# BURNS & McDONNELL.

BATTLE OF THE BRAINS

JUDGING THE BIG IDEA

You be the judge!*

1. Select a partner and a playing card.

2. Your team will receive a proposal to read. Determine if the proposal follows the requirements of:

   ❑ No more than four pages in length (preferably with one-inch margins and font size no smaller than 10 points)

   ❑ Diagrams/sketches of the exhibit are present

   ❑ Rubric sections are all present (preferably in rubric order)

3. Find the section corresponding to your playing card.

4. Use the rubric to evaluate each criterion in your assigned section. Circle the best description of each criterion based on your proposal and assign a score for that section.

5. Add your team results to the other teams who are reviewing the same proposal. Would this be a competitive proposal? Why or why not?

Creativity & Inspiration

Constructability

Interactive Exhibit Engagement

Relevancy
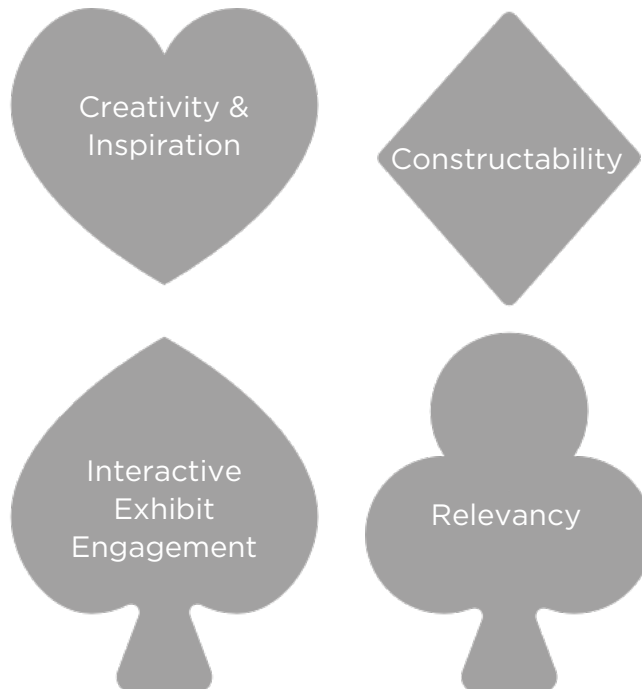
*Since the competition debuted in 2011, we've seen hundreds of great proposals filled with big ideas, STEM principles and amazing student enthusiasm. Sample proposals are provided as representative examples, but please note that the competition rubric changes from year to year, so what you see in these proposals from past competitions may not match the requirements of the current competition.

City in Motion

Everyone is affected by transportation; each visitor arrives at Science City through some form of it and will leave the same way. Each person will come into the exhibit with an initial impression of transportation. After visiting the City in Motion, we hope they can leave with information that will help them through their experiences with transportation.

Our exhibit will delve through some of the many components of transportation such as fuel efficiency, traffic management, and the components of an engine. We will explain which methods of traffic control are most effective, how drivers can conserve fuel and what effects different modes of transportation can have on emissions. Also, our exhibit will break down the engine and explain the individual parts such as the four strokes of an engine. From our exhibit, visitors will learn the most effective methods of transportation, how to conserve fuel, and how their vehicle is running while they are traveling.

An important part of our exhibit is that it explains STEM principles. We will demonstrate a little of each throughout our entire exhibit in a fun and educational way. For example, our exhibit will explain the engineering aspect of a vehicle while visitors are able to enter an enlarged engine. Additionally, the technology used for traffic control will be explained, such as car-to-x communication.

Our interactive engine will allow visitors to enter a room in which they are able to stand inside a piston, turn the crankshaft, or just simply observe what is happening. From this, someone will easily be able to learn about a four-stroke engine. Kids will have fun moving up and down in a piston or turning the crankshaft and watching their friends move up and down. If visitors do not want to participate in the interactive part, on the opposite side of the room we will have a piston moving, hitting the spark plug, and demonstrating what is actually happening when the crankshaft is turned. Whichever way visitors choose, it will be a memorable experience that everyone will benefit from. Also, information will be provided that will include the history of an engine, and what engineers are working towards developing. Although we are only demonstrating a four-stroke engine, the properties of other engines will be explained as well. Our inspiration for this is that many people know very little or nothing about the inside of a car. We want visitors to know the mechanics of something they trust their lives with.

The second exhibit includes a fun carnival game. The activity is inspired from the water-shooting game that everyone on our team has played before. Rather than a regular target, it will be a vehicle. And rather than water, it will be a laser to eliminate the mess of water. Players will compete while learning about how different vehicles have different amounts of emissions. Along with the interactive aspect, information will be presented that explains how pollution is a problem in our world. It will also talk about which ways would be the most successful to reduce emissions. We were inspired to create this exhibit by the increasing problem of global warming. If we can solve just one of the problem areas, it will create a huge improvement in our environment. We hope to educate our visitors so they will understand how important fuel efficiency is and the benefits it can have.

