Early Science Learning Resources, Tools, and Activities to Help Support Children’s Science Learning

October 20, 2017
1:30-5:30 pm
Introductions and Ice Breaker

- Find 3-5 people you do not know and find
  - Something that is similar about the work you do
  - Something that is different about the work you do
  - A fun fact that you can’t tell by appearances
Overview of the Session

- Background of the Collaborative for Early Science Learning
- Museumtools.org
- Justification and Partnerships, Teacher Trainings, Family Engagement
- Implementation plan overview
- Help us answer the questions posted around the room
Justification

- Why museums?
  - Community Resource and Stakeholder
  - Skilled at engaging adults and children
  - What can your institution offer?
    - Professional Development Plans
    - Family Engagement
    - Museum Access Programs
Why Science?

- Science is developmentally valuable for young children
- Young children are already developing ideas on how the world works through hands-on exploration
- Young children learn like scientists
- Process skills vs Content
Justification

How do you see children practice science process skills in your exhibits or programs?
Mind in the Making- Alison Gopnik
Justification

How do you see children practice science process skills in your exhibits or programs?
Justification

- Why focus on early childhood programs?
  - Science and STEM PD is often requested by teachers
  - Adults often feel uncomfortable with science
  - Low assessment scores from teachers
  - Science learning covers literacy and math
  - Science process skills align with early childhood standards and assessment goals
Justification

Before Teacher Trainings

After Teacher Trainings
Head Start Early Learning Outcomes Framework

# Connecting Process Skills to Assessments

<table>
<thead>
<tr>
<th>Science Process Skill</th>
<th>COR (Child Observation Record) Assessment Items</th>
<th>Teaching Strategies Gold Assessment Items</th>
<th>CLASS Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observing</td>
<td>• Observing and Classifying&lt;br&gt;• Natural and physical world&lt;br&gt;• Patterns</td>
<td>• Shows curiosity and motivation&lt;br&gt;• Uses scientific inquiry skills&lt;br&gt;• Attends and engages&lt;br&gt;• Recognizes and recalls</td>
<td>• Connects Concepts&lt;br&gt;• Integrates with previous knowledge&lt;br&gt;• Real world applications&lt;br&gt;• Related to students real lives&lt;br&gt;• Active participation&lt;br&gt;• Focused attention&lt;br&gt;• Follows students lead</td>
</tr>
<tr>
<td>Predicting</td>
<td>• Experimenting, predicting and drawing conclusions</td>
<td>• Uses scientific inquiry skills&lt;br&gt;• Shows curiosity and motivation&lt;br&gt;• Shows flexibility and inventiveness in thinking</td>
<td>• Prediction/Experimentation&lt;br&gt;• Brainstorming</td>
</tr>
<tr>
<td>Measuring</td>
<td>• Measurement&lt;br&gt;• Tools and technology</td>
<td>• Uses scientific inquiry skills&lt;br&gt;• Compares and measures&lt;br&gt;• Uses tools and other technology to perform tasks</td>
<td>• Active Participation&lt;br&gt;• Focused attention</td>
</tr>
<tr>
<td>Experimenting</td>
<td>• Experimenting, predicting, and drawing conclusions&lt;br&gt;• Data Analysis</td>
<td>• Uses scientific inquiry skills&lt;br&gt;• Shows flexibility and inventiveness in thinking</td>
<td>• Evaluation&lt;br&gt;• Prediction/experimentation</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>• Problem solving with materials&lt;br&gt;• Conflict Resolution</td>
<td>• Uses scientific inquiry skills&lt;br&gt;• Attends and engages&lt;br&gt;• Solves problems&lt;br&gt;• Persists</td>
<td>• Problem Solving&lt;br&gt;• How and Why Questions&lt;br&gt;• Integrates with Previous Knowledge&lt;br&gt;• Hints&lt;br&gt;• Assistance&lt;br&gt;• Focused attention</td>
</tr>
<tr>
<td>Using Tools</td>
<td>• Measurement&lt;br&gt;• Problem Solving with Materials&lt;br&gt;• Tools and technology</td>
<td>• Uses scientific inquiry skills&lt;br&gt;• Uses tools and other technology to perform tasks</td>
<td>• Range of auditory, visual, and movement activities&lt;br&gt;• Hands on opportunities&lt;br&gt;• Focused attention</td>
</tr>
<tr>
<td>Communication</td>
<td>• Speaking&lt;br&gt;• Listening and Comprehension&lt;br&gt;• Reflection</td>
<td>• Uses an expanding expressive vocabulary&lt;br&gt;• Speaks clearly&lt;br&gt;• Follows directions&lt;br&gt;• Tells about another time or place</td>
<td>• Peer Conversations&lt;br&gt;• Contingent responding&lt;br&gt;• Back and forth exchanges&lt;br&gt;• Encourages student talk&lt;br&gt;• Elicits ideas and/or perspectives&lt;br&gt;• Specific Feedback&lt;br&gt;• Variety of words</td>
</tr>
</tbody>
</table>
Getting Started: St Louis Science Center

