

One World One Well

Creativity and Inspiration

Kansas City is the City of Fountains and we love fountains. At first we wanted to know how fountains work and do fun experiments with water. But the more we researched water, the more we realized how important water is to all living things. We found out that getting enough clean water is a problem for many people all over the world and even here in the Midwest the Ogallala aquifer is shrinking. There is only a certain amount of water on our planet and only a very small percent of that water is fresh water. For everybody on our planet to get enough water to have a healthy and good life, now and in the future, we need to responsibly share our water and take good care of the water we have. This is a very important sustainability issue that we wanted people to be informed about and to be thinking about solutions to this problem. We want kids to want to grow up and be the kind of engineer or scientist that will help solve this problem. We also want to inspire people of all ages to take measures now to conserve water.

Our exhibit *is overflowing* with STEM principles and concepts.

1. Interdependent Relationships in Ecosystems: Animals, Plants and their Environment
ESS3.C Human Impact on Earth Systems – Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air and other living things.
ESS3-3.3 Communicate solutions that will reduce the impact of humans on the land, water, air, and /or other living things in the local environment.
2. Forces and Interactions: Pushes and Pulls
PS2.A Forces and Motion - Pushes and pulls can have different strengths and directions and pushing or pulling on an object can change the speed or direction of its motions and can start or stop it.
PS2.B When objects touch or collide, they push on one another and can change motion.
PS3.C A bigger push or pull makes things speed up or slow down more quickly
3. Earth's Systems: Processes that Shape the Earth
ESS1.C The History of Planet Earth Some events happen very quickly; other occur very slowly, over a time period much longer than one can observe.
ESS2.A Earth Materials and Systems – water can change the shape of the land
ESS2.C: The Roles of Water in Earths' Surface Processes

This exhibit will remain relevant in the future for many reasons.

1. Current day events indicate that water and people's access to clean water will only become more and more problematic as population increases. Where there is limited access to water, people fight over it, whether it is how much water Kansas farmers can draw out of the Ogallala Aquifer or marginalized people in dry environments just getting enough to water to live through the day. Since the amount of clean water we have on this planet is finite and as long as there are people and living things on our planet, water will be a very important issue to address.
2. The apps and information on the touchpads and interactive screen on the walls can be updated as necessary to be an accurate depiction of facts, conservation tips, and possible solutions. People will leave motivated and knowledgeable about ways to make a difference.
3. The key science principles of forces and interactions demonstrated will not change over time.
4. The modern and future visitor to science exhibits expects interactive and highly engaging exhibits. Ours is; with the added benefit that it ties into Kansas City.

Interactive Exhibit Engagement

We knew that we had an important sustainability exhibit. But we want to do all this in a fun way. After going to Science City, we experienced that some exhibits just look exciting and make you want to run over and check it out. (But please walk – it is a rule at Science City) We wanted our exhibit to be one of those kinds of exhibits – interactive! So we started to dream big and think about what would draw people to our exhibit. **PUMP IT UP:** Since we started with Kansas City fountains, we want there to be a big fountain in a corner of the exhibit that is cut in a cross section for visitors to see how the pump works. In another section of that same fountain, visitors are supplying the energy (instead of the pump) to move the water shooting skyward. Visitors find out how hard they need to pump or push to make the water spray up to different heights. At ***PUMP IT UP*** visitors conduct their own experiments with water and pressure. They can see how using a dial to change the width of the pipe walls affects the height of the water column spurting up or how blocking some of the output holes might affect water pressure. Next: **WATER in MOTION** Even from a distance, visitors can see a huge Archimedes Screw moving water uphill – almost to the ceiling. Upon closer examination you notice that visitors are supplying the force necessary to move this water uphill by turning a crank. You will see that once this water is at its highest point it then starts a chain reaction on its way back down. At ***WATER in MOTION*** there will be multiple ways to see forces in motion as the water cascades down this chain reaction: a waterwheel changing the downward vertical motion to buckets moving around horizontally; water splitting into two channels with one channel turning on a light bulb and the other ringing a bell; a boom box sending sound waves into the water to make the water wobble; a siphon transporting water over several levels; and water sprinkling down on a little rooftop garden in a model of a big city. Then the same water once back to ground level will be recycled back to the Archimedes Screw for visitors to start the process all over again. How fun would it be to create your own Rube Goldberg chain reaction design on the touch screen in front of this exhibit? In our exhibit you can! **DROP into WATER:** You will see a gigantic water droplet hanging from the ceiling and wonder what the visitors get to do when they climb inside! Our biggest mobile component will be launched here at ***DROP into WATER***. See what people do inside the water droplet in the “Digital Online Programming” section below. **WELL of LIFE:** Once drawn into this exhibit, central to the room in much the same way as wells are central to village life, will be a well, grounding the visitor and the exhibit to our sustainability theme. And of course there will be something interactive for visitors to do here at the ***WELL of LIFE***. There will be water- drop-looking-sandbags that visitors can retrieve from the well and carry to another section of the exhibit transporting them to another part of the world where water does not come so easily from a spigot. The touchscreen there shows how much water (or sandbags) each person needs each day to survive, comparative data as to how much people in different part of the world actually use in a day, what scientist and engineers are currently doing to help the problem, and how to conserve both individually and as a city and nation.

