

# Making STEM Real at SEEC

STEM Smart Conference

December 3, 2013



**Making STEM Real**

Our ordinary

is extraordinary.

# Disconnection...

- Too often we teach science as a set of disconnected facts with little or no connection to real life.
- Information goes into memory and stays there when a person can make a connection to something they already know or something they care about.

# Brain Facts

- Rich, stimulating environments promote greater learning.
- The brain absorbs much that goes on at different levels, often picking up subtle bits of information that complete a larger picture.
- By varying content, presenters, or learning environments for your students, they will learn more (multiple exposures)

# Vision and Learning

- Vision is by far our most dominant sense, taking up half of our brain's resources
- We learn and remember best through pictures, not through written or spoken words

# Recall

- Recall is three times better for visual information than oral information
- Recall is six times better when there is both visual and oral

# Transfer of Learning

## Multiple exposures and distributed learning

- Knowledge that is taught in a variety of contexts and over time is more likely to support flexible transfer than knowledge that is taught in a single context.
- Information can become “context-bound” when taught with context-specific examples.
- When material is taught in multiple contexts, people are more likely to extract the relevant features of the concepts and develop a more flexible representation of knowledge that can be used more generally.





# Who are we?

- Serve 135 children ages 2 months-Kindergarten
- The 19 museums and research facilities of the Smithsonian are a vital piece of our curriculum
- Early childhood teachers and museum educators work collaboratively

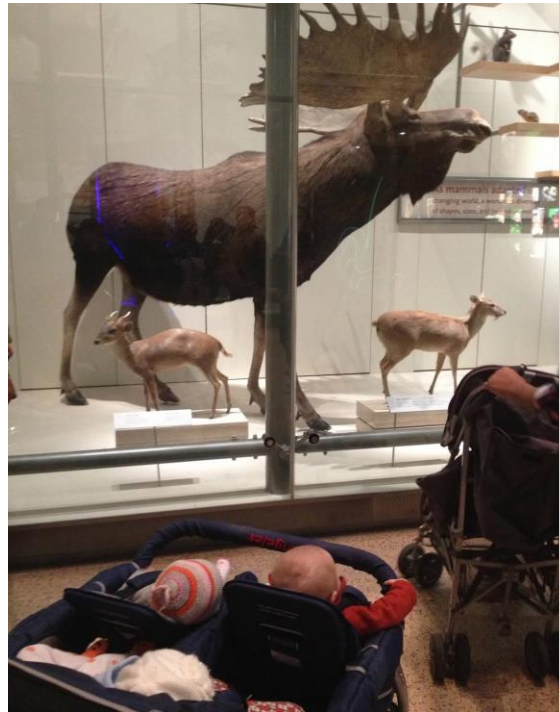
# Across the years and across our days we encourage important STEM skills....

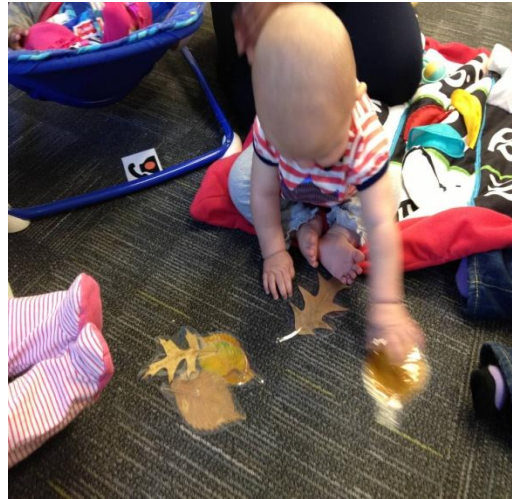
- Observing through careful looking
- Describing through word or pictures
- Comparing
- Questioning and searching for answers
- Predicting what might happen
- Experimenting
- Reflecting
- Cooperating

# Across the years the focus changes...

- Exploring: babies
- Experiencing: toddlers
- Engaging: two year olds
- Examining: three and four year olds
- Experimenting: Kindergarten

