When we first thought about doing a H.S.E. project we were inspired by our mentor who is an engineering teacher, so we started developing a sculpture, “The Thinker”, to be made from recycled junk. Then we questioned ourselves, what would this do to benefit others or would it just be something to look at? That project didn’t get off the ground very well so we shoved it. Ms Nix suggested our project should combine architecture, science, and engineering. The answer to this was provided by Prof. Despommier in his book “Vertical Farming.” His concept was to place farms in urban areas where the majority of the people live. Prof. Despommier was promoting a new idea called “skyscraper farms”, using Aquaponics and Hydroponics. Our team decided to learn about these two growing methods, and how we could apply them in urban areas.
The Eli Project Team B. E. Mays

2010 Fall Semester
The Eli Project 2010-11

Team Members: Nouhayla Houssaini, Quantavious Griggs, Austin Williams, Anwar Zeb, James McKinnon, Justin Gispert, and Elmer Moreno.
The Georgia Tech undergraduate students involved, helped to elevate cognitive development by reinforcing biology, chemistry, physics and mathematics principles. Students were able to explore these concepts in a stimulating project-based after school learning environment. They studied the scientific method and empiricism involved in the investigation of aquaculture and hydroponics systems. Students learned charting and graphing on the computer (using Excel) to show the relationship between fish and plant growth and the pH in the water quality. Mathematic formulas and data analysis were also used to determine pump size, grow bed volume and fish/plant yield ratios.
Low-income communities have little to no access to fresh nutritious foods. This lack of accessibility to nutritious food has led to an increase in obesity, high blood pressure, and other health related conditions or diseases. How can we solve the economic, social, and environmental crisis associated with the lack of access to nutritious foods? Our solution to solving this problem is to grow healthy food at home. There are several methods that we tested to achieve this task. They are: Aquaponics which is the simultaneous cultivation of marine life and crops in a symbiotic relationship, Hydroponics which is the cultivation of crops in a medium using essential plants nutrient elements, dissolved in water, and Geoponics which is the traditional method of producing crops using soil.
The USDA defines a food desert as urban, rural low income areas that lack accessibility to affordable nutritious food.
Club Activities
Hydroponics and Aquaponics Systems

The Aquaponics System Performed Best. Our plan is to design portable tabletop units as well as backyard systems.
At the conclusion of our research, we will begin to create our systems. The purpose of these systems is to test the productivity of each method. We used storage containers and fish tanks as housing for the fish in our Aquaponics systems. In the preparation of our Aquaponics grow bed, we must allow nitrobacteria and nitrosomanas to grow and develop in the Hydroton, which is the grow media we used, before we place crops in the system. Those bacteria are essential in developing a productive Aquaponics system. Once the bacteria has developed, which takes two to four weeks, we place plants in the grow bed.
Classroom Aqua/Hydro/Geo Systems

Growing vegetables in the classroom.....
Classroom Aqua/Hydro/Geo Systems

Student responsibilities: included seed germination, feeding fish, replenishing water in tanks, checking pH and water quality.
In our Hydroponics system we used a bookshelf wrapped in plastic. The bookshelf was placed horizontally and filled with water enhanced with the Pure Blend solution. Then we placed floatable Styrofoam grow trays on the water and in each grow tray there were peat moss pods that contained germinated plant seeds. In Aquaponics and Hydroponics systems the water must be continuously moving so we developed fountains in which pumps were placed in each reservoir and the water was pumped into another reservoir from which gravity led the water into suspended PVC pipes with holes in them. These pipes allowed the water to continuously flow and aerate the sitting water. In our Geoponics system we used pots and an aquarium, and filled them with moisture control potting soil. Once the soil was in place we added plants to each pot and the aquarium. The plants used in each system were: tomatoes, basil, lettuce, cucumber, bush beans, and watermelon.
The title of our project was “Optimizing Food Production in Red Line Food Deserts using Hydroponics and Aquaponics.” They really are happy!
Goals of the Future

- At the conclusion of this experiment, we developed a table top system and plan to design a large scale Aquaponics and Hydroponics systems. These systems would be economically and environmentally efficient and they would produce more crops per square foot in a shorter period of time. There would be no need for pesticides like that of those currently used in commercial farming.
Team Accomplishments

- Participants in the National Science Foundation Expo.
- Second Place at Benjamin E. Mays High School Science Fair.
- Winners of Gold Medal and Grand Prize at the Atlanta Public Schools (APS) in which we were chosen to represent APS at the Intel International Science and Engineering Fair.
- Third Place at the Fort Valley State University Science Fair.
- Second Place at the 63rd Georgia Science and Engineering Fair at the University of Georgia.
- Fourth Place in Environmental Sciences at the Intel International Science and Engineering Fair in Los Angeles, CA.

Our team learned a lot and had fun!!!!