Deliverables for Árboles Mágicos

Content Matrix

Topic	Tree Cycle
Description	The life of a tree and how it grows, from a seed to a fully grown tree. Can be likened to a child growing to adulthood to create empathy and transversality with 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 a successful cycle. Stresses on the cycle include insects, disease, injuries, competition, weather and time. The seed is created by both the male and female part of the tree. They are are transported around the world by wind, water, animals and humans. Only though favorable environmental conditions will a seed germinate and become a sprout. A sprout is when the roots from the seed begin to grow downward and the flower breaks through the seed's coating toward the sun. This is also the beginning of photosynthesis. The sprout continues to grow and obtains more wood-like characteristics. More leaves grow and green stems begin to harden and change color. At this time the tree is most likely to be killed and very likely to catch fire or be eaten. Roots are seen at the top part of the soil in order to receive oxygen. A sapling is considered a small tree in its juvenile state and is not yet ready to reproduce (4.5 ft). A lot of growing in this time and potential competition threats for resources. Once the sapling is fully grown to its full size it is the prime time to harvest the tree for its resources, and the time when reproduction can occur and fruits will from. If the tree is not harvested it will begin to decline. External stresses begin to take a toll on the old tree and it begins to lose to other competing trees. This however is not the end of the tree of the tree's cycle. Decomposition of the tree begins and turns the tree into nutrients for other tree to grow in its place beginning a new 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://www.plt.org/family-activity/tree-lifecycle/ http://texastreeid.tamu.edu/content/howTreesGrow/
Objectives / Takeaways	-Transversality -Basic Tree Knowledge

Topic	Parts of a Tree
Description	Parts of a tree and how each part helps the tree survive. We will go in depth on each part and explain what it does for the tree, and how it is similar to a human process.
Research	Roots- A large tree may have over 30 miles of roots, with about 5-million root tips. One part of the roots ("Root Hairs") absorb water and nutrients from soil, and are helped by colonies of beneficial fungi. "Absorbing roots" connect to "Conduction roots" that bring water and minerals back to the trunk. Roots also are very important in supporting the tree. 90% of roots are located in the top 1-2 feet of soil. Bark- Resembles human skin a lot. The outer bark, what we can see, is a layer of dead bark cells that have cracked from the expansion of the tree. Below the outer bark there is

	the inner bark, or phloem. The phloem is a layer of living bark cells and tubular cells that transport sugar and growth regulators dissolved in water. Bark is a tree's first line of defense against insects, humans, and temperature changes. Trunk- Gives tree shape and strength, transports water and minerals from roots to crown. Trees also use their trunk to store starches and other materials. There is a layer between the bark and the wood of the tree called the vascular cambium zone that lays new wood over old wood on one side and new inner bark cells on the other side beneath older bark cells. This layer allows the trees to cover minor wounds and to cut off entire columns of infected wood. Seeds- Seeds have a tough outer coat called a teste that protects the seed from fungi, bacteria and insects. Seeds leave a tree in a very dry, dormant state, where the chemical processes of living in the seed are very slow. During this dormant state they actually consume oxygen and release CO2, just very slowly and in small amounts. To begin to grow, a seed needs access to water, oxygen, and enough warmth. It will then soften so that the sprout can break through the hard outer shell and begin to grow. Leaves- Sheets of spongy living cells used to absorb sunlight. Leaves are connected to the air around them by small openings called stomatas. They have a waxy layer to keep water inside to avoid dehydration. Leaves often have hairs, bristles, scales, and other adaptations for the environment they are in Crown- The crown is the top portion of the tree consisting of leaves and branches. They filter the air, creates shade, Facilitate photosynthesis
Metaphor (transversality)	Relate to parts of the body
Resources	https://www.ncforestry.org/teachers/parts-of-a-tree/ http://www.kidzone.ws/plants/trees.htm https://www.for.gov.bc.ca/hfd/library/documents/treebook/parts.htm http://www.sactree.com/assets/files/greenprint/toolkit/c/huntsvilleTreeGuide.pdf http://www.biology-resources.com/plants-seeds-01.html
Objectives / Takeaways	-Empathy -Transversality - the ability to relate tree growth to human growth and development
Topic	Trees effect on ecosystem
Description	How flowering trees help all life in a forest How an individual tree is also an ecosystem in itself Root systems and how trees communicate with each other
Research	In general: Trees are able to provide shelter to animals, use animals to facilitate pollination/germination, absorb carbon dioxide, prevent soil erosion, some trees fix nitrogen in soil in order to make it easier for other vegetation to be able to grow In Costa Rica: Example: Angel's trumpet trees produce flowers that open at night to use bats for pollination ---> Mutual symbiotic relationship: Tree uses bat for pollination of flowers and bat gets food in return
Metaphor (transversality)	A tree is like a house, because it houses so many animals, other plants
Resources	http://www.ducksters.com/science/ecosystems/oxygen_cycle.php http://www.savatree.com/whytrees.html http://www.vivacostarica.com/costa-rica-information/costa-rica-flora.html
Objectives / Takeaways	-Real World Impact -empathy -transversality -motivation
Topic	Species of trees
Description	-Different Trees in Costa Rica -The Country's National Tree (Guanacaste Tree)

