

Todd Livesay, Part Two

(As published in The Oak Ridger's Historically Speaking column the week of April 25, 2022)

Welcome to part two of Benita Albert's story about Todd Livesay. You are about to learn more of his skills and abilities as well as his hobbies and his growing family. RamSat is now in space making Robertsville Middle School the first middle school to do so. See the links included below.

It was a chance encounter of two former Oak Ridge High School alumni at a Christmas Eve service in 2015 that led to an innovative project involving Robertsville Middle School (RMS) students and the National Aeronautics and Space Administration (NASA). Todd Livesay (ORHS Class of 1981) and Patrick Hull (ORHS Class of 1992) talked briefly about engaging students in a creative STEM activity, an experiment to be conducted in the Earth's thermosphere via a nanosatellite. Todd, an RMS STEM teacher, was intrigued but also initially overwhelmed considering the enormity of such a project.

Todd described the beginnings of the program: "The first year was simply an enrichment class, no expectations of building a CubeSat. Because the kids worked so hard, completed, and presented so well, NASA personnel contacted RMS and encouraged them to apply for the actual CubeSat initiative."

The following summer found Todd in Huntsville, AL visiting the Marshall Space Flight Center and discussing the project further with Patrick, a NASA aeronautical engineer, as well as with other NASA officials. A portion of that visit was filmed and is available online at <https://www.youtube.com/watch?v=yxeOmXJctUk&t=10s> Todd explained, "The video was made as a challenge to RMS students to motivate them and make the project a real life subject."

In school year 2017-2018, Robertsville students began the project to define the scientific experiment, design and construct a CubeSat for launching, and ultimately track the data from their tiny, orbiting satellite. The CubeSat, now named RamSat for the school mascot, is orbiting the Earth as of its launch from the International Space Station on June 14, 2021. The data collection includes plans to study the reforestation of the Smokey Mountain/Gatlinburg area after the devastating wildfire of 2016. The progress of RamSat can be followed at <https://www.ortn.edu/robertsville/ramsat>

It takes a teacher stepping outside of his comfort zone, an advocate who believes anything is possible with his students, and an enthusiast for new challenges to inspire and lead such a mission. Todd Livesay's energy was tested in his tireless work to reset the curriculum, seek scientific mentors, and solicit necessary, outside funding.

His leadership has now earned Robertsville Middle School the honor of being the first middle school CubeSat project in space. And Todd is not done yet. Tracking his professional teaching career and interviewing him about the changes he has seen over the thirty-seven years he has been in the classroom is a reminder of how much the world has changed.

Todd was born and raised in Oak Ridge, and he left only to pursue his undergraduate degree in Technology Education. He said, "My goal was always to come back and teach in the Oak Ridge Schools." Graduating from UT in 1985, he learned that no positions in his field were open in Oak Ridge.

He accepted a job in Knoxville at Northwest Middle School where he taught Industrial Arts for all students, grades 6-8. While at Northwest, Todd started a chapter of the Technology Student Association (TSA), an extracurricular opportunity for students to learn and compete in a variety of academic areas. TSA became an extremely popular student activity, not only at Northwest where he served for seven years, but also in all the subsequent schools at which he has taught.

He moved to a Diversified Technology teaching position at Karns High School in 1992, setting up a lab in partnership with Pellissippi State Community College. His lab provided introductions to the newest technology at the time such as lasers, robotic arms, an electronics training lab, computer hardware construction kits, and broadcast radio and TV equipment. Todd said, "Since there was no curriculum, we had to build it including pre- and post-testing instruments. Additionally, we added a unit in graphic arts, running it on a DOS operating system (there was no Windows technology)." Smiling, Todd recalled having one modem and a fax machine which he described as "state of the art at the time."

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From 1995-2005, Todd served as a state trainer for diversified technology teachers in East Tennessee. In the summer of 2007, Todd says his professional life got a shot of adrenalin when he trained in the program, Project Lead the Way. He briefly described it as a program designed by retired engineers emphasizing applied learning, student collaboration, and real-life, project-based explorations. He added, "I loved everything about it. Every lesson has math, science, English, and student presentations (both written and oral.)" The educators attending the training became students who were required to complete the curricular packages: Design and Modeling, Automation and Robotics, Magic of Electrons (Electricity), and the Science of Technology.

Todd's last four years in the Knox County School system were spent at Farragut High School where he once again established a lab for diversified technology students. Hearing of a position opening in the career technical education program in the Oak Ridge Schools, Todd interviewed and enthusiastically accepted a position at Robertsville Middle School starting in 1999. His life goals were being met, and it was the Oak Ridge Schools who supported his training at the University of Seattle's Project Lead the Way summer seminar. Todd said, "That training changed my teaching trajectory."

Over his Robertsville career, Todd has created a learning environment heavily emphasizing team project work and STEM projects worthy of course credit at the high school level for his Robertsville students. Todd has been asked to set up a STEM lab at ORHS where he is currently assigned for 60% of his teaching day in the 2021-22 school year. He enthused while showing me the equipment obtained thus far: band saws, five drill presses (for different applications), down-draft sanding tables, a track saw, and of course, also the requisite hand tools. His dreams are endless as he anticipates adding a computer numerical control router, a new Advanced STEM 3 course (in 2022-23), and a vision for an additional STEM 4 work-based learning course. Todd currently teaches Introduction to Advanced Manufacturing (welding) and Advanced STEM 1 & 2, ORHS elective, career and technical education courses.

