

Rockets for All

Big Ideas Impact Report



BIG IDEAS

 **UK SPACE
AGENCY**

IMPERIAL

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Introduction

Rockets for All is a UK Space Agency programme designed and delivered by social impact agency Big Ideas in partnership with Imperial Space Lab. The programme was commissioned in November 2024 and ran to 31 March 2025.

Rockets for All was designed to bring new audiences to rocketry competitions and demonstrate to young people across the UK that the space sector is open to all. Open to students aged 14 - 18 year olds in secondary schools and FE colleges across the UK, the Rockets for All programme included:

- Digital skills based workshops with space industry professionals
- Youth-led water rocket competitions in schools
- Digital celebration event with the United Kingdom's first astronaut, Helen Sharman
- Prize winning trip experience for two winning classes.

The programme aimed to engage 2000 young people in 50 schools between January and March 2025, with a focus on driving participation from schools that serve areas of higher deprivation. Big Ideas delivered the Rockets For All project with the grant of £101,947 from UK Space Agency along with an in-kind contribution from Imperial to the value of £19,000.



Programme highlights

Impact on young people

Teachers reported on the impact of the programme in regards to young people's awareness, perception and motivation around space sector jobs.

95% of participants learned something new about space sector jobs.

89% of participants changed their perceptions about who can work in the UK space sector.

95% of participants are motivated to learn more about space careers.

Wide reaching

Participation data demonstrates the programme reach across the UK and the delivery of its purpose to widen participation in rocketry competitions.

All schools, bar one, were new to rocketry competitions.

68% of participating schools served areas of higher deprivation (indicated by Free School Meals percentage eligibility data).



Legacy

Teacher confidence and evergreen resources demonstrate programme legacy.

Nine out of ten teachers agreed that their confidence in talking about space careers with their students had increased.

550 water rockets were sent to schools across the UK.



Programme Overview

The aim of Rockets for All was to bring new audiences to rocketry competitions and support young people to explore careers in the UK space industry.

The objectives of the programme were:

- To widen access to rocketry competitions by introducing new schools to competitions using an accessible youth-led competition framework.
- To drive large scale participation in the programme through an incentivised programme pathway including free water rockets to schools, access to workshop series and celebration event and chance to win in-person prize experience delivered by Imperial Space Lab.
- To increase curiosity and motivation of young people to explore space careers through digital skills workshops with industry professionals demonstrating a sector open to all.
- To provide opportunities to young people to develop technical and soft skills to support the UK space industry's future talent pipeline.

Key deliverables and KPIs:

- 2000 young people in secondary and FE colleges take part in 10 digital workshops focused on space skills (January 2025)
- 50 teachers apply for Rockets for All Competition Challenge Pack and receive water rocket kits (January 2025)
- 1000 young people form teams and organise rocket challenge competitions in their schools and launch water rockets (March 2025)
- 1000 young people attend digital Celebration Event (March 2025)
- 50 young people (two schools) win special competition prize - a hands-on rocket experience with Imperial Space Lab.

The programme was designed to deliver the following outcomes:

- Young people across the UK will benefit from increased awareness of the opportunities and skills required in the space economy.
- Young people's perceptions of who can work in the space industry will be challenged through access to diverse industry role models with different career pathways and jobs.
- Young people will benefit from increased motivation to explore space-related careers and embark on STEM related educational and career pathways.

- Teachers' knowledge and confidence to reference space careers and career pathways in their classrooms increases.
- Teachers' motivation to run rocketry competitions in their schools increases through access to evergreen resources and reusable water rocket kits to drive longer term impact for future cohorts of young people.

Programme evaluation was supported by an integrated monitoring and evaluation framework. Teacher data collection was built into sign-up for workshops, post workshop qualification for free rocket resources, and post water rocket competitions to be in with a chance of winning the prize trip experience with Imperial Space Lab.

Programme Delivery

The Rockets for All programme had three phases:

Phase 1: Digital Skills Workshops

Schools attend Digital Skills Workshops

Teachers complete feedback survey and request water rocket packs

Phase 2: Rocketry Competitions

Schools receive water rocket packs and digital resource pack

Schools hold youth-led rocketry competitions

Teachers complete feedback survey about rocketry competitions

Two schools are selected to win prize experience with Imperial Space Lab

Phase 3: Celebration Event

Schools attended digital Celebration Event with first British astronaut Helen Sharman Two schools who were chosen for the prize experience with Imperial Space Lab announced at Celebration Event

Programme Impact

Rockets for All met or exceeded all its KPIs and was delivered within the budget and timeframe allocated. The partnership with Imperial Space Lab was instrumental to the success of the programme with Big Ideas working closely with Dr Simon Foster, Engagement Lead at Imperial Space Lab, at all stages of the programme to maximise both the programme's investment and its impact for young people and teachers.

The table below shows achieved programme delivery data against agreed KPIs.

