**Teaching Science to Young Children With Visual Impairments**

**Event Started:** 1/14/2015 1:40:38 PM ET

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We will start at the top of the hour. Please let us know who you are and where you're calling from.

I want to welcome everyone. Many participants are typing in the chat.

People will continue to join. I know this is a full visitation, I do not want to take time away from the presenters. Welcome to Perkins webinar series. It is January 14, 2015. I am Robin Sitten and I want to welcome you to today's presentation. Teaching science to children with visual impairments. There will be many suggestions for hands on science exploration that gets kids learning by doing.

Perkins e-learning webinars are presented out the year on a monthly a this. You may register to attend live at no fee or view recorded webinars that suits you. The webinar series is one of the offerings in our professional development program which includes obligations, newsletters, webcasts, and self-paced learning. You can see our listings at our website at Perkins e-learning website@Perkinse-learning.org. This will be a multi-approach to learning. It includes biological concepts such as digestion, magnets, and many concepts can be taught to blind students.

Before we get started, let me review a couple of things about the technology. It has been a while since we presented online. We keep noise levels in control by muting your lines. You will see a question and answer box appear on your screen. Throughout the presentation, you can submit a question in the box. We will do questions at the end.

We are using this virtual meeting room for our audio. Short the volume is on. You may find that external speakers or personal speakers give you the best audio. You have controls for your screen. You can make your own adjustments. Our speakers are on audio and video. Sometimes it is out of sync. Unfortunately we cannot control it from our end. If you find it confusing, you can minimize the boxes or tried refreshing your connection.

This event will be recorded and available on our website as well as the presentation that you will see today. You will get a lot of good ideas today.

Thank you again. Let me introduce our speakers. We have Dr. Lillian Rankel a science teacher and Marilyn Winograd a teacher of the visually impaired. They are both members of I lab the independent laboratory access for the blind. Their website is I LA be -- this team is from Penn State University. And funded by the National Science Foundation. They will tell you some of their story when they began. Their team had researched ways to modify equipment and material so that students with visual impairments can be fully integrated into bathrooms and lab activities. In the summer of 2009 both Marilyn and Lillian traveled to Kenya for a workshop for teachers. They will talk to you about that as well. Let me welcome Marilyn.

Thank you. I am Marilyn. This is a Lillian. We are in New Jersey right now. I am a teacher of the blind. Lillian and I worked together a few years ago with an exceptional high school student who recently lost his vision. He took on our classes -- honor passes. -- Classes. We had to work together in a way to integrate him into those classes.

Lillian decided as the science teacher she was going to make him do everything that was necessary to complete the work. We worked hard to come up with ideas and ways to present the concepts he needed to learn. And to be able to do the lab work.

Lillian contacted the American chemical Society, and they put me in touch with a doctor who was at Penn State working with the I lab project. He was a blind chemist. He was able to get me the tools that my student needed. Different probes that gave output through a pewter so we could measure temperature pressure. Velocity meters and things you need for chemistry and physics.

Once our student graduated, we said we started with nothing and we have a lot of information. He was very successful and went on to college and is working we decided we needed to share the information with other people. We started to speak at conferences and we would apply to give presentations. To share what we did with chemistry and physics and high school science. Then we realized that this is not where we need to start. Lillian does not teach in high school anymore. She spends time doing science and science activities in a preschool.

I see what young children can do in science, we should have the same expectations were children who do not have normal eyesight. They should be doing the same activities.

We are ready to get started.

The first slide is a business slide. The rest are more fun. This slide tells about the needs for hands-on learning in the classroom. Now with computers, children do not do actual labs. They use representations on the computer. That is not the way to teach our kids these concepts. Kenneth Wesson, a cognitive scientist, firsthand experiences are what wired the brain. Computer simulations cannot substitute for real world firsthand learning experiences. Representation of objects and events should follow the experiences the real things they represent. And experience determines which neurons communicate with which brain cells to represent our knowledge. It is important for children to get their hands in it and feel it and learned.