Research	-Using color of tree leaves and specific tree characteristics to differentiate between species Guanacaste Tree- This is the national tree of Costa Rica. It grows to an enormous size, around 2.5 meters in diameter. This tree has a large crown, which creates a large area of protective shade beneath it, similar to how the government protects its people which is why it is the national tree of Costa Rica. It also has strange ear shaped seed pods. Almendro Tree- These are popular shade and ornamental trees. They can reach up to 40 meters. They produce showy flowers at the end of the tree's branches after the onset of rainy season, so that within a month or two the forest canopy is speckled with purple crowns. The tree fruits between December and April, which alleviates the prolonged fruit shortage. Because of this, when the tree fruits, many birds flock to it, and ground animals converge below it to enjoy its fruits. Tamarindo Tree- This is a large tree that has leaves that come with 10 to 18 pairs of leaflets. It grows large brown fruits that are made into a popular local drink. It can grow in both dry and humid climates. Higuerón Tree- This is another tree with a large green crown, which looks very similar to the Guanacaste tree. In fact, it is often mistaken for the national tree. The natural cracks and holes in striking trunk of the tree provide shelter and homes to many different creatures. Manzana Rosa Tree- This tree has fruits with a good taste and aroma. It can grow in almost any soil. Its roots and its leaves can be used as a medicine. *Higuerón tree is very similar to Guanacaste tree*
Metaphor (transversality)	Trees are like humans, there are many different kinds that are all good at doing different things
Resources	http://landsinlove.com/blog/trees-of-costa-rica/ https://www.britannica.com/plant/almendro
Objectives / Takeaways	-Being able to determine the national tree -encourage excitement for variety of trees -transversality
Topic	Parts of a forest
Description	Determine different parts of forests and functions of each part
Research	Rainforest: Emergent layer - contains the tallest trees (broad leaved, hardwood evergreens) most amount of sunlight, Animals include eagles, monkeys, bats, butterflies, etc. Canopy Layer: Primary layer of the forest; trees have smooth oval leaves; food is abundant and animals include snakes, frogs, tropical birds Understory: Little sunshine reaches this layer --> plants must grow larger leaves to get adequate sunlight; Animals include large cats, frogs, insects Forest Floor: Dark; very few plants grow here; Animals include giant anteaters and scavengers Cloud Forest: Dryer and cooler than rainforests; Trees grow smaller than in rainforests due to increased light penetration and water permeability --> also leads to thicker understory foliage; Animals include Costa Rican national bird, the Quetzal Tropical Dry Forest: Similar to Rainforest, however has a longer dry season; trees are deciduous (trees that shed leaves annually); canopy is lower than that of a tropical rainforest; undergrowth is often dense/tangled due to more light penetrating to the forest floor; Animal species are less diverse compared to rainforests; include crested guan, other birds, snakes, lizards
Metaphor (transversality)	A forest is like a house, different levels house different people/animals
Resources	http://www.srl.caltech.edu/personnel/krubal/rainforest/Edit560s6/www/whlayers.html http://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/world-biomes/characteristics-of-bioclimatic/tropical-dry-forest/ http://cloudbridge.org/wp-content/uploads/2016/07/CLOUD-FORESTS-INFORMATION.pdf

Objectives / Takeaways	Understanding of the parts of the forest and how they work together and influence each other.
Topic	Cultural Symbol of a Tree
Description	How other cultures worship and respect trees
Research	In many Native American tribes, there is a story similar to this: The Creator planted a Sacred Tree, under which anyone could gather. There they would find healing, power, and wisdom. The roots of this tree ran deep into the body of Mother Earth, and its branches reached up high towards Father Sky. The fruits of the tree are the good things the Creator has given to the people: teachings that show the path to love, compassion, generosity, patience, wisdom, justice, courage, respect, and humility. The shade under the tree would protect them. If they completely forget the tree they will lose its gifts. If they seek to destroy the tree, the suffering will fall on the people. They will lose all the gifts, and their lives will turn to anger and gloom.
Metaphor (transversality)	Use metaphors found in the stories about trees from other cultures
Resources	http://globaltrees.org/threatened-trees/tree-values/cultural/ The Sacred Tree by Jane Goodall: https://books.google.co.cr/books?hl=en&lr=&id=yNGrqIaaYvgC&oi=fnd&pg=PP7&dq=native+american+tree+symbol&ots=_RXbVpZzqV&sig=FQirEVHNKaKGgp6YNN9fXmIQQOo&redir_esc=y#v=onepage&q&f=false
Objectives / Takeaways	-Respect for one's culture -Mindfulness Empathy
Topic	Communication between Trees
Description	Tree are known to communicate each other to assist each other with survival.
Research	Trees communicate to warn each other of danger, so that they can prepare Fungi have a web of thread beneath them, called mycelium. These threads connect to tree roots, and trade nutrients for carbon with the roots. This network connects to multiple different tree roots system. Trees use their root systems to trade carbon, water, nitrogen, defense chemicals, and hormones. Mother trees (large established trees) send their resources to small seedlings trying to grow. Trees even prefer their own children when doing this. If you leave the bigger "hub" trees, a forest that loses trees can heal faster and regrow easier. Losing too many major trees can damage the entire forest Tested by: Planted a group of young tree saplings together. Covered each tree in a bag and filled some of the tree's bags with a radioactive carbon isotope and some with a regular carbon isotope that wasn't radioactive. One tree without the radioactive isotope was put under a shade bag so it could not absorb any CO_2. After waiting a while for the other trees to absorb the CO_2, the tree under the shade bag had received the radioactive isotope and was reacting to the Geiger meter. The bags stopped the tree from absorbing any radioactive CO_2 on its own, so it must have received the isotope through its roots from the other trees.
Metaphor (transversality)	Trees are like a community, they communicate with each other to help each other survive
Resources	https://www.ted.com/talks/suzanne_simard_how_trees_talk_to_each_other#t-427642
Objectives / Takeaways	Transversality Leadership Bio