Target	Achieved
2000 young people in secondary and FE colleges take part in 10 digital workshops focused on space skills (January 2025)	3810 young people attended digital workshops
50 teachers apply for Rockets for All Competition Challenge Pack and receive water rocket packs (January 2025)	55 teachers applied for Water Rocket Kits
1000 young people form teams and organise rocket challenge competitions in their schools and launch water rockets (March 2025)	1705 young people launch water rockets
1000 young people attend digital Celebration Event (March 2025)	15,795 young people were registered to attend from 439 classes in 250 schools.
50 young people (two schools) win special competition prize - a hands-on rocket experience with Space experts	47 young people awarded prize experience with Imperial Space Lab (Brighton Aldridge Community Academy and Gleniffer High School)

Digital Skills Workshops (Phase 1)

GUEST SPEAKERS



DR HELEN O'BRIEN MECHANICAL ENGINEER MONDAY 10AM & 2PM	TASKEEN ALI SPACE POLICY TUESDAY 10AM & 2PM	PROF MARK SEPHTON SPACE GEOLOGIST WEDNESDAY 10AM & 2PM	DR SIMON FOSTER SOLAR PHYSICIST THURSDAY 10AM & FRIDAY 2PM	DR SUNDAY POPO-OLA SPACE ENGINEER THURSDAY 2PM	DR TAMLYN PEEL REMOTE MEDIC FRIDAY 10AM
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Rockets for All launched with a week of digital skills workshops on Monday 20th January 2025. Ten events took place over the course of the week, at 10am and 2pm each day, with six guest speakers. Each speaker discussed their work in the space sector, offering students an insight into their job, the skills needed in their role, and their education to career pathway. Ahead of each workshop, guest speakers designed a skills based challenge with Big Ideas, providing students with an insight into a real-life task required in each space career. Students were offered the opportunity to ask the speakers questions about their research, education and wider questions related to space.

The panel of speakers included:

Dr Helen O'Brien - Space Instrument Manager of the Solar Orbiter

Taskeen Ali - Head of Futures at HMRC writing Space Policy

Professor Mark Sephton - Planetary Scientist looking for life on Mars

Dr Simon Foster - Solar Physicist researching Solar Flares

Dr Sunday Popo-Ola - Director of Integrated Space Science and Engineering at Imperial

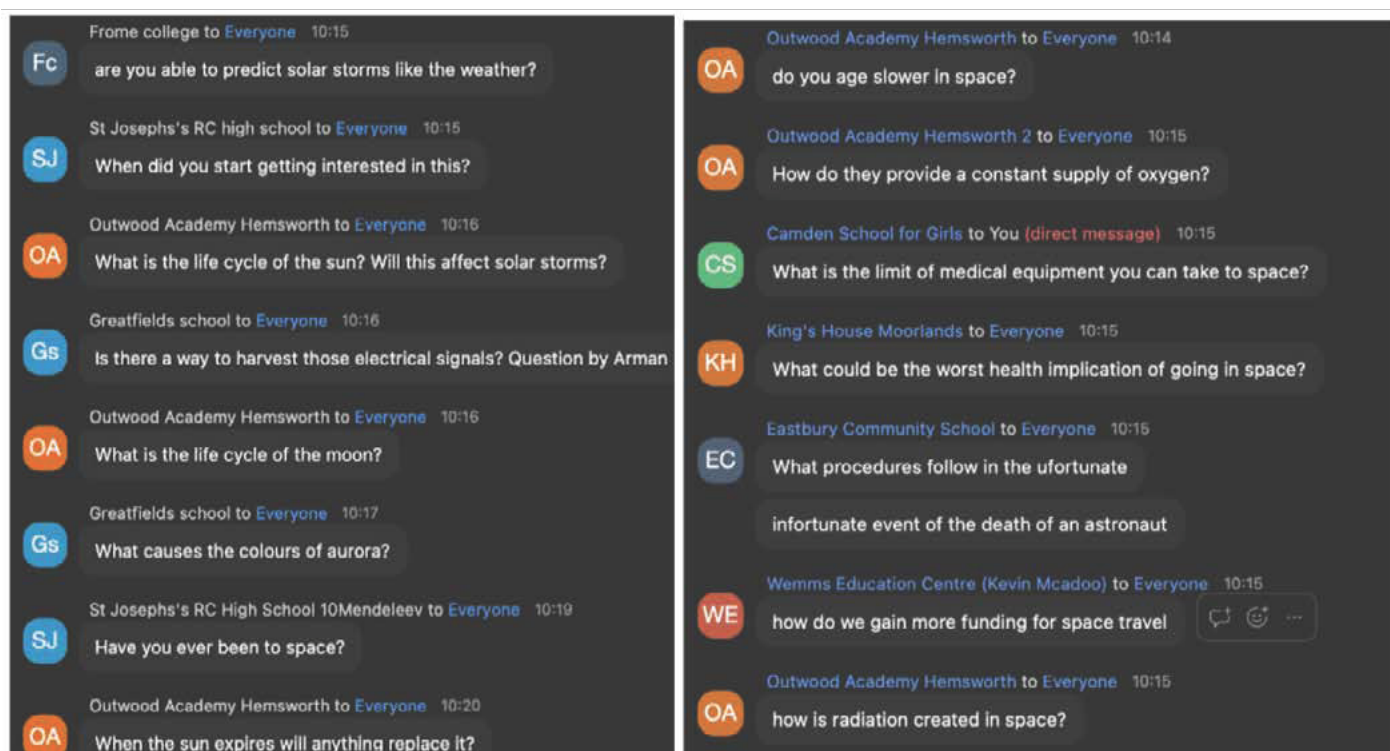
Dr Tamlyn Peel - Scientist and Teacher of Remote Medicine

Students responded very well to the workshops and this was reflected in chatbox engagement and in the generation of word clouds.

Word cloud generated by young people around skills needed in the space sector.



Chatbox examples from skills workshop, demonstrating student engagement



Participation data

3810 students from 65 schools across the UK took part in one or more of the 10 digital workshops that focused on space skills.

