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**Testimony of Mr. Jeffrey Manber
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before the

** Senate Committee on Commerce, Science and Transportation
Subcommittee on Aviation and Space**

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**Building NASA's Workforce of the Future: STEM Engagement for a 21st
Century Education**

Chairman Cruz, Ranking Member Sinema, and other distinguished members of the Aviation and Space Subcommittee, thank you for giving me the opportunity to return to this room to testify before you. I look forward to discussing how commercial access to the International Space Station has provided an unprecedented educational experience to over a million students across the United States.

Let me begin today by explaining that I am here in two different capacities. I am, of course, representing Nanoracks as the CEO, but I am also Chairman of the Board for DreamUp, Nanoracks' educational sister company. Once just a division in Nanoracks, we spun DreamUp out to be a standalone public benefit corporation because the business of providing educational access to space was, and remains today, strong and important. DreamUp's sole focus is bringing space to the classroom, and the classroom to space.

We opened the doors at Nanoracks in 2009 with the goal to make space accessible to everyone. I am proud to say today that the very first customers that brought Nanoracks into business were in fact, schools. Our very first experiments were small projects that were developed by middle school students. These kids quite literally held bake sales - not to sponsor their soccer team, or raise money for the school dance, but to send their very own science experiment to the International Space Station via a Nanoracks Space Act Agreement with NASA. This is something that could never be imagined before the commercial pathway. Nanoracks standardized and miniaturized technologies as well as created programs that made something as complicated and expensive as space, into something that was both affordable and doable within one school year.



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One of our major educational partners is the Student Spaceflight Experiments Program, run by Dr. Jeff Goldstein, which has been a flagship program for Nanoracks and DreamUp since our first flights on the Space Shuttle. Dr. Goldstein's program is now on their 15th mission to the Space Station, and he has engaged nearly 100,000 students across the country in the spaceflight process – from creating and hypothesizing an experiment, submitting a proposal for review, building an experiment, flying it to space, and receiving the experiment back on the ground for analysis. Of course, not every proposal is selected – but even those which aren't are provided a unique classroom experience where they think critically, collaborate, and build a proposal strategy, just as they would as future NASA or industry employees.

Notably, all of this has been done with no direct NASA funding.

Dr. Goldstein's program is one of many incredible programs that was built on commercial access to the Space Station. Just this weekend, Nanoracks flew the first-ever oven to the Space Station, set to bake DoubleTree cookies on orbit. Never before has something been baked from raw ingredients in microgravity. This provides not only for a fascinating microgravity experiment contributing to how we endure long-duration space travel, but also allowed a private enterprise to build an educational program, in partnership with Scholastic, that was delivered to **one million students** in 50,000 classrooms across the United States. Using a symbol of hospitality, this experiment shows what will happen to one of the most relatable items on Earth – a chocolate chip cookie – in the complex environment of microgravity. Students who have never been engaged in space before, now have a tangible object they recognize, and can think critically about what would happen when gravity is taken away, and are learning how the International Space Station and NASA are trying to best understand the science behind human exploration. These are the students that may one day bring humans to Mars – and yes, they are going to want desert when they get there.

These are just two significant examples of hundreds that I can reference. To date, Nanoracks has flown nearly 600 educational experiments to the Space Station – experiments which include building plant growth chambers and fluid chambers, materials aggregation, DNA sequencing, and so much more.

If I might add, Chairman Cruz, that Nanoracks and DreamUp have flown nearly 60 educational payloads to the Space Station from Texas schools – from Hawkins, Houston, Burleson, El Paso, San Antonio, Austin, Buda, and more.

Senator Sinema, we have also flown four experiments to the Space Station from Arizona – including a university small satellite that launched just this past Saturday! Over 15 students from Arizona State University joined my team in Wallops Island to watch their hard work take flight.

I am beyond proud of the educational outreach done by both Nanoracks and DreamUp, but I would be remiss if I didn't use this platform to share that we as a nation have so much more work to do.



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These 600 payloads represent so much hard work done by students, teachers, parents, and community leaders across the country – but the strong majority come from well-off communities. Let's do more to bring our underrepresented communities to space.

So today, Nanoracks and DreamUp have begun a dedicated effort to engage Historically Black Colleges and Universities – and I hope to share in the coming weeks some exciting news about these efforts. Additionally, we will show that it's more than just engineers we are looking for in the aerospace industry. We need to better engage agricultural colleges like Texas A&M or Prairie View A&M, we need involve biology departments and pharmaceutical colleges to find that cure for Cancer. . Space is more than engineering today, and we are dedicated to assuring we are fueled by more than a handful of schools.

Just last week, the 2019 National Assessment of Educational Progress showed that average scores of fourth and eighth grade students have declined since 2017. The Secretary of Education was quoted as saying that America's 'antiquated approach' to education fails too many children.

This means that the model in which an educator, who holds all the knowledge, stands in front of his or her classroom and imparts knowledge to their students does not work anymore. The world is changing too quickly, innovation happens too fast, and we must give students real, hands-on experiences that teach them 21st Century Skills, particularly the ability to think on their feet, adapt, and persevere (even when they "fail").

We can do better by engaging the full spectrum of students in space exploration as a clear path to make our next generations bolder and brighter than my generation.

Since we're talking about education, let me provide the committee a report card.

America has been doing great work in building up the next workforce in STEM fields. The commercial pathway has provided unprecedented access to students both in America and across the world, and created job opportunities once never imagined. We have quite literally changed the lives of students, and opened their eyes to the wonders of space. But let's together cast a wider net. Funding for NASA's educational division has long been debated. Let's not tie NASA's hands behind their backs when it comes to educational outreach. Let's allow NASA the freedom as other agencies have to have robust STEM programs. NASA is likely one of the only government agencies that can inspire both a 5 year old and a 50 year old – something no other government agency can boast. If we want to maintain American leadership in space, it's by investing in the kids today that will be the future NASA Administrator, or the future Chairman of this Subcommittee.

Today, I am announcing that Nanoracks and DreamUp are assuring that every Congressional district in the United States has sent at least one student research project to the International Space Station by 2025. We will work with industry and educational organizations to assure that the work force taking us to Mars will be strong, world-class and inclusive of all Americans.



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I ask the Committee to join me and my team as we ensure America's leadership in space via these ambitious but critical goals.

I am happy to provide the Committee with our full list of statistics for all of the districts in which we've flown payloads, and further information on our educational outreach products both on the ground and on-orbit.

Thank you.