Our third exhibit will feature a model city. Visitors will be able to interact with this by controlling cars on the streets and learning how different traffic control methods work more efficiently than others. Traffic is an issue for everyone. Therefore, this exhibit is important to teach visitors how traffic can best be controlled and which ways are most effective. Different vehicles will also be included such as public transportation and street cars. Another feature that will be included is the explanation of car-to-x communication. As this is just being developed, it will help our exhibit maintain relevance long into the future.

Along with car-to-x communication, our exhibit as a whole will be able to maintain relevance for many reasons. For example, vehicles are never going to go away; we are always going to need to work to improve them. Also, fuel efficiency is a constant thing we are improving in our efforts to create a greener world. The engine has been used for years and will continue to be used. Educating visitors about engines will help them now and into the future.

Interactive Exhibit Engagement

Our entire exhibit is about mobility! But do you want to take something from room to room? If you have our app, it will follow you through each exhibit and provide information for you! If a visitor wants to access it but they do not have a smart phone, each room will feature a large screen that has the app on it as well.

Visitors will be engaged for long periods of time with our various interactive exhibits. Each of our three rooms has its own interactive area that relates to that particular topic. All of the activities are very different and create a nice variety for our exhibit. For example, the engine room has an actual engine that visitors can go inside and the fuel conservation room has an area that resembles a carnival game. These activities will be educational as well as fun and will keep visitors' attention for a generous amount of time.

If any of our visitors have been to a carnival or fair, they will be immediately drawn to our fuel conservation exhibit. When you enter, you will see what looks like a water shooting game. The difference is that the "targets" are different vehicles and whenever the target is hit, "smoke" (actually water vapor) will be emitted from the vehicle. Some of our vehicles will include: a bus, hybrid car, airplane, SUV, diesel truck, and a regular car. The vehicles that are the least fuel-efficient will emit the most "smoke." Which will make it to the top first? At the end of the game, visitors will notice which methods of transportation are least fuel-efficient. Also, when the game is over, information will be displayed that gives the logistics of fuel emission for each vehicle. For example, above the bus target would be information such as miles per gallon or daily emissions and how many busses there are on average in motion each day. Visitors of all ages will have a fun time competing with their friends but they will also learn about fuel efficiency and how to conserve their environment. Leaving this section, people may wonder: Which mode of transportation best protects the environment? How does my family car, or school bus, or the plane I take on vacation measure up? Is there a better way?

Kids love to watch things happen, especially when they get to make things happen! In the engine room, you will notice that it is divided into two parts. On one side is a piston that someone can get inside of. The other side is another piston, but you cannot go inside this one. In the center is something that will resemble a crankshaft that visitors can turn themselves. As they turn this, whoever is inside the piston will be moving up and down, and, on the opposite side of the room, you will see a piston and notice the four strokes individually. This way, if you are not inside the piston you can still understand what is happening. However, being inside the piston will create an experience that is unforgettable: Am I strong enough to power an engine? What else could fuel an engine?

In our last room, there will be a table with a simulation city and roads with different traffic controllers such as stoplights, roundabouts, and speed bumps. Visitors will be able to control the vehicles and come to their own conclusion about which method of controlling traffic is most effective. Also, there will be an "Optimal Performance Button" that can be pressed which will show the most ideal situation in which traffic can flow. Visitors of any age will benefit from this exhibit. Adults will learn how they can better proceed through traffic and it can make kids ask questions as to how traffic can be improved and they can take that inspiration to create better ways of traffic management in the future. People will have a great time getting to control the vehicles in this exhibit while learning about traffic. Imagine: Could I solve those traffic jams on the way to school or work?

Digital/Online Educational Programming

Our exhibit will include an App that all visitors can use. It can follow them from room to room and can also stay with them beyond their trip to Science City. All of the information provided in the exhibit will be translated easily to our app. Inside our app we will include the main idea of our exhibit and additional information that helps teach visitors even more. Also, links will be provided throughout that will take you to trustworthy websites that include even more useful information. It will challenge visitors to understand everything about engines and have fun while doing so.

Student Involvement

Each member of our team is strong in a particular area of STEM. We were able to discuss what knowledge we have. From there we began brainstorming ideas that included some of our strengths. We visited Science City to get ideas of the kinds of exhibits that are already in place. We decided on something relating to transportation because it affects us all and if we wanted to learn more about it, surely others do too! Also, we thought more could be done with that topic. Deciding on a specific topic within transpiration was difficult so we combined a few. In small groups, we brainstormed designs and concepts for our rooms. After we finished that, we split again into groups that drew the rooms on Google Sketch-Up and researched or worked on other aspects of the project.

We came up with many different ideas initially such as: A shoe that will charge your phone as you walk, a Rube Goldberg system that transfers human energy, and finding alternate fuel sources. However, we decided to go with our exhibit because we felt it would be the most informative and will remain relevant into the future.

