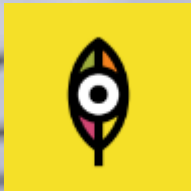


Camioneta Mágica:

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



WPI



Deliverables

Recommendations and
Findings

Methodology

Problem and Goal

Road Map

A photograph of a yellow flower in a field of green plants and brown soil. The flower is in the bottom left corner, and the rest of the image shows a field of similar green plants with some brown soil visible.

Problem

Cities lack greenspaces

Causes increased stress levels

Reversed by environmental education

Children in San José lack in-depth
environmental education



Goal

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:

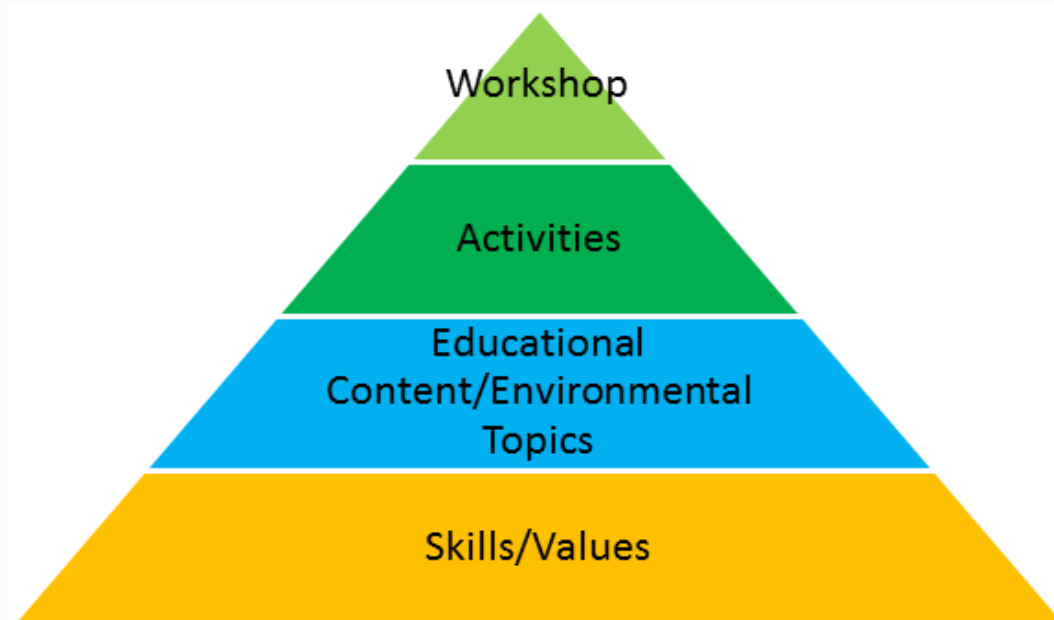
Identifying Effective
Teaching Methods for the
Mobile Workshop

Objective 3:



Designing the Mobile
Workshop and Assessing
its Feasibility

Project Construction





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

Teaching Environmental Topics

Recommendations



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



	Empathy	Transversality	Sense of Community	Motivation	Leadership
Life cycle		X			
Components of a tree	X	X			
Effect on the ecosystem	X	X	X	X	
Species of trees		X	X		
Parts of a forest		X			
Cultural Symbol of a Tree	X				
Communication between Trees	X		X	X	X

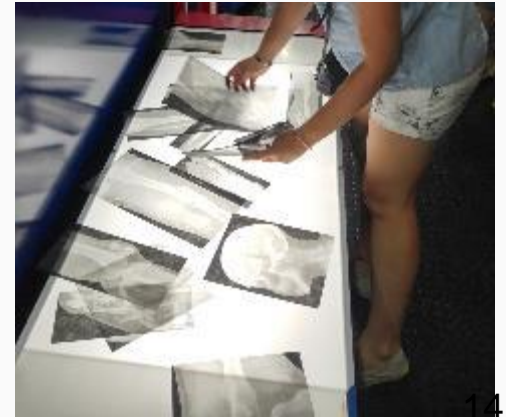
Use visuals, animations, and hands-on activities

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

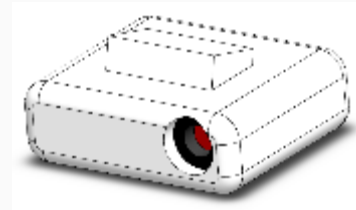
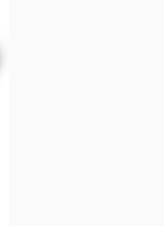
- Increases creativity, critical thinking, problem solving and mental growth



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

	Animation	Website	Scavenger Hunt	Voice Box	Video	Flowering Planting Activity	Role Playing Activity
Life Cycle	X						
Components of a Tree						X	
Effects on the Ecosystem			X		X		X
Species of a tree	X	X					
Parts of a Forest		X					
Cultural Symbol of a tree					X		
Communication between Trees				X			16

