

# The Nova Hydroculture Project: Bringing a Community of Science, Technology, Engineering, Arts, and Math (STEAM) Learners Together to Grow a Unique Garden

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## Outreach Program Summary

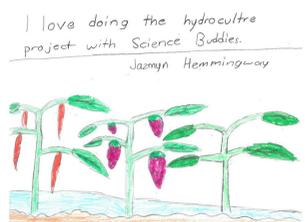
The Nova Hydroculture Project (NHP) is a collaboration between Nova Southeastern University (NSU), Science Alive, a non-profit science outreach organization, and the Nova Public Schools (K-12) in Broward County, FL with funding from Sigma Xi, The Scientific Research Honor Society. For the NHP, we are collaborating with schools that have the Title 1 designation meaning that at least 40% of the student population comes from low-income families. Several (18%) of our college volunteers are the first in their families to attend college, as would be the case for many of the K-12 students that we serve. One of our college volunteers is also a former student from the elementary school as well. Therefore, we are in an ideal environment to positively impact students that are “just like us”.

## Program Details and Design

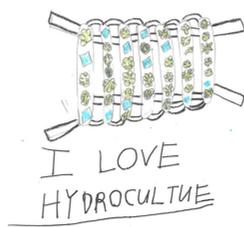
Hydroculture refers to any system of growing plants without soil. We developed hydroponics specifically for the NHP. This involves nutrients being fed to plants via an enriched solution. Hydroponics is a sustainable agricultural method since it can use up to 90% less water, require less space to grow, and yield faster growth. After investigating various hydroponics systems, we decided to use a PVC tube system with a reservoir and pump since it was the most affordable and easiest to maintain for the space at Nova Blanche Forman Elementary School (NBF). We assembled the first gardens in Sept. 2021 and by March 2022 we had created and maintained 4 tube, 1 ebb and flow, and 1 hydroponic tower garden system(s). Here we report on the tube garden systems at NBF.

## Impact - Elementary Students

Drawing 1:



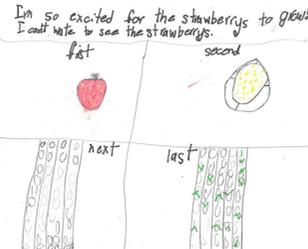
Drawing 2:



Drawing 3:



Drawing 4:



Drawings 1-4: Students document their gardening experiences

- This is “the best day ever!” said by a student on the first day of putting the gardens together.
- “I want to bring the vegetables we grew to my Mom and Dad so that they don't have to buy them at the store.”
- “It was really hard learning how to grow the plants with just water and so many of our plants died. But we didn't give up!”
- “One day I will make a healthy, delicious salad from the Nova Hydroculture Garden!”



Step 1: Plant the seeds in starter trays



Step 2: Seedlings emerge



Step 3: Assemble PVC tube garden and reservoir



Step 6: Maintain the garden for eventual harvest and repeat



Step 5: Move seedlings into PVC tube system



Step 4: Prepare the seedlings for the tube garden

## Impact - Project Volunteers

A survey conducted of 11 NSU students that volunteered for NHP in the 2021-2022 school year revealed (on a five-point scale, 5 highest):

- Most NSU students go very often (nearly every week) to help with the project ( $\bar{x} = 3.6$ ;  $SD = 1.6$ )
- Many NSU Students have been involved in Science Outreach for multiple semesters ( $\bar{x} = 2.9$  semesters;  $SD = 1.8$ )
- NSU students had very little prior gardening experience ( $\bar{x} = 1.9$ ;  $SD = 0.7$ )
- NSU students are now more likely to garden in the future ( $\bar{x} = 1.9$ ;  $SD = 0.7$ )
- All NSU Students list their involvement on their resumes
- NSU students used the NHP for professional development-grant writing

Thoughts from NSU volunteers:

- I think it is very important to expose students, especially those attending a Title I school, to science at a young age and inspire them to pursue science careers in the future.
- Science Alive has given me the wonderful opportunity to combine my love for working with children/students, teaching, and science.
- It is heartwarming to watch children's faces light up especially when they tell us that they didn't know science could be so fun. I have also been blown away by the sense of community among everyone involved in the Science Alive program.

## Impact - Teachers

Teachers are asking for tours of our hydroponics garden and using the project for reinforcing lessons on plant parts, fruits & vegetables, weather, and growth. The garden provides real world experience that enhances and engages STEAM and ELA standards, as students have been writing and illustrating their own garden journals. As a 1<sup>st</sup> grade student says, “It's cool because of all the plants like, strawberries, tomatoes, lettuce, that we can eat and grow like magic!”

## Acknowledgments

We would like to thank all the NSU student volunteers and the students at the Nova Blanche Forman Elementary School TitanCare afterschool program as well as the middle school and high school volunteers. The administration at NSU and NBF also facilitated this program. We would also like to especially thank Sigma Xi for awarding us a Science, Mathematics, and Engineering Education (SMEE) grant that helped fund this project [www.sigmaxi.org/chapter-grants](http://www.sigmaxi.org/chapter-grants).

## Highlights



Photo 1: Setting up the garden on the first day



Photo 2: Growth in the garden several weeks later



Photo 3: Triton Peppers harvested from the garden



Photo 4: Harvesting a variety of lettuce, basil, tomatoes, and peppers

A:



B:



C:



Photos 5 A-C: Examples of meals prepared with garden produce

## Discussion

The Nova Hydroculture Project has built a genuine connection between the university and the community. The NHP has taught both volunteers and children how to use alternate methods to grow fresh produce, especially in situations where traditional agricultural practices may not be possible. The participants also developed a sense of ownership as they maintained a commitment toward growing their own plants. College students gained practical skills while filling a need for enhanced science education in the community. The elementary students look forward to having the college students visit every week to share the joy of scientific discovery. Through outreach projects like this, alumni look back on their experiences as a highlight of their college years and as experiences that advanced them in their career goals.

**Science outreach: What a joy and something we all can do!**

