



## 2007 AAAS/Subaru Essay Writing Competition for K-12 Educators, Finalist Essay



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chemical reactions through the study of water. The eight-step Engineering Design Process served as a guide for the project.

The first step was to identify the problem. What exactly was causing these algae to grow in Fellsmere Pond? Students gathered information about algae growth and ways to prevent it from online searches, visits from the town historian, and an environmental engineering consultant from the City of Malden. From their research, students found that nutrients from the decomposition of animal waste were a major contributor to algae growth. Since Fellsmere Pond was home to a large population of Canada Geese, the students identified the geese population as the cause of the pollution. The students investigated ways to deter the geese from staying at Fellsmere Pond. They brainstormed possible solutions and decided to build a model of a swan. Since swans are very territorial, swans and geese do not coexist on ponds. To make it even more lifelike, the students decided their swan model would have to be able to move.

In conjunction with the technology teacher and an engineering student from Tufts University, the students designed and built lifelike swans that fit over remote control boats, to allow for maneuverability in the pond. When these were completed, the swans were tested every day over the course of one week to determine if the geese would move away from where the swans were. The results were amazing!

During the first three days, the geese did move away from the swans but returned once the swans were removed. On day four, the geese moved to the opposite side of the pond and did not voluntarily return until we placed swans on that

### Saving Fellsmere Pond

As educators of science, one of our jobs is to inspire creativity and problem solving within the context of our curriculum. I also believe that connecting classroom experiences to the world around them increases student interest and engagement in the learning process.

As a seventh-grade science teacher at the Beebe School in Malden, Massachusetts, one of the most memorable experiences that I provided my students was our community project to save Fellsmere Pond ([http://www.anei.org/download/61\\_fellsmerepond\\_andparkguide.pdf](http://www.anei.org/download/61_fellsmerepond_andparkguide.pdf)). The students were faced with a real-life environmental engineering problem. A local pond, within walking distance to the school, was suffering from severe algae bloom. The color of the pond was a murky, greenish-brown color accompanied by an extremely unpleasant odor. The future of the pond was in jeopardy. To connect the seventh-grade science and technology frameworks to the school-wide theme of survival, an interdisciplinary project was launched where the students were able to use inquiry and the Engineering Design Process to identify and design a possible solution to the algae blooms in Fellsmere Pond. The students gained an understanding of



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side. On the last day, we merely showed up at the pond and the geese took off to the opposite side of the pond. They perceived the swan prototypes as a threat after only five days of testing.

The students recorded observations of the geese behavior as well as the structural integrity of their swan prototypes. To complete the Engineering Design Process, they wrote letters to communicate their results to the City of Malden and recommended that a pair of swans be placed in the pond. They also made additional recommendations for what could be done with the existing algae at the pond. The City of Malden has taken the students' recommendations seriously. Two swans were placed in Fellsmere Pond last fall. The geese left the area and did not return during the fall.

This project included chemical testing of the pond water where students identified how to perform chemical testing and identify signs of a chemical reaction. They learned what is needed to maintain a healthy environment in an aquatic habitat. They learned how to complete research in support of the Engineering Design Process. They also were able to develop possible solutions, build prototypes, and test their solutions. The students were truly engaged in the whole process and have become stewards in communicating environmental concerns.

In reviewing the project, students were able to achieve a better understanding of a real-life environmental engineering problem in their own backyard. I believe that their attitudes toward the environment have been enlightened in a positive way. This non-traditional approach to teaching scientific concepts made it possible for students of all abilities to become engaged and truly understand the impact of the project. I was

completely amazed by the energy input I received from students who typically did not do well in school and/or had difficulty achieving in the traditional classroom setting. They became the leaders in the project and really understood the scientific concepts behind it. When they were questioned about the water quality, they could answer just about any question asked. They gained the skills required to perform chemical testing and were able to accurately analyze the results. This project is one that I know I will always remember and I hope the students will as well.