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Professional Partnerships Enrich Teachers And Students

by Doug Kilmister

Traditionally teaching has been considered, in one important sense, a lonely profession. Teachers certainly spend plenty of time with students, but once class begins, they have limited contact with adults, especially professionals in other fields. While some support from administrators and colleagues is built into teachers' work lives, they are pretty much on their own planning lessons, managing the classroom, and considering the next moves to make instruction effective for their students.

National and State educational leaders are working to make teaching and learning, especially at the secondary level, more connected to work in the real world. One strategy is to build relationships between teachers and professionals in the field. An initiative at Pittsfield Middle High is making teaching and student learning more public and connected to work in the applied sciences. Students in Kiza Armour's physics and physical science classes are working with Richard Onyancha, a Ph.D. student in UNH's mechanical engineering program, to approach their class work from the perspective of a scientist/engineer. Onyancha is a second-year graduate student and fellow with UNH's Project PROBE, which stands for



UNH PROBE fellow, Richard Onyancha, and Pittsfield Middle High School Physics Teacher, Kiza Armour, watch as physics students, Bob Feeny, Jesse Fisher, and Jaime Roa, work on an experiment.

Partnerships for Research Opportunities to Benefit Education. "Teachers are hungry for professional conversations," says Armour. "Richard brings a valued perspective to everything from the way I prioritize objectives, to the kinds of thinking students exhibit."

When working with physical science and physics classes, Armour and Onyancha do not stand in front of the class and lecture. More typically, they plan instruction that requires students to pose questions, design experiments, conduct investigations, and analyze results. And then they let the students take over. For much of the class period they are on the sidelines, coaching students to do the hard work and thinking. "It's fascinat-

ing to sit with students and pick their minds as they work on an investigation," says Onyancha.

"We have been approaching problems differently," says senior physics student Shelby Paradise. "They give us a general question, and say, 'Now do something.'" For example, students were asked to de-

velop their understandings of the principle of refraction, the change in direction and velocity of an energy wave passing obliquely from one medium into another.

The general question was, "What can we learn about refraction using a digital camera, a ripple tank, some water, and a sheet of clear acrylic?"

Armour and Onyancha stood back and watched while the students went to work. Physics students designed an experiment in which they used the camera to record measurable waves in the ripple tank. They collected data and then applied the mathematical formulas they had learned previously to understand the nature of refraction. "We had to figure things out on our own," explains senior Jaime Rao. "They let us make our own mistakes and come up with our own solutions."

For both Armour, and
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Onyancha, the process of watching students work and then talking about what they see has proved valuable. Onyancha, who plans to teach at the university level someday, gets to work with typical high school students and learn instructional strategies from a master teacher.

For Armour, Onyancha's experience as a working mechanical engineer gives her ideas on ways she can help students grapple with problems more like those in the working world of science and engineering.

Onyancha and Armour will work together for the remainder of the school year. He spends two days a week at PMHS. During the second and third years of the PROBE-PMHS partnership, teaching fellows will support PMHS chemistry and biology teachers, allow branches of the science curriculum