- Why did you want to get started?
  - Contacted by local Head Start initially
  - Growing our early childhood initiative
- What services do you provide?
  - Classroom visits/Field Trips
  - Teacher PD workshops
  - Parent workshops
  - Family experiences
- Funding?
  - Grant funded
  - Fee based
Getting Started: St Louis Science Center

- Who is involved from Head Start?
  - Curriculum Coordinator
  - Site Supervisors
  - HS Director

- Who is involved from your museum organization?
  - Education
  - Development
  - Marketing
Maintaining and Sustaining Partnerships: Maryland Science Center

- Goals of the Partnership
- Communication with your partners
  - Figure out what works for them
- Evaluation
  - Useful for grants - data speaks
- Funding
  - Without our long term commitment to our Head Start Partners, we would have never received an endowment for the program
- Institutional Support
  - Kept the program going for years
Challenges and Solutions

- Who do you initially make contact with?
- Staff turnover
- First year blahs.
- Scheduling
Implementation Guide Questions:
Desired Impacts and Capacity
Break

C E S L

Collaborative for Early Science Learning
Planning Teacher Training Programs

- Common Goals
  - Inspire teachers to make science part of their daily routines, activities, and interactions in the classroom.
  - Help them to plan and provide developmentally appropriate early learning experiences in science.
  - Engage teachers in hands-on activities that allow them to experience exploration and discovery much the way children do.
  - Collaborate with each other to discuss adaptations and extensions to the activities in their own classrooms.
  - Encourage teachers to think of themselves as lifelong learners of math and science.
Planning Teacher Training Programs

▶ Teacher Training Components

▶ Audience
  ▶ Same organization or different?
  ▶ Ages participants work with
  ▶ Types of programs (home day care, preschool, district, Head Start, etc.)
  ▶ Number of Participants
  ▶ Funding
Planning Teacher Training Programs

- Teacher Training Components
  - Logistics
    - "One shot" workshops or ongoing?
    - Frequency of workshops during the year
    - Length of workshops
    - Content/activities
    - Location of training
# Planning Teacher Training Programs

- **Common Components**

<table>
<thead>
<tr>
<th>PD Component</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign-in and nametags</td>
<td></td>
</tr>
<tr>
<td>Snacks</td>
<td></td>
</tr>
<tr>
<td>Presenter and participant introductions</td>
<td></td>
</tr>
<tr>
<td>Review workshop goals/agenda</td>
<td></td>
</tr>
<tr>
<td>Ice breaker game</td>
<td></td>
</tr>
<tr>
<td>Highlight Science Process Skills</td>
<td></td>
</tr>
<tr>
<td>Hands-on science activities (modeled and experienced as would be done with children)</td>
<td></td>
</tr>
<tr>
<td>Small group discussions</td>
<td></td>
</tr>
<tr>
<td>Sharing related research</td>
<td></td>
</tr>
<tr>
<td>Connections to state guidelines, Head Start frameworks etc.</td>
<td></td>
</tr>
<tr>
<td>Workshop evaluation/feedback</td>
<td></td>
</tr>
<tr>
<td>Provide curriculum resources and take-home materials</td>
<td></td>
</tr>
<tr>
<td>Other?</td>
<td></td>
</tr>
</tbody>
</table>
Planning Teacher Training Programs

- Hands on Activities!
  - Snails observations
  - Measuring exploration
  - Predictions with chemical reactions
Planning Teacher Training Programs

What questions might you use to guide teacher conversation?

