

**Roncalli High School teacher Ben Grimes** was a recipient of the Institute for Quality Education's Catalyst for Quality teacher grant in August. Grants were awarded based on applicants' innovative ideas and incorporation of data-driven instruction as a catalyst for quality teaching. Ben is pictured below with students from his Physics class.



When I became a Physics Educator in 2006, my goal was to provide an environment in which students are able to learn science by doing science. I wanted to move away from the traditional classroom approach of lecture, lab and test at the end, to more of the modeling approach to the curriculum I was opened up to at a workshop in 2009. This approach to learning meant students would need to be able to collect data and present or analyze that data in the form of graphs. Collecting the data is often limited in the science classroom to the equipment available. The grant money I was awarded by the Institute for Quality Education will be used to purchase Vernier equipment that will allow students to collect data for some of the most complex Physics models of the courses I teach. In Introductory Physics and AP Physics 1, students will build the models which describe the behavior of circular motion from a sling to the orbits of planets using the Rotary Motion Sensors and Centripetal Force Apparatus following the same process used by the scientists who first explained the models centuries ago only today with considerably more advanced tools. Students in my AP Physics 2 course will use the Mirror Optics Kit to develop their understanding of how a curved mirror can form a unique reflection, similar to looking into a funhouse mirror, by measuring and graphing where an image is formed as an object is moved towards or away.

I am extremely excited to give my students the opportunity to use tools for data collection and analysis which will build their understanding in a high school classroom. My expectation is not that they become scientists through this course, but that they gain a new appreciation for science, its process and its role in today's society. I want my students to become capable of thinking scientifically about the world around them and have a better appreciation for how it behaves because they have learned how to explain its behavior with challenging hands-on learning experiences.

## **Using data-driven instruction as a catalyst for quality teaching**

Knowing what students need to learn begins with knowing what your students have and haven't already learned. At the beginning of every unit, I give my students a Core Concepts and Skills pre-test and tell them the reason for asking all these questions about a unit we have never discussed is "In order to know what you need to know, you need to know what you don't know." The results of those pre-tests show how each student has retained previous content knowledge and skill sets which are still applicable to the upcoming unit. It also allows me as teacher to tailor the curriculum in the next unit based on the students' current abilities and understanding. If 90% of my students demonstrate they understand the concept, I know that I don't need to spend much time on it. On the other hand, it also allows me to design specific activities in the classroom which relate to the concepts or skill sets in which the students are weakest. However, without the pre-test information, I have no idea if the students learned (not were taught) this material before they take Physics.

Upon completing the unit, students take a post-test of similar concepts and skill sets as the pre-test. Students are able to see the fruits of their labor and feel rewarded by their growth. It gives concrete evidence of growth in the classroom. I also use my post-test data to assess where students may still be struggling with a particular concept or skill. This focuses my review session only on the part of the unit where students need the help rather than a blanket review of everything.