Science in the Learning Gardens

SciLG

Factors that Support Ethnic and Racial Minority Students’ Success in Low-Income Middle Schools, 2014-2017

Dilafruz Williams & Sybil Kelley

STEM smart: Lessons learned from successful schools
San Francisco. February 1, 2016
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Overall Goals of SciLG

• Advance **equity** in STEM
• Strengthen pipeline to higher education
• Honor diversity and inclusivity
Our Core BELIEFS and VALUES

Unyielding commitment
  – to diversity and inclusion
  – to non-marginalization

Reject deficit-based models of education

Students do not have to give up who they are and what defines their identity
For culturally and linguistically diverse students, the garden has potential to empower and to encourage pride and respect in their cultural heritage.

Karen Payne, Program Director of the American Community Garden Association
Curriculum: NGSS/Culturally responsive

Instruction: Garden as milieu/Hands-on, experiential, holistic

Research: Motivational engagement Science learning outcome

<table>
<thead>
<tr>
<th></th>
<th>LANE (Grades 6-8)</th>
<th>LENT (Grades K-8) SciLG: (grades 6-8)</th>
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</thead>
<tbody>
<tr>
<td>NON-WHITE</td>
<td>58% (Hispanic 27%; Asian 17%; African-American 6%)</td>
<td>76% (Hispanic 44%; Asian 15%; African-American 10%)</td>
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<tr>
<td>SPED</td>
<td>20%</td>
<td>15%</td>
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<tr>
<td>TAG</td>
<td>5%</td>
<td>0.9%</td>
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<tr>
<td>LEP</td>
<td>10%</td>
<td>33%</td>
</tr>
<tr>
<td>FRL</td>
<td>82%</td>
<td>85%</td>
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<tr>
<td>TOTAL</td>
<td>480</td>
<td>564</td>
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</tbody>
</table>
Cultural Understandings
Judy Bluehorse Skelton
Dilafruz Williams
Nakisha Nathan
Dunya Minoo
Esperanza De La Vega

Motivational Engagement Research
Ellen Skinner
Motoaki Hara
Esperanza De La Vega

Cultivating a Sense of Place
Fostering Curiosity and Wonder
Discovering Rhythm and Scale
Valuing Biocultural Diversity
Living Soil
Awakening the Senses
Nurturing Interconnectedness
Embracing Practical Experience

PEDAGOGICAL PRINCIPLES

Sit Spot all year long--Change over time/journaling & writing

Studying Materials & Chemistry of Materials (Fall)

Fall Garden Unit/Focus (PS1-3, PS1-2; PS1-6; LS2-3): Investigate the cultural, medicinal, and synthetic applications of plants in the garden; build compost/worm bins to investigate chemistry of materials and energy flow through systems. (This gets at concepts for both integrated and non-integrated alignment and different sequence of non-integrated)

Chemistry of Materials

PPS Integrated focus for 7th grade: Northwest Region/Bioregion

Winter Garden Unit (LS2-2; LS2-4)--Interactions among organisms across ecosystems; changes in ecosystem components impacting populations

Bottle Ecology: Yearlong ecosystem

Erosion and Deposition

Switch order??

Ecology

Possible classroom connection

Plate Tectonics

Spring Garden Unit (LS2-1; LS2-5)--Resource availability, populations, biodiversity, and design solutions

"Teachable" moments in the garden

7th Grade Yearlong Map

SEPUP Units

2015-2016 Non-Integrated

Water & Force & motion (Winter)

Energy & Waves (Spring)
STUDENTS’ EXPERIENCES IN THE GARDEN

- Autonomy (personal importance of activities) & Purpose

TEACHERS’ PERCEPTIONS OF STUDENTS

- Engagement In the Garden (having fun, working hard)
- Expectations of Students’ Potential to Succeed in Science

ACADEMIC OUTCOMES

- Science Grades

(GARDENS AS A MOTIVATIONAL MILIEU
(Predicting from Winter to Spring Term)

STUDENTS’ EXPERIENCES (Predicting from Spring to Fall Term)

- Belonging and Competence
- Engagement In the Garden (having fun, working hard)

STEM Identity

n = 104. Arrows show individual regression analysis paths in which earlier experiences predict changes in the levels of later outcomes, after controlling for the prior effects of those outcome variables. Survey items used 1-5 scale where higher levels showed stronger agreement with statements. Science grades were converted to a standard 4.0 scale. Mean of Autonomy & Purpose = 4.08, SD = 81. Mean of Belonging & Competence = 3.77, SD = 77.
Student voices

What do you feel?

“I feel safe at the Learning Gardens.”

“It releases stress from me. I feel really happy.”

“No one (is) judging me for who I am. It is a circle of life, of friendship.”

“It's like I'm a member. I'm home. I'm safe. I'm comfortable.”

“I feel smart. I feel like a better learner.”
“It's hands-on (with) plants. You actually get to touch them, see them, when we learn about plants. There's fresh air. At school, we just sit on our butt on our desk and write. It's more interesting here. We get to walk around and learn stuff. We get to get dirty.”