Space Prize Challenge—New York City

By Kim Macharia and Mark Wagner

Abstract

The Space Prize Foundation is focused on empowering students, particularly young women, to pursue STEAM education and to explore careers in the growing space industry. It has become difficult to imagine an industry that will not be impacted by real-time satellite data and ubiquitous global broadband in the next decade, and today's students must be prepared for this reality. Unfortunately, despite sixty years of space exploration, gender inequality has historically kept women from being equally represented in the space industry. While the Space Prize is a spectacular contest, the team is dedicated to ensuring that all participants benefit from a meaningful educational experience, including opportunities for networking and mentorship. Many of the programs being launched by Space Prize, including a guest speaker series and an ambitious space education curriculum, also benefit other students and educators worldwide. The first Space Prize Challenge was focused on young women in New York City public schools. A number of similar regional contests are planned in the next year, with long-range plans including a global contest, with reservations for grand prize winners on one of the first Space Perspective flights. Meanwhile, there are many opportunities for partnership and sponsorship with the foundation.

Introduction

The Space Prize Foundation, or simply Space Prize, is a 501c3 non-profit organization based in New York City. Space Prize is focused on empowering students, particularly young women, to pursue STEAM[1] education and to explore careers in the growing space industry. This is achieved through a combination of attention-grabbing contests (with spectacular prizes), opportunities for community (for networking and mentorship), and open educational resources, including a globally available guest speaker series and an ambitious space education curriculum. The first Space Prize Challenge, which culminates in a zero-G flight for five winners on May 28, 2022, focused on young women in New York City public schools.

Space Prize was founded in 2021 by board members Roman Chiporukha, Susanne Moore, and Eddie Miller. The executive team includes the present authors, Kim Macharia, and Mark Wagner. Chiporukha comes from the luxury travel industry, where his ultra-wealthy customers began to be interested in private space travel. His firm, Roman & Erica, run in collaboration with his wife, Erica, introduced the last private astronaut to Axiom

[1] STEAM is Science, Technology, Engineering, the Arts, and Math. This is differentiated from STEM education by acknowledging the importance of creativity and the arts in student success—and in the growing space industry.

Space's AX-1 mission, which recently returned to Earth on April 25, 2022, after a seven-day stay on the International Space Station. Following this success, they founded a new brand, Space VIP, focused on aggregating private astronaut experiences for consumers of all income levels. In collaboration with one of their clients, Karoline Starostik, who became the foundation's first benefactor, they also founded Space Prize as a companion non-profit effort.

Roman and his colleagues recognized the need to redirect the "billionaire joyrider" narrative and the "earth versus space" narrative, which do not acknowledge the benefits humanity has already accrued and stands to accrue from investments in space science, including private space travel. From its inception, Space Prize has thus been conceived of as more than a contest; it is meant to support universal space literacy around the world.

Why Space?

Over the past six decades, commercial, industrial, and government applications of space science have made a real impact for people on Earth today. Some space technologies, like the Global Positioning System for instance, have already changed the world economy by impacting everything from ride sharing to supply-chain management. It has become difficult to imagine an industry that will not be impacted by real-time satellite data and ubiquitous global broadband in the next decade. Already in 2022, space industry jobs include a variety of roles well beyond traditional astronauts, engineers, and scientists.... Space Prize judges and mentors represent astrobiologists, space architects, space lawyers, space marketers, and space designers of many kinds, including spacecraft interior designers and zero-G fashion designers. Existing fields of study include space anthropology, space medicine, and space philosophy.

Moreover, space technologies are our best tools for understanding and protecting our environment. For example, in a white paper commissioned by the Space Prize Foundation, Rebecca Schembri found that space technologies help to support clean energy, clean water, and smart agriculture—in addition to protecting against deforestation, carbon emissions, and illegal poaching.[2] Similarly, satellites help to monitor severe weather, wildfires, natural disasters, and biodiversity—while also being critical to communication infrastructure and internet access worldwide.[3] In addition, the United Nations has determined that space technologies support all thirteen sustainable development goals, from reducing poverty and hunger to providing quality healthcare and education.[4]

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[2] Rebecca Schembri, "Why Space Matters: The Environment and Climate Change," docs.google.com/document/d/1ORgKJOFHNW1kUg7apcIQQVobgvMn9JYsOmqpSw5HYyI/edit?usp=sharing.

[3] Schembri, "Why Space Matters."