Another thing I wanted to mention, Lillian has also visited the White House. She met with a special assistant to the president for disability policy to discuss ways to intrigue low vision students that could lead to careers in STEM . This is science, technology, engineering, and mathematics. The president has initiated this initiative to move children from the middle to the top of the pack and science achievement over the next decade. That is one reason. Another reason to be interested in STEM and the areas of STEM, it is a viable field for our children to go into. It is a positive location. There is something that everyone can do in these fields.

We want to get them started early. Make sure they are interested. That they are learning about science and math and technology and engineering. While they are young and they can learn more as the years go by.

Kitchen skills equal lab skills. Skills acquired by working in a kitchen transferred directly to developing good laboratory and math skills, as well as appropriate concept development. When you work in a kitchen, you measure, mix, stir, also kitchen prep -- peeling and year of corn. Slicing a zucchini with a plastic knife. Or peeling and orange. There was a woman in our workshop who did not know how to peel and orange. These are skills everyone should be able to do. I found when children have kitchen skills, they are better in the lab. If you are doing an experiment in one of the steps is to put a test tube in the boiling water, you would need to take -- put the water on first.

It helps you to start thinking about timing and staging.

The rest of the slides you will see in this presentation will be skipping through various concepts and activities in areas of study and a curriculum that Lillian put together that she used with both blind and visually impaired students as well as site students. From preschool up to fifth grade.

The activities can be done at home. You have all of this in your house. Or things we purchased at the dollar store. Very inexpensive materials.

It can be done with TVI . As a reward we can do a science experiment. Or we can do a math game. Some things you see I work in through a story or with braille.

You will see young children in these slides actively participating in many of the science and technology and engineering and math activities.

Exploring ramps. A ramp is a simple machine. The children had to determine if the ramp was able to make work harder or easier. They had a heavy toolbox. They tried to pick it up in the air. Then they tried pushing it up the ramp. They found the ramp made it easier to get the whole box to the top of the stool. Then we talked about wheels. They had a big plastic truck. They put the toolbox in the back of the truck. When they pushed the truck up the ramp, it made it easier than just pushing the toolbox. Wheels help overcome friction. It makes things easier.

The bottom picture shows a spring scale. They were measuring the force you need to pull a truck up a ramp compared to just taking it up. They found when you pulled it up the ramp, it took 20-30 movements. They realized that ramps can make work easier. On the right, there is a ruler that has a channel in the middle. They used that with blocks and they were rolling marbles down the ramp. What they found is that the ramp stayed stable and it would roll farther. On the bottom photo, there is a plastic pipe. I asked them if they thought a marble would do the same thing in the pipe? Most children said no. They were not sure if the marble would even go down the pipe. We set up the pipe with blocks under it so it had a pitch do it. They all realized that a pipe is similar to a ruler.

They were using a scientific method by making predictions before they actually started.

After the experiment was over, I asked them to explain what they saw happening. Now they are reporting back data and improving their speech by improving -- expressing ideas.

What does down a ramp? This was another activity. I had a ramp and I gave them random objects in a box. They had bought, measuring spoons, pencil erasers, plastic dinosaurs, pill bottles, and matchbox cars. I asked them to predict what would go down the ramp. The ramp was maybe 8 inches high and 3 feet long. They thought the bottle Would go down the ramp. As the ramp got steeper, things were sliding down the ramp. They explored all of this themselves.

Sound amplification. I had tubes from paper towels and we used those two amplified sound. One of the pictures, a child is listening through a tube. They had a kitchen timer at the other end. When they put both together it was much louder. On the top, a little girl is listening to another girls heart. Then I had them jump up and down 10 times. Then listen to the heart again. It was obvious her heart was beating faster.

On the right, a boy made a cone out of construction paper. They were using batlike and amplifier.

How much water can a sponge old? I gave them two different kinds of sponges. One was a fine porous sponge. The other was a more natural sponge. They had to squeeze it in a pan of water. They had to squeeze it into a cup. Then they had to determine which sponge could hold more water.

Solar ovens. I took cardboard, disposable bowls and lined them with aluminum foil. Each child took a straw and put it through a large marshmallow. Then make covered each with Saran wrap. We put them in the sun for 20 minutes here after that, they opened them up in the marshmallow became soft. These solar oven heated up the marshmallow. They all got to eat a marshmallow.

