Connecting Children and Nature Through Art-based Environmental Education Programming

Lincoln Larson, Ami Flowers, & Gary Green

Play Conference, 2016
Opening Exercise

• Draw a *habitat* or *ecosystem* that you see or play in almost everyday.
Session Objectives

- Discuss the value of art in EE programming
- Examine the impacts of art-based EE on children’s environmental attitudes and awareness
- Explore methods, materials, and resources that can be used to enhance art-based EE
What are the issues?

- **Children becoming increasingly isolated from nature** (Clements, 2004; Karstan, 2005; Larson et. al., 2011; Louv, 2008)

- **Technology draws or keeps children indoors in front of “screens”** (Balmford et. al., 2002; Roberts & Foehr, 2008; Wason-Ellam, 2010)

- **Lack of exposure to nature has adverse affects on children’s environment orientations** (Anderson & Moss, 1993; Keliher, 1997)
Possible Solutions?

- **Environmental Education (EE) programs**
  (Aldridge & Goldman, 2007; Bartosh et. al., 2006; Larson et. al., 2011; Lieberman & Hoody, 2000; Paterson, 2010; Strevy & Kirkland, 2010)

- **NAAEE’s “Guidelines for Excellence”** encourage engaging & innovative methods of teaching & learning to reach diverse children

- **Art activities are one possible method for enhancing EE programming**
Why Art & EE Programming?

• Art integration into curriculum advances student knowledge & understanding of subjects (Blandy & Hoffman, 1993; CAPE, 2001; Inwood, 2008; Orr, 1992; Reinsborough, 2008)

• Interaction of art & EE may produce even greater benefits (e.g. eco-art education) (Inwood, 2008; Kesson, 2004; Lankford, 1997; Orr, 1994; Palmer 1997; Zakai, 2002)
Why Art in EE Evaluations?

• Traditional paper-and-pencil assessments easy to implement & quantify, but not all students perform well on “standardized” test (Armstrong, 1994; Cronin-Jones, 2005)

• Art allows students to express knowledge through creative hands-on methods, alleviating test anxiety (Cronin-Jones, 2005; James et. al., 1998; Tunstall et. al., 2004)

• Studies support the use of art assessment tools in EE program evaluation (Alerby, 2000; Aronsson & Andersson, 1996; Barraza, 1999; Bowker, 2007; Guichard, 1995; Palmberg & Kuru, 1998; Tunnicliffe & Reiss, 1989)
Examining Impacts of Art-based EE

- Study in Athens, GA, during 2010-2011
- Evaluated one-week, day-camp summer programs:
  - Memorial Park Day Camp
  - Sandy Creek Day Camp
Participants

- Total of 327 campers
- Age Groups
  - 6-7, 8-9, 10-12
- Ethnic Groups
  - African American
  - Asian
  - Hispanic/Latino
  - White/Caucasian
- Diverse Income Levels
Methods

• Pre-test/post-test design (survey taken Monday and Friday of camp)
• Items read aloud, 30-40 minute duration
• Focused on three groups:
  • Control group with no EE program
  • Treatment group with traditional EE programming
  • Treatment group with art-based EE programming
Study 1: Using Art in Environmental Education Program Evaluation

Objectives

1) To develop a valid and reliable survey instrument for measuring children’s environmental perceptions & knowledge using both quantitative (Likert-type statements) & qualitative (drawings) methods

2) To develop a valid and reliable scoring rubric for assessing the qualitative (drawing) component of the survey instrument.
Part 1: Likert Scales

- **8 - Eco-affinity**
  - Environmental reference & behavior

- **8 - Eco-awareness**
  - Environmental importance & sustainability

- **4 - Art-appreciation**
### Eco-affinity

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I like to learn a lot about plants and animals.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Plants and animals are very important to people.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I like to spend time drawing and coloring.</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Eco-awareness

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I like to learn a lot about plants and animals.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Plants and animals are very important to people.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I like to spend time drawing and coloring.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Art-appreciation

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I like to learn a lot about plants and animals.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Likert Scale Results

• Cronbach’s Alpha – $\alpha = 0.866$
• Exploratory Factor Analysis
  • Three factors explained 49.6% total variance
  • Eco-affinity – 8 items*, $\alpha = 0.884$, 30.6% total variance
  • Eco-awareness - 5 items*, $\alpha = 0.712$, 11.7% total variance
  • Art-appreciation – 5 items*, $\alpha = 0.767$, 7.3% total variance

*Item loadings were $\geq 0.4$
Part 2: Open-ended Drawings

• Draw-An-Environment Test (DET)
  1. Draw a *habitat* or *ecosystem* that you see or play in almost everyday.

