Impacts of Teaching Garden Hands-on Activities on Student Learning

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Hands-on Learning in Horticulture

✓ Hands-on learning as one of the key components of the Horticultural Science curriculum

✓ At UF: An increase of student engagement in active hands-on learning along with the rising enrollment in the courses and major and minor programs in Horticultural Sciences Dept.

UF Horticultural Sciences Dept. Teaching Garden
Teaching Garden as an Important Resource

- HOS 1014 - Vegetable Gardening
- VEC 2100 - World Herbs and Vegetables
- VEC 3221C - Commercial Vegetable Production
- HOS 3020 - Principles of Horticultural Crop Production
- HOS 3281C - Principles of Organic and sustainable Crop Production
- HOS 4283C - Advanced Organic and Sustainable Crop Production
Teaching Garden as Field Laboratories

- Cultivate integrative hands-on learning
- The multifaceted function of institutional teaching gardens and farms in promoting student learning is increasingly recognized

“interdisciplinary learning, place-based learning, active and engaged learning, relationship-building, multiple perspectives, and systems thinking and interconnectedness.” (Burns and Miller, 2012)
Objectives

- Identify student perceptions of hands-on learning activities in different courses taking place at the vegetable teaching garden on campus and their impacts on student learning.

Fall 2015

- VEC 2100 - World Herbs and Vegetables
- VEC 3221C - Commercial Vegetable Production
- HOS 3020 - Principles of Horticultural Crop Production
- HOS 3281C - Principles of Organic and sustainable Crop Production
Survey Instrument

- Online survey via Qualtrics
- 210 students enrolled in the four courses were contacted via email
- Demographics: gender, age, major, ethnicity, prior gardening or farming experience
- Aspect of learning influenced by hands-on activities
- 1-5 rating scale: 1 = highly negative, 2 = slightly negative, 3 = no influence, 4 = slightly positive, and 5 = highly positive
Aspect of learning and experience assessed

- New technical skill(s) in horticulture
- Acquisition of knowledge
- Skills related to team work
- Leadership skills
- Writing and presentation skills
- Time to be outdoors and connecting with nature
- Gaining physical exercise
- Inspiration in the discipline
- Active learning in the discipline
- Interest in horticultural science research
- Interest in courses in future semesters that take place directly in the teaching garden
- Overall motivation in horticulture
What Did Students Tell Us?

126 responses (n =126) used in the analysis
✓ Linear models used, SAS 9.4

> 90% of the respondents indicated positive impacts of different hands-on activities on:
✓ acquisition of knowledge in the area relating to the activity
✓ new technical skills in horticulture
✓ devoting their time to be outdoors connecting with nature
✓ overall motivation in horticulture
What Did Students Tell Us?

126 responses (n =126) used in the analysis
Linear models used, SAS 9.4

> 75% (< 90%) of the participants perceived positive effects of class activities on:
  - skills related to team work
  - interest in guided-research in the horticultural sciences
  - interest in courses in future semesters that take place directly in the teaching garden focusing primarily on hands-on activities
  - gaining physical exercise
What Did Students Tell Us?

✓ 126 responses (n =126) used in the analysis
✓ Linear models used, SAS 9.4

● ~ 89%: positive influence on student interest and active learning in the discipline
● ~ 73%: positive impacts on inspiration to invent or develop something new or original
● ~ 71%: responded positively regarding leadership skills
● ~ 66%: positive impacts on writing and presentation skills
## Comparing the Impacts

- Linear models used, SAS 9.4
- Fisher’s LSD test for multiple comparisons, \( P \leq 0.05 \)

<table>
<thead>
<tr>
<th>Impact</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting with nature, outdoors</td>
<td>4.62 a</td>
</tr>
<tr>
<td>New skills in horticulture</td>
<td>4.54 ab</td>
</tr>
<tr>
<td>Motivation in horticulture</td>
<td>4.47 abc</td>
</tr>
<tr>
<td>Acquisition of knowledge</td>
<td>4.44 bcd</td>
</tr>
<tr>
<td>Interest in the discipline</td>
<td>4.35 cde</td>
</tr>
<tr>
<td>Interest in courses in future semesters with a hands-on focus</td>
<td>4.31 de</td>
</tr>
</tbody>
</table>