Seat belts. This is an experiment to demonstrate how a seatbelt in a car works and why it is important. It is a plastic cup laying on its side with a marble in it. If you push the cup -- pushed the cup and then stopped pushing it. The marble came rolling off the table. The second time we put a seatbelt on the marble. We used masking tape to hold it in. Then we did the same thing. Pushed the cup forward, then stop it. The marble did not come out. It is an example of how the seatbelt in a car protects the kids when they are sitting in the back.

This is a tactile representation of the seashore. We live in New Jersey. We are near the shore. Even though we do, there are many students who have never been to the beach. We use various materials to represent different textures that are found at the seashore. We used sandpaper for the sand. We used seashells that we glued on to the sand. Then we used textured paper for the water. Another texture for the sky. And another texture for the sun.

Newspapers and when socks. -- Wind socks. This is a great activity. It is inexpensive. We used newspaper and cut them into strips. We made a headband out of construction paper. Then they attached the strips of newspaper to the headband with glue. Then they put the headband on. You can hang it outside on a tree -- it can feel which way the wind is blowing it. Or they can put it on their head and face a fan. If they are turned away from the fan, and the strips are coming from the back of their headband, districts will blow past their face. They will get to feel how the wind is blowing and in which direction. If they are facing the band -- fan, they will feel it blowing past them.

I had a three speed fan. The day I did the activity there was no breeze. I had to grab a fan quickly. I could show them a soft, medium, and strong wind.

This is Lillian's favorite. Lifecycle of a frog. You can by these at Michael's craft store. I got the frog lifecycle. It has the frog eggs. It has the frog tadpole. Then the frog at which is a frog with its tail still on. I set it up in a lasagna pan with craft materials. I used foam lily pads, some foliage I took off a plant I have in the living room. I put some stones in their. Children can explore the four different parts of the lifecycle of a frog. There is no way you will ever find for lifecycle parts in a pond.

Facts about penguins. Everyone likes penguins. We were showing here, we talked about how penguins do not get cold in the anarchic. -- And Arctic. They have a large layer of fat. I put a glob of Crisco in a zip lock bag. Then I put in ice cube on top of the Crisco. They can see how quickly the hand gets cold when they do not have a thick layer of fat. The hand got -- never got cold. We talked about how penguins carry eggs on their feet. We stuffed a sock with rice. The kids had to keep the egg on their feet. Then they had to pass the egg from feet to feet.

Ice melts to water. I gave young children ice cubes and they were melting in their hands. They could not figure out why their hands were getting wet. I did not realize ice melts to water. This is a good science lesson. I had to bowls of water. One had cold water and one had hot water. They put ice cubes in. The ice cubes in the hot water disappeared faster than in the cold water. They went home that night talking about ice cubes. Parents were wondering why they were excited about ice cubes.

This lesson was involving learning about different types of houses in different environments. The first house we built was an igloo. We're not sure if anyone lives in homes made out of ice. We were teaching them about igloos in cold environments. In order to build an igloo, we used a plastic cup. It was an inverted cup. From an applesauce or putting. -- Putting. We had them spread marshmallow fluff over the cup. That was the glue that was going to hold the marshmallows which represented be ice blocks. In the top right is a igloo that a child made.

Then we went from where it was cold to where trees grew. Another day we made a pretzel log cabin. For this one we used an inverted rectangular plastic container. Rubbermaid has some that are disposable. We used Russell rods. And icing is the glue that holds the would together. A graham cracker for the roof. You can see in the bottom right hand picture, the child is eating the logs as well as building a house.

Parts of a plant. This is an activity that children did with a paper plate, which represents the flower of the plant. Than a strip of paper for the leaves attached. And string for the roots. Then they use beans for the seeds. I punched out cardboard. They glued them together and they learned about the different parts of the plant.

Another activity I used, is to use a bold. -- Bold. bulb. Rather than put it in a dirt, we put it into a cup with stones. Every other day the children would water it. Once it started to grow, we could lift it out of the stones and feel it. You could feel the seed, which was the bulb, and the roots coming out of the bottom. We could take it out every day and feel how it is growing and changing.

