



BRADFORD HILL

Physics teacher leverages lessons learned from KSTF Fellowship to change curriculum and practice in his Oregon district—and beyond.

With an undergraduate and master's degree in physics, it's only fitting that Bradford Hill spent some time working as a patent examiner. Unlike Albert Einstein, he quickly realized that his calling was to teach high school. "I wanted to influence people's perception of science and the role of science in their lives," says Hill, now a physics teacher at Southridge High School, a large comprehensive high school in Beaverton, Oregon.

KSTF's Teaching Fellowship supported Hill's subsequent career change, providing a network of like-minded peers and resources through a two-year science and math education program at the University of California at Berkeley and then at his first teaching position at a small charter school in Oregon, where he found himself the only science teacher. Without other science teachers in his building, Hill relied heavily on KSTF's network to help continue honing his practice. "There were times I thought about leaving the profession," he says. "A big component of me staying was the support and camaraderie I had at KSTF."

KSTF also gave Hill new perspectives on teaching as a profession, providing him with a "safe environment" to take on leadership roles. After moving to Southridge High School, that soon translated to establishing a "three-minute observation club," an informal way for teachers to observe each other and have conversations about instruction. "This proved to be a great way for teachers in my school to connect and critically discuss how to improve our teaching practice," he says. That role led to work within the school to improve outcomes for English Language Learners, and then beyond it, as Hill participated in panels to revise science standards and curriculum at the state level and led professional development for the district on the patterns approach to teaching physics—a

Bradford Hill

Physics Teacher, Southridge High School, Beaverton, Oregon

- Leads district professional development for science teachers
- Revised district physics curriculum after shift to single-sequence model
- Received grant to fund three-minute observation club at own school
- Conducted research on astronomical digital cameras at Portland State University through Murdock Partners in Science Program; awarded \$9,000 grant to engage his own students in similar research
- Teaches three courses for science teachers at Portland State University
- Serves on the Oregon Department of Education Science Panel for Standards and Assessments and the Oregon University Systems Engineering Design Teacher Advisory Panel
- Developed patterns approach to physics instruction published in *The Science Teacher*

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more visual approach to science pedagogy aligned with the Next Generation Science Standards. Hill's work on the patterns approach has since been published in a professional journal and presented at several conferences.

After the district realized it had 188 different science pathways, Hill was instrumental in developing new curricula for a single sequence of physics, then chemistry, and then biology, along with a weeklong professional development course to prepare teachers who would be teaching freshman physics for the first time. "We had teachers walk out saying it was the best professional development they had ever had," says Dr. Susan Holveck, the district's secondary science coordinator. "You could see the light bulbs going off in their heads."

Today, Hill splits his time between the classroom and being a teacher leader who provides professional development for the district's science teachers. Hill leads monthly meetings with established learning teams at each school. "The most important thing to change student outcomes is to have a professional community that does the work it takes to change teaching practice," he says, crediting the Knowles Fellowship as a model.

"Even in an excellent [preparation] program, the Fellowship really challenged my thinking and got me to put the work in to change my teaching into to a more research-based practice," Hill says. "I can't say enough about what a good start I got off to."

Holveck agrees: "Through his experiences with Knowles, he has a broader perspective on the purpose of science education... to focus on the scientific practices and the content as a vehicle for the practices," she says. "He takes it seriously, which I haven't always found with teacher leaders."

To fully understand the impact of the Knowles support on his career, Hill points to his classroom—and those of his peers across the district. "The level of rigor has definitely increased," he says. "Students have gone to more thoughtful, rigorous analysis multiple times a week and are always wrestling with informational texts. I've given my own students such a better learning experience—so much more inquiry, so much more being engaged with difficult material with the right amount of support."

TEACHER PROFILE

- Presented at 2014 and 2013 National Conferences of the National Science Teachers Association (NSTA), the 2013 Area Conference of the NSTA and the 2013 National Meeting of the American Association of Physics Teachers (AAPT)
- Selected to present at AAPT 2014 National Meeting
- Co-facilitated workshop for KSTF Fellows on patterns approach to physics
- Named Oregon Science Teacher Association's 2013 Outstanding Classroom Teacher in High School Science
- President-Elect, Oregon Science Teachers Association
- Received 2014 Paul W. Zitzewitz Award for Excellence in Pre-College Physics Teaching from the AAPT
- Named Oregon finalist for Presidential Award for Excellence in Mathematics & Science Teaching

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