Storm Grove Middle School (SGMS) Letter of Idea

Name of Project: **Dive Deep and Soar High – A STEAM Enrichment Project**

About the project: SGMS has been working hard to not only improve student achievement on the state mandated science tests but, to become a STEAM designated school. We want to have every student experience the joy and wonder of science and learn how science, technology, engineering, the arts and math can be used to solve local and global problems. This project will use a problem-based approach to address real world challenges that will enable students to make connections between the content they are studying and the application of that content in authentic and relevant ways.

Dive Deep - Students will build and test underwater remotely operated vehicles (ROV) in a tank that simulates the Neutral Buoyancy Laboratory (NBL) operated by NASA at their astronaut training facility in Houston. Students will then be challenged to use the ROV's to repair or replace components of the model International Space Station (ISS) in the tank. The challenges will mirror the real spacewalks or extravehicular activity (EVA) that astronauts have performed in the training pool and in space.

Soar High - Another component of this project is to involve students in closely looking at the space objects we study in class. Students will control robotic telescopes to take images of objects in Space. They will use imaging software, which is similar to the software NASA used on the Cassini Project, to process the images. They will apply their knowledge of light and the electromagnetic spectrum to create these Astro-photographs.

Both parts of the project will allow students to move from receptors of information to constructive creators and innovators. Students will gain knowledge of STEAM related jobs and will enhance technology literacy skills as they develop important critical thinking, problem solving, and design skills. Behavioral competencies such as perseverance, adaptability, and organization will also be reinforced.

Amount requested: $5087.38

Total Project Cost: $ 5087.38 from grant. Space for the test tank will be provided by SGMS. Work will be conducted in the eighth grade Science Lab and outside, on the school grounds. The sea perches we will use for the Neutral Buoyancy Lab simulations, were donated by another donor. We also hope to use a 3D printer to print some of the components for our builds. We will use the MicroObservatory and imaging software from NASA and the Harvard/Smithsonian Center for Astrophysics for the astrophotography activity. Donations will be sought for additional consumable supplies on an on-going basis.

Target Population: The targeted audience for the Dive Deep activity will be sixth, seventh and eighth-grade students in our science club. The targeted audience for our Soar High activity will be the eighth grades students. Eventually, the lessons and activities will be open to the entire student population.

Number of children to be served and grade level: Approximately 25 sixth, seventh, and eighth grade students in the science club will participate in the Sea Perch activity and 400 eighth graders will complete the astrophotography activity. Eventually, all students will participate.

Succinct Summary - Issue: SGMS students' scores are low on the Nature of Science (NOS) questions on standardized tests. The NOS standards deal with the tools and processes of science, the human element of science, and the domain of science and its limitations. NOS standards, particularly the scientific way of thinking, problem solving, and collaboration are important 21st century skills.

The Change: The project will provide students with an opportunity to explore a wide range of science concepts, learn to use tools and materials, collaborate with each other, and develop creative solutions to real world problems. Students will develop their independent thinking skills as they work to solve problems. The creation of tools to "fix" the "problem" on the model ISS and the Astrophotographs they process will help students to build real world connections to what they are learning in class. By allowing students to experiment, take risks, tweak their own ideas, and create artifacts, we will be giving them permission to trust their own thinking. They will iterate from their own "failures" to achieve success. They will naturally develop a growth mindset. They will have the hands-on problem-solving experience necessary for success in the future and will increase their understanding of the NOS.

The Deep Dive test tank will also be used to train students to use Sea Perch ROV's to monitor the Indian River Lagoon and the retention ponds near the school. They will be able to view the bottom of these waterways through the GoPro and add water collection equipment to monitor water quality. In addition, we hope to eventually compete in National Sea Perch Competitions.

The Soar High equipment will also be used to help underserved students print out materials for their Science and Engineering Fair projects.

In a recent presentation by the National Math and Science Initiative, it was stated that, "STEM Education is the greatest lever to accessing opportunity and is unmatched in unlocking student potential." This project will provide our students with the opportunity to unlock their potential.

The Action: The materials requested for Dive Deep will enable us to build a simulated Neutral Buoyancy Laboratory. A partial model of the International Space Station will be built in the tank. The remaining materials will be used to develop and solve real world "problems" involving the International Space Station. Students will use sea perches to simulate the spacewalk's made by astronauts to repair the station. The eighth-grade science teachers will design open ended projects utilizing these materials, that align to our standards-based curriculum with particular emphasis on the Nature of Science and on Space technology. Students will have after school opportunities to complete their projects.

The materials for the Soar High project will be placed in the 8th grade science lab. Mrs. Martinelli, Ms. Petrosky, and Mrs. Sleeper will enroll their students in the YouthAstroNet program and will guide them in the development of their astrophotographs. They will design lessons that recognize and explain how the electromagnetic spectrum is used in astronomy. Students will have some class time and after school opportunities to complete their projects.

Oversight: Science Teachers, Joan Martinelli, Caitlin Petrosky. And Melissa Sleeper will initially provide oversight of the **Deep Dive and Soar High Project.** Additional oversight will be provided by Anne Bieber, principal. The long-term goal is to have teachers, across all disciplines, involved in the project.

Monitoring Progress and Results: Student scores on standardized tests will be monitored. All participants will be required to keep a project notebook documenting their thinking. As the students become more adept at building and maneuvering the sea perches, they will be given more complex problems to solve. Student astrophotograph's will be exhibited during the school's James Webb Space Telescope (JWST) Event. SGMS is an official NASA Community Event site for the JWST. Student work will also be on display during the STEAM Expo.

Volunteers: Community volunteers will be sought to help mentor students as they work on the sea perches**.** Local "experts" will be invited to share their skills and passions with our students. Volunteers will be needed to help with the sea perch builds on Tuesdays (the day there is a late bus) after school. Additional volunteers will be needed to help organize and print the astrophotographs. The day and time for these volunteers will be arranged on an as needed basis.

Budget:

Item	Cost	Item	Cost	Item	Cost
10' poly tank + shipping	**1899.00**	**Velcro Industrial (2)**	**35.86**	**Magenta 6515 Toner**	**89.00**
Sterlite 45-gallon latch totes pkg of 4	**87.60**	**PVC External End Caps**	**14.99**	**Yellow 6515 Toner**	**89.00**
Corrugated plastic sheets	**39.99**	**Elbow ½" Set 20**	**12.74**	**Cyan 6515 Toner**	**89.00**
Drill and bits	**54.99**	**PVC winged elbows 10**	**51.20**	**Black Original Toner 6510, 6515**	**131.99**
Ratchet-type pipe and PVC Cutter (2)	**31.16**	**PVC Tees 20 pk**	**19.99**	**HP Premium Photo Paper 50 sheets (8)**	**159.92**
Mini storage crate 12pk	**34.13**	**PVC Pipe (8)**	**79.80**	**Intex 10' Pool Cover**	**44.99**
Duct tape (3)	**29.07**	**Pool Noodle Pack**	**19.99**	**Marine Silicone(3)**	**57.15**
Hot glue gun (6)	**59.88**	**Hero9 Black Bundle GoPro**	**399.98**	**Xerox Work Centre 6515/DNI Color Printer**	**599.99**
SSWW Mega Craft sticks	**54.99**	**GoPro Protective Casing**	**24.99**	**MiniPCR Mars Colony at Risk Lab (7)**	**561.00**
Polypropylene Rope	**15.99**	**Seek Compact XR**	**299.00**		
				Total	**5087.38**