SAMPLE GRANT PROPOSAL for $5000 in new Vernier data collection interfaces and sensors, Volunteered by greater Phoenix modeler Lynn Jorgensen and adapted in Jan. 2020 by Jane Jackson. Lynn was awarded her grant by Salt River Project, a local utility. Use it as a template; do not copy it.

PROJECT DESCRIPTION
[Your high school or college] requests funding to buy new Vernier data collection interfaces, the LabQuest 2, and new sensors for use in our advanced (AP 1, AP 2) and regular and honors first year physics courses. We currently have a very old set of original interfaces that are no longer reliable in labs, as they often corrupt the data taken. With new interfaces we can perform labs at the national AP standard, and allow our students access to labs that would not otherwise be possible. Our students will also learn how to design technology-based labs and write lab reports for others to use.

Our physics courses are centered on building and deploying scientific models to describe the world around us. We do this primarily by lab investigations. Thus the physics classroom becomes more like the scientific workplace. These more technical labs will better prepare our students for college and careers in science, engineering, and technology. They will know what scientists and technologists do before going to college, and thus have a better understanding of what career choices they have.

STATEMENT OF NEED
Technology is constantly changing, devices wear out, and new developments in science open up new ways to explore the world around us. As a public school district, we have very limited funds to purchase new equipment when old ones wear out. We must rely on grants to help us to stay relevant and up to date in technology. Technology exists that allows our students to perform labs while not being tied to a computer. By adding new lab interfaces to our classrooms, we can better prepare our students for the rigors of the national AP exams, and first year college science and engineering courses. This will also teach them needed communication skills through working with their peers in lab settings, instead of relying on computer demos, where there is little to no troubleshooting.

We implement most of our labs with bare-bones technology since we cannot rely on our current interfaces. We use meter sticks and stopwatches instead of photogates. We use simple spring scales and balances instead of force sensors. For our centripetal force lab, we must use a meter stick, fishing line, and a spring scale, all spun overhead, to recreate centripetal forces. This can be dangerous. We would be safer, and get cleaner results, if we could use a rotary motion sensor from Vernier Software and Technology. Our primitive methods teach basic principles, but they are more time-consuming than using technology, and they do nothing to prepare our students for careers that use technology.

By purchasing the newer LabQuest 2 interfaces, groups of students can perform more technical labs in a shorter time. Using technology will benefit students due to immediate, live feedback on their data collection. The more efficient use of lab time will increase time for class discussions of data and subsequent scientific models developed in labs. Technology makes it feasible to have inquiry-based activities that otherwise are not possible. This cooperative learning empowers
students to take an active role in their learning process. Also, by learning how to concisely express ideas to other students, our students will gain skills they need to succeed in college. Being able to express abstract scientific concepts in verbal and written form will give them firsthand knowledge of how to communicate anything, from college applications to research papers that the scientific community can follow.

PROJECT ACTIVITIES AND TIMELINE

Our physics courses are centered on building and deploying scientific models to describe the world around us. We do this primarily by lab investigations. We try to perform labs weekly or biweekly, depending upon the topic of focus. By updating our old original LabQuest interfaces, we will be able to do technology-based labs for most of the school year. In mechanics, the first topic, technology-based labs will include basic labs for constant velocity of a cart and free fall of an object, to the more complex labs on balanced forces, momentum, and collisions, including the highly technical labs for centripetal force and rotational mechanics. In the second semester, technology-based labs will include electric forces and magnetic field mapping.

By updating technology, collaborative groups of students can design their own labs based on the current topic. For instance, the optics unit is a one month unit for AP Physics 2, and a two week long unit in our regular physics courses; both are performed annually. This first year, with a small AP 2 class, we expect to have at least 6 clear labs that can be performed by another class. Once our regular classes perform, and evaluate the labs, we expect to have 2 or 3 finely tuned, revised labs to use in subsequent years. By our second year, we expect to see 5 or 6 finished labs make it through the writing, evaluation, and revision process. And we expect to start submitting student labs to national physics groups for review, evaluation, and scholarship funding. The AP exams are given each May, with teachers having access to topic results by mid-summer. By our third year of implementation, we expect to see a discernible improvement in the metadata for both the optics topic as well as in our students' lab design questions, regardless of the topic.

STUDENT IMPACT

[Your high school] has 120-150 students each year enrolled in AP 1, AP 2, or regular physics. The Vernier technology will be used for many years, thus allowing for broad impact. Many of our larger labs and activities are done in open areas of our school; and we invite other science classes to come and participate, and see how science is a major aspect of their lives. As noted above, we encourage our students to design their own labs, with the ultimate goal of submission for scholarship reviews. In doing so, we expect these labs to have an even larger impact. Our eventual goal is to have students submit two to three labs each year; some submitted labs are used by other schools across the nation.

EVALUATION PROCESS

One of our goals is to teach our AP students how to design their own labs; this skill is not only a major portion of the AP exam, but also a skill for their future careers. Their peers will have the opportunity to evaluate the student-designed labs, and thus will develop and strengthen their critical thinking skills and communication skills. Students in the regular physics courses will perform the newly-developed labs using the new Vernier technology, and then evaluate the objectives and procedures. Student labs that are given high scores through peer evaluations will
be used again in subsequent years. This will allow both sets of students an active role in the lab development process. Also, we expect that our AP scores will improve, as well as improvements on AP unit tests. We expect to see an increase in enrollment in our AP 2 courses as other students become more aware and more involved in the physics program. By giving our students hands-on opportunities to explore science in a more in-depth way using Vernier technology, we will see more students applying for science and engineering fields in college.