For our commercial, one of our team members is in a film class so he was able to use the resources available to him through the film class. This included a camera and editing software. The research aspect of the project was done using the Internet. Excel was used to create the cost list while Word was used for our writing portion. Along with Google Sketch-Up, Inventor was used to draw some parts of the exhibit.

Our Burns & McDonnell representatives were extremely helpful. They broadened our perspective for what we could do with our exhibits. Our teachers were very helpful as well because they allowed us to get in contact with whomever we needed. For example, a friend who owns a carnival was contacted for information of the cost of a water-shooting game.

Our team members could go into several career fields that branch from this exhibit. These could range from a traffic engineer, automobile designer, or even a designer of future methods of transportation. Working to create a better method of traffic control would be a great field to go into. Any career relating to our topics in transportation would be very successful because they are such relevant areas of concern.
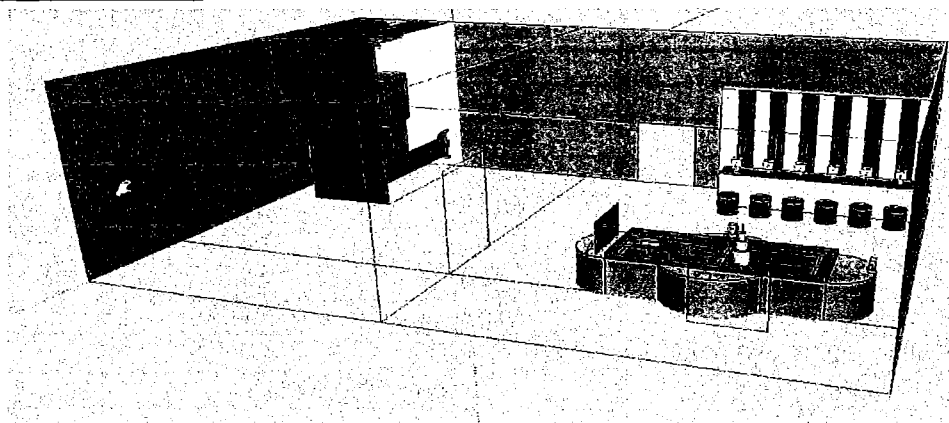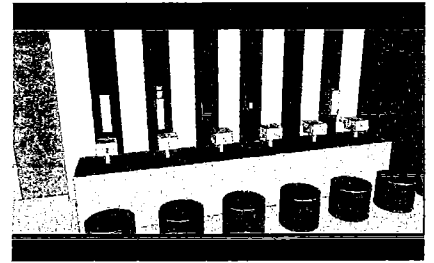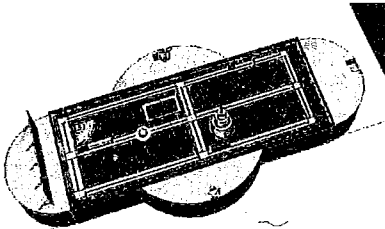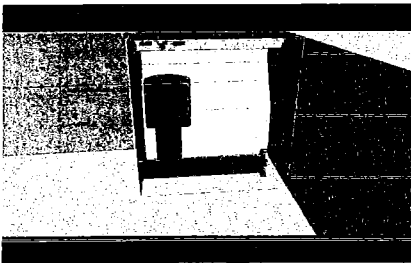
Constructability

A car can last 500,000 miles, but our exhibit can last through 500,000 visitors! Several steps have been taken to ensure our exhibit is durable. For example, Universe City is a hands-off exhibit, the vehicles inside will be completely protected and will last longer than any toy cars a 4-year old might be playing with. Also, if you think about it, carnivals travel all over the country and they are constantly taking setting up and taking down their trailers. If the games can last through that, surely they can last in our exhibit! Our exhibit is very safe. For example, inside the engine, there are boots for visitors to put their feet in so they won't be moved around. Also, rubber flooring is in our rooms to keep visitors from injuring themselves. Our cost estimate is below.

Quantity	Product	Unit Price	Expanded Price	Custom?
		Universe City Exhibit		
3	RC Cars	$14.99	$44.97	
3	Electronic Steering Wheel	$75.00	$225.00	
4	Model City buildings/Structures	$45.00	$180.00	
6	2x6 Monitor	$300.00	$1,800	
1	Wood Table	$1,600	$1,600	Yes
9 Per Pkg	Model Railroad Track (42ft)	$35.00	$315.00	
1500	Electrical Wiring (1ft)	$1.50	$2,250	
1	14' x 7' green fabric	$0.40	$40.00	
1	Railroad Hub Unit	$115.00	$115.00	
		Fuel Efficiency Exhibit		
6	Model Squirt Gun	$675.00	$4,050.00	
6	Mounted Swivel Stool	$125.00	$750.00	
1	Platform	$1,200.00	$1,200.00	
3	Smoke Machine	$149.99	$449.97	
1	Prius Model	$33.79	$33.79	
1	Smart Car Model	$89.99	$89.99	
1	RV Model	$53.74	$53.74	
3	RC Cars	$14.99	$44.97	
3	Touch Screen TV	$3,700.9	$11,102.97	
1	Table 18' x 3' x 3'	$1,200.00	$1,200.00	Yes
		Model Engine		
	Plastic Sheets:			
6	3' x 10'	$22.14	$132.44	
3	2.5' x 10'	$23.14	$69.42	
2	1.25' x 10'	$24.14	$48.28	
2	1' x 10'	$25.14	$50.28	
2	8' x 9.3'	$26.14	$52.28	
1	8' x 1.75'	$27.14	$27.14	
1	Strobe Light	$18.99	$18.99	
1	Smoke Machine	$149.99	$149.99	
1	PVC Pipe (27ft)	$35.99/10ft	$97.18	
1	Toggle Switch	$200.00	$200.00	Yes
1	Rubber Flooring (300 Sq.ft.)	$1.73/sq.ft	$519.00	
1	Custom Mold	Approx. $50,000.00		Yes
			Total	$78,509.37