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



Image 4

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



Deliverables

Content Matrix



Topic	Tree Cycle
Description	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.
Research	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. ...
Metaphor (transversality)	A tree is like a human, growing from a child to an adult Seed-Baby Sprout-Child Sapling-Teen Mature Tree-Adult
Resources	https:....
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

Vehicles		
Used Box Truck 1	Used box truck. Smaller than others. 2005 Kia K2700 .	c 5.600.000
Used Box Truck 2	Used 2002 toyota dyna. 171.000km. light cargo only? door on side	c 6.500.000
Used box truck 3	Used box truck. Already empty, large usable space, 1995 International 4700	c 7.000.000
Used box truck 4	Used 2004 GMC 142,700km	c 10.000.000
TECHNOLOGY		
Tablets		
Apple Ipad Mini 4	Apple, simple, small, cheap	c 177.000
Ipad Air 2	Apple, sleek, light, well priced	c 205.000
Apple Ipad Pro 9.7	Apple, Powerful, large screen, more expensive	c 332.000
Tree Communication Tubes	Tube with cones for communication	c 20.000
TV	TV to show animation	c 50.000-100.000
Speakers	Theater Solutions TS509 5.1 Surround Sound Home Entertainment System	c 40.000
Projector	Projectors for roof decoration and for video	c 25.000-50.000
Projector screen	2m wide projector screens	c 50.000-200.000

Deliverables

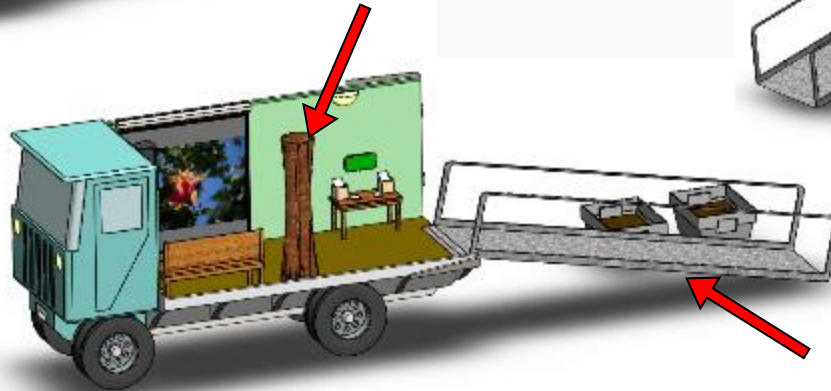
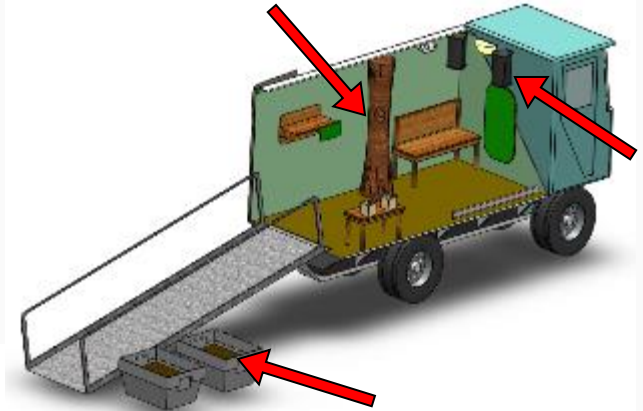
Bill of Materials

MISC		
Outside decoration	Graphics for outside of the workshop	c 4.425.000-6.637.000
App development for tablets	App for tablets for educational games and information	7.500.000-20.000.000
Upkeep	Inclusive costs of running the vehicle. yearly	Depends on vehicle
iPad Cases	shock and water resistant cases to protect against environment and kids	c 25.000-50.000
signs	Plywood sheets to make signs	c 5.000-20.000
table	Wooden table	c 50.000-100.000
chairs	Wooden chairs	c 25.000-75.000
Costume rack	wall racks for hanging costumes	c 25.000
main tree	Tree for inside truck	c 500.000
Inside decoration	Decorations for the inside of the bus to make it feel like a forest	c 400.000/m ²
ramps	Wheelchair accessibility ramps	c 100.000-500.000

