Camioneta Mágica:
Developing A Mobile Education Workshop to Reconnect Costa Rican Youth in San José with their Environment

Damon Ball, Andrew Casella, Aaron Hartford and Bethany Mays
Road Map

Deliverables

Recommendations and Findings

Methodology

Problem and Goal
Problem

Cities lack greenspaces
Causes increased stress levels
Reversed by environmental education

Children in San José lack in-depth environmental education
Árboles Mágicos’ goal:
Develop an appreciation for the natural environment and inspire people to take action

Project goal:
Develop a model of a mobile nature workshop and assess its feasibility
Objective 1:

Determine the Educational Content in the Mobile Workshop
Objective 2: Identifying Effective Teaching Methods for the Mobile Workshop
Objective 3: Designing the Mobile Workshop and Assessing its Feasibility
Project Construction

- Workshop
- Activities
- Educational Content/Environmental Topics
- Skills/Values
Interviews and Surveys

Private schools teachers
Public school teachers
El Museo de los Niños
The Exploratorium, San Francisco
The Children’s Museum of Indianapolis
Recommendations and Findings
Main takeaways:

- Empathy
- Transversality
- Sense of Community
- Motivation
- Leadership Skills
Teaching Environmental Topics

Recommendations

We recommend the mobile workshop teach:

- The life cycle of trees
- The physical components of a tree
- The tree’s effect on the ecosystem
- Different species of trees
- The parts of a forest
- The symbol of a tree in cultures around the world
- Communication between trees
## Teaching Environmental Topics

### Recommendations

<table>
<thead>
<tr>
<th></th>
<th>Empathy</th>
<th>Transversality</th>
<th>Sense of Community</th>
<th>Motivation</th>
<th>Leadership</th>
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<tbody>
<tr>
<td>Life cycle</td>
<td></td>
<td>X</td>
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<td>Components of a tree</td>
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<td>Effect on the ecosystem</td>
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<td>Parts of a forest</td>
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<td>Cultural Symbol of a Tree</td>
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<td>Communication between Trees</td>
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</table>

The table indicates which topics are relevant to different aspects of teaching environmental topics.
Use visuals, animations, and hands-on activities

Recommendations

“The [workshop] must be the perfect sort of a sensory tool like a trip in the forest.”

-Jeff Norris, a teacher from the United World College

• Increases creativity, critical thinking, problem solving and mental growth
Teach With Interactive Activities

Recommendations

1. Animation
2. Videogames
3. Scavenger Hunt
4. Voice Box
5. Video
6. Planting Activity
7. Role Playing Activity
8. Mindfulness Activity
# Teach With Interactive Activities

## Recommendations

<table>
<thead>
<tr>
<th></th>
<th>Animation</th>
<th>Website</th>
<th>Scavenger Hunt</th>
<th>Voice Box</th>
<th>Video</th>
<th>Flowering Planting Activity</th>
<th>Role Playing Activity</th>
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<tbody>
<tr>
<td>Life Cycle</td>
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<td>Components of a Tree</td>
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<td>Effects on the Ecosystem</td>
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<tr>
<td>Parts of a Forest</td>
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</tbody>
</table>
Start with Private Schools

Recommendations

- Private schools are free to incorporate different learning styles

- Public schools follow a stricter curriculum and schedule
  - 2 out of the 3 public school teachers surveyed do not take their students outside
Use Technology Safety

Recommendations

“We go for the industrial-strength model touchscreen units, heavy-duty cabinets and casework for iPads, etc.”

-Exhibit Designer at Indianapolis Children's Museum

• Boston University CityLab had a person teach lab procedure
Prototype the Workshop

Recommendations

• Construct the smaller version
• Demonstrate the results of the Mobile Nature Workshop
• Use the teacher reviews to improve the small `version and to gain more funding.
• Use extra funds to purchase the larger version of the workshop

-From Teacher Interview with Jeff Norris
Evaluate the Workshop

Recommendations

- El Museo de los Ninos and Children's Museum of Indianapolis exhibit designers get feedback from children
- Students surveyed before and after taking course
  - Karla Hidalgo, environmental teacher from CRLA
Deliverables