[4] UNOOSA, "Space Supporting the Sustainable Development Goals," www.unoosa.org/oosa/en/ourwork/space4sdgs/index.html.

Why Women?

Despite sixty years of space exploration, gender inequality has historically kept women from being equally represented in the space industry. Of the nearly six hundred people who have traveled to space, less than twelve percent have been women,[5] and women only hold about twenty percent of senior roles in aerospace.[6] The Space Prize Foundation is dedicated to changing these statistics and making gender equity in space a reality for the next generation.

To inspire young women by raising awareness of what is possible today, and to empower them to believe the space industry is for them, the Space Prize News page aggregates news stories from around the web focusing on women in the space industry.[7] Recent highlights include the women who help Virgin Orbit to launch satellites into orbit, the first black woman to make a long-term space flight on the ISS, a JPL engineer inspiring other young women, and young Kazakh, Kyrgyz, and Uzbek women launching nanosatellites of their own design.

In turn, Space Prize's gender equity work has been featured on NBC NY,[8] in WIRED,[9] and in international publications like the *Evening Standard* in the UK.[10] To view more recent articles, podcasts, and broadcast segments, check in on the Space Prize Press page.[11]

What About the Girls Who Don't Go Up?

Early in the development of the Space Prize NYC Challenge, space philosopher Daniel Fox, founder of Space 100.10 and The Future of Space,[12] asked the team "what about the girls who don't go up?" This question has driven much of the education program development undertaken by the foundation. The team is dedicated to ensuring that all participants benefit from a meaningful education experience, including opportunities for networking and mentorship. Many of the programs being launched by Space Prize also benefit other students and educators worldwide.

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[5] Wikipedia, "List of Female Astronauts," en.wikipedia.org/wiki/List_of_female_astronauts.

[6] United Nations, "Only around 1 in 5 space industry workers are women," UN News, October 4, 2021, news.un.org/en/story/2021/10/1102082.

[7] Space Prize, "News," www.spaceprize.org/news.

[8] NBC News, "NBC New York Spotlights Space Prize Challenge NYC," YouTube, February 10, 2022, www.youtube.com/watch?v=kx-KjBrNGsg.

[9] Ramin Skibba, "Axiom's All-Private Spaceflight to the ISS Preps for Launch," *Wired*, April 7, 2022, www.wired.com/story/axioms-all-private-spaceflight-to-the-iss-preps-for-launch.

[10] Rachelle Abbott, "Tech & Science Daily: Sending Young Women to Space," *Evening Standard*, April 27, 2022, www.standard.co.uk/tech/women-space-prize-apple-iphone-nasa-comet-b994203.html.

[11] Space Prize, "Space Prize in the Press," spaceprize.org/press.

[12] Daniel Fox, "The Future of Space," LinkedIn, www.linkedin.com/newsletters/the-future-of-space-6882171911019868160.

One of these programs is the guest speaker series.[13] The Space Prize Foundation hosts weekly webinars accessible to students and teachers around the world. Each week guest speakers from across the space industry share their experiences and insights. Every hour-long episode is interactive, including a brief presentation and plenty of time for questions and answers. The series is meant to empower young people to pursue STEAM education and to explore careers in the growing space industry themselves. The speaker series is hosted by Dr. Lesley Anderson, Albert Einstein Distinguished Educator Fellow, and it has turned into something special, including speakers from across the space industry … astronauts, engineers, scientists, entrepreneurs, designers, lawyers, historians, and more.

Space Prize also has plans to launch an ambitious new curriculum in the summer of 2022. The Space Prize Curriculum is a customizable open-source space education curriculum appropriate for middle- and high-school students, accessible worldwide to support educational equity. In addition to offering an introduction to space science, the solar system, and the history of space exploration, this program goes much further.

It begins with an emphasis on why space matters to people on Earth today, from the benefits of spinoff technologies to the critical role of space science in protecting the environment and combating climate change. Then it focuses on the skill sets and mindsets students need to solve problems successfully in their complex and unpredictable future, whether they work in the space industry or not: the explorer's mindset, moonshot thinking, design methods, synthesis, collaboration, and reflection. It includes up-to-date information on New Space (or Space 2.0), including commercial efforts like SpaceX, Blue Origin, Virgin Galactic, and more … such as independent international efforts like the Chinese space program. Finally, it looks forward to consider issues of sustainability, governance, and ethics. It introduces students to space philosophy, including the Overview Effect, the increasing existential threats to all life on Earth, and humanity's higher aspirations as custodian of life in the solar system and beyond. One sample lesson, focused on the explorer's mindset, is available online at the time of publication of this article.[14]

NYC Contest and Timeline

The first Space Prize Challenge focused on young women in New York City public schools.[15] The foundation worked with five schools, one in each of the five boroughs of the city. The participating schools were:

[13] Space Prize, "Speaker Series," spaceprize.org/speakers.