# Infants: Exploring their world













# Toddlers: Experiencing

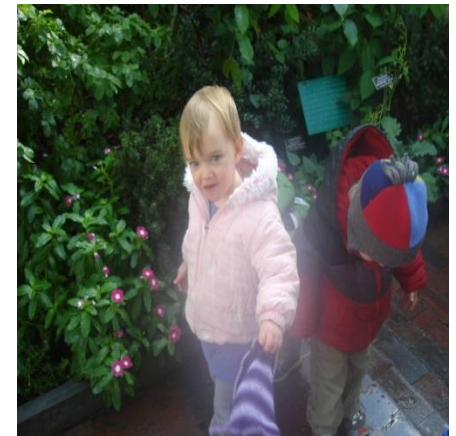
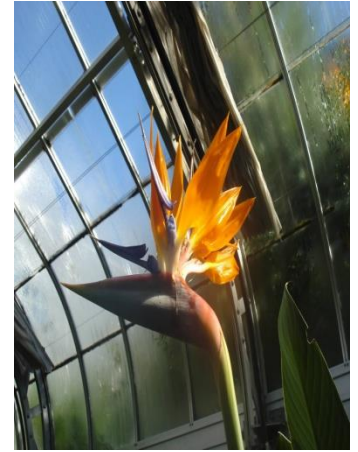




# Twos: Engaging











# Threes and Fours: Examining





## Making STEM Real

As part of a month long exploration using Wizard of Oz as a jumping off point they talked about how the Tin Man is pretend, and about what tin is. Sara, one of our museum educators, talked about how there used to be “Tin Men” a long time ago --knights that wore armor. Here she is reading “The Knight and the Dragon” to introduce knights.



## Making STEM Real

At the National Gallery of Art they first stopped outside the room they were going to visit to look at images of the two objects they went to see.





## Making STEM Real

Then they headed into the room designed to look like the inside of a castle and looked at some of the tapestries to see if there was anything that reminded them of what a real tin man might look like.



