourhoods. This can be due to prohibitive travel costs or a lack of confidence."

What advice would you give practitioners engaging Wonder audiences?

Ciaran: "It takes time to build relationships and your programme. If you walk in on your first meeting and ask people what they want, they don't necessarily know. You need to help by giving them a structure or options."

Abi: "Another STFC project-funded report used the phrase 'moving at the speed of trust.' This is so important. You've got to be willing to give a fair bit of who you are before expecting community groups to tell you who they are and be willing to work with you."

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