**HOW** do we teach/facilitate Quality SET Programs?

"sage on the stage"  "guide on the side"
OUR CLAIMS:

• 4-H can help youth increase their SET Abilities.

• 4-H has research-based approaches that are proven to work.
Research-Based Strategies

• Helping youth learn about science as a PROCESS.

• Giving youth experiences that help them make sense of their “Book Learning.”

INQUIRY-BASED INSTRUCTION

EXPERIENTIAL LEARNING
Food for Thought

Can we truly say that one of our six-session OST programs is **hands-on, inquiry-based and experiential**?
Hands-On
What Does It Mean?

- Youth are “learning by doing.”
- They are manipulating equipment, measuring, building, etc.
Research Says:

- “Hands-on is not necessarily “minds-on.””
- “Hands-on” needs to be a component of a research-based teaching strategy.
Hands-on activities, while essential, are not enough.”

National Research Council
Case: Garden-Based Learning

- Gardening AND Interest in Gardening: No Correlation
- Decision-making AND Interest in Gardening: Strong Correlation
Food for Thought

Can we truly say that one of our six-session OST programs is hands-on, inquiry-based and experiential
Experiential Learning

What does it mean?

- Youth are given a task to do.

  AND

- Youth are guided through a series of steps to "process" that experience.

"Making meaning through direct experience"
Experiential Learning

Research Says:

- Especially effective in helping youth understand science “in-depth.”

- Teaches youth how to interpret and discuss data.

- Prepares youth for guided inquiry experiences.
The Experiential Learning Cycle

Experience
Youth become familiar with the content

Facilitator's Role
Focus
Debrief
Feedback
Support

Apply
Youth apply content to real world situations

Generalize
Youth connect learning to other examples

Reflect
Youth explore a deeper meaning of the content
Guiding Questions

- **Reflect**: What did you do?
- **Generalize**: What did you learn from this activity?
- **Apply**: How does this activity relate to your everyday life?
- If you could do it again, how would you change the activity?
Food for Thought

Can we truly say that one of our six-session OST programs is hands-on, inquiry-based and experiential?
What Does It Mean?

• Youth start with a question and develop a plan to answer that question.
• Youth are following a process that parallels the generally accepted “scientific method.”
Research Says

• Connects with natural curiosity.
• Youth develop both critical thinking and SET skills.
• This method is easily adapted to different skill levels/learning styles/knowledge levels.
QuickChallenge

• Quickly sketch out a diagram of the scientific method as you learned it in middle school.
The Scientific Method

1. Ask a question
2. Do background research
3. Construct a hypothesis
4. Test your hypothesis by doing an experiment
5. Analyze your data and draw a conclusion
6. Report your results (Was your hypothesis correct?)
Two Approaches

Approach #1
• Build Parachute A.
• Build Parachute B.
• Test them following these specific procedures.
• What happened?
• What did you learn from this?

Approach #2
• What is the best shape for the canopy of a parachute?
• Here are some materials.
• How can we figure this out?
Continuum

Who determines?

- Questions
- Hypotheses (Predictions)
- Interpretation of Data
- Statement of Results
Structured Inquiry

<table>
<thead>
<tr>
<th>Inquiry</th>
<th>Experiential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do insects that live in water</td>
<td>Go to stream and examine the insects.</td>
</tr>
<tr>
<td>have the same parts?</td>
<td>Go to pond and examine the insects.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Do insects that live in the soil</td>
<td>Go to garden and examine the insects.</td>
</tr>
<tr>
<td>have the same parts?</td>
<td>Go to forest and examine the insects.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>What parts do all insects have?</td>
<td>Have youth determine what other types of insects</td>
</tr>
<tr>
<td></td>
<td>they should examine to answer this question.</td>
</tr>
</tbody>
</table>
• Learn by Doing (SET Abilities)
• Guiding Questions
• Meeting Kids where they are, and helping them to move towards science proficiency.
Getting Started

Science ToolKit

• Animal Science
• Climate
• Lost Ladybug
• Plant Science

http://nys4h.cce.cornell.edu/
## A Challenge:
### 2005 4th Grade Test Scores

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Percentage of All Students Scoring Proficient or Higher</th>
<th>Percentage of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>81</td>
<td>59</td>
</tr>
<tr>
<td>Black</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Hispanic</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>Asian/Pacific Is.</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>American Indian/ Native Alaskan</td>
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<td>1</td>
</tr>
</tbody>
</table>
Inquiry & Diversity

• Better achievement gains for:
  • African-American males
  • Emotionally disabled students
  • Female students

No variation in results across various learning styles

Source: Science in Afterschool Literature Review, SERVE Center 2006