

Sandee Coats-Haan

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Describe your pathway from being a chemical engineer to an award-winning physics teacher. How did the process impact your teaching career?

I've wanted to be a teacher since I was in second grade. But, there is little in our society encouraging students to become teachers. When I got to high school and loved chemistry and math, everyone encouraged me to be an engineer. The best school in Georgia was an engineering school (Go Jackets!), so I became an engineer.

I never lost the dream of being a teacher. I went on a business trip and read Tracy Kidder's *Among School Children*. I loved it. I kept looking for similar books. I even started reading educational methods books while still working as an engineer. Finally, one night while staring at the limited education book section in a local book store, my husband found me and said, "Why don't you become a teacher instead of just reading about them?" Without his encouragement, I'm not sure I would have made the leap to my life's purpose and passion.

Why did you decide to become Nationally Board certified as an Adolescent/Young Adult Science Teacher?

Teachers have lost respect in society. Becoming board certified is one way of demonstrating that there are complex skills and knowledge required for this profession.

I debated becoming recertified when I reached the end of my first certification. My state no longer offered any assistance with the application fee, nor was there any stipend associated with certification. At the time, I was working as a facilitator of online mentors for



Students review for a final exam by working with partners in a football game simulation. Photos courtesy Sandee Coats-Ham.

new teachers. Someone in that group suggested that you should never lose any certification that you have obtained. Based on that comment alone, I recertified. As it turned out, that certification was a factor that enabled me to get hired at my dream school and they DID pay a stipend. So, it was good advice.

Also to be perfectly honest, I am very competitive. If someone sets a bar, I want to jump it and board certification does this in a rigorous fashion.

Describe your school and classes.

If my students are reading this, they are thinking, "Oh, they should not have asked her that!" because I tell them daily that they are lucky to matriculate at "the number one school in Ohio, possibly the world." Technically, we are currently ranked #1 in the state of Ohio by *US News and World Report*. My niece who attends Phillips Exeter Academy might suggest that I am stretching the truth with the second part of my

statement, but I love my school with its focus on academic excellence and the arts. For example, 17 students had perfect ACT scores last year and our theater program regularly wins CAPPIE awards, a Tony-like award for high school theater. But, what I truly love about my school is the ethnic diversity and the well-roundedness of my students. The same student who led her team to eighth place overall in a national engineering competition was also selected to perform a spoken word poem to introduce Dr. Mae Jemison, the NASA astronaut, when she visited our city. That's my school!

The down side to being in such a wonderful school is that we are extremely overcrowded. And, as part of an urban district, we fight for funds like any other urban school. We are, however, fortunate to have an alumni association that greatly supplements our programs.

I teach an unusual schedule. I only

have 3 classes, but I see each of those classes for two fifty-minute periods every other day, and a single period on alternating days. Currently, I teach AP Physics C as a first-year course and I teach AP Physics 1 and AP Physics 2, a two-year course designed by the College Board in a single year. For anyone familiar with these courses, you know this is a grueling pace.

What are some of the resources you use for ideas and inspiration?

I'll start with the obvious: NSTA's *The Science Teacher*, AAPT's *The Physics Teacher*, NSTA press books, NSTA conferences, and College Board workshops. I'm still in contact with my science methods professor and just her very presence requires me to ask myself if I could do better. Right now, all the writings of Ron Clark and Kim Bearden, co-founders of the Ron Clark Academy in Atlanta, feed my teaching soul. Every teacher, administrator, and person involved in education funding should take at least a day to visit their magical school to see what education looks like when you have the most passionate educators and resource availability is not an issue.

I look for inspiration wherever I can find it, such as Instagram, the movies, the ball park. One of the things I've most enjoyed implementing in the past two years is breakout games. I learned about that resource from my Jazzercise instructor who teaches eighth-grade social studies. Even Jazzercise itself is inspiration; I have used it to demonstrate concepts about torque and rotational inertia.

Talk about your teaching methods. In what ways do you encourage innovative thinking in your classes? How do you keep everyone engaged?

I want my students thinking, thinking, thinking. The 5E learning cycle is the basis for creating my lessons. So, I try to provide them with hands-on ex-



Arriving to physics class on the first day of school and being welcomed by a red carpet greeting and photo op.

periences. If there is an equation they need, I try to have them derive it for themselves through a POGIL (process-oriented guided inquiry learning). I try to relate it to their lives. Resistors heat things up? What do you think is in that flat iron?