Target	Achieved
2000 students in secondary and FE colleges take part in 10 digital workshops focused on space skills	3810 students attended digital workshops*
At least 50% of schools attending have higher than national average FSM%	Where data is available, 68% of schools who attended workshops have higher than the national average FSM% (28 schools). 27% of schools who attended have recorded FSM% (15 schools)**

*Data gathered from teacher surveys. Ten schools did not complete the follow up teacher survey (student numbers calculated from teacher registration form).

**FSM data is not available for - 4 FE colleges, 2 SEND schools, 1 Alternative Provision school, 4 schools in Scotland, 3 schools in Wales, 1 school in Northern Ireland.

In total, **65 schools** attended the Digital Skills Workshops with **90 different teachers** bringing students to the sessions. **14 schools** came to more than one workshop with **2 schools coming to all five days of events**. Schools attended from **all four of the Home Nations**, covering **46 different local authorities**.

Word cloud generated by young people around skills needed in the space sector.

Impact data

Following each workshop, teachers were sent a survey to provide feedback on the event and to request a free water rocket kit to be posted to their school. **Of the 65 schools that attended, 55 feedback surveys were completed.** The below data is gathered from the 55 surveys received following the Digital Skills Workshops and shows impact on the young people's awareness, perception and motivation around space careers.

- 8 out of 10 teachers (83.9%) scored the event 4 or 5 out of 5 for student enjoyment (satisfaction).
- Nearly all (95%) of teachers agreed that their students now have a better understanding of the jobs available to them in the space sector (awareness).
- 9 out of 10 teachers (89.3%) said they thought the workshops had changed students' perceptions about who can work in the UK space sector (perception).
- Nearly all (95%) teachers said their students would be interested in learning more about space careers (motivation).



Regarding long-term impact of the programme, an important outcome is around teacher confidence in discussing space careers and career pathways in their classrooms. Nearly all (95%) teachers agreed their confidence to do this has increased after attending one or more of the workshops.

54 out of 55 schools that responded told us that their students had never taken part in a rocketry competition before achieving the overarching aim of Rockets for All, to introduce new audiences to rocketry competitions. All schools requested the free water rocket kit and resources.

Some examples of qualitative feedback from teachers is below. It demonstrates how well the teachers and students responded to the structure and content of the workshop as well as the opportunity to meet space industry professionals.

“We enjoyed the activities and engaging in something that other students were doing alongside us. The talk was so interesting.” **Springfield House School, Lancashire**

“They [the students] had not realised the vast choices and options within the space sector and were so enthusiastic about it that they left school (it was the last lesson) about 20 minutes late!” **University Collegiate School, Bolton**

“I think that we often think of science and space jobs as being a male dominated field so it was fantastic to listen to a female space scientist.” **Hope House School, Nottingham**

“Knowing that Dr Simon Foster is dyslexic and is doing such amazing work, really inspired students. It was like breaking the stereotype.” **Greatfields School, Barking**

“The event was also incredibly helpful in clarifying potential career paths. It provided a clear picture of how students might get involved in space research and highlighted the diverse range of related fields. This opened their eyes to possibilities they hadn’t considered before. As one student put it, “I never thought I could be an astronaut by studying medicine,” which perfectly encapsulates how the event broadened their understanding of the various routes into space-related careers.” **Pioneer Secondary Academy, Buckinghamshire**

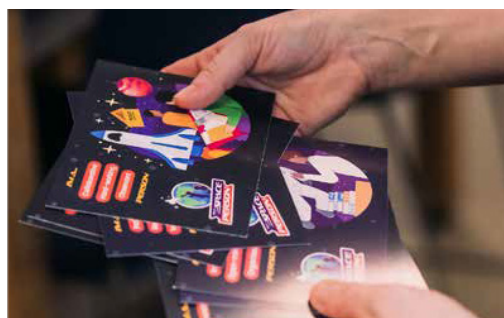
Rocketry Competitions (Phase 2)

Young people who attended the skills workshops were challenged to run their own youth-led rocketry competitions for their peers. Competitions were supported with resources sent directly to schools and competitions were judged on the level of engagement young people achieved across their schools rather than on technical criteria. This supported the programme’s design principle around accessibility and widening participation in rocketry competitions.

All 55 schools who completed the feedback survey and requested water rocket kits to run their own youth-led rocketry competitions received kits. Kits were posted out to schools along with a digital resource pack to support students to run their competitions. The company providing the water rocket kits, Water Rokit, provided a free gift for each school to award to the winner of their competition, a NASA branded water rocket and bag. Schools were also sent a prototype ‘height logger’ to use in their competition. Simon Foster, our partner at Imperial Space Lab, provided schools with postcards further outlining careers in the space sector. These postcards were included in the water rocket kits posted to schools.

The resource pack was sent out in English and Welsh. The digital resource pack provided a brief for students, outlining what they would do in their competition, along with a guide to what competitions would be judged on. The resource pack was written with support from Simon Foster from Imperial Space Lab who provided the content about rocketry and propulsion and the science behind water rockets. Students were then given tips and tricks to support them in running their own competitions. The packs were sent to teachers with a teacher brief providing clear curriculum links to science for the National Curriculum (England), the Curriculum for Excellence (Scotland), the Northern Ireland Curriculum and the Curriculum for Wales.

Career postcards sent to schools (left) and school resources in Welsh (right)



Participation data

Target	Achieved
1000 young people form teams and organise rocket challenge competitions in their schools and launch water rockets	1705 young people organised and participated in water rocket competitions in their schools.