- 1 = highly negative, 2 = slightly negative, 3 = no influence, 4 = slightly positive, and 5 = highly positive
## Comparing the Impacts

- Linear models used, SAS 9.4
- Fisher’s LSD test for multiple comparisons, $P \leq 0.05$

<table>
<thead>
<tr>
<th>Impact</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teamwork skills</td>
<td>4.24 ef</td>
</tr>
<tr>
<td>Inspiration to invent or develop something new or original</td>
<td>4.10 fg</td>
</tr>
<tr>
<td>Gaining physical exercise</td>
<td>4.09 fg</td>
</tr>
<tr>
<td>Interest in guided-research</td>
<td>4.06 g</td>
</tr>
<tr>
<td>Leadership skills</td>
<td>4.05 g</td>
</tr>
<tr>
<td>Writing and presentation skills</td>
<td>3.88 h</td>
</tr>
</tbody>
</table>

- 1 = highly negative, 2 = slightly negative, 3 = no influence, 4 = slightly positive, and 5 = highly positive
Demographics

- Linear models used, SAS 9.4
- Fisher’s LSD test for multiple comparisons, P ≤ 0.05

**Gender** effect regarding the impact of hands-on activities on learning new skills in horticulture

<table>
<thead>
<tr>
<th>Gender of students</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female (n = 66)</td>
<td>4.67 a</td>
</tr>
<tr>
<td>Male (n = 60)</td>
<td>4.40 b</td>
</tr>
<tr>
<td>P value</td>
<td>0.035</td>
</tr>
</tbody>
</table>

1 = highly negative, 2 = slightly negative, 3 = no influence, 4 = slightly positive, and 5 = highly positive
Demographics

- Linear models used, SAS 9.4
- Fisher’s LSD test for multiple comparisons, P ≤ 0.05

**Gender** effect regarding the impact of hands-on activities on *interest in taking courses in future semesters with a hands-on focus*

<table>
<thead>
<tr>
<th>Gender of students</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female (n = 66)</td>
<td>4.45 a</td>
</tr>
<tr>
<td>Male (n = 60)</td>
<td>4.15 b</td>
</tr>
</tbody>
</table>

P value: 0.047

- 1 = highly negative, 2 = slightly negative, 3 = no influence, 4 = slightly positive, and 5 = highly positive
Demographics

- **Gender** did not influence the impact of hands-on activities on:
  - acquisition of knowledge ($P = 0.819$)
  - motivation in horticulture ($P = 0.454$)
  - teamwork skills ($P = 0.195$)
  - inspiration to invent or develop something new or original ($P = 0.777$)
  - interest in guided-research ($P = 0.627$)
#### Demographics

**Ethnicity** effect regarding the impact of hands-on activities on motivation in horticulture

<table>
<thead>
<tr>
<th>Ethnicity of students</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other (n = 5)</td>
<td>4.80 a</td>
</tr>
<tr>
<td>Hispanic (n = 15)</td>
<td>4.67 a</td>
</tr>
<tr>
<td>Caucasian/White (n = 88)</td>
<td>4.51 a</td>
</tr>
<tr>
<td>African American/Black (n = 4)</td>
<td>4.50 ab</td>
</tr>
<tr>
<td>Not wish to disclose (n = 1)</td>
<td>4.00 ab</td>
</tr>
<tr>
<td>Asian/Pacific Islander (n = 13)</td>
<td>3.85 b</td>
</tr>
</tbody>
</table>

**P value**

0.029

- 1 = highly negative, 2 = slightly negative, 3 = no influence, 4 = slightly positive, and 5 = highly positive
Demographics

*Ethnicity* did not influence the impact of hands-on activities on:

- learning new skills in horticulture ($P = 0.538$)
- acquisition of knowledge ($P = 0.062$)
- teamwork skills ($P = 0.277$)
- interest in taking courses in future semesters with a hands-on focus ($P = 0.180$)
- inspiration to invent or develop something new or original ($P = 0.956$)
- interest in guided-research ($P = 0.394$)
What Did We Learn?

- Integrate hands-on activities into course design to enhance student learning and skill development.
- Teaching garden as an invaluable resource for integration and innovation: How can we optimize its function?
  - Targeting higher cognitive skills
  - Interdisciplinary collaborations
  - Curriculum design and innovation for promoting student engagement and recruitment