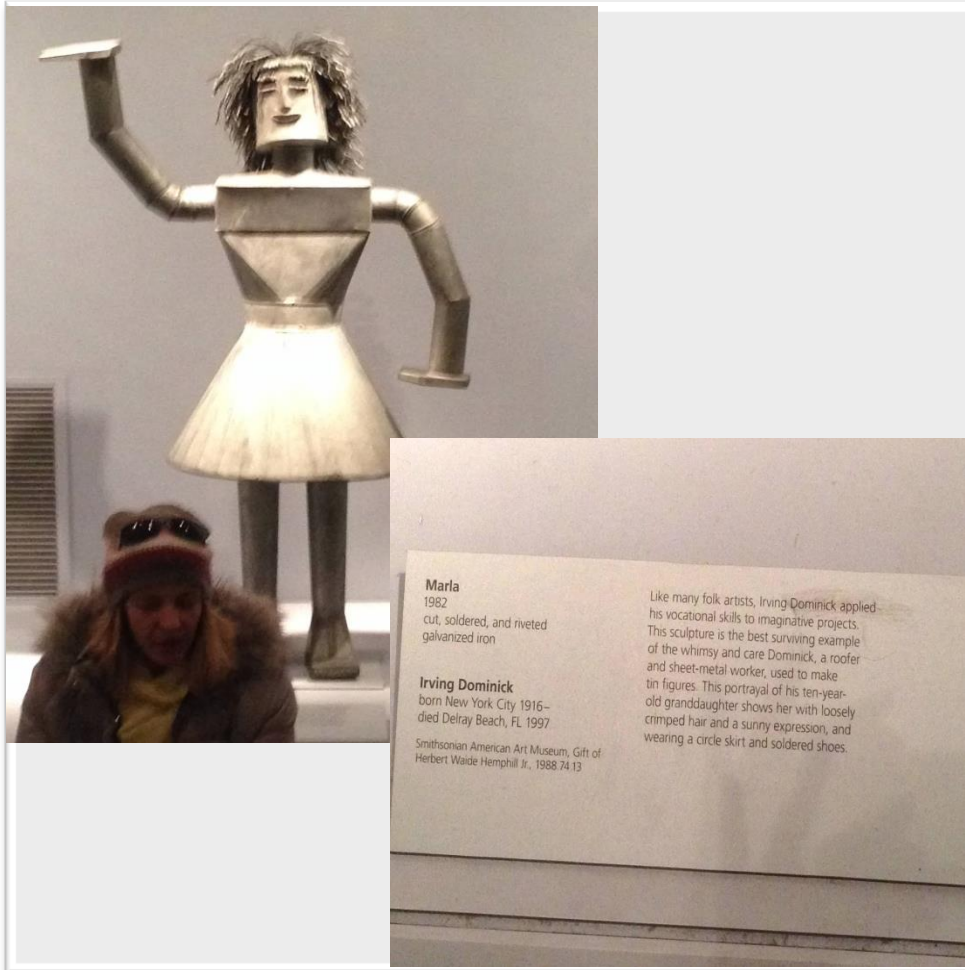
## Making STEM Real

They noticed the helmet on the left looked like a scary animal. They were surprised to learn that this knight wanted it to look like a dolphin. The children didn't think a dolphin was very scary and thought maybe a squid or a shark would have been a better choice.



## Making STEM Real

Then they had a chance to feel some light weight metal and learned that the armor a “tin man” might have worn would have been much heavier and harder to move in as well as stronger than the metal they examined.



**Marla**  
1982  
cut, soldered, and riveted  
galvanized iron

**Irving Dominick**  
born New York City 1916–  
died Delray Beach, FL 1997

Smithsonian American Art Museum, Gift of  
Herbert Waide Hemphill Jr., 1988.74.13

Like many folk artists, Irving Dominick applied his vocational skills to imaginative projects. This sculpture is the best surviving example of the whimsy and care Dominick, a roofer and sheet-metal worker, used to make tin figures. This portrayal of his ten-year-old granddaughter shows her with loosely crimped hair and a sunny expression, and wearing a circle skirt and soldered shoes.

## Making STEM Real

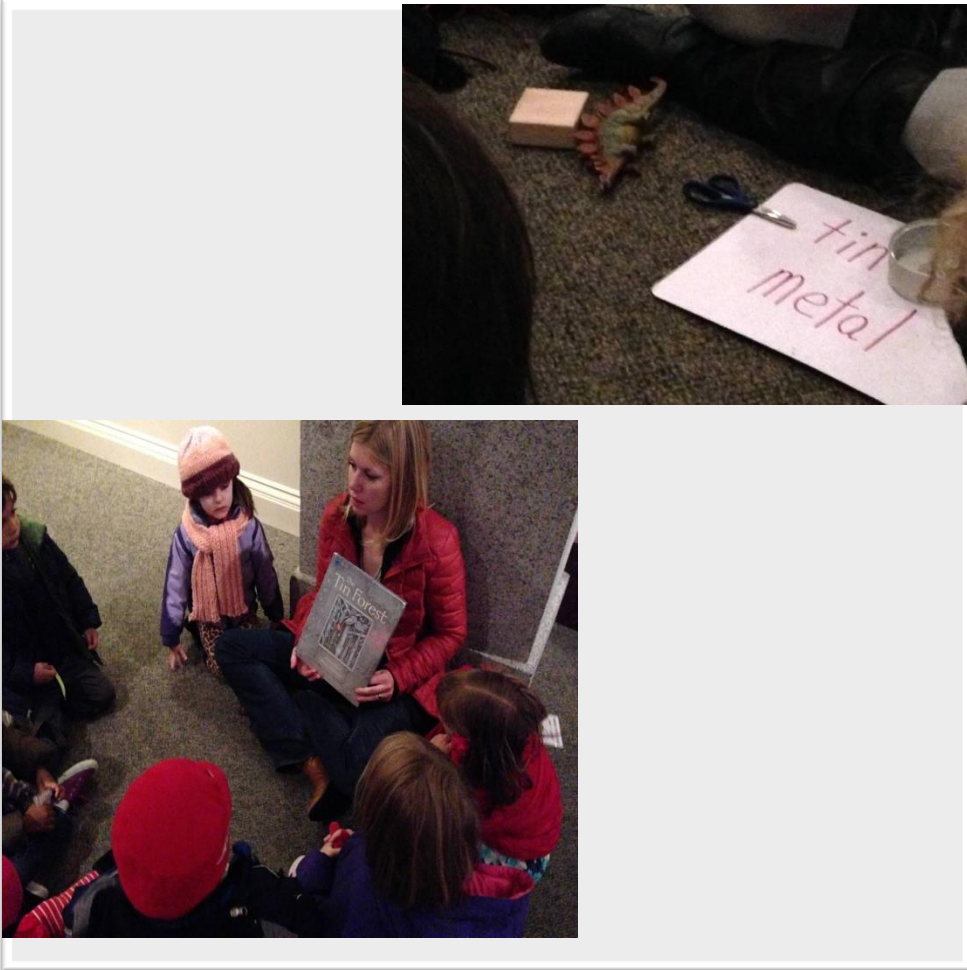
A few days later they headed to another museum to see another tin man character....