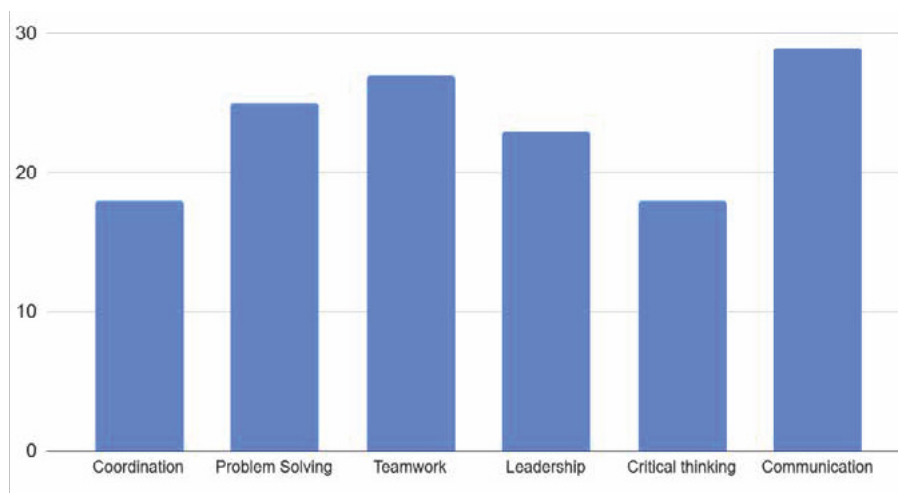
In total, 31 schools completed the final survey and told Big Ideas about their water rocket competitions. Teachers were asked to complete a survey by Wednesday 12 March to be entered into the competition to win the in-person experience with Imperial Space Lab. The teachers' surveys indicated that 768 young people were involved in planning the rocket competitions, 937 young people took part in the competitions, and so a total of 1705 young people were involved at this stage of the programme.

Impact data

Data submitted by teachers demonstrates the impact of the programme on the young people involved:

- All teachers (100%) reported that their students enjoyed participating in the rocketry competition (satisfaction).
- 97% of teachers reported that their students had developed a greater understanding of both rocketry and propulsion from taking part (awareness).
- More than 8 of 10 teachers thought the programme had changed students' perceptions of the space sector (perception).
- Nearly all (96%) of teachers thought that more of their students are now interested in pursuing careers in the space sector (motivation).
- 100% of teachers said they planned to use the water rockets again with other classes (evidence of long term impact).

Teachers were asked to comment on the skills they felt their students had developed from taking part in the programme. The graph below shows the number of times a teacher indicated their students had developed each skill:



Out of the 31 teachers who completed the teacher survey, 29 teachers reported that their students had developed communication skills as part of Rockets for All. Teamwork was selected by 27 teachers, problem solving by 25 teachers and leadership by 23 teachers. Eighteen teachers thought their students had developed both critical thinking skills and coordination skills.

“I have a very strong obsession with space and astro-physics; my dream job is to either become a doctor or an astrophysicist and work in NASA. The webinar gave me the opportunity to improve, learn and understand the skills that I need to have to become an astrophysicist and it gives me an opportunity to be able to have access to people who have already chosen this part of science and to learn tips from them.” **Student, Highlands School, Enfield**

Qualitative data from teachers demonstrates the impact of the youth-run projects on the young people involved and also the legacy in schools:

“The event was so successful that the Head of Department (HOD) has decided to make the Water Rocket Challenge an annual event. The challenge will now be recorded on the school calendar to ensure ease of planning and consistent execution in the future. This decision reflects the positive impact the challenge had on the students and the overall school community.” **Greatfields School, Barking**

Celebration Event (Phase 3)

Rockets for All was designed with a programme pathway that would offer several opportunities to maximize both school participation and the UKSA’s investment by reaching as many young people as possible. The Celebration event for schools was extended to key Stage 2 classes in primary school to sit earlier in the pipeline of widening participation in STEM.

Helen Sharman, the first British astronaut, was the star speaker at the Rockets for All Celebration event on Monday 17th March. The event was an interview between Lottie, the Big Ideas host, and Helen; covering how Helen became an astronaut, what it was like to be in space and what the return to Earth was like. Using a Mentimeter, students grouped topics they wanted to hear more about so that the event was shaped in real time by the young people’s interests. Students were keen to hear about many different topics including what it was like being a female astronaut at that time, if people who have disabilities can be astronauts, what time is it in Space and how much an astronaut earns. Helen provided thoughtful and informative answers to each question, the students who asked her questions on camera were excited to speak with her.

Helen announced the two winners of the Rockets for All competition live during the event, Gleniffer High School and Brighton Aldridge Community Academy. Both schools who had won the prize trip were on the call and were excited to hear that they were the winners!

We closed the event with Helen giving advice to students who may want to pursue a career in Space. Students and teachers found this inspiring commenting in the chat box:



Participation data

In total, 15,795 students were registered to attend by 439 teachers.

Target	Achieved
1000 young people attend digital Celebration Event (March 2025)	15,795 young people were registered to attend from 439 classes, in 250 schools

Engagement across the country was excellent as detailed in the map on the right.

Impact data

The Celebration event with Helen Sharman was an opportunity for young people (age 7-18 years old) to meet the UK's first astronaut. The event provided a quality employer encounter in line with best practice in careers provision (Gatsby benchmark 6).

When registering for the event, 9 out of 10 teachers said their students had not had the opportunity to meet someone who worked in the space industry before.