Activity Scripts

Table of Contents:

1. Tree Cycle Animation

General Description: The Animation activity shows the life cycle of a tree, from a seed to a mature tree. There will be a projector showing the animation on a screen. The animation will show visuals and text and will be clickable, so the student clicks from one scene to the next. This allows students to be able to absorb information at their own pace. Through the animation students would learn basic tree biology in the life cycle of a tree. Students would be able to relate their own personal growth and development to the development of a tree, which teaches students transversality.

Size: 0.75x0.45m of wall space
Time Needed: 5-8 min
Materials Needed: TV Screen

Animation will start by saying this: "A seed is like a baby...". Then a seed will appear on the screen, and next to the seed this text will appear: "Like a baby, the seed is the first stage in a tree's life. It is created by an adult tree and is located inside the fruit. Once it is safely in the ground, it needs to be fed enough water before it starts to grow." As the last sentence is shown, the seed transforms into a sprout.

The sprout appears and then the next text will show: "Next the seed grows into its child form, a sprout. The sprout begins to grow its roots and breaks through the surface of the soil to reach the sun. Just like how a child learns how to walk, the seed begins to absorb sunlight to make food through photosynthesis." [Briefly define photosynthesis]. "The sprout uses the food it gets from photosynthesis to grow bigger and stronger."

As the following text is shown, the sprout begins to transform based on the text: "The sprout continues to grow from a child to a teenager, or a sapling. Just like a teenager, a sapling begins to look a lot more like a fully grown tree. More leaves grow and green stems beginning to harden and change color. They still need time to grow before they are able to be on their own." A sapling begins to transform into a full grown tree as the following text shows: "Once the sapling is fully grown it becomes an adult tree. Just like an adult, it joins the world of other adult trees, competing with other adults for sunlight. The adult tree beings producing fruit that can feed the animals of the forest. Inside these fruit are the little baby seeds, fall to the ground in the fruit and begin the whole process over again".

2. Interactive Videogames

General Description: The first game teaches students about the different species of trees and where they are located within Costa Rica. The main emphasis of the first game will be on distinguishing the Guanacaste tree, which is the Costa Rican national tree, from other tree species as this is an area of importance for Árboles Mágicos. It also teaches students transversality as they can relate the different species of trees to the different nationalities of humans and how each species/nationality have different roles in the ecosystem/society. The second game will teach students about the parts of the different types of forests in Costa Rica and the biodiversity within these forests. This game allows students to relate the parts of a tree to the parts of their body - which also teaches students transversality. The third game focuses on teaching students about sustainability and ways to conserve resources. This last game gives students the ability to learn respect and empathy for the environment, and can also show students ways that they can make a change in the environment which strengthens leadership skills.

Size: 9.5x6.5 inches

Time Needed: 5-10 minutes

Materials Needed: Tablet or touch screens, website/application

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

Game 1:

The first game is about identifying tree species. Each screen will have a brief prompt to tell the students how the game works and give them brief instructions on what to do. They will have to "match the following trees with their pictures", and there will be four choices with images underneath. One choice will be the Guanacaste tree. When the student gets all the choices correct, there will be a description of each tree and what it's uses are and the animals that live in/use it. The description will also tell students where each tree can be found. Since there are many different types of tree species in Costa Rica, the game will exchange three out of four answer choices, descriptions, and images of trees each time it resets, so that students learn as much as possible from one game. However, the Guanacaste tree will remain constant throughout each time so that students will be able to identify the national tree of Costa Rica specifically.

Game 2:
The next game is a monkey climbing game. Students controls a monkey that needs to climb through a forest, from the understory to the canopy. The monkey will move by jumping from branch to branch as it climbs to the canopy. As the student progresses up the trees they will see what part of the forest they are in on the right. There will also be different animals on branches in different parts of the tree. They will act as obstacles, and when students reach each animal they will learn basic facts. At the end, there will be an overview of the parts of the forest and key highlights about each layer and the animals that inhabit these layers. There will be different levels to show the different types of forests. Easy is the type with the least layers (Tropical Dry Forest), medium is the one with the second most layers (Tropical Cloud Forest), and hard has the most layers (Tropical Rain Forest). There will also be more animal obstacles as the game gets harder.

