PowerUP Jax Fall 2016 Grant Winner

20. Gayle Fiser
Darnell-Cookman Middle/High School
Subject/Grade: Twelfth Grade AP Biology
Project Title: Your family has NO taste!

Summary of the Project:
The genetics unit in AP Biology is vast. There are several areas within this unit in which students struggle, such as protein synthesis, gene expression, and biotechnology. These are difficult concepts, which need reinforcement with engaging methods and relevance to their everyday lives. This project is about the PTC gene called TAS2R38. This gene is responsible for the aversion to the bitter tasting compound called Phenylthiocarbamide that some people express. Our students and their families are familiar with similar compounds at home, such as in coffee, broccoli, grapefruit, and Brussel Sprouts. If you just said "Yuck" as you read this list, you, too, might be a 'SuperTaster'. (These foods might even give you a little case of diarrhea.) However, "Yum", might indicate you are a 'Non-taster'. This aversion is genetic and runs in families. Maybe we could somehow, with some scientific evidence convince Grandma why we really don't like or want Brussel Sprouts at family gatherings.

Students will propose a hypothesis based on their own personal results and a family member pedigree they will construct with the use of a simple PTC paper test and food testing test. They will do this while they have a large family group together during the holidays. To help make their predictions, students will also do a taste bud count on their own tongues in class. Students will read topic related journal articles regarding taste and produce a story board of what they think their family genes indicate. Now for the real test, students will extract their own DNA, run PCR (Polymerase Chain Reaction) and Gel Electrophoresis, and then visualize the gene (their gene) that proves them a "Super-taster" or a "Non-taster". All of these extra activities will cost $500+ and will only be an option through a funding opportunity.

How many students will be directly involved? Explain any further impact on other students, teachers, the school as a whole, and/or the community.
This project will directly involve 50 AP Biology students at Darnell-Cookman Middle/High School, a Title I school. This project will affect students who are of low socioeconomic status and minority with targeted preparation in the AP Biology course. The students that would benefit from this request are representative of our school composition with 80% minority, 43% low socioeconomic status and 65% female. The Bluebox DNA Transilluminator Visualization System would be used for several years in future AP Biology classes. Through additional funding, such as the Lightening Round, additional PTC paper for families and sample foods for class can be purchased. This project will help further educate families and community members concerning their mysterious genes.

How will the project specifically increase student learning? Be sure to explain the project's connections to existing learning standards. Be clear about what new skills, knowledge, and/or dispositions the students will acquire.
The goal of improving student achievement on the AP exam this year will be met by increasing student knowledge and skill, and developing a more prepared, qualified, and focused student. Learning Objectives will be met through the following means: 1) Increasing student's exposure to advanced procedures; 2) Increasing student's hands on involvement, and 3) Increasing knowledge through new experiences with advanced techniques.
The projected short term outcomes of this project include improved AP exam scores, increased success for minority and low SES groups on AP exams, increased science achievement and interest, with possible long term increases in Biology and STEM related careers. Important Learning Objectives relative and supported by this project are taken directly from the College Board Curriculum: LO 3.1 The student is able to construct scientific explanations that use the structures and mechanisms of DNA and RNA to support the claim that DNA and, in some cases, that RNA are the primary sources of heritable information. LO 3.6 The student can predict how a change in a specific DNA or RNA sequence can result in changes in gene expression. LO 3.18 The student is able to describe the connection between the regulation of gene expression and observed differences between different kinds of organisms. LO 3.24 The student is able to predict how a change in genotype, when expressed as a phenotype, provides a variation that can be subject to natural selection. LO 3.25 The student can create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced. LO 3.26 The student is able to explain the connection between genetic variations in organisms and phenotypic variations in populations. The strategies requested in this application are directly related to increasing performance in these Learning Objectives.

What is the plan for evaluating the success of your project? What artifacts (photographs, samples of student work, testimonials, etc..) would you use to demonstrate the effectiveness of the project?

Upon completion of the project, a final report providing evidence of student learning and increased minority success on the AP Biology Exam can be prepared. Qualitative and quantitative evaluation stages will be used to measure the impact and effectiveness of the project before and after implementation. Plans for collecting data that measure student learning throughout the project include obtaining evidence for each objective. Student learning will be measured through observations of student behavior and skills during labs, along with student's scores collected with pre and post-tests, lab reports, CER (Claim Evidence Reasoning) posters, and the AP Exam. Along with the measurements mentioned above, additional qualitative evaluation will be conducted on the following objective: Increases in student learning will be measured with interviews of small focus groups after the first time lab experiences. Photographs of student engagement with the new products will be included.