Smells. Make your own scratch and sniff using Kool-Aid. I made this into a thick syrup by adding water to it. The children used Q-tips to color a picture. Once the picture dried, if you scratched the picture, you would get different smells. Whatever the Kool-Aid flavors are. Another thing I did with smells is I got eggs after Easter. They are fairly inexpensive. They have holes in them. If they do not have holes, you can put holes in. I put different things in the eggs and see if they could match exit by smell. The things I had in the eggs were lemons, oranges, bananas, basil, parsley, line, onions, cinnamon, apples and garlic. The children could match up the smells and had a good time.

Dissolving studies. What does dissolving in water mean? I gave the children salt and they put it in a cup of water and stirred it with a spoon. Then they felt the water and could not feel anything. You could not see anything. That indicates the salt dissolved. Next I showed them was say and. They all thought the sea and would dissolve. I gave them a spoon of sand and eight Stirring. You can feel that the sand is not dissolving. I gave them and Alka-Seltzer. That dissolved in water. They put it in with the water. You could feel the Alka-Seltzer getting smaller through the plastic bag. You could hear the gas is being formed. The Alka-Seltzer was dissolving. We also used M&Ms. They dissolved in the water. I gave them strength and paper. They thought this would dissolve also. But neither dissolved in the water. So we talked about what dissolving means and what types of things dissolved in water.

Does it dissolve? With the younger children I put out lasagna pans. I gave them sugar, salt, serial, paper, aluminum foil and sticks. They did not know what would dissolve. They started putting all of these things in the pans. They had a good time and they learn about what the word dissolve means. It was a good activity.

Digestion. This is my favorite one. We did a couple of activities with digestion. The one on the right, in the bag, there are -- there is a zip lock bag that has cheese it's, mini Oreos, and keys in it. That is supposed to represent a stomach and what someone might eat. The kids had to squeeze the bag to make the food breakdown. They could feel that it feels different. It is much smaller pieces in the bag after. There is more liquid in the bag. That explains what happens in the stomach to your food after you eat it.

Then we did another experiment. I really like this one. You use stockings to show digestion. We take bananas in Ziploc bags. We taped them up so the bags would not open. We took a pair of pantyhose. We tied off one leg. We cut the toes off of that leg. You put the bananas into the panty part of the pantyhose. That is the stomach. Then they had to pull and push to get the bananas through the entire digestive system. Until the very bottom. The boy at the bottom on the left, has to put out the bananas. They see what is left is just Moshe.

Many children did not know what pantyhose were.

Exploring the properties of magnets. Do magnets work through noses? A boy had to magnets stuck on his nose. They stayed there. Can magnets be arranged to float? If you lay them in the right way, they repel each other. Can magnets work through glass and water? I had a glass lasagna dish. I had foam boats that I had thumbtacks in the bottom. It was up on blocks. The children had rulers where I taped magnets on the rulers. Where I taped the magnets, they could make the boats move around in the pan. It became obvious that magnets do work through glass and water. The children did not think it would.

I taped a magnet to a matchbox car. They had a second magnet. They were able to set up the magnets so it pushed the car away and they had races with the magnets. We were showing how magnets repel each other.

Affordable materials. As I mentioned earlier, we shop in dollar stores. We do not spend a lot of money on materials. Many people do not have a lot of money to spend on things. We want to show you some things we purchased in an inexpensive store. There are sponges in different shapes. There are's figures -- our stickers that can be used in many experiments. You can use this for matching, finding ones that are different.

We have). -- clothes pins. I had index cards with numbers on them, and if -- they would clip depends on the index cards.

We had a bunch of buttons. These came from Oriental trading.

A protractor is on the left-hand side. It is the same protractor that another child in the class might use. We took a hot glue gun and made the lines tactile.

The little skeletons in the middle, after Halloween you can get these skeletons or very inexpensive. They are good for lessons with bones. Some children did not think they had bones. But they saw the skeleton and could feel the skeleton -- bones. They realized they had the same kind of loans.