Healthville (Health/Biomedical)

Ouch! I'm hurt! Where should I go to get my leg fixed up? **Healthville** is a super fun science exhibit that teaches about health. The main idea of **Healthville** is to explore anatomy, interact with biomedical tools, choose healthy foods to live right, diagnose and treat diseases, and perform medical treatments on patients. What kids learn here can also help them make healthy choices and maybe even motivate them to pursue one of these jobs in the future.

Our STEM concepts are:

Rl.1.2 Identify main idea and details in text	R1.2.3 Connect scientific ideas or concept to text	RST.6-8.3 Follow precisely a multi-step procedure
R1.1.10 Read appropriate text for grade	W.3.7 Conduct research projects to build knowledge	WHST.6-8.9 Draw evidence from informational text
W1.8 Gather info to answer question	Rl.4.7 Interpret info presented quantitatively	RST6.-8.4 Determine meaning of scientific terms

Welcome to Science City's very own **Healthville!** When you enter by our cool red cross road, you will find **Healthville's** very own **Health Mini-Mart, Doctor's Physical Clinic, Healthville Hospital,** and **Robotic Surgery Center.**

Creativity, Inspiration, and Online/Mobile Component

In the **Health Mini Mart,** kids and parents will choose from two different modes: *mode 1* is a snack mode which gives you $15 to spend wisely on healthy snacks for the week or *mode 2,* a lunch mode which gives you $30 to spend wisely on lunch. People scan the food they would like to "buy". When they scan the food labels, it tells them not only how much it costs, but the percentage of the minimum daily requirements they will have from eating that food. Also, it will tell you exactly how much exercise you will have to do to burn these calories. In the corner of the scanner screen, it will tell you how much money you have left to buy nutritious snacks or lunch for the week. When you dock your scanner at the checkout counter, a computer will print out a receipt of how healthy your food choices were. In the grocery store, posters will tell nutrition and health facts. There will also be one chart telling the minimum daily requirements for different-aged people.
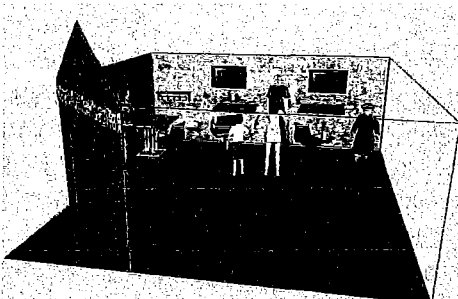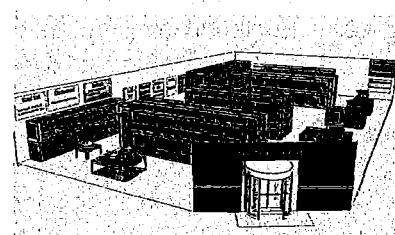
In **Healthville Hospital,** patients are painted on the wall with small display QR codes, two-dimensional barcodes, on their bodies. You will take a scanner and scan the patients' QR codes. The scanner tells all the health data such as blood pressure, heart rate, allergies, reflexes, temperature, etc. Each time you go to a patient, it will have different symptoms. You then enter the data from the scanner into the computer. It diagnoses and tells you what is wrong with the patient. You will use the data and figure out how to fix the patients' symptoms. This answers the challenging question in biomedical science of using handheld scanners to diagnose health concerns. Email yourself to see if your treatment fixed the patient.

In the **Robotic Surgery Center,** a big screen shows the robotic surgery of a remote patient. There will be three robotic armed stations where you can perform a heart transplant, practice lung transplants,
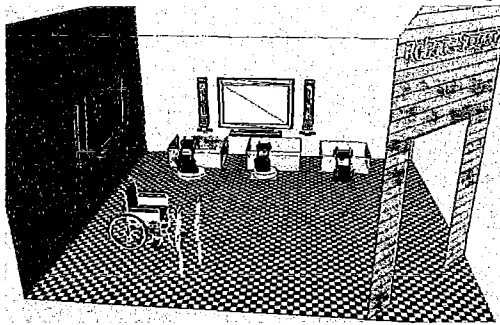
or put a pin in a broken leg. There will be a poster by each station telling you about robotic surgery and about the specific surgeries. The medical surgeries are of three difficulty levels: the heart transplant is very hard, the lung transplant is not as hard and the pin in the bone is super easy. We researched the DaVinci surgical robot which can conduct surgery remotely. Patients heal quicker and with less complications with this method.

