Welcome back to earth after the Space Shuttle mission (STS-134, Endeavor – how do you feel about the end of the Shuttle program? We think of it as a necessary termination of that program because of the amount funding NASA receives. It’s impossible to think of doing something else.

What did your role as Mission Specialist involve during STS-134?

As Mission Specialist #3, I was responsible for the middeck and prepared the cabin once we launched for orbit. I was responsible for getting the crew members out of their suits, deploying all of the laptop computers and Photo TV equipment, and changing the vehicle from a rocket into an orbiting satellite. One of my primary jobs was to transport the alpha magnetic spectrometer to space and install it on the International Space Station. Roberto Vittori, the other mission specialist, and I used Endeavor’s robotic arm to pick up the Alpha Magnetic Spectrometer-2 from the orbiter payload bay. We then handed it off to the ISS’s robotic arm Canadarm2, and Pilot Greg Johnson and mission specialist Greg Chamitoff used that to install the AMS-2 to the starboard side of the ISS’s truss. I also had to reconfigure the middeck back into a vehicle, so that we could fly home to land on Earth. As Lead Specialist #3, I was responsible for completing 3 out of the 4 spacewalks on the space station in support of space station’s assembly and maintenance. During our second spacewalk, I worked on two major projects: refilling one of the station’s cooling loops with ammonia, and lubricating one of the station’s massive Solar Alpha Rotary Joints (SARJs). I also installed the camera equipment to ensure the performance of choreography activities.

There were several activities carried out during the mission to highlight the importance of STEM education, including the LEGO Bricks in Space program and the STEM bars. What was the aim of these initiatives and do you think they succeeded?

A set of LEGO kits was brought up on the Shuttle to the International Space Station as part of an interactive project to get grade school kids excited about science. Our job was to build the 13 LEGO models to see how they would react in microgravity. The results were shared with schools as part of an educational project. I think it’s a wonderful opportunity for kids at an early age to learn about space, flight, and all the challenges it takes to be an astronaut. It’s great for learning about things like scientific management, hypothesis, and thesis.

Might I add that we also brought specialized nutrition bars with us, called “STEM Bars.” The STEM Bars, which were created by two high school students and sisters in Battle Creek, Michigan, were passed for spaceflight and flown up to the ISS to support the sisters’ efforts to raise awareness of the importance of STEM education. In case you’re wondering, all of us astronauts had the opportunity to eat the STEM bars, and they were quite a delicious treat.
Do you think that there is a problem with STEM education in the United States? If so, do you perceive some good solutions?

I think that our problems are rooted in the fact that we don’t reward teachers enough with the work they’ve done. This is primarily a salary issue, ranging from the middle school through university levels. Aside from internal desire to be a teacher, there’s very little incentive for very talented people to teach. Unless they’re offered solid job payment and satisfaction, most of our best and brightest are going to take advantage of distributing their work in programs elsewhere. Even NASA has experienced some challenges of their own with outreach and education, and how they can attract teachers to educate.

You received a Bachelor of Science degree in solid earth sciences and a Master of Science degree in geophysics at Purdue. Did you do any research as an undergraduate? If so, can you describe the project you worked on?

As a graduate student at Purdue, my research was related to high-pressure rock physics experimentation. I became interested in rock physics as an undergraduate through my geophysics professor Nick Christenson, who ran a high-pressure rock physics lab. He would hire undergraduate students to work in the lab and research with rock samples, and it was this experience which sparked my interest in becoming a researcher. I saw the value in completing longer-term projects that required critical thinking, which is an important component to your future as a professional; it was better than just studying for an exam and moving on to the next subject.

What was your MS Thesis on? Why did you choose this topic?

The title of my MS was “Physical properties of the uconn – koiukuk basin margin ophiolite assemblages in central Alaska.”

What that basically means is that I collected rocks in Alaska that originated from the ocean’s crust, took small samples of each, and pressurized them up to 6000 PSI. Then I monitored a sound wave through it in order to measure the speed of sound through the rocks.

Why do you find doing research interesting? How is the experience different from conventional learning in the classroom and lab?

Because it requires critical self-thinking. Maybe the end result is guided by an advisor, but the actual thought process and investigation is guided by you yourself. As a researcher, you’re given a question, and in figuring it out, you learn that you don’t always have to be right. This is not only crucial to research, but is important because it’s an approach that can be applied to questions and problem solving in everyday life. Knowing you’re not always going to be right is a great way to lead your life and learn new things about yourself and your work.

If there are current high school and Purdue students reading this interview who are interested in becoming astronauts, what should they be doing to maximize their chances?

Do the things that are important to you in life. Don’t make your priority the things that are going to make you an astronaut. Being an astronaut is someone who’s doing the best they can in their own particular field of study. We all come from different walks of life, and its essential to the future of space exploration to have people involved coming from different facets of life. This way, we then can bring different spectrums and talents to the table. That’s not to say that a good basis of STEM background isn’t important in becoming an astronaut; however, an astronaut can be anything: a medical doctor, chemist, physicist, engineer, aerospace engineer, you name it.

What was the high point of your time at Purdue?

Graduating with my master’s degree was my high point at Purdue. I started out at a community college in Michigan working as mechanic. To get from that point to graduating from one of the best science and engineering schools in the country—while being happy about the path that I had chosen and the school that I had chosen— was personally a great achievement for me.

What would you recommend current Purdue students do to get the most out of their student experiences?

University is a good time to explore what opportunities are out there for an individual. There are so many opportunities out there, and people can do whatever it is they set their minds to. I recommend finding opportunities that mean the most to you, and always keep the end game in the back of your mind as you strive towards completing that degree.

What do you like to do for fun when you’re not an astronaut?

Well, I still love to take my kids kart racing. Guess where that rooted from? The Purdue Grand Prix, which I participated in for about 5 years as an undergraduate. Overall, I’m passionate about working with cars, and I’m still a mechanic at heart. As technology advances, I think it’s important to have those skills. A lot of people have lost to touch with that sort of thing because of technological progression.