## Making STEM Real

First they shared observations about her and talked about how she was similar to the Tin Man in the Wizard of Oz.



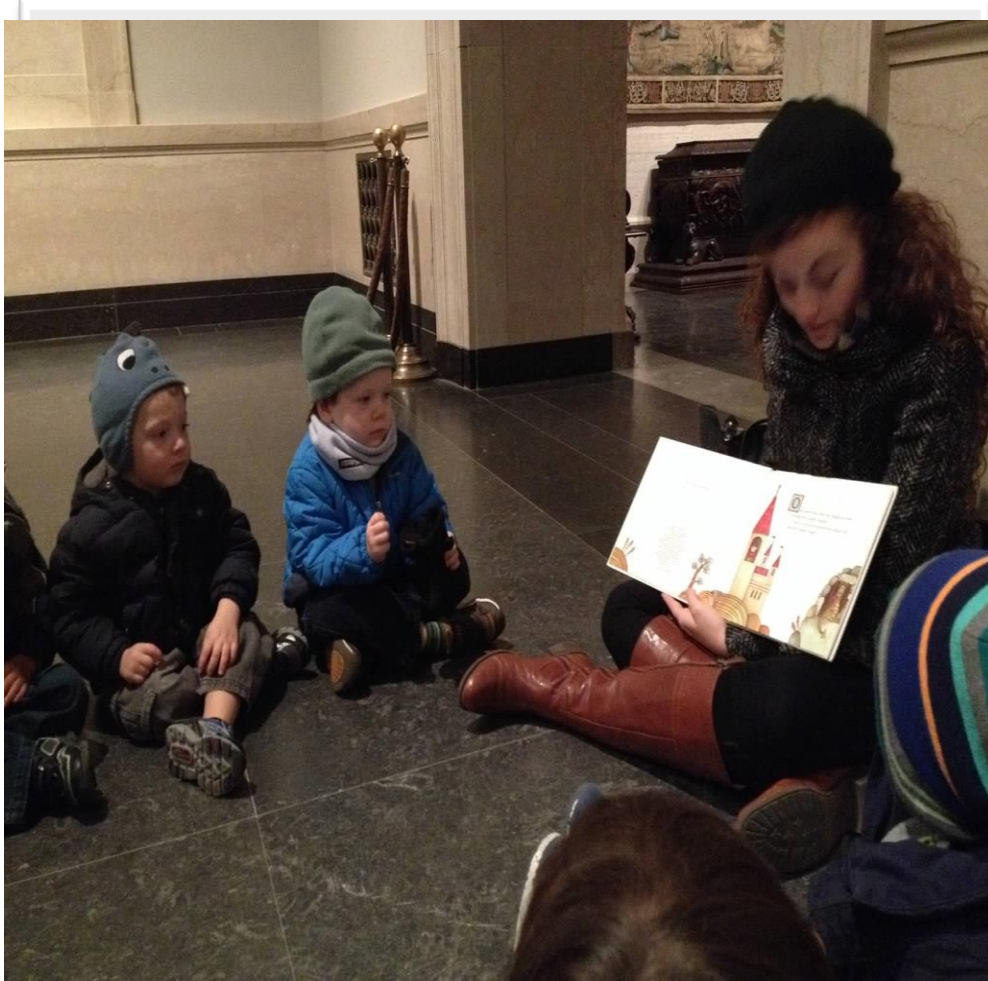
## Making STEM Real

After observing they divided into two groups. While one read a story about a tin forest the other group classified objects by metal and non-metal. They chose to put the scissors in the middle because half of it was made of metal and half of it wasn't.