• Draw-An-Animal Test (DAT)
  2. Draw your favorite *animal*, the *habitat* or *ecosystem* where it lives, & the things it needs to *survive*.
Open-ended Drawings

- Graded using modified version of:
  - Draw-An-Environment Test Rubric (DET-R)
  - Draw-An-Animal Test Rubric (DAT-R)
- Other subscales used:
  - Habitat Type
    - Indoor, backyard, park/playground, & outdoors
  - Environmental Components
    - Presence of animals, plants, # of birds, etc.
## Draw-An-Environment Test Rubric

<table>
<thead>
<tr>
<th>Factor</th>
<th>Not Present</th>
<th>Present</th>
<th>Basic Interaction</th>
<th>Complex Interaction</th>
<th>Explicit Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16 points</td>
</tr>
<tr>
<td>Human Built or Designed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>highest score</td>
</tr>
</tbody>
</table>
# DET-R Examples

<table>
<thead>
<tr>
<th>Drawing Factors</th>
<th>Not Present</th>
<th>Present</th>
<th>Basic Interactions</th>
<th>Complex Interactions</th>
<th>Explicit Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 Point</td>
<td>1 Point</td>
<td>2 Points</td>
<td>3 Points</td>
<td>4 Points</td>
</tr>
<tr>
<td>Drawing does not contain pictures or words of this factor.</td>
<td>Drawing contains pictures or words without any apparent interaction with this factor.</td>
<td>Drawing contains pictures or words interacting by only touching this factor.</td>
<td>Drawing contains pictures or words interacting by complex methods with this factor.</td>
<td>Drawing contains pictures and descriptions (labels or arrows) with deliberate emphasis placed on the interaction with this factor.</td>
<td></td>
</tr>
</tbody>
</table>

## DET Rubric Examples

<table>
<thead>
<tr>
<th>Human</th>
<th>Any humans</th>
<th>Human standing on bridge or ground</th>
<th>Human walking on bridge, human climbing tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biotic</td>
<td>Animals, trees, grass, flowers, insects</td>
<td>Trees touching grass, animals on ground</td>
<td>Animal running on grass, bird perching in tree</td>
</tr>
<tr>
<td>Abiotic</td>
<td>Mountains, rivers, sun, clouds, rain</td>
<td>Water touching ground</td>
<td>Wind blowing leaves, rain pooling on ground</td>
</tr>
<tr>
<td>Human Built or Designed</td>
<td>Buildings, automobiles, bridges, swing sets</td>
<td>House touching grass, car touching driveway</td>
<td>Smoke from chimney, car driving on road</td>
</tr>
</tbody>
</table>
Boy, age 9
EE Group
DET: Pre-test

Girl, age 7
Art EE Group
DET: Post-test

Girl, age 7
Art EE Group
# Draw-An-Animal Test Rubric

<table>
<thead>
<tr>
<th>Factor</th>
<th>Not Present</th>
<th>Present</th>
<th>Basic Interaction</th>
<th>Complex Interaction</th>
<th>Explicit Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystem Complexity</td>
<td>(0 pts)</td>
<td>(1 pts)</td>
<td>(2 pts)</td>
<td>(3 pts)</td>
<td>(4 pts)</td>
</tr>
<tr>
<td>Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16 points</td>
</tr>
<tr>
<td>Shelter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>highest score</td>
</tr>
</tbody>
</table>
DAT: Pre-test

Boy, age 9
EE Group
DAT: Pre-test

Girl, age 7
Art EE Group
DAT: Post-test

Girl, age 7
Art EE Group
Results

- Inter-rater Reliability
- Kappa Measure of Agreement & Pearson’s product-moment correlation coefficient
  - Initial three reviewers had percent agreement of 74.5%-98.0% on five rubric factors.
  - Reviewers discussed & revised rubrics
  - Upon final review, percent agreement improved to 88.2%-96.1% on five rubric factors.
Comparing Scales & Drawings