Game 3:
The third game will be about recycling and topics related to sustainable living and saving the environment. The premise of the game is that students will be playing the role of a secret agent with the task of helping save the environment. There will a map of Costa Rica that contains a few different places to click on. At each place there will be an environmental issue that will require the student's help to solve. Each issue, such as someone throwing plastic bottles into the ocean or dumping trash onto the ground, will prompt the student to make a decision for what the person should have done correctly as there will be three choices on the screen. The student will have three chances to choose the correct answer. If a student selects the wrong answer, the secret agent will then come onto the screen to tell the person what they should've done and why what they did was bad. There will be concepts such as recycling, conserving water, waste management, and general sustainability. As the child progresses, the country will gradually turn from a dirty brown color to green to signify the change from bad to good environmental practices. At the end of the game there will be an overview of key highlights of what should have been learned while completing the game.
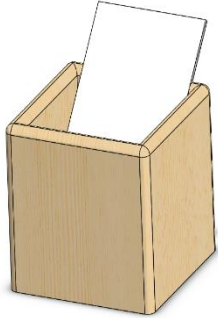
3. Scavenger Hunt
General Description: The scavenger hunt provides students with the opportunity to learn about a tree's specific role in the ecosystem and its symbiotic relationships with various animals. Students will also learn the real-world impact that trees have on the environment and empathy. Students will also use motivational skills of situational interest and student autonomy to actively search for each animal within the mobile nature workshop.

Size: 0.2m cube
Time Needed: 25-35 min (To occur during the entirety of the mobile workshop)
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.

"While you're walking through, keep an eye out for these animals:
Animal, description, where it might be found.
Etc.
Costa Rica is full of many diverse plants and animals. The ones that you found here represent a very small portion of those in all of Costa Rica.

4. Voice Box
General Description: In this activity, students learn how trees communicate through their roots. A pipe with a funnel attached to both ends runs from the large Guanacaste tree near the center of the mobile nature workshop to a smaller tree in a corner. Students talk to each other from two separate points by using the funnel as a microphone and an amplifier. This activity teaches students more basic tree biology and how they can relate tree communication to how humans communicate with each other.
Size: 3.2m long
Time Needed: 1-2 min
Materials Needed: Voice box
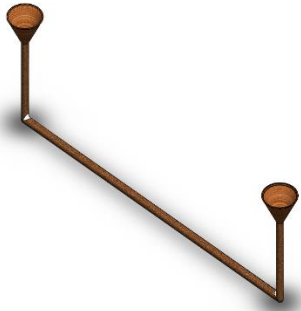
At the tree there will be located a funnel looking device that is camouflaged into the tree itself. Below the funnel will be an information card stating:

"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"

This funnel will be connected to a smaller tree in the corner of the bus where there will be another funnel with the same card to explain the concept.

"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"

5. Video
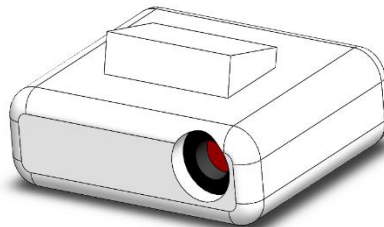
General Description: The video activity depicts a story adapted from an old tale told by many indigenous peoples. Through the video students will learn about trees as a cultural symbol and reinforce trees' roles in the ecosystems. Students will be able to relate to the trees and

animals in the video through empathy and learn to respect trees as a cultural symbol and be mindful of cultures that do so.

Size: Screen: 2m wide x 2.2m tall, Projector: 0.25x0.3m mounted on ceiling

Time Needed: 3-6 minutes

Materials Needed: Projector, Screen

[Video opens panning over a huge tree, and zooms in on a white tailed deer sitting beneath it]

Narrator:

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. On this fine day, Joaquín the white-tailed deer was resting beneath the tree's shade to escape the heat of the day, when a group of Capuchin monkeys approached him.

[Show the white-tailed deer looking up at some howler monkeys]

"Help us Joaquín," the capuchins chattered, "we need to use your antlers."

"For what?" Joaquín responded.

"We want to knock down the tree so we can reach the fruits at the top! The climb is too high for us."

Joaquín was horrified by this suggestion.

"How could you hurt this beautiful tree?" he exclaimed, "it provides us with its delicious fruits! It gives us shelter from the heat and the rain! It provides homes for the birds, snakes, lizards, and more!"

"We don't care, we are hungry now!" the monkeys moaned.

"But if you hurt the tree, think about how many animals will suffer," pointed out Joaquín.

