

## Nobel Prof Gives Schools High-Powered Science Help

*Physicist says Project-Based Learning Helps Build Interest and Aptitude Early*

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The scientist who co-discovered the first binary pulsar is tackling a new challenge these days: how to invigorate science education in the nation's K-12 classrooms.

[Dr. Russell Hulse](#), along with [Dr. Joe Taylor](#) from Princeton University, received the [1993 Nobel Prize in physics](#) for discovering two dense, collapsed stars closely orbiting each other. One of these stars is a pulsar, which can be detected by its emission of regular pulses of radio waves. The discovery of the first binary pulsar provided the first way to test Albert Einstein's prediction that moving objects emit gravitational waves.

Now in an effort to broadly increase science literacy as well as encourage future Einsteins, Hulse, a regental professor and associate vice president for strategic initiatives at UT Dallas, has formed the Science and Engineering Education Center (SEEC) at UT Dallas to ignite scientific interest in young minds through hands-on, project-based learning. In a partnership with the Metroplex Technology Business Council ([MTBC](#)), Hulse is taking this education approach to a group of sixth-graders in the Richardson Independent School District ([RISD](#)).

Using [Lego Mindstorm NXT](#) robotics kits, the students are learning about torque, force and other math and engineering concepts in order to craft robots that can perform specific tasks. Using a process called project-based learning, Hulse's approach focuses on tasks, such as designing robots that can climb ramps and push objects around with precision. The approach resembles the way real scientists and engineers think, with questions arising at each stage of discovery: How fast should the robot ascend the ramp? How much force is required? How can the robot's speed be controlled as it travels across the top of the ramp?

"Integrating tools like Lego Mindstorm NXT into curricula helps teachers create lessons that are more like the way scientists really do their work rather than having students simply memorize scientific facts and formulas with no connections to one another," Hulse said. "Project-based learning creates functional, integrated knowledge, as well as real personal engagement with the subject at hand."

The SEEC purchased Lego Mindstorm NXT kits for two schools. The MTBC contributed funds to buy kits for a third school.

"RISD truly appreciates the value of partnering with UT Dallas' SEEC and the MTBC, and in particular the involvement and enthusiasm of Dr. Hulse," added RISD Superintendent Dr. David Simmons. "This is an example of what can happen when a community works together to invest in our future."

More than 300 students are participating from [Arapaho Classical Magnet School](#), [Hamilton Park Pacesetter Magnet](#) and [The Math / Science / Technology Magnet](#). The students have completed the bulk of their academic



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“Far beyond simply memorizing facts from a book, this project affords our students another chance to learn about science in a hands-on way and lets them easily see how what they’re doing can be applied in the real world,” said Rita Latimer, RISD’s executive director of elementary curriculum. “The students are engaged, working together, having fun and excited about science.”

In addition to the competitions, teams within schools will square off against one another in a rapid-fire academic quiz contest based on what they’ve learned from the robotics projects. The events will conclude with students presenting their robots for judging by a panel of education and technology experts.

“Kids are capable of learning science well before we often think they’re ready,” said Dr. Kenneth Berry, assistant director of SEEC. “The students are given a task, such as having their robot draw a house. They have to learn about angles to design a robot to do that. They design robots that move, which means they need to figure out how to use gears to control speed and torque.”

Hulse’s center, working with Betty Justus from Lego Education, trained the sixth-grade teachers in the project-based approach. Berry, who is a robotics education expert, designed the robotics curriculum and is spending time working in the different classrooms. Two education researchers from the center, Dr. Cynthia Ledbetter and Dr. Koshi Dhingra, are following the students’ progress and will assess the effectiveness of the curricula. UT Dallas also has four of its [UTeach](#) students participating in the classrooms, helping the teachers and the students.

“An effort like this is a real credit to this part of Texas,” Hulse said. “It involves a school system, a research university, a technology company consortium and an educational technology company all working together to bring science and engineering to life in the classroom.”

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Students have to figure out how to use gears to control speed and torque on their robots.



Winners included (from left) Dawit Menghistab, Jonathan Garnica, Carlos Martinez Carpio and Ovais Khan.



A Lego Mindstorm NXT robot assembled from a kit. (Image courtesy of Lego Education)