Transferring water. This is an activity we always start with. We have talked at conferences with parents of blind children, national Federation of the blind conference is also. We tried to go to a day care while the parents are at the meeting. We go to the day care centers and work with the students that are visually impaired as well as the siblings. We always start with a water activity. There are two children engrossed in this. We have problems getting them away from the water activities.

We used a tray as a self containment area. There are two plastic cups in it. One has water and one does not. They have to transfer the water without pouring. One lady is using a syringe. She puts it into the water. The other child is using a straw. She puts it in a water, covers it with her thumb, it captures the water and it moves to the other cop. They are amazed.

Teaching for the kinesthetic learner. Tactile or kinesthetic learners are those who learn through experience or doing things. They need to touch everything to learn about it. Many complete concepts are formed through hands on experience and interaction with the real world. Are limitary research has shown that kinesthetic learning result in increased learning outcomes for all students. The more ways you can experience it, the more you will learn and understand it.

High fractions made from cardboard. I am showing a pizza cut into four pieces. If we're talking about the fraction one quarter, you could pulled out one section out and it would be represented. It has magnets on the back so you could stick them on the blackboard or magnetic board.

Writing fractions. One third of the triangles are rough. I have three triangles. To our out of some. The third is out of glitter from. On the bottom we had two sets of rectangles. On the left the rectangles are in quarters. On the rag -- right, I am representing eight pieces of foam to show 1/8. Most children will say 1/8 is bigger than one fourth. But if you feel the one quarter piece of foam in the 1/8 piece of foam, you will see one quarter is bigger.

Geometric shapes. I give young children popsicle sticks. I show them how to make a Pentagon. Then they get the sticks and try to make one. As they get older, I just tell them the shape. They have to take the sticks and make those shapes.

In order to keep them from sliding around, put pieces of magnet on them and use them on eight magnetic board.

Here is another geometric shape activity. I was in the back of a fifth room -- grade room. This was an activity in the room for cited children. There is no reason why a visually impaired child could not do this. It is different labels of different geometric words.

Angle, right angle, triangle, isosceles triangle, parallelogram. You can have different lengths of foam that is backed with magnets that are cut into pieces. I also have the words written in braille and in large print on strips of magnet. You can give the children the word and they have to find the strips and build it. Or you can make the shape and they have to find the word.

Then diagram. Venn Diagram is popular today. You do not get the whole concept if you are making a list versus using a Venn diagram. The one about the sun and the moon, and the properties of the sun and the moon, and how they intersect. We cut foam that was backed by magnets into that shape. The words are in large print and braille and can be placed on a magnetic board. The one on the right is three different circles cut out of posterboard. Also with magnets on the back. They can be adjusted so that the overlapping parts can be rigor or smaller. That can also be done on the board. Or at a desk. The children in class who need to use braille or large print can do this with their sighted peers.

Place value. This is a very difficult task for someone who does not see to understand. This is a possible way to show place value. I took a small magnetic white board and divided it into three sections. One section is labeled hundreds. One section is labeled tends. One section is labeled ones. We took small magnets and put one any hundred section. Three in the 10 section. And five in the one section. We brought the letters with Braylon them and put them accordingly.

I was in Michael's, and they had a counting caddy. You can put straws in different pockets. It looked like a shoe bag. You can get a shoe bag at the dollar store. Children could use straws and show the place value.

Tactile bar graphs. We went to the dollar store and went -- bought plastic baskets. We cut them up. This created a bar graph. We put little shells or glass in the sections. You could use anything to show the bar graph.

Graphing. I had children in the nursery school making graphs using different shape buttons. Stars, rectangles, circles. They were graphing how many people had dogs, cats, or fish.

The young lady below that, is using -- these are magnetic pieces that have braille letters. I kept this. We did not have a magnetic board so I taped it to a folder. She is making a bar graph putting pennies in the spaces to represent whatever they were working on in the classroom. Another teacher is of a student who is working with a raised line bar. She is using pennies to make a bar graph to finish her worksheets.

Family science workshops. In addition to working with the children, we try to get herons involved. And families. We had workshops where parents brought their children, cited and blind. And we have activities for them to do as a family.