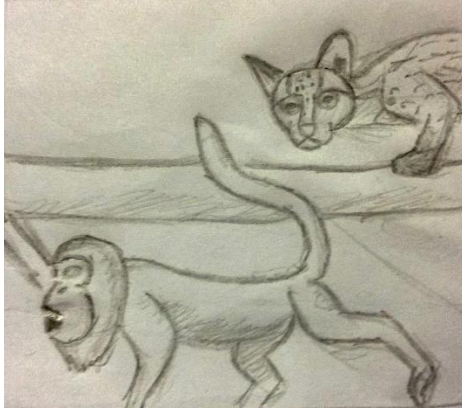[A few baby deer come out from behind a tree and start running around in the shade]

Joaquín les dijo: "Where will my children play? The sun is too hot!"

[A toucan lands on a nearby branch]

Toucan: "I need its berries to feed myself"

[An ocelot appears on the branch behind the Howler Monkeys and startles them, knocking them off the branch]

Ocelot: "I use these branches to nap in the shade. You are not hurting this tree! The trees of this forest provide us with a happy life."

Monkeys reply, "You are right this tree is important, but how will we eat, we will starve up here"

[Suddenly more birds come to gather at the tree and fly the monkeys to the top of the tree]

Monkeys continue to eat the berries, "Thank you! You all are a great community!"

6. Flower Activity

General Description: The flower activity will take place outside of the mobile workshop. In this activity students will reinforce the life cycle of a tree and how trees grow but planting seeds into soil and watering them. Students will be able to take their planted tree home with them as to remember what they've learned in the mobile nature workshop, thus giving students a real-world connection to what they've learned as well.

Size: 0.9x1.2m

Time Needed: 5-10 min

Materials Needed: Soil, recycled bottles, seeds, water, cleaning supplies
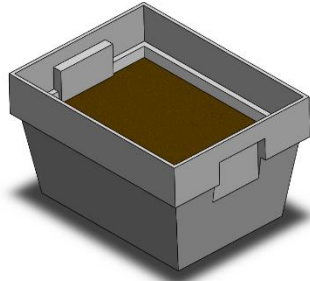
After the adventures through the bus the children will begin to exit the bus and gather around a large bucket of soil and other planting materials. They will all work together to gather the recycled materials and fill them with soil using their hands. There will also be a bag of seeds for planting in the soil. Volunteer will explain:

"To begin to grow, a seed needs access to water, oxygen, and sunlight. It will then soften so that the sprout can break through the hard outer shell and begin to grow. This is similar to a baby that needs love and nutrients to grow and the soil is like the mother that protects and feeds the seed."

7. Role Playing
General Description: This activity involves students dressing up in animal and plant costumes. Students will be able to explore their imagination, which incorporates situational interest and student autonomy into the activity.
Size: 0.5x1m of wall space and .4m out from wall
Time Needed: 2-5 min
Materials Needed: Costumes, Clothes Rack

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.

8. Mindfulness

General Description: The mindfulness activity is a meditation exercise will teach students how to be more mindful in their lives. This activity will occur inside the workshop and will be done in small groups.

Time Needed: 5 min

Materials Needed: None

1. Children will walk onto workshop and sit in a circle around the main tree.
2. They will close their eyes and listen to the sound that the workshop produces and just think about being inside a forest.
3. They will then think about a tree from their youth and about good memories about that tree.
4. The children will make sure to breathe deeply throughout the entire meditation.
5. Children will finally open their eyes and look around the workshop.

Bill of Materials

Item	Description	Price	Source
Vehicles			
Used Box Truck 1	Used box truck. Smaller than others. 2005 Kia K2700 .	c 5.600.000	https://poas.olx.co.cr/se-vende-kia-k2700-05-iid-924363983
Used Box Truck 2	Used 2002 toyota dyna. 171.000km. light cargo only? door on side	c 6.500.000	https://curridabat.olx.co.cr/toyota-dyna-iid-917890060
Used box truck 3	Used box truck. Already empty, large usable space, 1995 International 4700	c 7.000.000	https://mora.olx.co.cr/camion-internacional-iid-923244399
Used box truck 4	Used 2004 GMC 142,700km	c 10.000.000	https://desamparados.olx.co.cr/vendo-exc-estado-automatico-disel-iid-926718568
TECHNOLOGY			
Tablets			
Apple Ipad Mini 4	Apple, simple, small, cheap	c 177.000	http://www.techradar.com/news/mobile-computing/tablets/10-best-tablet-pcs-in-the-world-today-1113985
Ipad Air 2	Apple, sleek, light, well priced	c 205.000	http://www.techradar.com/news/mobile-computing/tablets/10-best-tablet-pcs-in-the-world-today-1113985
Apple Ipad Pro 9.7	Apple, Powerful, large screen, more expensive	c 332.000	http://www.techradar.com/news/mobile-computing/tablets/10-best-tablet-pcs-in-the-world-today-1113985
Tree Communication Tubes	Tube with cones for communication	c 20.000	http://www.cubbyhousekingdom.com.au/products/moreInfo/29/84/Voice-Tubes-with-Anchors
TV	TV to show animation	c 50.000-100.000	https://smile.amazon.com/s/ref=nb_sb_noss_2?url=node%3D6459737011&field-keywords=LCD+tv+32+inch&rh=n%3A172282%2Cn%3A1266092011%2Cn%3A172659%2Cn%3A6459737011%2Ck%3ALCD+tv+32+inch
Speakers	Theater Solutions TS509 5.1 Surround Sound Home Entertainment System	c 40.000	https://www.amazon.com/gp/product/B007S00G36/ref=s9_acsd_zgift_hd_bw_b1B7A_c_x_w?pf_rd_m=ATVPDKIKX0DER&pf_rd_s=merchandised-search-11&pf_rd_r=X0W7PJE5AXEN366CVJZX&pf_rd_t=101&pf_rd_p=6ea8ec92-d293-5a87-a07a-6de3f08a49ae&pf_rd_i=281056
Projector	Projectors for roof decoration and for video	c 25.000-50.000	https://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Daps&field-keywords=projector