[14] Mark Wagner, "Explorer's Mindset," in *Space Exploration*, section 2.1, flexbooks.ck12.org/user:bwfya0bzcgfjzxbyaxpllm9yzw../cbook/space-exploration/section/2.1/primary/lesson/explorer%E2%80%99s-mindset.

[15] Space Prize, "Space Prize Challenge—NYC." www.spaceprize.org/nyc.

Bronx—Young Women's Leadership School of the Bronx.[16]
Brooklyn—Midwood High School.[17]
Manhattan—New Explorations into Science Technology + Math (NEST).[18]
Queens—Bayside High School.[19]
Staten Island—Tottenville High School.[20]

In January 2022, each of these schools held an essay contest open to all young women on campus aged fourteen to eighteen. Responses to the following prompt were graded on a rubric that was provided for teachers volunteering to score the first round of entries:

> Round 1: Essay (1,000 words)
> The Overview Effect has been described by many astronauts as a cognitive shift in awareness when viewing the earth from outer space, suspended in the darkness of the cosmos. From this vantage point, one experiences the earth not as we typically see it on Google Earth: with borders, dogmas, conflicts, and strife, but as one planet in which everything is interconnected. Experiencing the overview effect can create a shift in the way that we think of ourselves, of others and of this place that we call home.
>
> Tell us about a time in your life when your perspective was meaningfully impacted and how has it changed the way that you experience the world?

The five top-scoring participants from each school site were invited to participate in a video competition during February. These twenty-five finalists each created a ninety-second video addressing the following prompt:

> Round 2: Video Presentation (90 seconds)
> Who are you?
> Where are you from?
> How old are you?
> What does exploration mean to you?
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> Tell us an instance when you felt the magic of discovery and how it has impacted your life.

In March, the videos were scored by a panel of volunteer judges using a similar rubric. Space Prize judges and mentors are influential women and men from across the space

[16] Young Women's Leadership School of the Bronx, "Mission Statement," tywlsbronx.org.
[17] Midwood High School at Brooklyn College, "Home," www.midwoodhighschool.org.
[18] New Explorations into Science, Technology + Math, "Home," nestmk12.net.
[19] Bayside High School, "Home," www.baysidehighschool.org.
[20] Tottenville High School, "Home," www.tottenvillehs.org.

industry, including experts in astronautics, education, finance, marketing, philosophy, and more. They represent a wide variety of the rapidly growing number of space careers available to young women today.[21] One winner was chosen from each school, but meanwhile, twenty-four finalists got to participate in a simulated mission to Mars at the Challenger Center in Manhattan.

In April, the five winners were also invited to participate in the new leadership program at the US Space & Rocket Center, known as Space Camp LIFT (Leadership Inspires Focus and Teamwork).[22] Four of the five winners were too young to meet the minimum age of 17 for Space Camp LIFT, so alternates from their schools got to attend in their place, effectively increasing the number of winners to nine. Then, on April 12, 2022, the anniversary of Yuri Gagarin becoming the first human in space, a Yuri's Night celebration took place at Waterline Square in Manhattan honoring all twenty-four finalists.

On May 28, the five winners experienced zero gravity on a parabolic zero-G flight out of Newark airport.[23] The experience included a flight on a helicopter from Manhattan to Newark, an interview with press at the airport, and a private lunch and post-flight interview streamed later.

What's Next for the Space Prize Foundation?

Due to the success of the inaugural Space Prize Challenge in NYC, the foundation is now planning additional regional challenges around the world. Potential contests currently under development include a focus on underserved students in Atlanta and in New Mexico (where the commercial space industry is growing up around them), as well as international competitions in France, Israel, Rwanda, and Peru. The Space Prize team is also hoping to fly student science projects and art on a Space Perspective balloon (and perhaps a student on a Blue Origin capsule) before the end of 2022.

