

Development of a Water Exhibit and Interactive Outreach Program for the Santa Fe Children's Museum



An Interactive Qualifying Project
Submitted to the Faculty of
Worcester Polytechnic Institute
in partial fulfillment of the
requirements for the
Degree of Bachelor of Science
in cooperation with the
Santa Fe Children's Museum
Submitted 12/16/2022



Submitted By:

Cameron Carlin
James Doucette
Mackenzie Pryor
Krish Shah-Nathwani

Submitted To:

Hannah Hausman
Santa Fe Children's Museum
Professor Zoe Eddy & Melissa Belz
Worcester Polytechnic Institute

This report represents the work of four WPI undergraduate students submitted to the faculty as evidence of completion of a degree requirement. WPI routinely publishes these reports on its website without editorial or peer review. For more information about the projects program at WPI, please see <http://www.wpi.edu/Academics/Projects>.

Executive Summary

Introduction and Background

New Mexico has an arid climate with only a few viable water sources. The climate, in combination with residents' underestimation of their water consumption, has led to a lack of water conservation (City of Santa Fe, 2022). This problem needs to be brought to the general public's attention to prevent it from escalating.

Educating children on water issues is an important step in increasing community awareness of household water conservation. Children will return home with the message that water conservation is important, effectively increasing outreach to adults.

Our background research showed that children learn best through play and investigation (Fromberg, 2012, 1:17). Interactive museum exhibits are an effective way of teaching children about topics in an engaging manner. Water conservation can be expressed through a museum exhibit to educate children on its importance.

Our project goal was to collaborate with the Santa Fe Children's Museum (SFCM) to design an interactive exhibit on water conservation. We also worked with the City of Santa Fe Water Division and Simtable to achieve our goal.

Methodology

Our project aimed to design an interactive water exhibit for visitors of the Santa Fe Children's Museum to express the importance of water conservation. The objectives that aided us in reaching this goal are as follows:

1. Gain a thorough understanding of water conservation in New Mexico
2. Recognize child behavioral patterns while they learn from hands-on exhibits
3. Observe various styles of successful exhibits and the features associated
4. Become familiar with exhibit portability and self-sustainability

We used several research methods to assist us in the completion of our objectives: participant observation, interviews, surveys, and comparative analysis. Our team conducted 28 interviews with local experts, museum staff, parents, and children. Additionally, we collected 100 survey responses from visitors of the Santa Fe Children's Museum. We also observed child behavioral patterns and took note of successful museum exhibits at various museums. Finally, comparative analysis was performed to produce findings for this project.

Findings

We identified categories of findings based on our objectives. The categories were:

1. Domestic Water Conservation Perspective
2. Child Behavioral Patterns in Museums
3. Successful Museum Exhibits

Participants of the survey acknowledged that the state does not perform enough outreach in terms of water conservation. Additionally, a majority of participants expressed that they actively think about and execute water conservation during their daily routine. However, a large majority of participants had a lack of understanding on how much water they actually use daily. The average amount of water used per day for one person in New Mexico is 93 gallons. Out of all of the participants who estimated their daily usage, 80% estimated under the average. 24% of participants had no idea how much water they utilize daily. Overall, the data displayed that participants

acknowledge water conservation and its importance but do not know how much water they use on a daily basis.

After conducting visits to multiple museums, participant observation, and interviews, we came to our findings about child interactions within museums. Children are more engaged when they are allowed to explore concepts and experiment in different ways. Collaboration also encourages increased engagement and allows children to explore together.

Regarding successful museum exhibits, we found that interactive exhibits inform children while maintaining engagement. We also found that various approaches, outcomes, and challenges within an exhibit encourages experimentation. Both of these components lead to increased child engagement and prolonged exhibit popularity. Our findings led us to eliminate the possibility of using a portable exhibit to satisfy the needs of this project. Portable exhibits have multiple constraints including weight, volume, power, assembly, durability, and manpower. Due to the limitations of portable exhibits, we concluded that concept distribution was a more efficient method of outreach for our project.

