

Growing plants and scientists: Hydroponic gardening program wins over students

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Boston College Professor of Science Education Mike Barnett (r in this file photo) and colleagues report a number of positive results for students who participated in an after-school science enrichment curriculum that uses hydroponic gardening techniques. Credit: Ed Hayward/ Boston College

Hands-on science lessons in a greenhouse can grow more than fruits and

vegetables. They also nurture a love of science among youths in student populations long underrepresented in the sciences, according to a new report by researchers at Boston College's Lynch School of Education.

Elementary-age students - primarily African-American, Hispanic and English Language Learners - developed [positive attitudes](#) toward science, less anxiety and greater self-confidence after participating in an after-school program where they grew fruits and vegetables using soil-less, hydroponic methods, the researchers report in the current edition of the Journal of Science Education and Technology.

"Engaging youth in learning to grow and care for their plants serves as both a way to spark interest and curiosity in science and offers an easy way for after-school instructors to support their students in learning science," said Lynch School of Education Professor of Science Education Michael Barnett, the project leader.

"Most after-school instructors have little experience with science, thus it is important to design programs that support not only student learning but are also easy for instructors to implement and to support student learning in the scientific processes," added Barnett, who co-authored the report with doctoral student Amie Patchen and former doctoral student Lin Zhang, now an assistant professor of education at Providence College.

The study of 234 Boston-area students who participated in the program at three sites showed anxiety decreased and interest increased for both boys and girls, according to the study "Growing Plants and Scientists: Fostering Positive Attitudes toward Science among All Participants in an Afterschool Hydroponics Program."

Self-confidence as science students increased for girls at all three sites, but did not change significantly for boys.

The researchers found that a student's first language - whether English or Spanish - was not a factor in changed attitudes.

"This was rather surprising in that the curriculum was not particularly designed to engage non-native English speakers," said Barnett. "We believe that as we re-design the materials with non-native English speakers as a focus of the curriculum design we will better support those learners."

The findings suggest that hydroponics "can be a useful educational platform for engaging participants in garden-based programming year round, particularly for settings that do not have the physical space or climate to conduct outdoor gardening," according to the study.

Because program format and implementation and instructor backgrounds varied at the three locations, the positive outcomes show the program lends itself to replication in a range of settings.

"The elementary version of our hydroponics curriculum could be easily and successfully implemented across teachers and contexts," said Barnett. "This is a very exciting finding as that suggests the hydroponics curriculum can be scaled to any number of contexts where teachers have little science, or teaching, experience.

The researchers say their next step is to look at which specific aspects of the program led to the positive changes in student attitudes toward [science](#).

More information: Amie K. Patchen et al, Growing Plants and Scientists: Fostering Positive Attitudes toward Science among All Participants in an Afterschool Hydroponics Program, *Journal of Science Education and Technology* (2016). [DOI: 10.1007/s10956-016-9678-5](https://doi.org/10.1007/s10956-016-9678-5)

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