In the **Doctor's Physical Clinic**, two medical simulation patients of the kind they use in medical schools

and with paramedic training are positioned around the room. One of the patients will teach kids and parents the three steps of CPR. Who knows if this early training may save future lives! The other simulation patient teaches kids all about how to give a physical to a patient. With the patient, you can actually check the pulse, take blood pressure, dialate pupils, listen to the stomach gurgle, listen to the lungs, check temp, and listen to a normal and not normal heartbeats. A poster in each area tells what to do. Kids use real tools like scales, thermometers, and stethoscopes, dressing up like doctors themselves. It will also be decorated like a doctor's office, with scales, height charts, and eye charts.

Perform robotic surgery, shop wisely for nutritious healthy food, and even diagnose common illnesses. But let us give you an inside scoop on how we accomplished all this. First, we had to brainstorm lots and lots of subtopics in the health and biomedical field. Second, we had to look very hard at the challenging questions in this field. Then, we researched the current advances in this field such as robotic surgery. Soon we were doing the Crawford Slip Method to decide our four health smart activities. After that, we elaborated our four areas. Finally, we filled out a job application and were assigned two jobs that our teacher thought would fit us the best. Then, we got to work.

Here are four reasons the exhibit will remain relevant to the future:

1. Kids will know how to make good nutritious food choices so they live longer. They will learn how to read nutrition and Nu-Val labels. They will learn which of their favorite snacks are healthy and which are not. It also will help kids learn how much exercise they need if they eat this food.

2. They will have an idea of what robotic surgery is like and it might inspire them to become a surgeon themselves. **Robotic Surgery** allows the top surgeons to work on patients from far away. The benefits of this surgery are it is much more safe, more precise, and patients heal quicker. It also gives people better chances of survival. It is a very successful biomedical tool.

3. In the **Doctor's Physical Clinic** you learn how to do C.P.R, You will also listen to the heartbeat of a person and hear the stomach growl. Parents and kids learn how to take their temperature so they can do this on themselves in case they feel sick. You also dilate pupils, check blood pressure, check pulses, and listen carefully to the lungs. All of these activities open kids' eyes to the world of medicine and healing. All of this is medically relevant since we have a high demand for doctors in MO and KS.

4. Scanners in **Healthville Hospital** will be relevant in the future, because with biomedical engineering, doctors will pull scanners out of their pockets and diagnose what is wrong in a matter of minutes. According to our research, in the future we will have scanners built into our houses that will tell us our blood pressure, pulse, temperature and other health data. This allows everyone to know if they are sick the moment they enter their house.

Interactive Exhibit

In Healthville, people have over 10 learning opportunities to investigate our fun. It is estimated that they will spend at least 40 minutes in this activity. First off, we have the **Robotic Surgery** center where people learn about the technology that doctors have been using with robotic surgery. After watching an informational video on the topic, the kids will get to try it out themselves in three different medical stations. They can connect a heart valve, pin a broken leg, or conduct a lung transplant.

Next, we have the **Healthville Hospital**. In this area, children scan the QR codes on their patients. Symptoms pop up on their computer screen. Kids find out how to treat their patients, and then later find out, by emailing the results to themselves, if they cured their patient or not.

Then we have the **Health Mini Mart**. In this part of the cool exhibit, kids will have the chance to go shopping at the grocery store just like Mom and Dad and see if what they are buying is really healthy. Each person will receive a scanner to scan what they think are healthy snacks. If their choices are not nutritious, they go back and try again. To help them choose what is right, we will have nutrition labels and the Nu-Val labels in front of every food. Finally, we have the Doctors Physical Clinic. In this area, kids can pretend to be the doctor themselves by dressing up and treating almost real life dummies. They can practice CPR, dialate pupils and take temps and blood pressure. This dummy even breathes and has tears! It's a fun way to play doctor, while at the same time learning about the everyday job that people perform. This area may even move kids to become a doctor themselves.

In our very own research, we tried to hit as many STEM concepts as possible. We added many different ways to have fun, yet learn at the same time. During our research we ran into a lot of good ideas, but they had little to do with the STEM concept like a Doctors' Play Place. We declined this idea because just playing doctor had nothing to with STEM. A firefighter told us about the teaching dummies which has more STEM. Another idea was to have walls in our exhibit, but we did not use this because it would cost too much money. We also talked about doing an animal DNA, but Science City did not want animals in the exhibit. Some ideas were off the wall impossible, but we kept trying until we settled on our current idea. We teach all ages how to make healthy food choices, do robotic surgery, learn CPR, and even diagnose like a doctor! Every age can be helped by learning how to take care of their health.