Recommendations

After the conclusion of our findings, our team proposed three recommendations for the Santa Fe Children's Museum to continue this project. The three recommendations were:

1. A stationary exhibit at the SFCM should be created to express the importance of water conservation to children
2. An interactive outreach program should be used to increase water conservation outreach
3. A "Grab & Go Kit" should be sent home with children to reinforce concepts

Recommendation 1: Stationary Exhibit:

A stationary exhibit will be more impactful than a portable exhibit due to the physical constraints a portable exhibit has. In order to create a portable exhibit, certain components need to be taken into consideration, such as: volume, weight, durability, assembly, power, and manpower. A stationary exhibit will remove many of these constraints.

Our team developed criteria for a stationary exhibit to be successful at the SFCM. The exhibit should include:

1. A water conservation theme
2. Interactive and engaging aspects
3. Various approaches and outcomes
4. The ability to collaborate and experiment
5. Accessibility to all users

These stipulations can be used as guidelines to design a successful exhibit.

Based on these criteria, we produced a potential design the Santa Fe Children's Museum could utilize (Figure A). The goal of this exhibit is to prevent water from being wasted. Water is pumped out from the top of the large, center tube, in a manner similar to a faucet. The water is then captured in bowl-shaped funneling pieces on rotating posts to flow down the steps of the exhibit. The user's goal is to transport the water to the bucket at the legs of the exhibit and prevent the water from spilling to the sides. The pieces can be taken off and swapped with different shaped pieces to implement interactivity as well as varying approaches and outcomes. Additionally, this exhibit is spacious enough for collaboration and exploration.

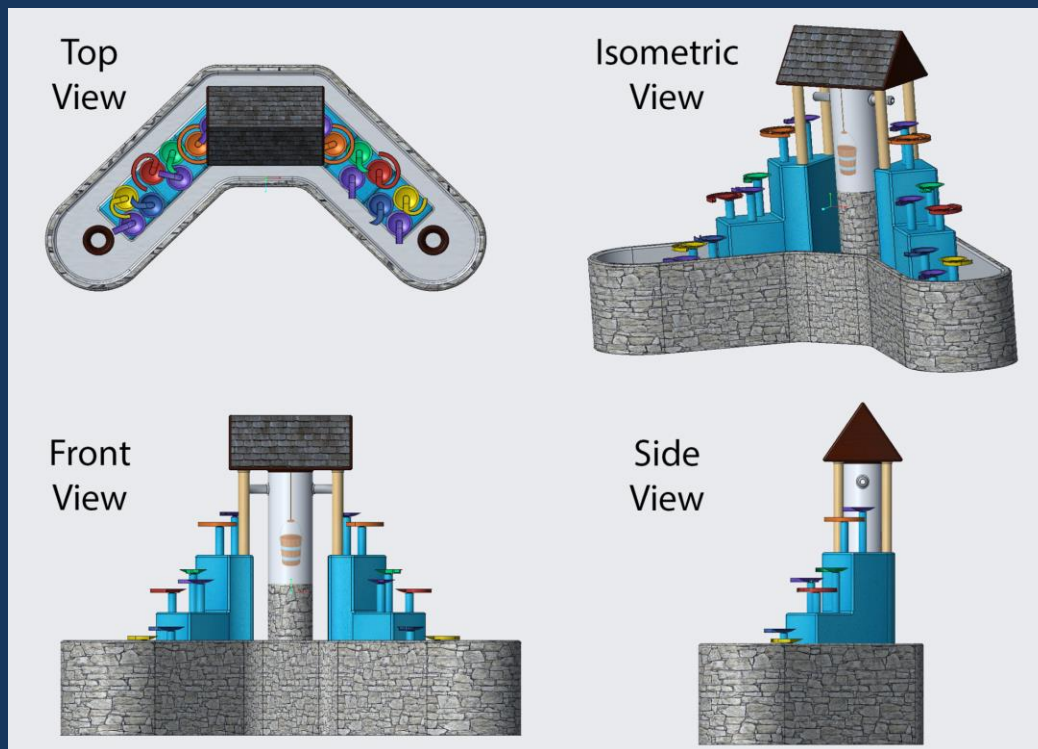


Figure A. *Potential Water Exhibit Concept for the Santa Fe Children's Museum*

Recommendation 2: Interactive Outreach Program:

The museum currently conducts various outreach events at schools. We recommend a water conservation outreach program that contains multiple interactive activities to expose children to the importance of water conservation. A water conservation activity program can contain several displays and games, ranging in participant size and interactivity. We recommend the following activities to raise awareness of water conservation:

1. *Conservation Display.* A faucet that will leak throughout the presentation. This will fill a separate container to display how fast water can be wasted through small actions.
2. *Pollution Activity.* Fishing magnetic pieces out of a tub of water to 'clean' it.
3. *General Water Display.* A 3D printed landscape of northern New Mexico to show where a town's water is sourced from.
4. *Conservation Activity.* A cooperative game where the goal is to transfer water from one cup to another in a relay until every cup has been used. This demonstrates how water conservation is an issue that requires a team effort to make a difference.