Content Matrix
Research of content that will teach important skills

Activity Scripts
Descriptions of recommended activities

Bill of Materials
List of materials to construct workshop

3D Models
Visual representation of workshop
<table>
<thead>
<tr>
<th>Topic</th>
<th>Tree Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>The life of a tree and how it grows, from seed to fully grown. Can be likened to a child growing to adulthood to create empathy for the tree.</td>
</tr>
<tr>
<td><strong>Research</strong></td>
<td>For the life cycle to run full circle, external and internal conditions must be favorable for the tree. There must be sufficient space, water, nutrients and sunlight for successful cycle.</td>
</tr>
<tr>
<td><strong>Metaphor</strong></td>
<td>A tree is like a human, growing from a child to an adult Seed-Baby Sprout-Child Sapling-Teen Mature Tree-Adult</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>https:....</td>
</tr>
</tbody>
</table>
| **Objectives / Takeaways** | - Transversality  
                          | - Basic Tree Knowledge                           |
Deliverables
Activity Scripts

Video Script:

Time Needed: 3-6 minutes
Environmental Topics Taught: Communication Between Trees, Effect on the Ecosystem
Materials Needed: Tv screen

“Había una vez, there was a Sacred Tree under which anyone could gather. It was a huge tree, with roots that ran deep into the Earth and branches that reached high into the sky. All the animals of the Earth would gather beneath this tree and enjoy its healing power and wisdom...”
### Deliverables

**Bill of Materials**

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Used Box Truck 1</td>
<td>Used box truck. Smaller than others. 2005 Kia K2700</td>
<td>$5,600.00</td>
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<tr>
<td>Used Box Truck 2</td>
<td>Used 2002 toyota dyna. 171,000km. light cargo only? door on side</td>
<td>$6,500.00</td>
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<tr>
<td>Used box truck 3</td>
<td>Used box truck. Already empty, large usable space, 1995 International 470</td>
<td>$7,000.00</td>
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<tr>
<td>Used box truck 4</td>
<td>Used 2004 GMC 142,700km</td>
<td>$10,000.00</td>
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</table>

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablets</td>
<td></td>
</tr>
<tr>
<td>Apple Ipad Mini 4</td>
<td>Apple, simple, small, cheap</td>
</tr>
<tr>
<td>Ipad Air 2</td>
<td>Apple, sleek, light, well priced</td>
</tr>
<tr>
<td>Apple Ipad Pro 9.7</td>
<td>Apple, Powerful, large screen, more expensive</td>
</tr>
<tr>
<td>Tree Communication Tubes</td>
<td>Tube with cones for communication</td>
</tr>
<tr>
<td>TV</td>
<td>TV to show animation</td>
</tr>
<tr>
<td>Speakers</td>
<td>Theater Solutions TS509 5.1 Surround Sound Home Entertainment System</td>
</tr>
<tr>
<td>Projector</td>
<td>Projectors for roof decoration and for video</td>
</tr>
<tr>
<td>Projector screen</td>
<td>2m wide projector screens</td>
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</table>
## Deliverables

**Bill of Materials**

<table>
<thead>
<tr>
<th>MISC</th>
<th>Description</th>
<th>Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside decoration</td>
<td>Graphics for outside of the workshop</td>
<td>c 4,425,000-6,637,000</td>
</tr>
<tr>
<td>App development for tablets</td>
<td>App for tablets for educational games and information</td>
<td>7,500,000-20,000,000</td>
</tr>
<tr>
<td>Upkeep</td>
<td>Inclusive costs of running the vehicle, yearly</td>
<td>Depends on vehicle</td>
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<tr>
<td>iPad Cases</td>
<td>Shock and water resistant cases to protect against environment and kids</td>
<td>c 25,000-50,000</td>
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<tr>
<td>signs</td>
<td>Plywood sheets to make signs</td>
<td>c 5,000-20,000</td>
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<tr>
<td>table</td>
<td>Wooden table</td>
<td>c 50,000-100,000</td>
</tr>
<tr>
<td>chairs</td>
<td>Wooden chairs</td>
<td>c 25,000-75,000</td>
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<tr>
<td>Costume rack</td>
<td>Wall racks for hanging costumes</td>
<td>c 25,000</td>
</tr>
<tr>
<td>main tree</td>
<td>Tree for inside truck</td>
<td>c 500,000</td>
</tr>
<tr>
<td>Inside decoration</td>
<td>Decorations for the inside of the bus to make it feel like a forest</td>
<td>c 400,000/m²^2</td>
</tr>
<tr>
<td>ramps</td>
<td>Wheelchair accessibility ramps</td>
<td>c 100,000-500,000</td>
</tr>
</tbody>
</table>
Deliverables