I need to be excited about what I'm doing. For the first day of school, I used a red carpet, lighting, and music that my students encountered when they entered my room. There is even an AP Physics Premier backdrop for photo-ops just like a real movie premier. If I'm not excited about what I'm doing, how can I expect my kids to be?

You have to be willing to take risks. I wrote a digital breakout game for my students to review the ideal gas law before starting a thermodynamics unit. It was a hit and way better than watching a PowerPoint on something you already know. But, then I did the same thing to teach another class about cyclotrons and synchrotrons. It was a disaster. They did not retain any knowledge, despite the video clips and diagrams,

because they were so focused on winning. I won't do that again!

What's the one project that you've always wanted to do but have never been able to, due to lack of time, money, etc?

I wish there was a time I could shut the "this could be a physics lesson" part of my brain down. This past summer, I was on a trip to an engineering competition with 16 students and a colleague. One night, we all stayed up late while the kids held a huge Smash Brothers tournament. My colleague immediately jumped in and started playing. I eventually did, too, and got DESTROYED, but first, I was watching the game and researching all the ways that I could use it on the first day of school as an example of physics in "real" life. So, there are a ton of ideas that are always circulating.

The idea that I am adamant that I will find a way to implement by next year is a cardboard regatta. I currently teach AP Physics 1 and AP Physics 2 in a single year to first-year students. I am working with the administration to eliminate that practice. I hope by next year to teach AP Physics 2 as a single-year course. The first unit will be fluid mechanics. The first project will be having students build a cardboard boat that they race across our school pool. PE classes are outdoors first quarter, so I am lucky to have access to the pool. If I am able to change the schedule, I will have enough time to do the project. All I need to do is find the money to purchase the cardboard and other construction supplies.

What do you feel is the most important big-picture takeaway for your students? If nothing else, what one thing do you want them to learn?

Obviously, I want every student to learn physics and ace their AP exams. But more importantly, I want them to love physics, science, and have an understanding of how our world works.

I want them to learn that I love them. No matter how they feel about physics at the end of the year, I want them to know that I was always on their side, rooting for the best possible outcome for them.

But, the most important lesson I want to give my students is that they can overcome any challenge. Physics can be a difficult subject. For many of my students, it is the first time they have ever had a class that was difficult for them. For some, it is the first time they ever fail a test. And those are the students I can really have an impact on. Together, we can figure out strategies that help them learn something that does not come naturally to them. Once they learn those skills, they can learn anything they set their mind to learn. What greater gift is there than that?

Describe a time a student impacted your life.

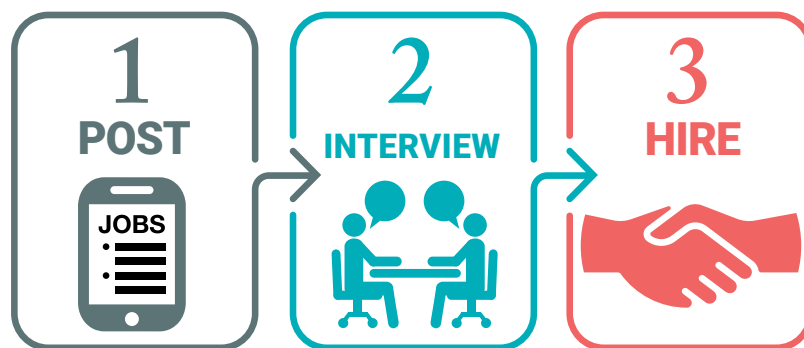
My students are my life. I am lucky to have lasting relationships with students who graduated more than 20 years ago. All of them have helped me in different ways—from the naval surgeon who I taught the year my son was born who mentally prepared me to be a military mom eighteen years later; the mechanical engineer who first demonstrated 3D printers to my students seven years ago; or the chemistry teacher who recommended me for my job at my current dream school.

But one student stands out. My first year at my current school was challenging. I was not like the previous physics teacher. One young man stood out as super grumpy. I remember overhearing him say about the valedictorian, “that

should be me.” I thought, “Wow, he’s entitled.” He slept a lot, no matter what my efforts were to engage him. It would have been easy to write him off as lazy, despite his excellent grades. One day, he came back after class looking for his wallet. It was just before lunch and when he didn’t find it, I immediately offered to loan him a few dollars so he could eat. Did I mention he was a huge football player with a hearty appetite? He didn’t miss a beat and responded, “Oh, no thanks. I get my lunch for free.” I later learned that his part time job that came after football practice was his family’s sole income. No wonder he was tired. No wonder he pondered what his class rank could have been without those extra responsibilities. Lesson learned: *Never ever assume you can look at a child and know where he or she comes from.*

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