We created a supplementary guide that illustrates how the program should be conducted. This guide will allow any staff member to lead the outreach program.

Recommendation 3: Grab and Go Kit:

In addition to a stationary museum exhibit and an interactive outreach program, children should be given "Grab & Go Kits" to take home from the museum or the outreach program. A "Grab & Go Kit" is an activity kit that can be taken home with the goal of reinforcing concepts learned in the museum. Our team has designed the "Grab & Go Kit" to inform families about water conservation practices. We recommend that the kit contains the following items:

1. *Cold Water Catcher Bucket.* This bucket will be placed in the shower to collect the cold water before children get into the shower. The water can then be used to water plants, mop the floor, and wash the car.
2. *Shower Timer.* A five-minute sand timer can be used during showers to help limit water use in a manner reminiscent of a game to keep them entertained.
3. *Faucet Filter.* A faucet aerator will be provided in the bag. The filter will go onto sink faucets and limit the flow rate of the water, which limits the water wasted.
4. *Plant Seeds.* These plant seeds will require minimal water, ultimately raising awareness on sustainability and gardening in addition to water conservation.
5. *Water Conservation Tracking Sheet.* A chart with numerous daily tasks will be included in the kit. Children and their families can all keep track of their water conservation practices on a daily basis. Some of the tracking sheet items may include: *Did you turn off the water while brushing your teeth?*, *How long was your shower?*, and *Did you turn off a dripping faucet?*. This tracking sheet can be completed daily, and then the families can compare them at the end of the week.
6. *Pamphlet on Water Conservation.* The pamphlet will include facts about water conservation and tips to reduce the daily water usage within a household. Additional strategies on conservation using household items will be provided. Using recycled items is an easy way to perform water conservation daily.

These “Grab & Go Kits” will reinforce the concepts of domestic water conservation to families. The goal of the kit is to help children and their families implement proper water conservation practices to decrease the amount of daily water used.

Considerations & Conclusions

Throughout the research process our team encountered some limitations that we were unable to address before the completion of the project. We planned to hold multiple focus groups at the Santa Fe Children’s Museum in order to gauge children’s opinions on exhibits. However, due to cancellations and lack of interest, the sessions were never held. Additionally, our findings made us aware of the importance of including water conservation in New Mexico’s school curriculum. However, our team was unable to research what is currently being taught within the schools. While these limitations have hindered aspects of our research, this deficit is negligible in relation to the project as a whole.

Initially, our team was tasked by the SFCM to design a portable exhibit that would inform children on water in New Mexico. Our research revealed that water scarcity and pollution are major issues within New Mexico. We decided that domestic water conservation should be the topic of consideration. Additionally, we discovered that a portable exhibit is not the optimal method to convey this to children at outreach events. Instead, an interactive outreach program and a “Grab & Go Kit” would be used to increase public outreach on water conservation within New Mexico. This has been paired with a design for a stationary exhibit in the museum to satisfy the idea that children will reinforce what they have learned previously at a museum. We believe that these recommendations will provide the SFCM with an effective exhibit and outreach program on the topic of water conservation.

Executive Summary References

City of Santa Fe Water Sources / City of Santa Fe, New Mexico. (n.d.). Retrieved September 5, 2022, from https://www.santafenm.gov/where_does_our_water_come_from

Fromberg, D. (2012, October 22). *What Kindergarten should be.*
https://youtu.be/YhpM_ibVopo

Stoke @, W. T. | S. T. (n.d.). *Why is Water Conservation Important?* Wave Tribe | Share The Stoke @. Retrieved December 15, 2022, from <https://www.wavetribe.com/blogs/sco/why-is-water-conservation-important>