Small Model

5.805.000 to 6.380.000 Colones
Deliverables

Large Model

39.200.000 - 43.500.000 Colones
Conclusions
Acknowledgements

Worcester Polytechnic Institute

Advisors: Seth Tuler and Fabienne Miller

Árboles Mágicos: Giancarlo Pucci and Isabel Vargas Rumoroso

Teacher Interviewees: Jeff Norris, Karla Rojas Hidalgo, María Castro, Steven Taylor

Teacher surveys: CTP Uladislao Gamez Solano

Museum Designers from: Museo de los Ninos, Indianapolis Children’s Museum
Questions?
Museum Images taken by Aaron Hartford from the Museo de los Ninos

Nature images taken by Andrew Casella

Solid Models Screenshotted from SolidWorks 2016
**Animation**

**General Description:** Animation showing the cycle of a tree

**Time Needed:** 3-5 min

**Materials Needed:** Speakers, screen, projector

There will be a projector showing the animation on a screen. The screen will depict the animation of the tree cycle from seedling to full grown tree. Note: Animation will be clickable, so the student clicks from one scene to the next...
Website

**General Description:** Website with multiple interactive games

**Time Needed:** 5-10 minutes

**Materials Needed:** Tablet or touch screen, website/application

There will be a home screen on which there will be a few choices of games that the kids can play.

The first game is about identifying tree species. There will be a prompt to tell the kids what to do. “Match the following trees with their pictures“....
Scavenger Hunt

General Description: Scavenger Hunt to have kids do while in the bus

Time Needed: 25-35 min

Materials Needed: Fake animals, Fact cards

Upon entering the bus, there will be cards listing out the items in the scavenger hunt that kids should keep an eye out for. The cards will be given out to each kid. When the kids find the items, there will be a fact card that helps teach kids about what they found. The animals themselves can be removed and played with, but the cards cannot....
Voice Box

General Description: Kids just talk to each other through a tube

Time Needed: 1-2 min

Materials Needed: Voice box

At the tree there will be located a funnel looking device that is camouflaged into the tree itself. Below the funnel will be an information card stating:

“The older larger trees communicate to the younger trees to send them extra food or warn them of danger, just like how your parents feed and protect you from danger. Speak through the phone to communicate to the other trees”...
Video

**Time Needed:** 3-6 minutes

**Materials Needed:** Projector

“Había una vez, there was a Sacred Tree under which anyone could gathered. It was a huge tree, with roots that ran deep into the Earth and branches that reached high into the sky. All the animals of the Earth would gather beneath this tree and enjoy its healing power and wisdom…”
Flower Activity

**General Description:** Children plant flowers to take home

**Time Needed:** 5-10 min

**Materials Needed:** Soil, recycled bottles, seeds, water, cleaning supplies

After the adventures through the bus the children will begin to exit the bus and gather around a large bucket of soil and other planting materials. They will all work together to gather the recycled materials and fill them with soil using their hands. There will also be a bag of seeds for planting in the soil....
Role Playing

**General Description:** Animal and plant costumes

**Time Needed:** 2-5 min

**Materials Needed:** Costumes

Different animal and plant costumes will be hanging on coat rack inside the workshop. Under each plant and animal costume there will be a description about where that plant or animal lives (what part of forest) and their part in the overall ecosystem. The child will be able to read the description if they choose or they can walk around the workshop in their costume pretending to be a plant or animal.
Mindfulness

**General Description:** Meditation in the workshop

**Time Needed:** 5 min

**Materials Needed:** None

Children will walk onto workshop and sit in a circle around the main tree. They will close their eyes and listen to the sound that the workshop produces and just think about being inside a forest.

They will then think about a tree from their youth and about good memories about that tree.

The children will make sure to breathe deeply throughout the entire meditation.

Children will finally open their eyes and look around the workshop.