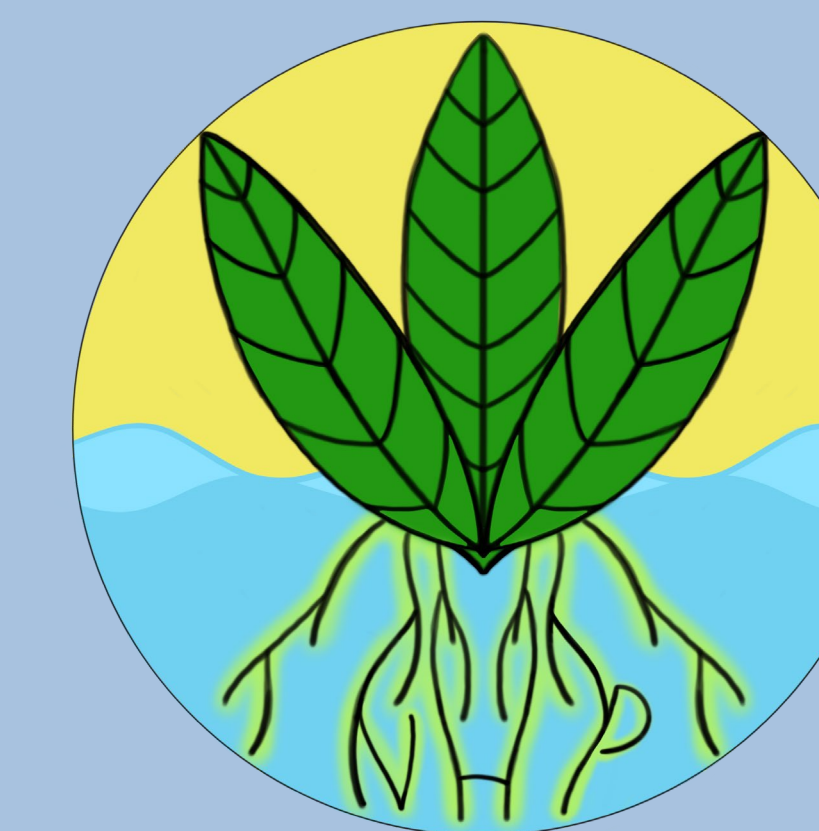


Science Buddies: A sustainable, scalable, and relatable afterschool STEM program led by college students

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Program Overview

The Science Buddies program is a collaboration between Nova Southeastern University (NSU), Science Alive, and the Nova Public Schools (K-12) in Broward County, FL. Science Alive, www.sciencealivefl.org is a 501(c)(3) non-profit organization (formed by STEM faculty members in 2016 who were raising their children and wanted to provide meaningful STEM leadership experiences for college students and their own children as well). The Science Buddies program was envisioned by STEM college faculty members, working with their college students and elementary school teachers. Science Buddies was implemented in the 2015-16 school year and has been running continuously ever since. Through pre and post surveys, gains in learning, leadership, management, public speaking, confidence, enjoyment of STEM subjects, and satisfaction with STEM-based professions have been documented among all Program participants.

Program Details and Design

In Broward County Florida, at Nova Southeastern University (NSU) and Nova Blanche Forman Elementary (NBF), minority populations comprise a major proportion of the student population. Thus, our institutions are well-poised to serve as models for providing improved access to higher education and training college students in leadership skills that they continue to develop throughout their careers. NBF holds a Title 1 designation meaning that at least 40% of the student population comes from low-income families. This public school is located directly across the street from NSU (a Hispanic-serving Institution). Many of our college student leaders are the first in their families to attend college, as would be the case for many of the grade school students that we serve. We are in an ideal environment to positively impact students who are "just like us". The Science Buddies program was implemented to explore what STEM-focused college students and a general population of elementary students each gain from an after-school science curriculum implemented for children in kindergarten through fifth grade. STEM college student gains in career development and personal satisfaction have been tracked (2015 to present). Science Buddies are teams of STEM college students organized into leaders and helpers under the supervision of faculty and aftercare teachers. The Science Buddies Project implements the (Tell-Show-Do) approach where college students spend some time telling students about a concept, show them something about it and then let them do the activities where they get to actively learn through hands-on experience.

