

**National Defense Industrial Association (NDIA)  
Gulf Coast Chapter  
Okaloosa County Math and Science  
2019-2020 ACCErator Grants Program**

**Applicant:** Michele Stockton,  
Davidson Middle School  
**Project Name:** It's Alive!  
**Aquaponics system**  
**Grade:** 7<sup>th</sup>  
**Number of students:** 134

Purchases		
Cost of build	-\$880.77	14 trips to Lowes. Itemized receipts available upon request.
Plants	-\$42.46	
Animals	-\$86.98	
Total Purchases	-\$1,010.21	
Amount awarded	\$1,003.00	
Difference	-\$7.21	Paid by teacher

Timeline	
11/8/2019	\$1003 deposited into school account from NDIA ACCErator Grant Program.
11/11-11/22	Initial purchases for educational standards begin and designs are discussed and finalized with local plumber.
11/23-12/1	Thanksgiving holiday. Aquaponics system is built, set up.
12/2-12/19	Minor adjustments are made. Leaks are addressed. The filter system is changed twice to a more reliable one. Teacher and students begin discussing the difference between hydroponics and aquaponics and the students develop a better design that the teacher created, but the money is not available for a total redesign.
12/20-1/6/2020	Winter Holidays. The system is left to run over the holiday. All the timers are set, and teacher comes in weekly to check for leaks. Tank is seeded with microorganism rich limestone so that the microorganisms can make their way into the tubes and be ready for nitrogen fixation when the plants are added.
1/7-1/19	Jobs are created. Students apply for jobs. Interviews are scheduled and run with 54 different students.
1/19	Seeded plants are purchased.
1/20-1/31	Student training for jobs. Students in charge of plants are involved in the planting and care of the autotrophs begin. Total takeover of the care and maintenance of plants is achieved 1/28. Teacher moves to complete hands-off approach.
1/27	Aquatic snails, shrimp and aquatic plants are added to the fish tank. Student with fish tank jobs receive OJT and begin the process of organism care and maintenance.
2/1	More snails and fish are added from the local pet store.
2/3-3/12	The great fish extinction of 2020 begins. As the fish from the store begin dying one species at a time, we track the nitrogen, pH, temperature, Dissolved Oxygen levels and discuss what could be causing it. By the time a student discovers all the fish need a warmer ecosystem most of the fish have died. Students start

	researching better options. They come up with a plan for what to replace the fish with when everyone returns from spring break. It looks like the goldfish – the fish they had originally requested- are going to be the best bet. The ghost shrimp outlast everything. The teacher is out a week for surgery. The ghost shrimp survive. While the teacher is out students throw trash in the pipes clogging the pipe flooding the system the tank must be turned off for 7 days with no rotation. The ghost shrimp survive. The aerator is pulled out and does not run for 7 days. The ghost shrimp survive. Even spring break turned into a pandemic with no check in or food. The ghost shrimp survive.
3/24	While at this point there was not any clear direction on if schools would be reopening it was clear that a tank needed to be removed and reassembled somewhere for the summer. The Aquaponics system was disassembled and the remaining TWELVE happy ghost shrimp, the tank, and the pipes were broken down and moved to my house for the summer so that the system could be set back up and adjustments could be made for the next year.

While the original intent of this tank was to support the ecosystem lesson that was taught online this year. It ended up being a lesson in design and research and the students actively engaged in the design process of identifying problems researching fixes and follow through. Students were allowed access to the financial part where we discussed cost value and availability. We also had an opportunity to discuss ethics associated with animal-based research and cost of animal life in a situation created by research or food production.

Overall, I think that the lessons were deeper and more meaningful. Next year I want to use a different system, not the pipes and the tank will include a heater which I've already purchased from my own funds to try and get the system to truly be as much of a closed system as possible. I will implement the job application system sooner in the year and hopefully students will be able to finish out the year in the classroom and they will be able to actually work on lessons connected to the environmental standards.

**A visual scrapbook of  
It's Alive!  
Aquaponics system**



The Aquaponics system up and running.

Baby snails that were originally transferred from a previously owned tank.



The first yield of plants from the system.