“Cherry Orchard have really enjoyed listening and you have definitely inspired Year 5.” **Cherry Orchard Primary School, Birmingham**

“Wow, that was out of this world! Thank you from Durness Primary”
Durness Primary, Highlands

“Helen and Big Ideas, thank you so much for a fantastic experience. This has been excellent and so enjoyable. Thank you from Thornsett Primary” **Thornsett Primary, Derbyshire**

Winners prize trip experience

Integral to the design of the programme was the competition for schools to win a high quality experience provided by partner Imperial Space Lab. The two winning schools are Brighton Aldridge Community Academy and Gleniffer High School in Scotland. They were selected on the level of engagement that students had achieved in their schools around their rocketry competitions.

The prize trip will be an all-expenses-paid trip for a class to spend the day at Imperial Space Lab, taking part in hands-on workshops. The trips will take place on Wednesday 18th June 2025 and the young people will be aged 14 - 16 years.

47 young people will visit Imperial as part of the prize.

Paul Childers, teacher, Brighton Aldridge Community Academy, explained that his students are from one of the most deprived areas of the country. Even though his students only live a few miles from the seafront in Brighton, many of them had not had the opportunity or means to visit it. A trip to Imperial Space Lab will be the first time many students have visited London, which will have a huge impact on the young people.

“At the end we found out that the school had been chosen to attend a day at the Space Centre in Imperial College London. I did not hear any of the rest of the talk as the room erupted in a cacophony of noise and cheering as the school’s name was announced. It was a lovely reward for the Year 10’s for all their hard work and extra time they put into making what was a series of brilliant days that has made the whole school ask what they can do to get involved with future events. A Year 7 student approached me at the end of the talk and said that “these few days have been the most exciting and exhilarating that they have ever had at school before and can we make the rocket firing part of the STEM Club”. **Paul Childers, Brighton Aldridge Community Academy**

Gleniffer High School is a co-educational Scottish state secondary school located in the town of Paisley, near Glasgow. Molly Ingledew, the teacher contact at the school said her students couldn’t believe they had been chosen as the winners of the competition, expressing how excited they were to be able to visit Imperial Space Lab. Many of the students have never travelled to London and this trip will be a memorable experience for all of the young people attending.

Budget and Timeframe

Big Ideas delivered the project with the grant of £101,947, with an in-kind contribution of £19,000 provided by Imperial; totalling £120,947.

Evidence of expenditure has been documented to the UKSA at six Milestones agreed between Big Ideas and the UKSA.

The level of project funding was adequate to deliver the programme and its agreed KPIs in full. Big Ideas brought in extra staff resource to meet the compressed delivery timeframe due to the requirement for the project to be delivered by 31 March 2025.

The project budget provided funds for the generous provision of resources to schools and to fund the prize trip experience for two winning classes. Each participating school received 10 water rockets - a reusable resource to encourage use with future cohorts of young people.

The table below shows the project delivery schedule, which was a compressed timeline of live delivery of just three months.

November 2024	• Programming onboarding • Creation of visual identity + marketing assets • Formal teaming agreement with Imperial created and signed • Water Rocket established as resource provider and costs agreed
December 2024	• Digital campaign launched to recruit schools • Recruitment of minimum 50 schools for Skills Workshops • Creation of Monitoring and Evaluation Pathway (three touchpoints) • Creation of digital forms for registrations and feedback • Creation of digital competition challenge pack (also in Welsh)
January 2025	• Delivery of 10 Digital Skills workshops (w/c 20th Jan) • 50 schools apply for water rockets and challenge packs • Water rocket kits sent to participating schools • Schools hold youth-led water rocket competitions
February 2025	• Schools hold youth-led water rocket competitions • Schools submit competition data.
March 2025	• Deadline for competition submissions (12 March) • Judging of school competition submissions • Celebration Event with Helen Sharman held (17 March) • Winners announced by Helen Sharman in Celebration Event • Prize experience for two schools arranged with Imperial Space Lab • Celebration of two winning schools on social media • Evaluation report created and submitted

Conclusion

Central to the success of the programme was the partnership with Imperial Space Lab and Dr. Simon Foster's expertise and support throughout. Dr. Foster was able to quickly mobilise a high caliber network of guest speakers from industry and his scientific expertise informed content of both workshops and resources. Imperial Space Lab's provision of the prize trip experience for two winning classes provided a compelling incentive for participation for teachers and students alike. It was also Dr. Foster's insights and experience of the accessibility of water rockets that provided the programme with its central accessible activation. Big Ideas and Imperial Space Lab established a creative and productive partnership that underpinned the success of the programme which both parties would be keen to build on for future programmes.

The overarching aim of Rockets for All was to provide an opportunity to widen participation in rocketry competitions among underserved communities across the UK. The programme disrupted the traditional model of rocketry competitions using accessible water rockets that would build confidence in teachers and allow youth-led competitions so that young people would develop employability skills through leading competitions among their peers.

The project reached far beyond the proposed level of engagement with 370 schools and over 20,000 young people taking part in the programme overall. Impact data from teachers demonstrates how the programme has driven increased awareness and motivation in space careers among young people across the UK, and changed perceptions of the sector as one that is truly open to all.

Big Ideas would like to extend its thanks for the opportunity to deliver Rockets for All, and to its partners Imperial Space Lab and the UK Space Agency.