Projector screen	2m wide projector screens	c 50.000-200.000	https://huntoffice.co.uk/overhead-projector-screens.html~width=2m_wide
MISC			
Outside decoration	Graphics for outside of the workshop	c 4.425.000-6.637.000	https://www.busbank.com/bus-wraps-commonly-asked-questions-about-them/
App development for tablets	App for tablets for educational games and information	7.500.000-20.000.000	https://savvyapps.com/blog/how-much-does-app-cost-massive-review-pricing-budget-considerations
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	https://www.amazon.com/s/ref=nb_sb_noss_2?url=search-alias%3Dcomputers&field-keywords=life+proof+ipad
signs	Plywood sheets to make signs	c 5.000-20.000	http://www.homedepot.com/b/Lumber-Composites-Plywood/N-5yc1vZbqm7
table	Wooden table	c 50.000-100.000	https://www.amazon.com/s/ref=nb_sb_noss_2?url=search-alias%3Daps&field-keywords=wooden+table&rh=i%3Aaps%2Ck%3Awooden+table
chairs	Wooden chairs	c 25.000-75.000	https://www.amazon.com/s/ref=nb_sb_noss_2?url=search-alias%3Dcomputers&field-keywords=life+proof+ipad
Costume rack	wall racks for hanging costumes	c 25.000	https://www.amazon.com/nexxt-Shelf-24-Inch-5-Inch-White/dp/B016CCSTNE/ref=sr_1_5?ie=UTF8&qid=1487620517&sr=8-5&keywords=wall+pegs+with+shelf
main tree	Tree for inside truck	c 500.000	High estimate from musem interview
Inside decoration	Decorations for the inside of the bus to make it feel like a forest	c 400.000/m^2	From interview with exhibit design specialist @ Museo de los Ninos
ramps	Wheelchair accessibility ramps	c 100.000-500.000	http://www.1800wheelchair.com/category/van-suv-ramps/
Sculptors	To create life-like trees and plants		Jessica Chen 88809162
Graphic Designer	To program any video games for the workshop		Ariel Arburola 25243824

Small workshop			
Item	**Description**	**Quantity**	**Cost per unit (Colones)**
Predictable			
Used Box Truck 1	Used 2005 Kia K2700, 5x2.3m	1	5,600,000
Tree Communication Tubes	Tubes to sim. tree communication	1	20,000
Speakers	Speakers to create forest feel	1	40,000
Projector	Projectors for roof and video	2	25,000
Projector Screen	Screen for Video	1	50,000
Signs	Wooden Signs for inside	5	5,000
Table	Table	1	50,000
Chair	Seating	2	25,000
Costume Rack	wall mounted rack for costumes	1	25,000
Ramp	Ramp to enter workshop	1	100,000
Projected			
Main Tree	Tree for inside of workshop	1	500,000
Outside decoration	Attractive outside of but to draw attention	1	4,500,000
Inside Decoration	Decorations to create forest feel	1	400,000/m^2
Upkeep			
Total Predictable Costs			6,010,000
Possible total costs excluding yearly upkeep			15,610,000
Suggested budget	(including 20% for safety)		18,732,000
Assumptions: Used low end items when applicable, used lowest costs on ranges			

| Large Workshop				
Item	**Description**	**Quantity**	**Price per item (C)**	**cost**
Predictable				
Used box truck 3	1995 international 4700, large box 8x2.3m	1	7,000,000	7,000,000
Apple Ipad Pro 9.7	Apple, Powerful, large screen, more expensive	2	332,000	664,000
Ipad Cases	Cases to protect Ipads	2	50,000	100000
Tree Communication Tubes	Tubes to sim. tree communication	1	20,000	20,000
Speakers	Speakers to create forest feel	1	40,000	40,000
Projector	Projectors for roof and video	2	50,000	100,000
Projector Screen	Screen for Video	1	50,000	50,000
Signs	Wooden Signs for inside	5	5,000	25,000
Table	Table	2	50,000	100,000
Chair	Seating	4	25,000	100,000
Costume Rack	wall mounted rack for costumes	2	25,000	50,000
Ramp	Ramp to enter workshop	2	200,000	400,000
Projected				
Main Tree	Tree for inside of workshop	2	500,000	1,000,000
Outside decoration	Attractive outside of but to draw attention	1	6,500,000	6,500,000
Inside Decoration	Decorations to create forest feel	1	400000/m^2	7,360,000
App development for tablets	Development of an app or website for use on ipads	1	20,000,000	20,000,000
Total Predictable costs				8,649,000
Total costs				43,509,000
Suggested budget	(Including 20%for safety)			52,210,800
Assumptions:	All of the nicest options were chosen, upper limits of ranges were used.		***Links to products are found in Bill of Materials***	