The Threes saw the same things  
but in very different ways....



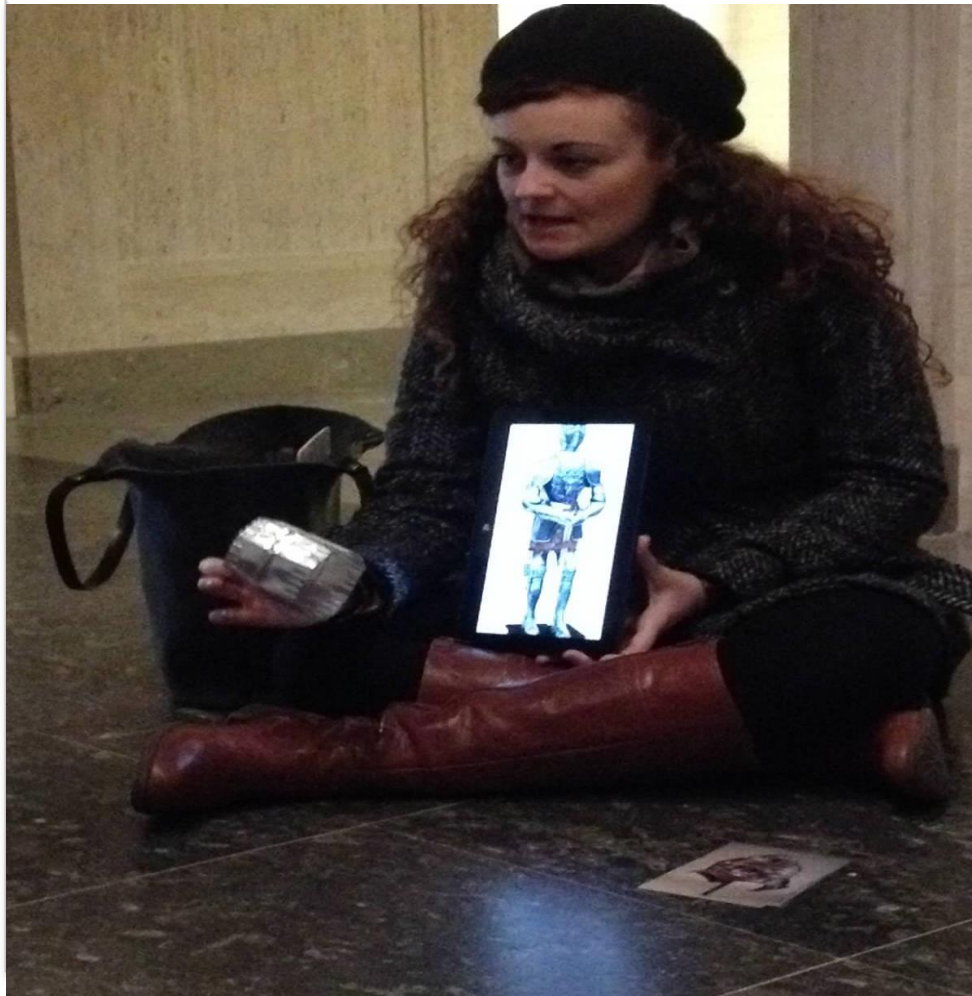
## Making STEM Real

They read a book as soon as they arrived at the museum to better make the connections in that space



## Making STEM Real

When they saw the masks they were most interested in the emotions...how the faces looked scary. They decided to make their own scary faces.



## Making STEM Real

Went they went to see Marla they first saw a photo of a knight and a piece of tin.





## Making STEM Real

Then got to hold and feel many items made out of metal before returning to their classroom to make tin suits for the little people in their classroom.