- Expected relationships between scales & drawings, thought not statistically significant

Study 1: Summary

- Use of both quantitative (Likert-type statements) and qualitative (drawings) assessment methods are valid/reliable tools for measuring children’s environmental perceptions & knowledge
  - Using combination of both might be best strategy
- Scoring rubrics are an efficient, adaptable, and user-friendly tool for quantifying qualitative drawings by children
Study 2: The Effects of an Art-based Environmental Education Program on Children’s Environmental Perceptions

Source: Flowers et al. (in prep).
Objectives

1) Establish a baseline measure of children’s environmental perceptions across different gender, age, ethnicity, and income levels

2) Evaluate the effects of two types of one-week environmental education programs compared to a general one-week summer camp program on children’s environmental perceptions across different gender, ethnic, and income levels
Pre-test Results: Surveys

- Eco-affinity - highest scores:
  - Ages 6-7, $F(2, 261) = 4.09, p = 0.018$

- Eco-awareness - highest scores:
  - Ages 10-12, $F(2, 261) = 5.45, p = 0.005$

- Art-appreciation - highest scores:
  - Females, $F(1, 261) = 4.33, p = 0.039$
  - Low income, $F(1, 261) = 6.02, p = 0.015$
Pre-test Results: Surveys

- Hispanic/Latinos & White ethnic groups scored higher on eco-affinity & eco-awareness, $F(3, 261) = 7.48, p = 0.001$; $F(3, 261) = 7.70, p = 0.001$
Pre-test Results: Drawings

• **DET-R & Environmental Components**
  - Hispanic/Latinos & White ethnic groups scored higher
    \[ F(3, 261) = 3.23, \ p = 0.023 \]
    \[ F(3, 261) = 3.93, \ p = 0.001 \]

• **DAT-R & Environmental Components**
  - Females scored higher
    \[ F(1, 261) = 5.54, \ p = 0.019 \]
    \[ F(1, 261) = 25.07, \ p = 0.001 \]
Post-test Results: Surveys

Mean Score Differences (Post-Pre)

- Control
- EE Treatment
- Art EE Treatment

Eco-Affinity  Eco-Awareness  Art-Appreciation

N = 285
## Post-test Results: Drawings

### Mean Score Differences (Post-Pre)

<table>
<thead>
<tr>
<th>Component</th>
<th>Control</th>
<th>EE Treatment</th>
<th>Art EE Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DET-R</td>
<td>0</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>DAT-R</td>
<td>0</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Env. Components</td>
<td>0</td>
<td>4.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*N = 285*
Study 2: Summary

• Both the traditional EE & art-based EE treatment groups improved children’s environmental perceptions & knowledge

• Traditional EE programs provide a well-rounded curriculum of activities that engage campers in a variety of learning methods

• Art-based EE programs do the same, but may be more suited for specific audiences who enjoy art
Summary: Art & Programming

- **Using art activities in EE programs** enhances learning through hands-on engagement.

**Examples from EE:**
- Project WILD
  - *Adaptation Artistry* – design a new animal with cool features
- Project Learning Tree
  - *Tropical Treehouse* – create a symphony of rainforest sounds
- Project WET
  - *Make-a-Mural* – develop a mural of a watershed

**Other ideas???
Summary: Art & Evaluation

• Using art activities in EE program evaluation creates new assessment opportunities
• Fosters expression through multiple intelligences
• Help educators better understand children’s beliefs, way of thinking, & cognitive grasp of environmental issues
Implications: Art in EE

• Development of more effective educational methods, materials, & resources for integrating EE programming & evaluation
Future Research

• Look into how the use of art in EE effects...
  • ...children with learning disabilities?
  • ...children with discipline issues?
  • ...children from diverse backgrounds?
• Long term effects of art in EE?
• Other art media in EE programs?
• Other art media in EE evaluations?
Acknowledgements

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  • Dr. John P. Carroll (Co-Advisor)
  • Dr. Stacey Neuharth-Pritchett
  • Gene Wright
• Dr. Lincoln R. Larson & The Green Team
Questions?