

BEYOND ABC'S: CAN PLANTS IN A CLASSROOM HAVE AN IMPACT ON HIGH SCHOOL MATH STUDENT BEHAVIOR AND ACADEMICS?



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Introduction

- Humans have an intricate connection with nature. Perceiving and collecting vital information from the landscape with plants being an essential element^{4,6,13}.
- Plants provide many practical benefits such as, ability to add oxygen, control soil erosion and improve the aesthetic outdoor and indoor environment^{4,6,13,15}.
- Research indicates that potted plants improve indoor air quality by increasing relative humidity, removing particulate matter, and removing volatile organic compounds^{1,9,15,16}.
- Powerful aesthetic and emotional values are also associated with plants and natural settings including stress and aggression reduction, increased productivity, and faster recovery time from an illness^{1,4,5,8,10,12,14}.
- People prefer and are physiologically affected by particular landscape types, tree shapes, and tree colors^{2,3,4,6,7,11,13}.

Objective

- A pilot study was developed to investigate if indoor potted plants in high school math classrooms would affect academic and social behaviors.
- Study was conducted at a Hawaiian high school that was located in a socio-economically disadvantaged area.
- Math classes were selected since math is generally a subject that causes stress in many students.

Methods

- Students standardized math test scores and classroom disciplinary reports, along with student and teacher self-reports were measured.
- Data was collected for a semester before, a semester during, and a semester after plants were placed in five classrooms.
- Classrooms were 25'x25', and were physically similar except for one that was windowless.
- Students in each classroom were of mixed standings from Freshman-Seniors & from Pre-algebra-Trigonometry.
- Plants were placed in approximately the same location in each room, with more in the front where students' attention is usually directed (See Figure 1. below).
- Placement species and quantity: (3-4 *Dracaena deremensis* 'Janet Craig'; 3-4 *Dracaena marginata* 'Colorama'; and 3 *Anthurium scherzerianum*).
- Students from a ag-science class were trained to care for the plants weekly.

Classroom Set-Up

Pre-Plant Classrooms



Figure 1. Typical Plant Set-up

Plants in Classrooms



Results

Table 1. The Difference in the Number of Discipline Reports

Academic Year	Difference of discipline reports from Fall to Spring across all five classes ¹
Fall 2004 compared to Spring 2005 No plants in any classrooms	1 (5.76) ²
Fall 2005 compared to Spring 2006 Plants in all classrooms during Spring 2006	-42 ³ (3)
Fall 2006 compared to Spring 2007 No plants in any classrooms	-1 (3.90)

¹A positive number means the number of reports increased from the Fall to the Spring
²The standard deviation of differences across the five classrooms is in parentheses.
³The difference between Fall 2005 to Spring 2005 is significantly smaller than the differences between 2004/05 and 2006/07 at the 95% level of significance.

Table 2. The Difference in Test Scores

Academic Year	Difference in test scores from Fall to Spring across all five classes ¹
Fall 2004 compared to Spring 2005 No plants in any classrooms	-928 (5.7912) ²
Fall 2005 compared to Spring 2006 Plants in all classrooms during Spring 06	3.02 (4.1044)
Fall 2006 compared to Spring 2007 No plants in any classrooms	2.013 (2.9477)

¹A positive number means the test score increased from the Fall to the Spring
²The standard deviation of differences across the five classrooms is in parentheses.

Conclusions

- Students scored higher on standardized testing, and had less disciplinary problems when plants were present in classrooms.
- Students reported that they had lower levels of stress, felt more comfortable, felt the air was fresher, and were able to concentrate for longer periods.
- These results indicate that plants in classrooms improved students' feelings of well-being, improved academic achievements and decreased discipline problems.

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