College students work with faculty to create teams for each topic, update schedule and develop activities/handouts; update www.sciencealivefl.org website

Leaders gather supplies and practice activities on NSU campus

Leaders organize their teams and deliver their activities on Fridays according to the schedule. They collect Pre/Post Surveys of students, college volunteers and collect reviews from faculty, teachers and students/families

Results – Evidence of Effectiveness College Alumni

Table 1: 54 Alumni responded to a survey given from (2019-2022) regarding their involvement with the Program

Education level when involved in program	13% graduate 83% undergraduate
Year graduated	2004-2022
How many years involved in the program Average (SD)	2.5 (1.3)
Did you include program on your resume	90% yes
Did you think that the Program helped you in your career/professional development?	100% yes
Was participating in the Program one of your favorite undergraduate memories?	98% yes
Did you go to graduate school?	96% yes
Did participating in the Program help in your graduate school interviews?	74% yes
Were you the first in your family to earn a bachelor's degree?	12% yes
Were the first in your family to earn an advanced degree?	43% yes

Example Feedback from Alumni: Presenting to the kids was the best part. Sometimes I would forget how much I loved science because of a particular class's level of difficulty. Yet, when I was able to share my knowledge with the children and see their faces light up in amazement, it reminded me of myself at their age and really helped keep me going (especially through classes like Organic Chemistry).

The Program was one of my favorite parts of undergrad, as it allowed me to explore my passions for science and education. I loved helping to come up with experiments and help teach them to elementary school students. I loved working with the kids especially because it allowed me to share my excitement and passion about science, and possibly interest them! I loved how it also taught me how to teach at the appropriate level, which is very important for my future career. The Program was the best thing that I could have been a part of, and I'm so glad that I was!

Current College Students (Fall 2022)

Table 2: 18 current colleges students (Fall 2022) responses regarding their involvement with the Program

Currently receiving college credit through Internship course	56% yes
How much experience with science-related service learning did you have before joining this program (1 low - 5 high); Average (SD)	2.6 (1.5)
Approximately how many semesters have you been volunteering with the program including this semester? Average (SD)	1.4 (1.5)
Is or will your involvement with this program be listed on your resume?	100% yes
Did you attend a public school in Broward County, Florida?	17% yes

Elementary School Community(Fall 2022)

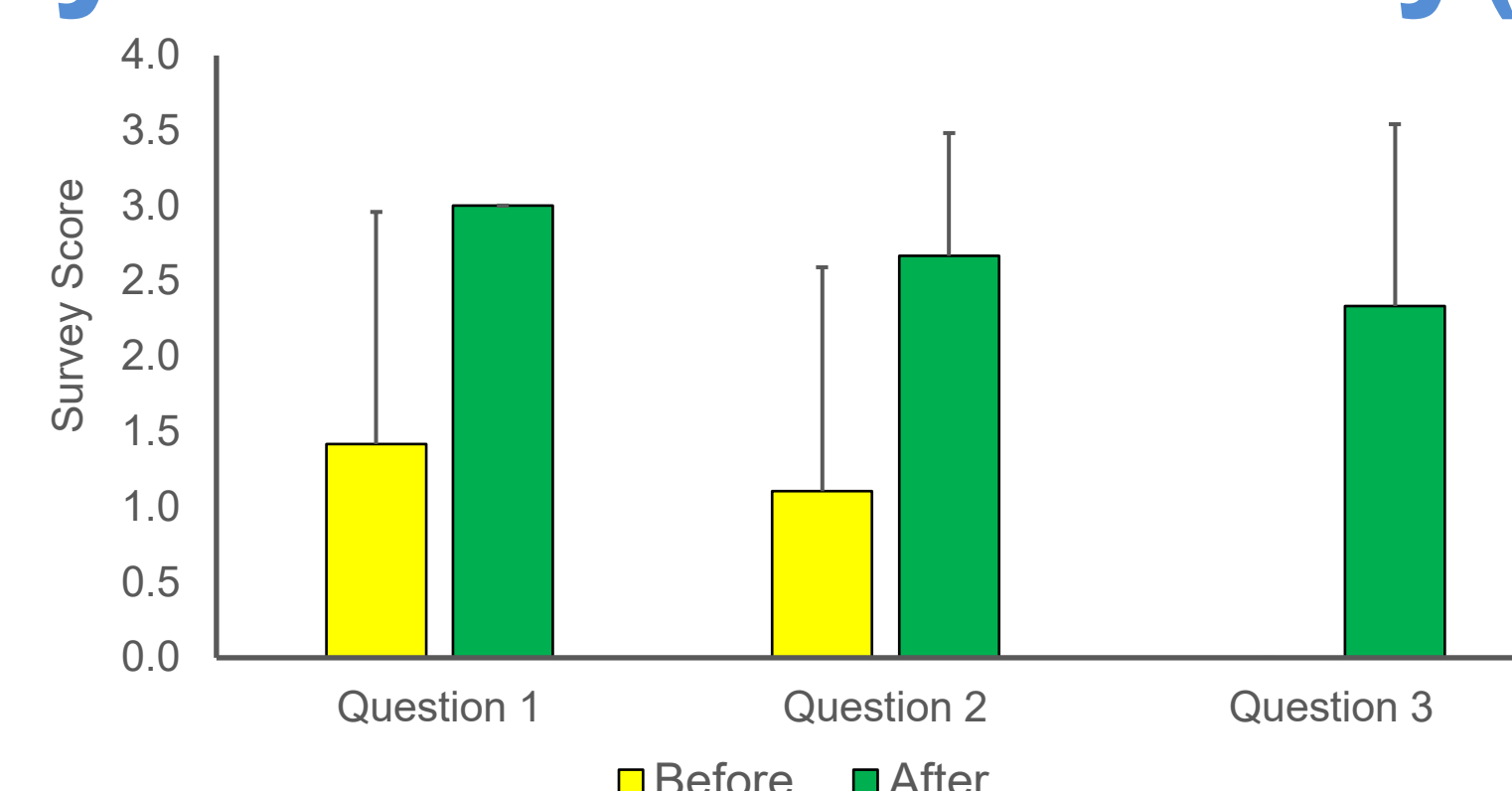
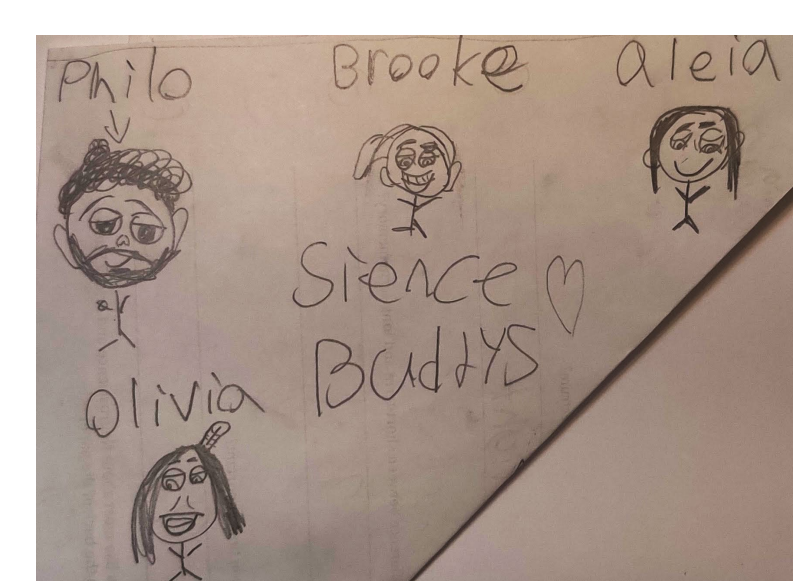