We had a volcano. There was a cop and they put some clay around it to make it into a volcano. Then we put the law that in the chamber, which is a mix of of catchup and water. Then we put in Alka-Seltzer in. When it bubbles the volcano goes over the side of the cup. It is disgusting but kids love it.

We also did activities on who could build a big house. Using marshmallows and uncooked spaghetti. They had to put something together that would not fall apart or break. To see which family could build the biggest house.

This is a book that is published by[ Indiscernible ]that Lillian and I both wrote. There are signs experience -- science experience -- experiments in here. It is available through national braille press. The book was selected by the international board for children with disabilities for their 2015 exhibition and ordering.

Trailers, slates and canes for Kenya. I am working with a school and they have 80-90 children that are blind. I need slates and canes for them. Even if the braillers are broken please send them to me. We will put up our email addresses again.

If you have anything, feel free to contact us.

Thank you. This is an important program in Kenya. It is important to share supplies when we can.

Thank you both. We are getting thank you's in the Q&A. There are some questions. I will get to those in a moment. If you have a question, you can write it directly to the screen.

Do you have a our website for those of you that are active on pinch rest, you can access them as well.

You can go to Pintrest. You can put a great idea out there. We will post those as well.

You are focused today was on the Pre-K through fourth grade. Someone is asking about the upper levels for science. Some of these ideas can be matured. I also know that I-Lab has chemistry and physics ideas as well.

There is information on our website. Science for the blind. If you want to get specifics, we can answer any questions. We have worked with the higher level high school students. Lillian was a chemistry teacher. We do have that type of information.

I am scrolling through. You are getting great feedback. I will share all of this with you later.

I will link all of the sites including the out of sight book that is provided by national braille press.

I am interested to know, how you see the cited kids in the class responding to these multisensory -- you mentioned how powerful kinesthetic learning can be for everyone. I was curious about the children working together in groups. What have you observed about that?

We always try when we know the students -- we try to make it the groups we choose. Children will work together. Everybody wants to do activities. They love doing all the tactile things. Everyone wants to try it out. They were a big hit when I was teaching chemistry.

The younger children also, they want to touch everything.

I appreciate how you formed the scientific question in a multi sensory way here --. Liked as a magnet work through your nose. At the early levels, it is about watch this. If it is a scientific inquiry that has to do with smell or touch. It takes a level of creativity to spark the mind to question whether a magnet will work through your nose.

I tried to put the materials on the table, and I give them a small amount of direction. Then I let them loose. They talk about it. After I asked them to describe what they saw. Everyone has something to say. I tried to get them to make observations and good about describing what you have seen.

When there is a blind child in class, the teacher will show something. Then stop the activity and let the child feel it. When we do activities like this, everyone is involved in everyone gets to touch it. And everyone is into it.

Do you differentiated between low vision and no site?

I had to pick partners for my student in high school. In the past, you pick the smart kids pack --.

What kind of seeds were you growing in the seed project?

I was talking about a bulb.

I used lima beans. You can feel the sprout. I had plants in dirt and dig them up and wash them off.

We had huge flowers from the stem. They grew 2-3 feet.

You can lift it out of these stones every single day.

I have one more question to ask our participants.

We would like to hear from you about your feedback on this particular session. We are getting notes in the Q&A, and it is helpful. We want to know how useful this material has been to interaction with blind or visually impaired children. I need to know if you will go back and use it, if you think it is useful and you can adapted. If you think it is informational, if you're not sure how you will use it. Also we need to know if you find is not useful for your immediate need or not relevant to your students or practice.

If you could answer those. While you're doing that, I want to thank our presenters Lillian and Marilyn. They put a lot of time into these types of presentations. Sometimes I forget to ignore knowledge the amount of commitment that it takes. This was a first time for them.

The recording should be ready by tomorrow on our website. Those of you who are registered will receive a reminder with a link to the material. You can share the material in your practice with your colleagues.

Our next presentation is at the end of this week. On Friday I'll be a presentation on early intervention. Coming up in the spring, is ONM. You can always reach us through our website.

Thank you everyone. Have a great afternoon.