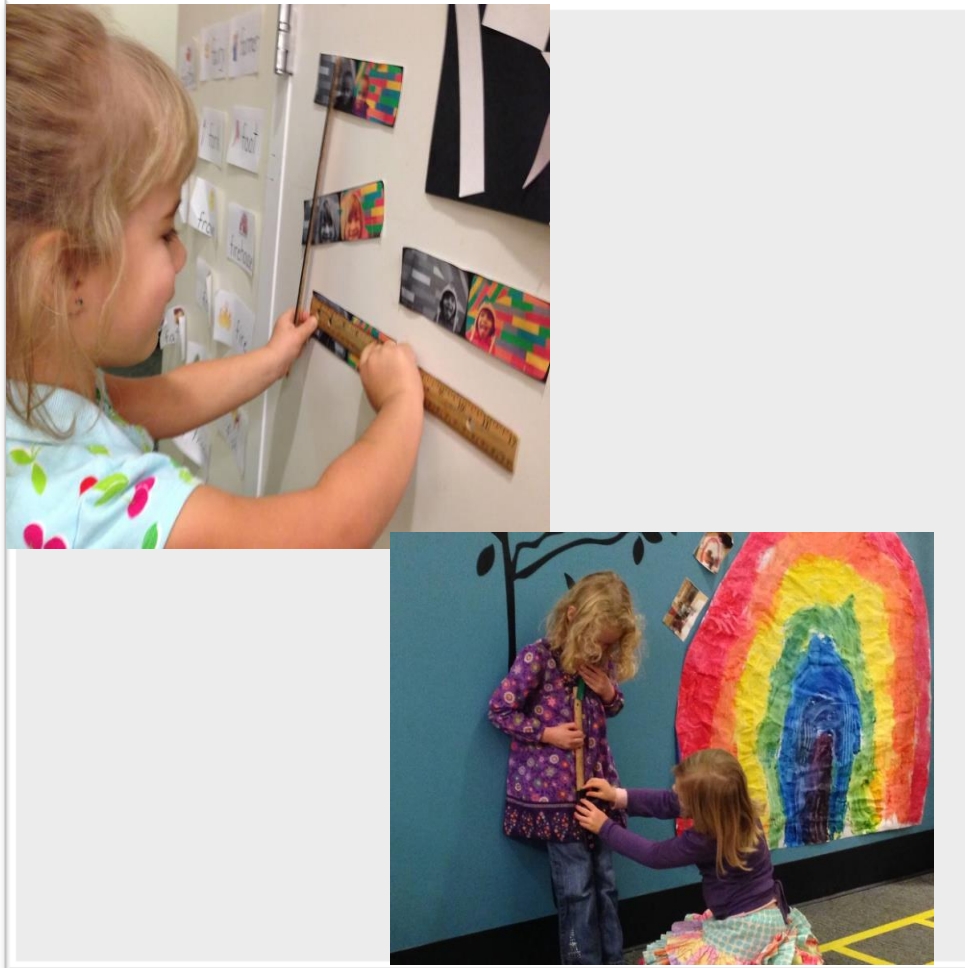
The Fours also begin to  
experiment and test ideas more  
often...