Figure 1: Responses (0 lowest to 3 highest) of 2nd graders to 3 questions linked to the Chemistry Lesson (Fall 2022). There were 19 Pre-Surveys and 6 Post Surveys. Error bars are given as standard deviation. Q1: What are the three stages of matter? Q2: Do drops of water want to stay closer together or farther apart? Q3: What makes foam appear in a reaction with hydrogen peroxide and yeast?

Example Feedback - 4th grader (Fall 2022): I like that I get to learn new things and communicate with different people!
Example Feedback - 2nd grader (Fall 2022): Drawing of their Science Buddy and Ice Cream from the chemistry group.

Drawing 1: A 4th grader's drawing of their College Science Buddies Team



Drawing 2: Drawing of a favorite Science Buddy



Highlights



Photo 1: Science Buddies Group Photo September 2022



Photo 2: Banana DNA



Photo 3: Science Buddies in front of the hydro-garden



Photo 4: Science Buddies doing chemistry



Photo 5: A. Learning about physics on the racetrack and B. Drawing showing the winner.

Implementation for Impact

The Program has flourished since 2015 due to the partnerships made with NBF and the development of a sustainable college student-organized leadership model. Over 7 years, more than 300 NSU student volunteers participated with 40 of them taking on strong leadership positions. In the first year alone 40 NSU students spent 1.5 hours with the children every Friday, contributing over 1000 hours of community service. As Science Buddies, NSU students discuss the context of the day's lesson, lead the students in engaging STEM discovery and review the results. Pre and post surveys assessed student learning. College student surveys reflected increased professional development, specifically noting gains in confidence explaining STEM concepts and being a leader. NSU students were able to discuss their leadership and curricular development experience gained here during their job/graduate school interviews allowing them access to increased opportunities. This Program of hands-on STEM learning benefits everyone involved and has been a highlight of many of the undergraduate students' college experience. It is sustainable, relatable, and scalable such that any college faculty and enrolled college students could follow this model and improve satisfaction and retention in STEM fields. **Elementary students have begged their parents to stay late on Friday afternoons to see their Science Buddies – a true sign of Program success!**

Acknowledgments

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