

Tenacity and Perseverance Lead to NASA Experience

Marie Thornsberry and Wendi Rodriguez

On January 24 and 25, 2017, Wendi Rodriguez, a middle school science teacher in Phelan, CA, and Marie Thornsberry, a third grade GATE cluster teacher in Rialto, CA, took two of the most amazing flights of their lives. They flew to the stratosphere on NASA's Stratospheric Observatory for Infrared Astronomy, SOFIA. On their first flight, they had the thrill of taking off in the cockpit, alongside the pilots, experiencing a perspective so different to any other flights they had ever experienced. On the second flight, they experienced landing in the jumpseats.

The opportunity all began about seven years ago when Wendi was invited to an Open House at Armstrong Field in Palmdale. That is where she met SOFIA. Wendi toured the facilities, met with NASA personnel and learned about this great 747, its telescopes and instruments, and learned about the Airborne Astronomy Ambassador (AAA) program. During the tour, she discovered that SOFIA, from its inception, was to include educators. As then a science teacher for 21 years, she instantly knew her dream. She entered the plane, amazed by the equipment necessary for the observation, looked around, selected a seat, sat down and said, "This is MY seat!" She had set her goal. Isn't that what students are taught? They are urged to set goals and stick to them, with the understanding that there will be obstacles, there will be challenges, but they can do it.

In 2011 the first cycle for AAA was released, Wendi applied, along with a high school colleague, and was not accepted. When the second cycle came along, Wendi invited Marie, her long-time friend, an elementary teacher in Rialto, CA, and California Association for the Gifted board member, to apply with her. To qualify, one person had to be a secondary science teacher. The partner applicant could be an educator in any field. The pair discussed the opportunity and possibilities of outreach, and how they could expand on the experiences they could provide for their students. For gifted students to "Think like an Astronomer" was one thing, but to be able to hear from their teachers who worked alongside astronomers (astrophysicists, engineers, etc), would give whole new perspectives. They decided to apply.

Unfortunately, after about six months of waiting, the disappointment arrived that the pair had not been selected. Two years later, the partners learned that another cycle opened up, but had only two days to meet the deadline. They completely rewrote their essays to include current lessons they were teaching, acquired the necessary letters and signatures to accompany their application, and submitted. In February of 2015, the pair were selected as Earth Partners. As Earth Partners, they received resources from NASA/SETI to use in the classroom, attended online meetings that included astronomy lectures, and presented to GATE elementary and

middle school students and parents about SOFIA and how to view the sky. Finally, word came that they had been selected to be Cycle 4 Airborne Astronomy Ambassadors (AAA) and would fly on SOFIA. After flight dates were changed three times, the actual flight week was set for January 22-27, 2017. To prepare, Wendi and Marie had to complete a graduate level astronomy course. They discovered this to be one of the greatest challenges of their lives, especially since they were attending alongside people with backgrounds in astronomy, astrophysicists, and AP high school science teachers. This was yet another experience to share with their students, telling how they had to undergo a truly rigorous course and receive an A.

Once in Palmdale, Wendi and Marie spent a full week meeting with scientists, astronomers, astrophysicists, and engineers. They learned about SOFIA, the six different interchangeable instruments that the telescope uses, took tours of the different labs, and twice flew on SOFIA for approximately ten hours on each ride, reaching altitudes above 45,000 feet. Two of the main targets for the flights were Mars and Venus and their atmospheres, gathering data to find evidence of methane, water, possible former oceans and how quickly they evaporated. They also saw Orion, Vesta, and Messier 77, which is a spiral galaxy with a black hole in the center, as well as other celestial bodies. Seeing these targets through the infrared observatory gave the scientists more data than viewing them using visible light. The instrument EXES was used during the two flights. EXES collects information on the molecules that are in the atmosphere of the target. The presence (or lack) of certain molecules allows scientists to make predictions about the history of the target. Wendi and Marie saw evidence of ancient oceans on Venus and the lack of methane in the atmosphere on Mars.

Wendi was allowed to take two experiments that her students suggested on board SOFIA. The first experiment was an extension of a classroom challenge on which they were working. The challenge was to see which plastic water bottle would flip (rotate 360 degrees) when tossed in the air. The students determined, through a series of tests, the ideal water bottle and the exact amount of water that performed the best. The students asked their teacher to take this test on SOFIA to determine if the altitude would have any effect on the bottle toss. After reviewing the data, the students determined that the altitude did not affect the bottle toss experiment.

The other experiment students requested to take on SOFIA, was to see if the change in altitude, or direction, changed the weight of an object. To test their hypothesis, Wendi took a digital scale and a family heirloom (her mother-in-law's high school class ring). The ring weighed exactly 16 grams when weighed on Earth. Once the flight began, she weighed the ring as the plane ascended, descended, and changed directions. The change of force on the ring would register a change of "weight" on the ring. Throughout the flight, the ring registered a weight as low as four grams and as high as 45 grams. This experiment led to a great discussion in Wendi's class

the week of her return. The fact that mass does not change, but weight is affected by forces was understood by her students.

Just as exciting as viewing the targets, was getting to know the people who work on SOFIA. They were immediately recognized as grown up gifted kids. Wendi and Marie asked several of them to share their stories of how they had arrived at where they are today. Most reported having an interest in astronomy from an early age. Some described themselves as not fitting in as young students. One spoke of sneaking out of boarding school at night to look at the stars, another told of building his own telescopes. Nearly every one though, named one special teacher who at some point in their education recognized their potential, and took time to guide them. And, that is what made the difference. They all said that in working on SOFIA, they had found their peers. They share a passion and share the same level of humor. It was evident that they are challenged by their work, but more importantly, satisfied and happy individuals.

As advocates for gifted learners, the pair saw firsthand how important it is to make sure that gifted students are placed together, are challenged by teachers who understand them, and are provided mentors in areas of their interest. Wendi and Marie observed that when this happens, it can lead to great accomplishments and satisfying lives.