

My Earth science educator story – Missy Holzer

What I did, why I did it and what happened



Growing up as a "tom-boy" in a suburban neighborhood with a ton of kids, I was outside more than inside. We played outside until the street lights came on, and although some play consisted of organized fun (kickball, flashlight tag, etc.), for us playing meant exploring. Whether we were racing up and down White Mountain (a small hill!) and through the woods, skating and hiking around Bean's pond, or building forts from scraps of wood, the outside world was our playground. Between picking up cases of poison ivy, I also picked up anything interesting – sticks, rocks, leaves. I made up a collection that defined who I was at that time and still am now – a curious explorer devoted to life-long learning about our world and how it works.

But how did all of this get me into my career as an Earth science educator? - not via a direct path by any means. My father was a research chemist who specialized in electron-microscopy, but also had a passion for the geosciences in general, and mineralogy more specifically. Although in his later-in-life PhD pursuit he focused on forensic soil science for his dissertation, our home included museum cases filled with an exquisite mineral collection. As a kid, I didn't think much of it, but later in life I came to appreciate the story each specimen told about places near and far from our home in New Jersey. My undergraduate years were more closely connected to my love of plants and gardening which led me to a degree in environmental planning and

design. After a few years of working in the horticultural industry, I felt I needed to do something more interesting and with a purpose. Following a suggestion from someone I took a class on the foundations of education, and subsequently substituted in a local school district in order to find out what it was like to work in a school setting. My science education career was launched. Upon completion of my student-teaching experience, I was hired in the same district, and remained in that district for ten years before landing in my current district, where I've been for 20 years.

My role as an Earth science educator came a few years after teaching a hodgepodge of freshmen science courses when the school district changed our curriculum to Earth Science for all freshmen (14-15 year old students). To prepare for this transition I applied for and received a summer sabbatical which took me to the Southwest United States and Yellowstone National Park. I was like a "kid in a candy shop" during these field courses since my previous travels had been limited. I was overtaken by the grandeur of all of the sights and the mechanisms by which they were created. I finally understood why my father loved geology so much! This was the perfect professional development experience I needed, to prepare for my new curriculum. I was hooked, and my search for "geologic eye-candy" continues to this day, with volcanoes highest on my list.



El Tiede volcano, Canary Islands.

Now I try to emulate the outstanding professors who ran the courses and encouraged us to "zoom-in" and "zoom-out" as we studied the landscapes from multiple scales.

My summer vacations after my sabbatical mostly consisted of field research, and it was these experiences that enlightened me to the goal of science, which is to seek an understanding of our natural world. Besides learning cutting-edge science, I was enthralled by the creative field methods employed by Earth scientists! An archeological dig in the Blue Mountains of Jamaica turned me onto the connections between the geosciences and history. The numerous research cruises I've been on enlightened me to the work of marine scientists and how they do their science in a place that's big, dark, and salty. I learned that collecting volcanic rock samples requires quite a bit of forethought and agility in order to get to the locations harboring ideal samples. These and my other field assignments taught me how the design of good research questions and the selection of appropriate field methods are necessary before heading into the field, and that "Plan Bs" are also necessary should initial research plans fall short given the challenges of field constraints.



Samburu, Kenya.

All of these experiences (NOAO RBSE, NOAA Teacher at Sea, Earthwatch

¹ NOAO RBSE = National Optical Astronomy Observatory Research-based Science Education; NOAA = National Oceanic and Atmospheric Administration; NASA SOFIA = National

Expeditions, NASA SOFIA, PolarTREC¹, numerous professional development workshops across the country, etc.) taught me how to craft meaningful lessons and field experiences for my students, and now when my students go into the field, they are not only getting outside, but they are "doing science" and loving it!



Svalbard cirque.



With the Stratospheric Observatory for Infrared Astronomy (SOFIA).

As a life-long learner who wants nothing but the best for her students, I knew I needed more experiences, but this time it was back to school for me, and not in the field. I decided having a Masters in Arts in Teaching was fine to get me into the classroom, but it was not enough to teach me how to do research. I enrolled in the Rutgers University Geography Department with two goals: 1) to learn about the connections between humans and their

Aeronautics and Space Administration
Stratospheric Observatory for Infrared Astronomy;
PolarTREC = Polar Teachers and Researchers Exploring and Collaborating.

world, and 2) to take on a research project from start to finish. My physical geography focus was predominantly in climatology, and my research project explored the diurnal changes in our regional heat island. I learned how to craft a good research question and design methods to answer my questions, just like all those with whom I worked in my field experiences. After completing this program, I knew there was one more degree I needed to pursue. This time the focus was on how students learn science, and I subsequently enrolled in a science education PhD program. I recently defended my dissertation which focused on how students develop complex systems thinking skills, an important skill needed to fully understand how our natural world works.

More than having experienced wonderful professional development experiences and acquired degrees, it is the way my thinking has been shaped by all of these experiences for which I am grateful. My students are poked and prodded to get them to think, to make connections, and to ask good questions. They know that when they write a research question, every word has meaning, and that their question must be testable. They know to be creative in designing their methods, and how to access data and datatools to help them to answer their questions. I am thankful to all of the mentors who assisted in creating the educator I am today.



Fieldwork with students.

As a way to give back to all who have mentored and inspired me, I've been involved in offering professional development to educators in local, state, national, and international venues for quite some time. Like in my classroom, I use my professional development offerings as a chance to inspire other educators and encourage them to branch out to find new ways of engaging their students in order to prepare them to be effective citizens who make informed decisions, and to explore their natural world.

My Earth science educator story is about the development of my passion for our home planet and science education. It is our experiences that connect us to each other and to our natural world. For all of my experiences, I am grateful.

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