Recommendations

Big Ideas delivery of Rocket for All has led to the following recommendations to the UKSA for future delivery of rocketry competitions in UK schools:

- 1. Extend rocketry competitions to primary school Key Stage 2 classes** – Evidence of interest is 212 primary schools signed up to meet Britain's first astronaut. Working with this age group allows the UKSA to change perceptions of young people earlier in the pipeline of widening participation in STEM. Water rockets would be fully accessible activation for this age group.
- 2. Prioritise diversity and inclusion to deliver impact** – Rockets for All successfully engaged with schools serving areas of higher deprivation and brought 55 new teachers and 1705 young people to rocketry competitions. This was achieved through the accessible activation (water rockets) and an incentivised participation password that provided teachers with a number of engagement touch points to encourage participation.
- 3. Access to diverse industry role models is key to changing perceptions** – Young people need to see it to be it. Providing access to industry role models from groups underrepresented in STEM careers - women, people ethnic minority backgrounds, neurodiverse people - key to changing perceptions of a space industry where everyone is welcome.
- 4. Focus on building confidence among teachers to drive legacy** – A key outcome of the programme was the impact on teachers confidence to reference space careers and career pathways in their classrooms. This will benefit future cohorts of young people.
- 5. Provide high quality, free resources to school to increase participation** – Water rocket kits proved popular with teachers and the budget allowed for a generous provision of evergreen resources to schools that incentivised teachers to participate and provide sustainable impact in participating schools.

Annex A: Student Case Study

Mulberry Academy Shoreditch

"I am a Year 12 student from Mulberry Academy Shoreditch, and along with three of my classmates, I helped lead, plan and run the Rockets of All project for Year 9 students participating in the Science Society in collaboration with Imperial College.

The Year 9 students were given 2 to 3 weeks to build their rockets, which used a combination of gas and water pressure for launching. They also had to create a poster and present their research to demonstrate their understanding of the principles involved.

The event took place on Friday, March 7th. Teachers and representatives from "Big Ideas" visited to observe us as we led the event and to see what the younger students had built and planned. We began with a PowerPoint presentation that introduced the day's activities. Following this, we watched the students' presentations. As judges, we evaluated their presentation skills and overall performance, scoring them out of 10 in each category. This really developed my teamwork skills as the four of us had to work hard and share our responsibilities based on our areas of strength.

We also provided a safety briefing, emphasising the importance of wearing goggles and staying at least 10 meters away from the rockets during launches. After the briefing, we moved to the Multi-Use Games Area (MUGA), where we prepared the rockets by filling them with water and using a gas pedal pump for launch. We judged the rockets based on their performance, design, and data collected from a detector that measured the height and acceleration of each rocket. This took a great deal of planning, communication and coordination as we had to book the classrooms and outside area, ensure students knew when and where to meet and keep the competition running smoothly.

After calculating the total points for each individual or group, we identified the winner based on the highest score. The winning team received a sports bag featuring a rocket design, along with a more advanced rocket kit. The overall atmosphere of the event was competitive, as students were eager to learn the results. The project aimed to determine which group or student achieved the highest rocket height through effective aerodynamics and the best presentation of their information.

The hardest part of planning and running the event was identifying potential safety hazards and taking precautions to avoid injury. If I were to help with the competition again, I would arrange a small lecture or talk with a member of staff with a good subject knowledge in aerospace engineering to enhance their understanding of rockets and how various

factors affect their performance. I would also suggest that students create PowerPoint presentations instead of posters for smoother presentations. The competition definitely supported our critical thinking, as we had to think on the spot when some of the rockets wouldn't initially launch.

The event was successful, as everyone had fun by the end of the day. Several rockets reached around 25 meters, and one even went outside the school boundaries. The visitors were very social and polite, which added to the event's success.

One key takeaway for me was that rockets rely heavily on physics, particularly Newton's Third Law, and how the expulsion of gases propels the rockets into the air.

While running the Rockets of All project, I developed numerous skills, such as leadership and teamwork, as my classmates and I engaged deeply in this project and shared our ideas and perspectives to make the event enjoyable and safe. Additionally, I improved my communication skills while interacting with younger students, teachers, and important visitors to ensure a fun and memorable experience for everyone."

Annex B: Case Study Brighton Aldridge Community Academy

Brighton Aldridge Community Academy is a coeducational academy school in Brighton & Hove with a current total enrollment of 886 students, 48.6% of which receive Free School Meals. A group of 36 Year 10 students attended the Rockets for All skills workshop with guest speaker Taskeen Ali, space policy specialist, in January 2025.

The Rockets for All youth-run Rocketry Competition was run by the 36 Year 10 students who attended the digital skills workshop and built on their momentum from attending this event. The students led, organised and participated in the event along with 36 Year 7 students who were taken off timetable for the event to lead the building of the rockets.



The lead science teacher, Paul Childers, further prepared his Year 10 students for the rocketry competition by delivering a powerpoint on the physics of rocketry. The next day, 36 Year 7 students who were chosen by the Head of Year came into the Year 10 Class; the older students were tasked with splitting up the younger pupils into groups of 4 with an equal number of Year 10s in each group. Within their groups, the older students organised the groups into Manufacturing, Finance, Prototyping and Managers. They were given a limited budget and had to purchase the necessary supplies to manufacture their finished rocket. The next stage of planning involved designing and drawing sketches of their rocket and making notes to explain why they had come up with their design. The drawings had to be annotated with explanations that detailed why their rocket would achieve the greatest altitude, based on scientific concepts that they had learned (Newton's Laws, CM-Center of Mass and CP - Center of Pressure). Big Ideas supplied materials that outlined key

terms and concepts to link the competition to relevant STEM curriculum. Students then built their rockets over the course of one week.