Deliverables

Small Model

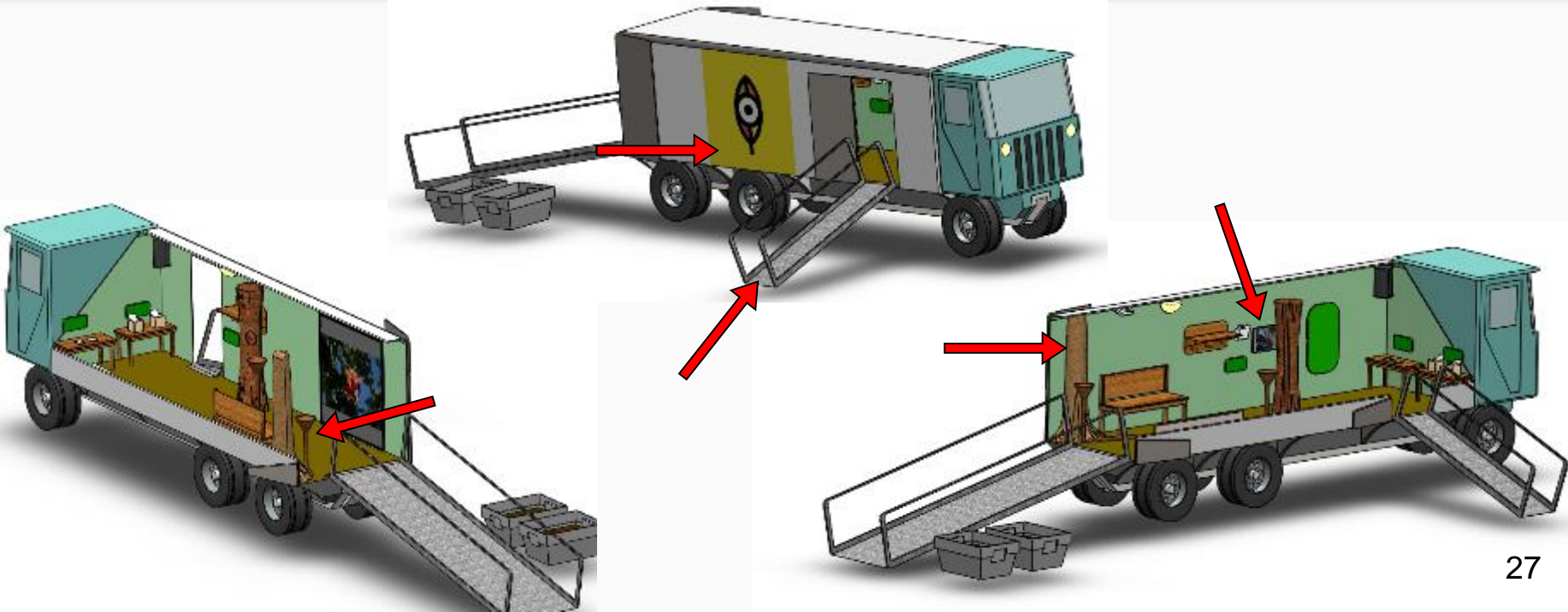
5.805.000 to 6.380.000 Colones



Deliverables

Large Model

39.200.000 - 43.500.000 Colones



Conclusions



Acknowledgements

Worcester Polytechnic Institute

Advisors: Seth Tuler and Fabienne
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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 Niños, Indianapolis Children's
Museum



Questions?



Images



Image 1- Árboles Mágicos – arbolesmagicos.org

Image 2- wpi.edu

Image 3-

https://www.aliexpress.com/wholesale?ltype=wholesale&d=y&origin=y&isViewCP=y&catId=0&initiative_id=&SearchText=Industrial+Ipad+Case&aff_platform=aaf&cpt=1488059722501&sk=ey76EUj&aff_trace_key=fb22e40579ca49daad40c008cae80375-1488059722501-00604-ey76EUj&blanktest=0&tc=af

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 mul

Time Needed: 5-10 minutes

Materials Needed: Tablet or touch scre



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

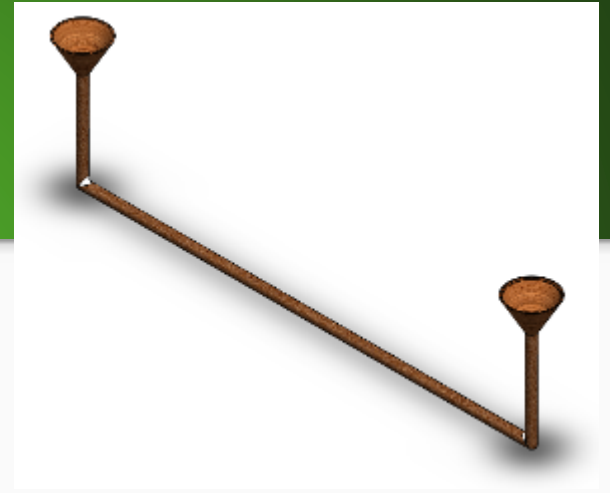
General Description: Kids just talk to each other through a tube

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...”



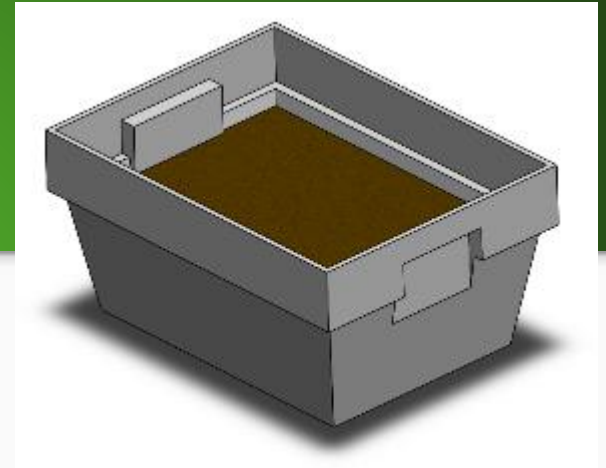
Flower Activity

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.