Making STEM Real

Designing and  
building a  
birdhouse





## Making STEM Real

Measuring each other and things in the classroom

# Kindergarten: Experimenting



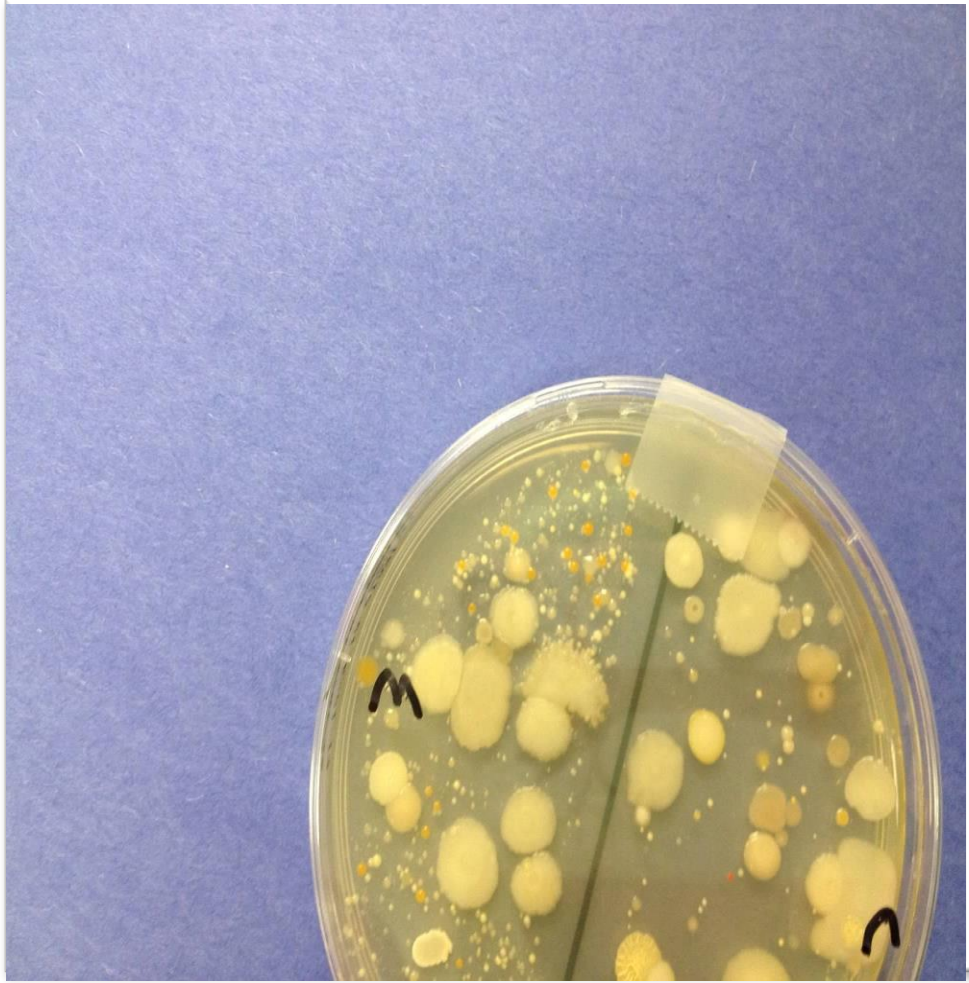
## Making STEM Real

Dr. Adamski talks about germs and then each child washes their hands before taking a sample from their own hands.



## Making STEM Real

The next week each child gets their sample back to see how well they washed....



## Making STEM Real

Some found out that they weren't washing as well as they could be....





**Making STEM Real**

While others were  
pretty happy!

Learning about water across the  
years...exploring, experiencing,  
engaging, examining and  
experimenting











### Who Lives Here?

Coral reef organisms have evolved unique adaptations to share limited resources and space.

**LOOK** in the tank, **FIND** the reef critters sketched on this rail, and see how they have adapted to life on a crowded coral reef.

This reef is modeled after those of the Indo-Pacific. Its organisms were grown in captivity or harvested in a sustainable manner.

How many different kinds of fish can you find in this coral reef? Can be the only reef builders. In the January Through Time gallery on the other side of the Ocean Hall, find out who else builds reefs.

- |                     |                |                   |                  |               |
|---------------------|----------------|-------------------|------------------|---------------|
| Attached to reef    | Sharing space  | Feeding at reef   | Sharing space    | Sharing space |
|                     |                |                   |                  |               |
| Christmas tree Worm | Shrimp Crab    | Littorina Pudding | Sea Anemone      | Shrimp Crab   |
|                     |                |                   |                  |               |
|                     | Carpet Anemone | Shrugging Shrimp  | Scalloped Shrimp |               |

#### Sharing Tight Spaces

Species share or battle for the living space. Sometimes you'll see two species in the same place but they're not competing for the same resources.











# Visit SEEC...live

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Smithsonian Early Enrichment Center (SEEC)
- Twitter: @SISEEC
- Web: [www.si.edu/SEEC](http://www.si.edu/SEEC)