“I’ve gotten better at working with others on a team.” **Year 7 Student**

“I’m a pretty avid space lover; I learned more about aerodynamics.” **Year 10 Student**



The rocket launch, on Monday 10 March, brought students together at the start of the day to meet about safety protocols, structure of the competition and the methods by which the lead students would measure and record rocket heights. Students were instructed to observe which design elements of each rocket might contribute to the height, speed and direction achieved. Using the height logger, students found it exciting and straightforward to determine which rocket achieved the greatest altitude, acceleration and length of flight.

The launches were carried out on the school playing fields where students maintained a safe distance from the launch site, up a small hill. One by one, students were invited down from the hill to attach the height logger to their rocket and commence take off. Students were thrilled with how high and how fast their rockets went, with some designs being more successful than others.

The winning launch achieved a height of 32 metres, an acceleration of 36 metres per second squared and a flight time of 18 seconds, with no parachute or added design element with the purpose of deceleration. All rockets were able to launch to various heights. As a result of the success of the competition, Mr. Childers has decided to build the project into the Year 7 Forces unit, for future years. He’s also incorporated the same lesson, with greater complexity, more advanced theories and the analysing of graphs, into the Year 10 curriculum.



Because of the organised record keeping during the event, Year 10 students were able to announce the winner of the competition soon after the last rocket launch. There was one winner and they received the free gifts from Water Rokit that had been posted to Mr. Childers. Brighton Aldridge Community Academy had an excellent turnout at the competition and engagement was high. Students were invested in the event, very happy to be there, attentive and supportive of one another.

“I think everyone enjoyed building a rocket. I really like engineering... Teamwork was a good part of it. We all worked with people we didn’t really know.” **Year 10 Student**

“I didn’t know about aerodynamics... I’d like to know more about particle theory and light in space... What’s the inside of a blackhole look like?” **Year 10 Student**

“I liked how my rocket turned out. I’d like to make a bigger rocket with a better point in future to make it more aerodynamic.” **Year 7 Student**

Mr. Childers reported that none of his students had participated in a water rocket competition before this one. He believed his students’ perceptions about who can work in the UK Space sector had changed as a result of the workshop and rocket competition. Reporting that his students now have a better understanding of jobs that could be available to them in the UK space sector, Mr. Childers said his pupils also had a better understanding of the skills required to fill those positions; communication, critical thinking, leadership, teamwork, problem solving, and coordination were particular skills Mr. Childer’s students self-reported growth in. As an educator, Mr. Childers communicated that he felt more confident talking to students about careers in space, as a result of the skills workshop and competition. There were many enthusiastic students that seemed destined to go into the UK space industry.

Annex C: Case Study

Mulberry Academy Shoreditch



Mulberry Academy in Shoreditch is a comprehensive co-educational academy for students aged between 11-18 in Tower Hamlets, London. A group of Year 9 students attend the Rockets for All skills workshops in January 2025 with Professor Mark Sephton, a Planetary Scientist. When asked what the students remembered about the session they responded:

“We came to the event with Mark Sephton - he was talking a lot about Mars.” **Year 9 student**

“He was talking all about the rocks he would bring back from Mars to test for life!” **Year 9 student**

“Yeah he was talking about the life he was hoping to find in the water. I thought that near the water was the best place to test for life.” **Year 9 student**

The teacher who brought the students to the online skills workshop commented that:

“The students really enjoyed the online workshop - they were really engaged.” **Teacher**

The Rockets for All youth-run Rocketry Competition was run by four Year 12 students, the participants were Year 9 Science Society students who were taken off timetable for the event. On launch day (Friday 14th March) students were graded on several categories by the Year 12 students including a short presentation, design of rocket and height/acceleration reached during the launch event.



Ahead of the launch, each Year 9 student was tasked with creating a poster and presentation about the design of their rocket, incorporating information they had researched to help make their rocket as successful as possible in the final competition. This element of the competition was carried out in the students free time. During the presentations, the Year 9 students spoke knowledgeably about rocketry and propulsion (insert quotes) and detailed how they had taken their research into action when designing their rockets.



“When making it [my rocket] I considered what could make it go higher. I studied Newton’s Law of Gravity” **Year 9 student**

“I made my rocket by gluing two bottles together, I didn’t want the mass to be too light!”
Year 9 student

“I created a centre of mass around the nose to keep it straight during flight. I created a parachute out of recycled bags” **Year 9 student**

“I created a tapered teardrop shape with an aerodynamic body - this will allow it to move through the air with increased efficiency.”
Year 9 student

A safety briefing was given by the Year 12 students who alerted the group that points would be deducted for any breaches of the safety instructions given. Throughout the planning process the Year 12 students were available to help the students in creating their rockets. They commented that:

“The students have been great, they have done some really great planning to make their rockets and their posters.” **Year 12 student**

“If they needed help they could have come to us to ask and we would have helped them.”
Year 12 student



The launch was carried out in the school basketball courts and students were grouped a safe distance from the launch site and given protective goggles to wear by the students organising the competition. One by one, students were invited to attach the Rocket Logger to their rocket and launch their rockets. Students were thrilled with how high and how fast their rockets went, with some designs being more successful than others.

