

POWERUP JAX FALL 2015 GRANT WINNER

5. **Gayle Fiser**
Darnell-Cookman Middle/High School

Subject: AP Biology
Grade: 9-12



Project title: Increasing Understanding of Photosynthesis and Cellular Respiration in AP Biology

Summary: Photosynthesis and Cellular Respiration are two of the most difficult processes in AP Biology. The essential knowledge is tedious and needs reinforcement with engaging methods that help students remember. This past year, according to my College Board Instructional Planning Report, this was our weak link. When interviewed, past students said, "We don't work at home. You do an amazing job explaining things in class, but this was very detailed and needed us to work on our own". One idea is to enhance an existing hands-on activity. Students go through these processes using a transparent cell membrane and move play-dough balls as the molecules crossing the membrane. The Pop-Artsy Beads will enable students to design and make distinguishable, cool models to represent these molecules. If they design the molecules and they all are different and interesting, we could make progress with retention. This past summer, I had the opportunity to work with a new product coming out this fall. The Photosynthesis and Cellular Respiration Algae Bead Kits are a two processes in one lab activity. You use algae beads in an indicator solution and then apply variables, such as light and dark. Measurable color changes in the tubes occur that indicate levels of photosynthesis or cellular respiration. The beads then can be kept in this micro-tube and tied as an ornament for students to keep that continues to work for at least a month. Both of these extra activities will cost \$495 and will only be an option through a funding opportunity.

How many students will be directly involved?

This project will directly involve 55 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, 40% low socioeconomic status and 65% female. The Pop-Artsy beads will be utilized for several years in future AP Biology classes. Through additional funding, such as the Lightning Round, more bead kits can be purchased and distributed to science classes for the same concepts, adjusted accordingly to grade level and age of the student. Our school is a 6-12 model, so many levels of vertical alignment can occur. At the end of the year, I try to do an outreach lab at my granddaughter's elementary school. This past year, I did a modified college level photosynthesis lab with her 3rd grade class. The Pop-Artsy Beads can also be used during opportunities such as this.

How will the project specifically increase student learning?

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 live organisms and 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. The two most important Learning Objectives relative and supported by this project are taken directly from the College Board Curriculum: LO 2.4 The student is able to use representations to pose scientific questions about what mechanisms and structural features allow organisms to capture and use free energy. LO 2.5 The student is able to construct explanations of the mechanisms and structural features of cells that allow organisms to capture, store, or use free energy. LO 2.41 The student is able to evaluate data to show the relationship between photosynthesis and

respiration in the flow of free energy through a system. The strategies requested in this application are directly related to increasing performance in these three Learning Objectives.

What is your 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, through increasing student's exposure to advanced procedures and through increasing student's hands-on involvement, 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, mini-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 with new organisms. Photographs of student engagement with the new products will be included.