Examples:

- What process skills do you notice?
- What adaptations can you make for specific ages?
- How does this activity support preschool standards?
Planning Teacher Training Programs

- Activity Review
  - What process skills do you notice?
  - What questions would you use to guide teacher conversation?
  - What adaptations can you make for specific ages?
  - How does this connect to preschool standards?
Implementation Guide Questions:
Planning a Teacher Training Program

---

Collaborative for Early Science Learning
Break
Planning Family Engagement Programs

- Common Goals
  - Engage families in their children’s learning.
  - Teach families about what science looks like for their young children.
  - Help families understand science is simple and already all around us.
  - Teach parents to recognize when their children are doing science.
  - Give families the tools to do science activities with their children.
Program Components

- Defined Objectives
- Funding
- Point Person
- Staffing
- Attendance
- Scheduling
- Location
- Evaluation
- Food
- Marketing
- Engaging Content
- Materials
Connections: Parent Play Workshop - Bay Area Discovery Museum

Connections Program

- Currently 43 schools, 90 classrooms, more than 1700 students
- Outreach & Field Trips with federally subsidized preschools
- Parent Play Workshop (PPW) is within this long term, multi touch point partnership program
- Funding: museum raises funds through grants, foundations, and individual donors
Connections: Parent Play Workshop - Bay Area Discovery Museum

**Logistics**

- **Location**
  - At school: in classroom, all purpose room, etc.
- **Audience**
  - Parents/Caregivers as adult learners
  - Anywhere from 5-40 people
  - 1-2 museum staff facilitating, often translated
- **Frequency & Length**
  - Offered to each partner site once a school year
  - 60-90 minutes
Family Engagement Workshops - Sciencenter

**Logistics**

- **Audience**
  - Head Start families (adults & children)
  - ~100 people

- **Frequency & Length**
  - Nine events a year; 1.5 hours each

- **Location**
  - On-site at museum
  - Transportation provided

- **Staffing**
  - 2 to 3 educators

- **Funding**
  - IMLS Science From the Start, donors, Tompkins Community Action

- **Food**
  - Dinner provided
Activities
- Teachers run activities, encourage adults to facilitate for children
- Complement PD curriculum
- Easy, use simple materials

Wrap Up
- Gather everyone in amphitheater for story and science experiment
- Helps signify end of event.
Frost Science

- Two primary strategies to engage Head Start families:
  - Workshops for parent leaders
  - Family Science Days

- Based on Early Childhood Hands-On Science (ECHOS®)
Parent Leader Workshops @ Frost Science

- Play is Learning
- Science and Math in Your Pocket
- Parent Café: Conversations to Keep Families Strong
- Learning Resources at the Science Museum
- Parents try out and take home science activities
- Families try out activities during Family Day
Family Days @ Frost Science

- **Audience**
  - Children and families

- **Frequency & Length**
  - Once a year per center
  - Half day on Saturday or Sunday

- **Location**
  - Frost Science; bus provided

- **Special Feature**
  - ECHOS ambassadors - high school students from Upward Bound Math/Science program – bilingual, from same communities
Hands-on Stations

Sciencenter

- Family Engagement Workshops

Frost Science

- Workshops for parent leaders
- Family Science Days

Bay Area Discovery Museum

- Parent-Play Workshop
Implementation Guide Questions: Planning a Family Engagement Program

CESL

Collaborative for Early Science Learning
Implementation Guide Chart: Next Steps
## Resources & Museum Tools

### Engage. Educate. Empower.
Families, teachers and other professionals are invited to use and share our hands-on activities guides and professional materials. The Sciencenter will continuously add relevant information to this page.

### Resources for Kids & Families

<table>
<thead>
<tr>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Activities</td>
</tr>
</tbody>
</table>

### Resources for Educators

<table>
<thead>
<tr>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Trips Supplemental Activities</td>
</tr>
<tr>
<td>Chemistry Activity Lesson Plans</td>
</tr>
</tbody>
</table>

### Resources for Museum Professionals

#### Collaborative for Early Science Learning

Resources to support museums partnering with local Head Start programs to provide teacher professional development and family engagement focusing on early childhood science.

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch a Collaboration</td>
</tr>
<tr>
<td>Working with Head Start Teachers</td>
</tr>
<tr>
<td>Working with Head Start Families</td>
</tr>
</tbody>
</table>
Thank you!

This project was made possible in part by the Institute of Museum and Library Services