Digital Online Programming

Our virtual components are a big part of our overall exhibit. There will be a touch screen by each component explaining the processes at work and including games too! On the wall behind ***DROP into WATER*** will be a huge touchscreen showing time lapse views of how the earth’s land becomes covered with water if global warming continues. The September 2013 issue of *National Geographic* had a pull out map of the continents if all the ice melted. We loved it and want to make it into a time lapse version. Visitors can check out where they live and how long it will be before it is under water or becomes waterfront property! ***DROP into WATER*** itself will house three stations where visitors can climb in, sit in a comfy seat and play games and retrieve information. We can envision an app where you carry water buckets on a yoke across your back and run back and forth across the screen trying to capture enough water drops to do different functions: survive for a day, flush a toilet, and even make a car. And of course there would be different levels depending on how much water is needed. Another app where a ghost of yourself is in a race to get water and has to choose correct information on how to conserve water to gradually change from a ghost to a conservation savvy person. These fun games will include facts about the water cycle, how global warming is influencing our world’s waters, what scientists and communities are currently doing, what still needs to be accomplished, professions to go into to be a part of solving these issues and what anybody can do now to help! Included will be the latest in technology – a desalination plant in Israel getting fresh water from the oceans, Aqua

Science's water harvester getting water from the air, and Hydrophobic Airogels that clean polluted water. Exhibit workers will soon learn that the ***DROP into WATER*** is the place to look when parents can't find their children!

Constructability

The four components to our exhibit can be built mostly with everyday materials that should be within the \$300,000 budget. ***WATER in MOTION*** might be the most expensive because we want it as big as can be afforded. Both the screw and the chain reaction can be made mostly out of wood, metal and plastic components. ***PUMP IT UP*** - Some of the water spurting up in columns will come from a pump and Plexiglas will be needed to show the pump working. Other columns of water will be people-powered at stations where they can pump or push down to provide the force for the water. They can also manipulate controls to change the width of the walls in the pipes or to close off certain holes to build up pressure. For both water components Plexiglas will protect visitors and the floor from getting wet. Additionally, we put ***Pump it Up*** in a corner and ***Water in Motion*** against walls so the water can be contained for safely. ***DROP into WATER***– We want this to look smooth and sleek and big enough for three stations inside. Our mentor thought it could be made out of blue Fiberglass and manufactured in sections. Another expense will be the development of the apps used heavily here and throughout the exhibit. For these apps, we will need six touchscreens (three inside *Drop into Water* – anchored to the chairs- and one for each of the other exhibits built on and attached to a stand for visitors to stand and use.) These should all have a nice big screen – hopefully at least 18 inches and may cost \$1000 each. Then there is the huge touchscreen on the wall beside ***Drop of Water*** that will be as big as possible – maybe 36 inches wide that could cost 2 or 3 thousand dollars. ***WELL of LIFE*** - This will be the least expensive component made out of bricks with a crank to lift up a bucket with sandbags in the shape of water droplets.

Student Involvement

The Creative Problem Solving Model was our guide through the process. First - Define the Problem. We started with the Burns and McDonnell rubric. We visited science city to see what we liked in an exhibit. We wanted something new for Science City, a major WOW factor, and super interactive. Our mentor suggested that we see where our interests took us. The four students' interests were: space travel; robotics; the brain; and fountains and how they all worked. We ranked our ideas against the criteria. Fountains and water was the clear winner. The brain was hard to come up with ideas for the exhibit or to even understand. There was a space section already at Science City. Robotics was a distant second.

We started researching water themes using many current library books and the computer. We continually brainstormed, researched, and then evaluated our ideas. We got excited about the experiments/ demonstrations and got into making siphons. Water going down multiple levels was awesome, which made us think of incorporating a chain reaction. We wondered how pumps worked and thought visitors would like to actually see a pump working. We asked questions like - How could we move water without pumps? That is how we found out about the Archimedes screw. Our mentor encouraged us to look at sustainability issues. We became concerned about people having enough clean water and picked water sustainability as our central idea. We listed important concepts to include. We were inspired by the book [One Well The Story of Water on Earth](#) and picked a well to represent the total amount of drinkable water in the world and decided to put a well at the center of our exhibit to ground our exhibit/visitor to this important theme. We brainstormed titles using the word "well" and fun names for each component. We brainstormed apps. We wanted a cozy place to go where visitors could spend extended time with the apps – playing and learning. We brainstormed again! We evaluated again! We thought about the space we would need– and picked the 40ft by 60ft space to accommodate everything. We turned our room into a mock exhibit to envision how everything would fit, drew our model and made the commercial. It was fun to make – especially the skits!

Thanks Burns and McDonnell for this fabulous experience. **One World One Well** would be an "aquamazing" addition to Science City!