Three-Dimensional Models of Mobile Nature Workshop

The first design we recommend is a relatively small box truck. For this design, the workshop would be a box truck that measures 2.3 meters high, 2.3 meters wide and 5 meters long. Due to the size of this model, only five of the scripted activities from Appendix I would fit. We recommend that the small model include the scavenger hunt, role playing, flowering activity, mindfulness activity, video, and forest experience activities. All of these activities will fit inside the model while leaving room available for wheelchair access and are a smaller investment opposed to other activities recommended.
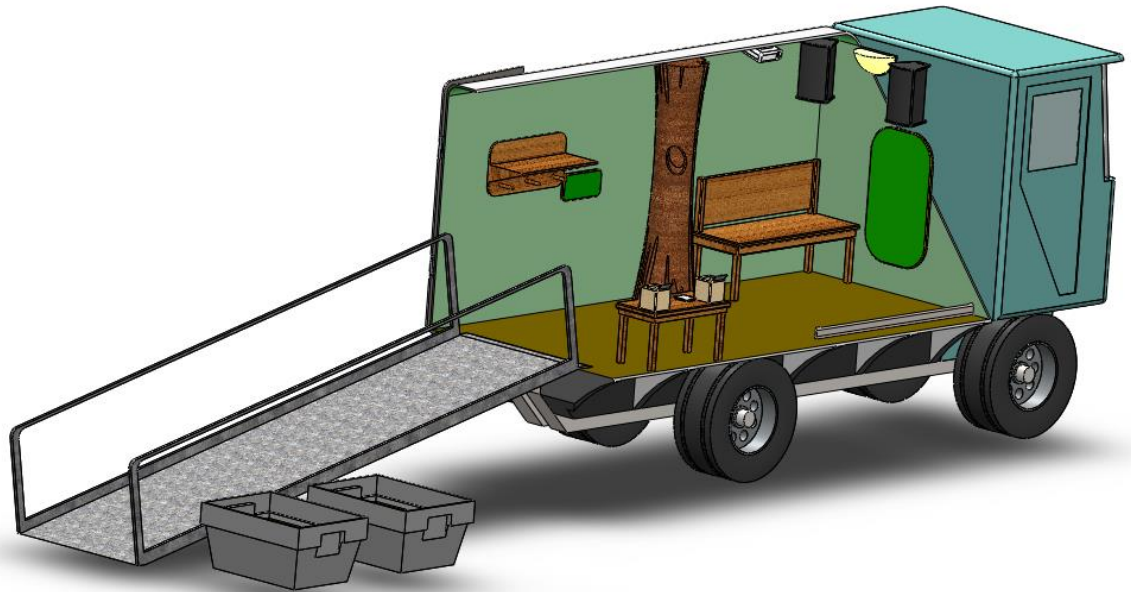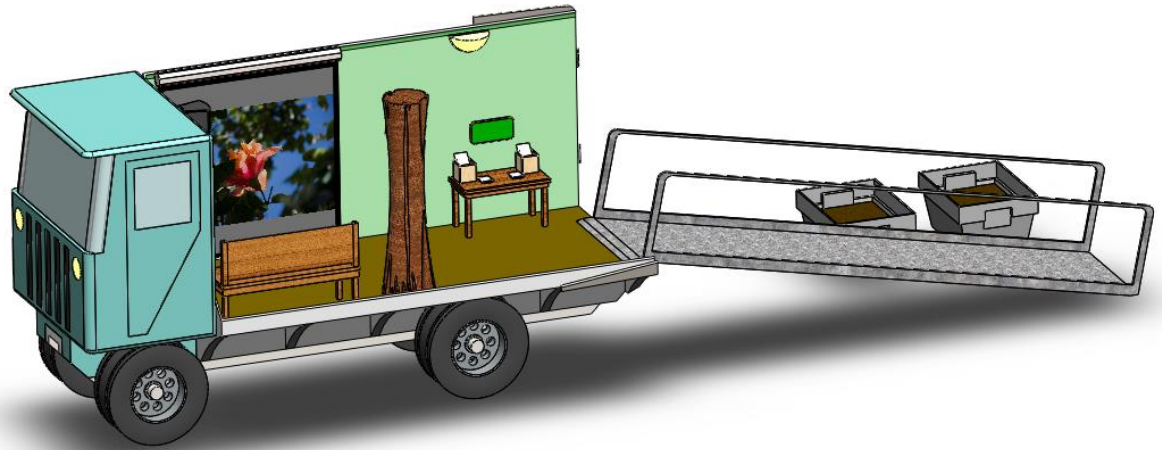
For the second design of the mobile nature workshop, we recommend that it also be a box truck except this larger model would measure 2.3 meters high, 2.3 meters wide, and 8 meters long. This larger model also could hold all eight activities from the activity scripts (Appendix I).
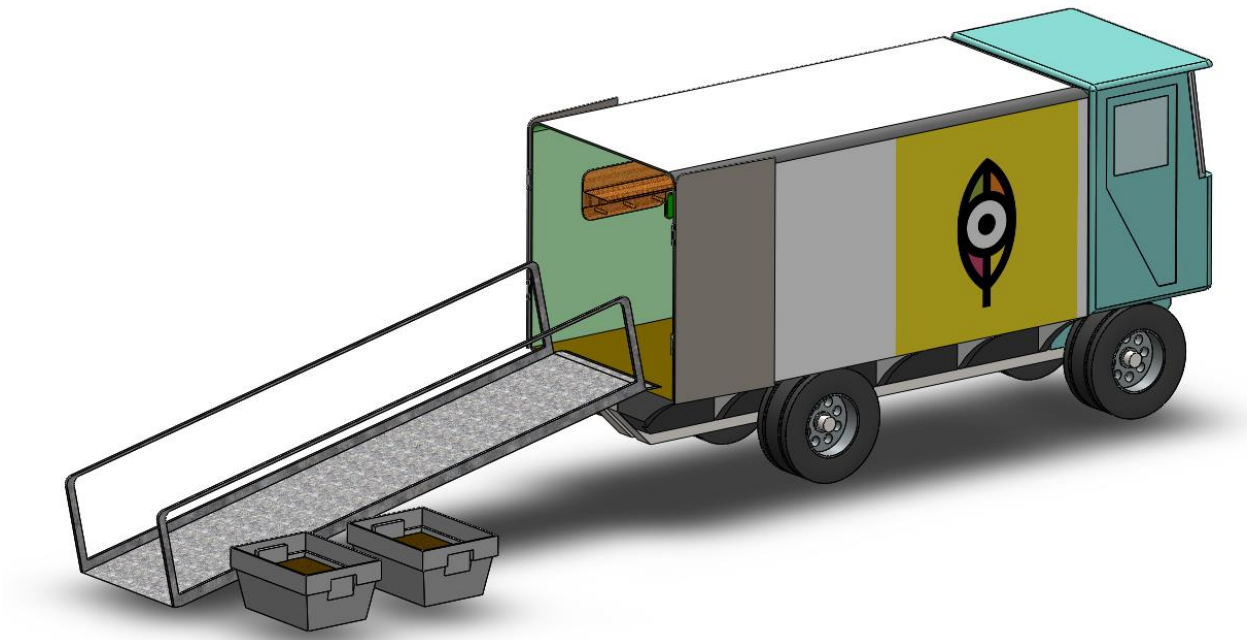
Both models would also have at least one ramp that is approved for wheelchair-accessibility to abide by Ley 7600, which requires all spaces be accessible for people with disabilities. The two models must allow a minimum of 1.52 meters throughout the interior of the workshop to abide by ley 7600. Braille will also be used in the workshop for students that are visually-impaired to understand written information and sign language be included in all video presentations for students that are hearing-impaired. All textual information in the workshop should have a word count between 25-30 words. Museum designers stated that they keep to this range with word count in order to get across information without boring readers.