Todd is effusive when talking about his students. He recalled the first year he introduced the NASA project and the necessary student investigations and goals. The curriculum suggested by NASA to introduce the program was completed by his students in only one semester. Patrick Hull and other NASA officials were incredulous. The students presented their project work to Hull just before Christmas, and it was clear they were prepared and ready for more. Todd laughed remembering that their presentation included his students' idea to wear Santa hats.

Todd proudly stated, "Throughout the project, students researched and proposed their own solutions such as the use of a magnetorquer for stabilization of the CubeSat in flight. Each class year took on a new aspect of the project: programming, camera technology, communication devices, sun sensors, wiring, to name only a few. As the project proceeded, we enlisted local scientific experts to consult and instruct. Those mentors have volunteered their own time outside their work at ORNL and Y-12. They have been great role models for my students whose future might include STEM careers."

The RamSat project had a demanding timeline which was potentially compromised by the Covid restricted, school shift to online instruction in 2020. However, Todd sought permission from the Oak Ridge Schools Administration to permit his former students who were ORHS students to continue the build at Robertsville.

RamSat was launched via a Space X rocket to the International Space Station on June 3, 2021. It was released for orbit from the Space Station on June 14, 2021. Students, parents, consulting experts, and teachers traveled to Florida to view the launch. NASA made a special launch patch for the occasion and presented it to all involved in the project.

NASA also made lapel pin replicas of the patch. A description of the mission was included as an attachment: "ELaNa missions provide flight opportunities for educational CubeSats, selected via NASA's CubeSat launch initiative. These CubeSats, or tiny satellites, are primarily developed by universities and high schools to introduce students to the design and development of spacecraft... The ELaNa 36 mission involves the deployment of a single 2U CubeSat (RamSat)...RamSat was built and will be operated by the students at Robertsville Middle School in Oak Ridge, TN."

Other teaching rewards Todd mentioned included his pride in the fact that his three children have had Oak Ridge Schools' educations. His daughters, Laura, and Mary are 2011 and 2012 ORHS graduates while his son, Samuel, will graduate in the ORHS Class of 2022. Laura and Mary went to Glenwood Elementary, and both had Patrick Hull's mother, Mary Ann Hull, as their kindergarten teacher. Sam attended Linden Elementary, and all three siblings went to RMS. The opportunity

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to teach all of his children was special for Todd who observed, "I have been able to watch them grow up and find themselves." Todd's wife, Kristin, whom he married in 1989, is the church administrator for Christ Community Church in Oak Ridge. They now delight in their new generation of two grandchildren.

Asked to comment on his teaching challenges, Todd wiped his forehead while recalling the online learning issues for the hands-on projects that his courses emphasize. He also said, "Whatever you're teaching will be history in the future. Technology is changing so rapidly. Thus, I emphasize concepts and a bigger picture perspective that I hope will serve future change."

Another candid reality of his teaching career arose when I asked about his hobbies, namely his skilled work in custom carpentry. He grimaced when stating that his first teaching contract in 1985 provided an annual salary of \$11,500. He said, "I wanted to eat, so I had to supplement my pay." His skills in cabinet design and construction were honed in his senior year at UT when he was given permission to use the industrial arts lab equipment to build an entirely new kitchen for his parents. His UT professor/mentor challenged him by offering an advanced credit in woodworking if he was successful with the ambitious project. Not only did his parents get a beautiful new kitchen, but Todd also earned the credit.

Moving home after UT, Todd did carpentry work on the side while also teaching. He said, "In my first four years, I was able to buy all the equipment I needed to set up my own cabinetry shop." His skilled work, in great demand, graces many homes and businesses in the area.

After accepting his Oak Ridge Schools appointment, Todd pursued advanced studies, earning a Master of Education degree and an Educational Specialist degree. Though he has certification in educational administration, Todd loves teaching and mentoring too much to leave the classroom. His specialized training continues, a necessary component of the rapid change in technology and STEM topics.

We had to reschedule a recent evening interview when Todd learned of an ORHS Naval Junior Reserve Officers Training Course (NJROTC) meeting. Serving as the President of the NJROTC Parents' Booster Club for three years, Todd felt he could not miss. His son, Samuel, has been a four-year member of the class and now holds the rank of Commander. It was a special pleasure for both father and son to make the NJROTC school trip to Hawaii last December. Todd cited the visit to the USS Arizona Memorial, the site where more than 900 US sailors died, as the most moving memory of the trip. On the 80th year observance of Pearl Harbor Day, the ORHS NJROTC was honored to represent the State of Tennessee and march in the commemorative parade.

I asked Todd for advice for prospective teachers or new teachers. He succinctly replied, "Focus on the kids, it's really all about them." He then asked me if his answer was enough. I replied, "It's perfect!" The countless hours Todd has devoted to his students, both in the classroom and beyond, is evidence that he places student engagement and interest first. In spite of the many distractions placed on educators by mandated programs and evaluations, Todd's core value to prioritize his students' love for learning is his secret to success.

As his former teacher, I feel incredibly proud to see the excellent educator, parent, and role model he has become. I always said that in the classroom I saw the future, and in those student faces, the future looked bright. Todd was one of those shining promises.

The Oak Ridge Schools motto is "Excellence in Education since 1943." No one symbolizes this more than Todd Livesay, an inspiring educator who represents the best in passion for his work, in his love of Oak Ridge and the Oak Ridge Schools, and in the inspiring challenges he has brought to STEM education in Oak Ridge.

Such an outstanding achievement for Todd and for Oak Ridge Schools to be the first middle school to put a CubeSat experiment in space. Thank you, Benita, for yet another most interesting story of one of our very own.

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Todd Livesay and his wife Kristin



The official NASA patch for RamSat-- Quite impressive!