Big Ideas asked the students about how they felt about the rocketry competition:

“I’m proud of my rocket!” **Year 9 student**

“I like watching my rocket launch, it was really fun to watch them all. When you see everyone’s rockets flying you know they put in so much effort.” **Year 9 student**



“The best bit is seeing the final product (the launch)” **Year 9 student**

“The rockets were really successful!” **Year 9 student**

“I’m very happy and very proud.” **Year 9 student**

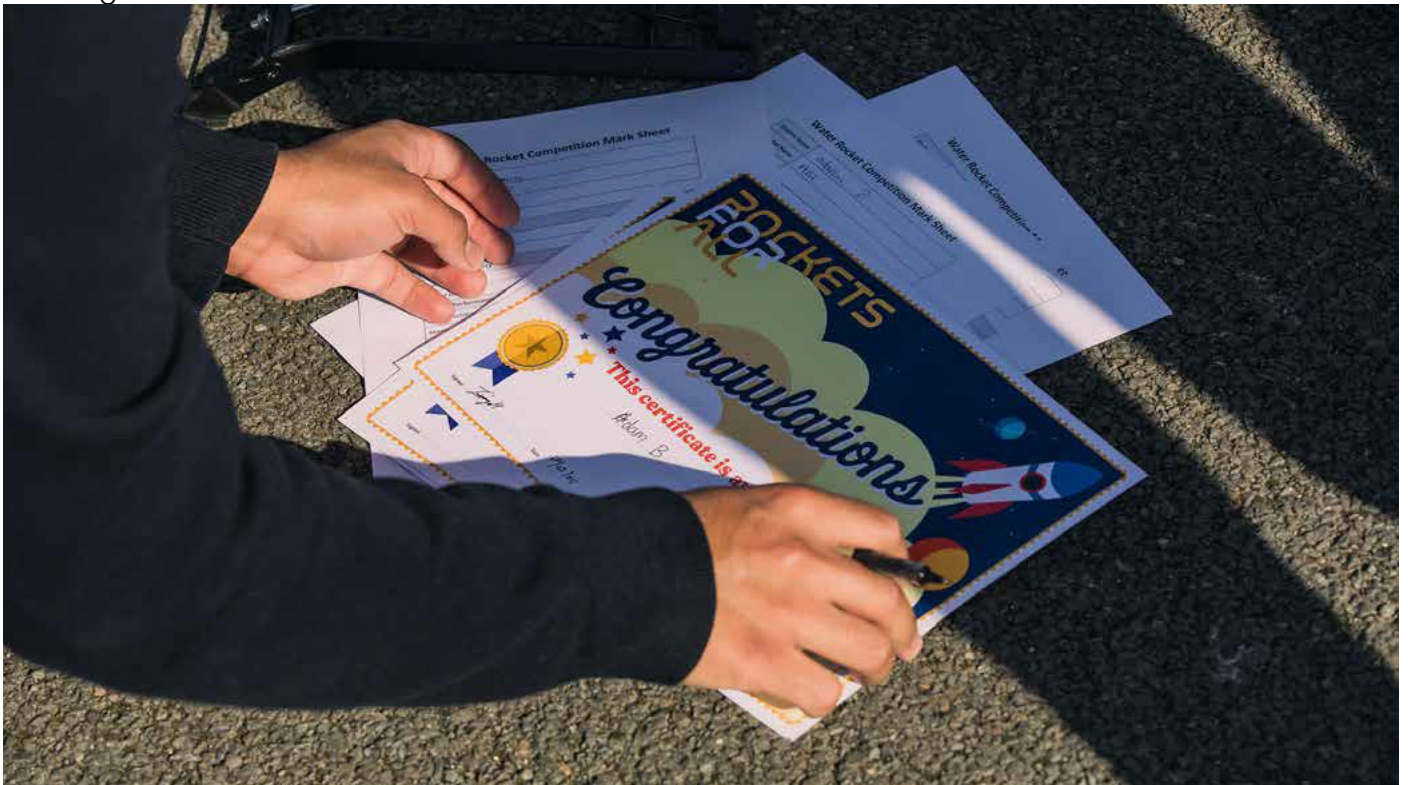


Students who had cut their bottles in any way found that their rockets didn't launch. When water and air was pumped into the rockets, any gaps in the bottle made it impossible to launch them. Students attempted to fix these with tape but sadly a few of them were unable to be launched as part of the competition. Big Ideas asked the students if they now had a greater understanding about rocketry and propulsion, after having taken part in the competition:

"Yes! I have learnt about rocketry and propulsion!" **Year 9 student**

"I learnt a lot about science in general. It's increased my understanding about rockets." **Year 9 student**

After all the water rockets had been launched, the Year 12 students looked at all the scores students had accrued during the event and chose three winners for first, second and third place. The school produced branded certificates and awarded the free gifts from Water Rokit to the winning students.



When asked about the experience of running a competition for their peers, the Year 12 students said:

"It's been pretty challenging but fun!" **Year 12 student**

"Team work was important." **Year 12 student**

The students were asked if they were now more interested in careers in the space sector. All students who were spoken to were interested in careers in the STEM sector including engineering, mechanical engineering, and aeronautical engineering.

In a follow up survey completed by the teacher, we asked what skills they thought the students had developed taking part in the competition. The teacher responded that the students had developed their Communication, Critical thinking, Leadership, Teamwork, Problem solving, and Coordination skills.

The Mulberry Academy Shoreditch students worked hard on their competition and the high level of planning and preparation by both the students running the competition and those participating was evident through the smooth execution of their event. The teachers and students enjoyed the competition and will use the resources again in the future.



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