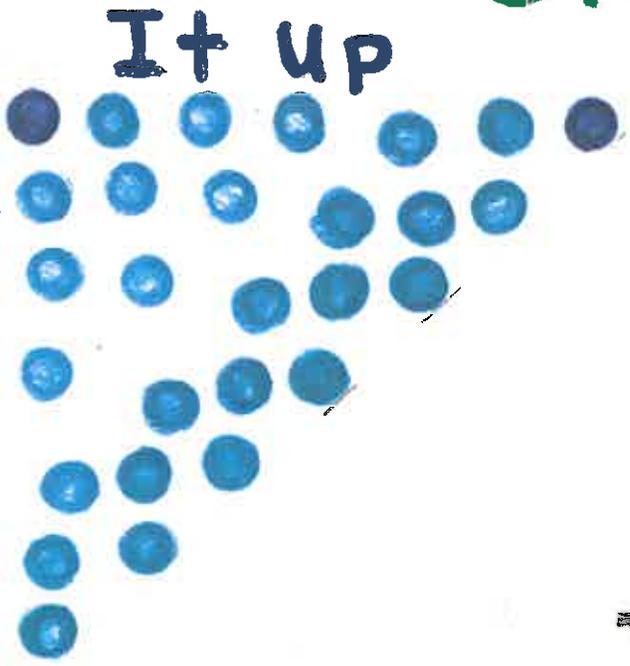
side wall

Back wall

Side wall

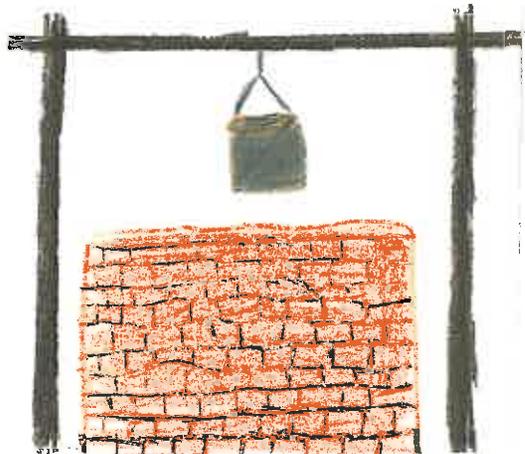
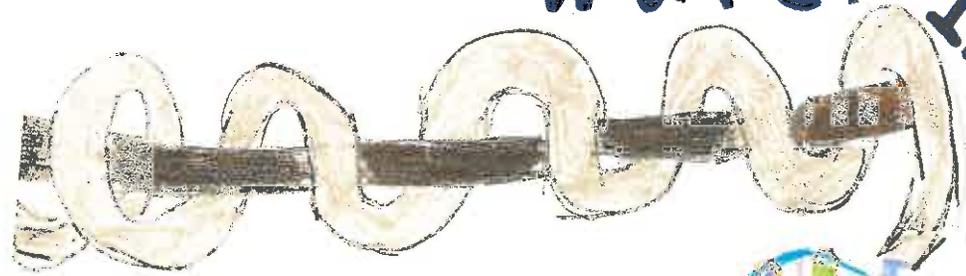
One World One Well

Pump

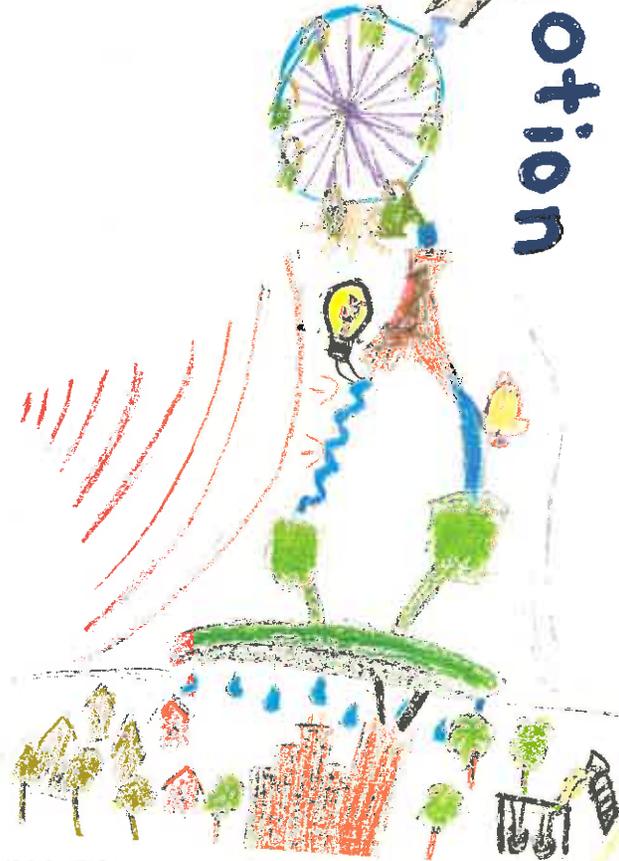


It up

Water In Motion



Well of Life



entrance

Touch screen on wall