In our research, we learned about many challenges in health such as vaccine development, biomarkers, and engineering cells to fight disease. One challenging question we addressed was that doctors need an easier way to diagnose patients without going through so many tests, like maybe just scanning the person? Sound familiar? We developed our own with the QR codes on the patients. Another question is the health of children. Our Health Mini Mart helps address nutrition. Our Surgery Center and Doctors Physical Office address the latest technology in biomedical engineering and the ability to provide medicine remotely.

We added as many WOW factors as we could to each room. We added real robotic arms in robotic surgery. We gave kids a chance to do surgery, plus use wheelchairs and crutches. In the grocery store, you buy whatever you want and check nutrition. In the Doctor's Physical Clinic, you can use tools doctors use every day, but on simulation patients. In **Healthville Hospital**, you scan QR codes on the dummies in order to diagnose the illnesses of the patients.

Our online educational game/app is a surgery game. You do a kidney transplant and correct a heart arrhythmia. This idea was inspired by a game at http://www.edheads.org/activities/aortic/.

Constructability

Because safety is really important, our exhibit has no sharp corners, no small parts that people could choke on, and everything is low and accessible to people's reach. We also plan to sanitize all the handheld devices and materials kids will be using.

Our amazing exhibit is durable because everything is made of quality materials, for example, the robots in the robotic surgery center. It will be the same with the other parts of awesome exhibit. Therefore, it should be years before the exhibit shows any sign of weakening.

Materials/Cost

Robotic Surgery 2 computers: $1,400.00 2 monitors: $1000.00 3 chairs: $1000.00 3 desks: $1500.00 1 wheelchair: $230.00 1 pair of crutches: $85.00 3 robotic arms: $30,000.00 store front construction: $ 1275.00 Total: $36,490.00	**Doctor's Physical Clinic** 2 health room cots: $500.00 blood pressure cuffs $150.00: doctors kit: $500.00 scanning thermometers:$300.00 flashlights: $35.00 doctor coats: $100.00 pillows: $12.00 2 tables: $400.00 2 medical simulation dummies: $4500.00 store front construction:$1275.00 Total: $7772.00
Health Mini Mart fake food: $600.00 cubbies and pretend freezer: $2000.00 nutrition labels: $484.00 2 computers: $1400.00 4 tables:$200.00 10 scanners: $2,000.00 store front construction: $1275.00 Total: $7959.00	**Healthville Hospital** 3 (Laerdal) simulation dummies: $4800.00 model heart: $1,500.00 height and weight measure/scale: $500.00 patient smocks: $100.00 store front construction: $1275.00 QR scanner: $ 150.00 Total: $8,325.00 **Exhibit Total: $60,546.00**

Student Involvement

STEM concepts were researched by going onto websites that were approved by our teacher. Then we shared what we found with the rest of the class, voted on what we liked, and went into further research. We then started to take our ideas and make them more realistic. When good enough, we started designing the exhibit on Google Sketch Up. We also started the commercial, application writing, and pricing. Each work team had about four students on it. When we finished a job, we went to help on another team.

In the process, we rejected three ideas. One idea we changed was having only one robotic surgery. It was going to be mostly watching the surgery, so we added more hands-on. Another Idea was an online health quiz. We said no to that idea was because it was not interactive or exciting. Another idea we rejected was making the walls go all the way round the activities. Because it would cost too much, we choose do a store front. Also the drop is better because then people can go around the drop if they want to.

We used these resources in our research:

Biomedical Advances: **http://tinyurl.com/on7dkan**   Global Health:http://tinyurl.com/ma3tt5m

7 Predictions for Medical Advances **http://tinyurl.com/mne9k6q**

Top 10 Medical Advances: **http://tinyurl.com/kp9nho2** Tissue Engineering:http://tinyurl.com/mxrhlbm

Nuclear Medicine Advancements:http://tinyurl.com/lmcwzno

Predicted Advances of 2012: http://tinyurl.com/6ww53uc Sports Medicine: http://tinyurl.com/khqfjg7

Jobs related to this topic are nurse, grocer, doctor, surgeon, engineer, computer programmer, receptionist, nurse practitioner, chemist, dietician, and scientist.

In conclusion, **Healthville** teaches children, and adults, the ways of medicine and nutrition, all while having fun at the same time!

Recycle City

Creativity and Inspiration

It is all around us: trash, garbage, refuse, rubbish and junk. Everyone can help be a solution to this problem. Our school already had a program in place to recycle paper, plastic, metal and cardboard, but we wanted to do more! So we decided this year that our school would step up its efforts to reuse, reduce and recycle by introducing a full recycling and composting program during breakfast and lunch times.

With the help of adults, it took no time for students, kindergarten through 6th grade, to learn what items go in which bin during breakfast and lunch. Now our school has reduced the amount of garbage that goes to the landfill from 8 bags of trash a day to less than 1 bag of trash.