The interior and exterior of the bus will be covered with plants such as hanging vines, branches, leaves, shrubs, etc. A projector will be placed at the bottom of the bus (not on the floor; preferably on the side of the inside of the truck so it will not be stepped on) to project the view from beneath the Guanacaste tree (leaves, branches → underside of the canopy) onto the top of the that the bus so that it has a forest-y feel. There will also be smells and sounds that mimic being in the forest, such as bird sounds, the smell of flowers and trees, rustling leaves, and insect noises. In the middle of the bus there will be a Guanacaste tree that will be interactive. On the outside of the tree there will be animals hidden throughout so that kids can find them as part of the scavenger hunt activity.
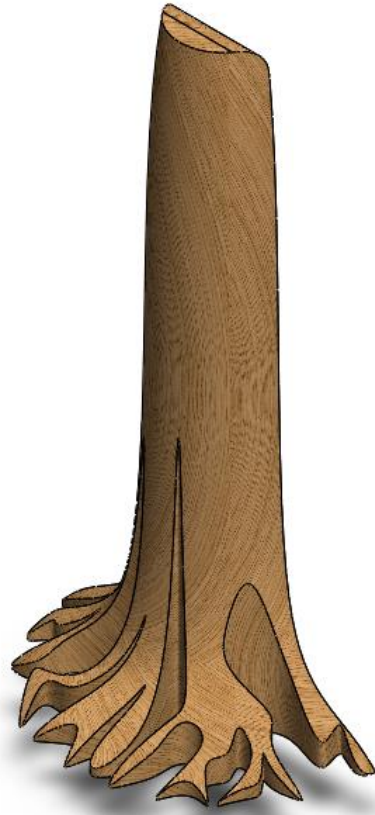
Small Truck Models

Large Truck Models