Meanwhile, students and teachers all over the world can participate in the speaker series every Wednesday at 4 p.m. PDT,[24] and they can view the recordings of past speakers at the Space Prize YouTube channel.[25] In addition, the Space Prize Curriculum, a twelve-week intensive program meant to be offered as an elective, an after school program, or a self-paced learning experience is scheduled to be launched in phases between June and September 2022.

These programs represent a number of partnership with and sponsorship opportunities for benefactors and organizations that wish to work with Space Prize toward their shared mission. Space Prize is actively seeking funding for the regional contests, the

[21] Space Prize, "Judges & Mentors," www.spaceprize.org/judges-and-mentors.
[22] Space Camp, "Leadership Inspires Focus and Teamwork (LIFT) Academy," www.spacecamp.com/LIFT.
[23] Zero G, "New York, NY (EWR)," www.gozerog.com/reservations/new-york-ny-ewr.
[24] Space Prize, "Speaker Series."
[25] Space Prize, "The Space Prize Challenge," YouTube, www.youtube.com/channel/UCCY0K_FxyAZWocWAvMHOc7w.

speaker series, and ongoing development of the curriculum. To learn more about these opportunities and to explore opportunities for inquiry, contact the Space Prize team.[26]

Conclusion

In just six months, the Space Prize Foundation, a New York-based non-profit, has completed the first Space Prize Challenge, a contest for young women in the New York City public school system that culminated in a zero-G flight. The purpose of the contest was to inspire and empower students, particularly young women, to pursue STEAM education and explore careers in the space industry. Space science and technology matter to humanity, but historically, women are underrepresented in the space industry. Based on this need, and the success of the first contest, the foundation has plans for several more similar regional competitions around the world, and a spectacular global challenge sending young women to the edge of space. Meanwhile, they have also launched open education resources freely available to students and educators around the world. Anyone can get involved by donating,[27] or by reaching out to the team to discuss possible participation or partnership.

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Editors' Notes: The final paper in this issue is a concrete description of a meaningful non-profit effort focused on universal space literacy, and on gender equity in the space industry. Macharia and Wagner tell the story of the Space Prize Foundation and the inaugural Space Prize Challenge in New York City, from the spectacular origin story to a Zero-G flight for five young women from public high schools in New York. Their work is squarely focused on space education, a field closely related to space philosophy and the mission of this journal. It is a responsibility all space enthusiasts share. Ad Astra! ***Gordon Arthur and Mark Wagner.***

[26] Space Prize, "Contact Us," www.spaceprize.org/contact.
[27] Space Prize, "Donate," spaceprize.org/donate.

About the Authors

Kim Macharia, Executive Director of Space Prize, began her career in the space industry managing community relations for start-ups. She has worked on a range of projects including space situational awareness and private spaceflight. Kim has also had the privilege of representing companies at international events including the UN World Space Forum. Throughout her career, she has made a concerted effort to advocate for marginalized communities and to create pathways for non-traditional actors to engage in the growing space economy. Kim is also passionate about diversifying and democratizing the space industry. She advocates for the development of the space economy through her role as the Chair of the Space Frontier Foundation. Since taking on this position, she has launched ambitious initiatives centered around climate change, diversity and inclusion, and STEM. Kim currently lives in New York City, and she is excited to use her position to make access to the space industry more equitable.

Mark Wagner serves as President of the Space Prize Foundation, a non-profit organization focused on promoting STEM education and increasing the representation of women in aerospace careers. He also teaches the Space Education graduate certificate program at Kepler Space Institute and is the Associate Editor of the *Journal of Space Philosophy*. In addition, he is the founder of ARES Learning, a vision for schools that prepare students with the skill sets and mindsets they will need to be successful in the growing space economy—and in humanity's rapidly approaching multi-planet future. Mark has a PhD in Educational Technology and a master's degree in Cross-Cultural Education. He also holds graduate certificates in Space Education and Space Philosophy. He is the author of More Now: A Message from The Future for The Educators of Today (2018) and a forthcoming book about Space Education, which explores both current opportunities on Earth, and the possibilities for teaching students on the Moon, on Mars,

and in deep space habitats. Outside his work, Mark loves playing hockey, practicing martial arts, and obsessing over his ‘62 beetle, which now runs on an electric motor and Tesla batteries. He is a certified health coach and biohacking enthusiast, who also enjoys songwriting, spending time in nature, and exploring the world with his friends and family.