We thought we could show everyone how easy it is to reuse, reduce and recycle at school, at home and everywhere. If everyone knew the steps, the rules and how recyclable things can be reused, we could make Kansas City and the world a better place.

Recycle City will be exciting because it will explain where we have been in the past, where we are now, and where we could be in the future when it comes to how we deal with our trash.

Recycle City will be like no other exhibit at Science City. We wanted to teach others about how many things in our world can be reused and not just thrown away. Recycle City will provide a place at where students will be able to participate in activities that will test their knowledge of recycling and composting. Some exhibits will discuss the history of recycling and the impact on the environment of not recycling. Some exhibits will have students decide what can and cannot be recycled as well as what recyclable items can be turned into. All of our exhibits will be hands on and have an on-line activity that closely resembles the one located at Science City.

Students' inspiration came from the Next Generation Science Standards at nextgenscience.org

HS-ESS3 Earth and Human Activity

- HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.*
- HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
- HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*
- HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Interactive Exhibit Engagement

We think it is important that all video displays and demonstrations be actual footage of the processes involved with recycling and composting. Students have found some of the on-line resources show cartoons or items going into a 'magic box' to be turned into a recycled item. We believe it should be represented in the most realistic way to remove any mystery or misconceptions.
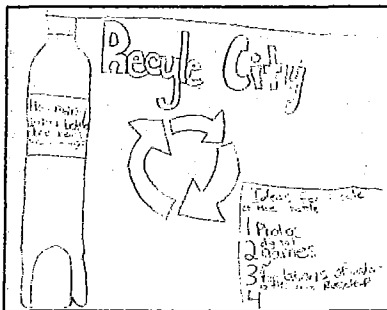

Giant Water Bottle Entrance - Visitors to Recycle City will enter through a giant water bottle made from small water bottles. Across the front of the bottle and above the entrances will be a digital counter of how many water bottles have been produced this that day, month, year and century.

The giant water bottle label will include facts about water bottles and how many are recycled at year (only about 13%) and what countries use bottled water the most. Part of the water bottle exhibit will include interactive touch screens that will allow students to enter their birth date and guess how many water bottles have been produced in their life time. Other multiple choice questions will include how far would a line of those bottles

produced during their lifetime stretch and how big of a block of plastic could be made from those bottles. Students will be asked to make predictions about how many bottles will be produced in their lifetime and possible other choices besides plastic water bottles. ***Digital Component: Information presented will be the same. The on-line activity would be the same with the student giving their birth date and answering the questions.***
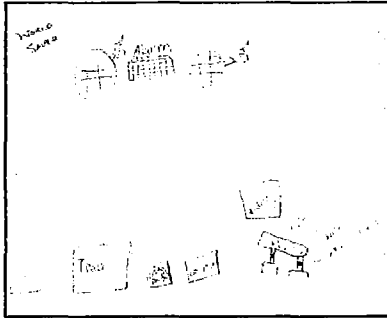
World Saver - Visitors will be given the task of sorting models of different types of items people throw away. This exhibit will have several stations where visitors can compete how fast and how accurately they can sort the items into the correct bin. The game starts with items 'dumped' from a garbage chute above each players table. The player then has one minute to sort through items to be paper, glass, plastic, metal, cardboard or compost. For each item sorted correctly they will earn a point. For each item placed in the wrong bin, they will lose a point. When they sort an item correctly, a bell will ding. When they sort an item incorrectly, a buzzer will sound and drop another item onto their table. Above the game will be video displays of the commercial process of sorting items. ***Digital Component: Information presented will be the same. The on-line activity would be the same with the student sorting virtual items into the correct bins.***
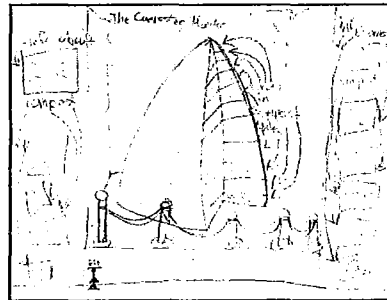

Compost Monster - Visitors will be introduced to composting by viewing a larger than life compost pile cross-section model. Facts on the wall next to the model of compost will give facts about what can and cannot be composted along with how much has been composted in the Kansas City area. On the wall will also be a review of how compost can be used and how it has been used in the past and possible uses in the future. Students will use touch screens create their own virtual compost piles. The items to create the compost pile will include food items, yard waste, paper and possible bad items like cooked food and dog/cat waste. Students can encourage the rate of composting by virtually turning the pile or introducing composting worms. The activity will record the best compost pile constructions for the past week. ***Digital Component: Information presented will be the same. The on-line activity would be the same with the student constructing a virtual compost pile with a composting grade given for each try.***
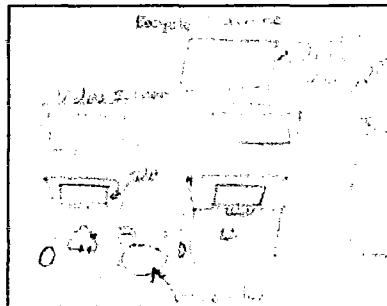
Recycle Machine - Visitors will pick from a variety of recyclable items and put them in a 'recycle bin'. Depending on what the student chooses to recycle, a list of 8 to 10 items will be displayed on a touch screen. The student will select what they want their recyclable to become. After selecting what they want the item to become, a video will show the process from the initial recyclable item to the finished product. The exhibit will keep a running total of which item is selected to be recycled the most and what item is selected to be produced the most. ***Digital Component: Information presented will be the same. The on-line activity will keep a running total of which item is selected to be recycled the most and what item is selected to be produced the most from the on-line participants.***

Paper Becomes Paper - Visitors will learn about paper consumption and recycling especially regarding schools. With an exhibit that looks like a giant pile of stacked newspapers and school worksheets. The interactive display will be large touch screen monitors. Students will be asked multiple choice questions about how much paper students and schools use. Students will be informed about how much paper can be recycled from schools and how many trees can be saved. ***Digital Component: Information presented will be the same. The on-line activity would also include an interactive multiple choice quiz.***
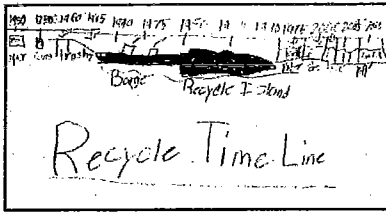
Recycling Timeline - Starting near the entrance to the exhibit will be a giant recycling timeline. Included in the timeline will be examples of recycling from different parts of history. A more detailed timeline will start with modern recycling efforts starting as a result of the Great Depression, World Wars and the recycle movement of the 1970's. An interesting part of the timeline will include how many recyclable items could have been saved and reused during each time period. *Digital Component: Information presented will be the same. The on-line activity would also include an interactive multiple choice quiz.*

Student Involvement

We knew we wanted our exhibit to be fun and have students learn. We thought about how we could have an exhibit that would not be like any other at Science City and still be interesting to us. We also considered how easy it would be to build, how kids would interact with the exhibits and how many students would be able to do the activities at a time.

Our original ideas included models of the human body that students could walk through and ideas for transportation. Students quickly understood that the human body experience would be a lot like the Body Venture traveling exhibit. Students also realized the transportation ideas would be too big to be practical or would not be able to have a lot of students participate at a time.

When we decided on recycling and composting, students brainstormed ideas for individual exhibits. As students came up with their initial ideas, they were assigned to develop their own part of the Recycle City exhibit. Students found the best way to research their topic was to 'Google' what they had in mind. Their on-line research helped narrow down what they wanted to include in their exhibit and what NOT to include in their exhibit.

Each student sketched their idea on paper or on the white board. Each student also wrote a short description of how their exhibit worked and what it was going to teach. We kept a master plan of the entire exhibit at the front of the room to help each student understand how it will all come together. Students were responsible for the script for their section of the video.

As a team we made suggestions and helped other students with our final video and entry.

Constructability

We researched several websites to determine the cost of our exhibit. Prices were gathered from Best Buy, Barcode Giant, FedEx Kinkos, and Grainger.

Giant Water Bottle Entrance - The creation of the water bottle entrance will take, by our estimate 8,000 water bottles. We will need 4 large display monitors, 2 large touch screen monitors and 3 CPU's.
TOTAL ESTIMATE: $23000

World Saver - The exhibit will consist of 3 sorting stations. Each station will have sorting bins for recyclables, compost, and trash. Each station will have a 'garbage chute' above the table and plastic representations of each item to sort. The plastic items will have a computer chip (like ones implanted in pets) so each bin can read and accept or reject the item. Each station will have a large display monitor, speakers and CPU with chip scanners.
INDIVIUAL STATION: $5000
TOTAL ESTIMATE: $15000

Compost Monster - There will be a large model of a layered compost pile made out of styrofoam and plaster. On both sides of the display will be 2 large display monitors and 2 large touch screens for the interactive activity. The exhibit will also need 2 CPU's.
TOTAL ESITMATE: $22000

Recycle Machine - There will be 2 stations for visitor engagement. Each station will have a recycle bin equipped with a computer chip scanner and a touch screen monitor on the lid. Each station will have a variety of recyclable items with scannable computer chips. Each station will have a large display monitor and CPU. An additional large

display monitor and CPU will be required to keep track of how many of each item was selected at Recycle City and on-line.

INDIVIDUAL STATION: $4000

TOTAL ESTIMATE: $11000

Paper Becomes Paper - In addition to the 'paper pile' model, the exhibit will include 2 large touch screen monitors and 2 CPU's for the interactive activity.

TOTAL ESTIMATE: $8000

Recycling Timeline - The recycling timeline will be made of a large sign about 4' high and 60' long.

TOTAL ESTIMATE: $3000

Additional Cost – We hope the cost of building the surrounding walls at an additional $18,000 in materials.

TOTAL ESTIMATE FOR THE ENTIRE EXHIBIT: $100,000.