

## Learning about Learning: The Story Behind the Story

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strategies are implicitly designed to spark memories and reflective conversations. With Loyola University, we took this process one step further by developing two exhibits that explicitly encourage verbal narratives as well as support our research about learning processes. First, with funding from the National Science Foundation (Grant #0452550), we added a photo-narrative component to the museum's existing *Skyscraper Challenge* exhibit, in which families build small structures together. An automated camera takes a series of time-lapsed pictures of the families as they work together, which visitors can then use as they record an audio "book" of their experience. Based on the success of this photo-narrative experience along with Haden's research findings (Benjamin, Haden, & Wilkerson 2010; Haden, Jant, Hoffman, Marcus, Geddes, & Gaskins 2014), the museum later opened *Story Hub: The Mini Movie Memory Maker* (IMLS MA-10-13-0157-13) that invites visitors to create a mini-documentary video about any exhibit they visited during a day.

In support of the strategies employed in these exhibits, Haden has used a few additional methods to study connections among visitors' behaviors and children's narratives in the museum, and the families' memory conversations after they go home. In one study (Benjamin et al. 2010) inspired by what many visitor groups do naturally in museums—split up to explore different exhibits and then get back together to talk about it—she collected their "reunion narratives." Children who had built a structure in *Skyscraper Challenge* with one adult caregiver were asked to talk about it with an adult member of their visitor group who had not been present. In a number of studies (e.g.,

Benjamin et al. 2010; Marcus, Haden & Urtal, in press), Haden has also loaned families small audio recorders and asked them to record memory conversations about their museum visit at home.

Across the different ways of engaging visitors in storytelling, it is clear that a family's way of engaging in an exhibit corresponds with their memory narratives afterwards. For example, in one study (Haden et al. 2014), a researcher posing as a building inspector provided building tips to families before they started building. "Inspector Sturdy" led families in a demonstration to show that triangles are a strong shape—cluing them into the engineering principle of bracing (See Photo 5). Some of these same families were also provided with an additional tip: ask each other questions as they were building.

Families provided with both engineering and question-asking tips asked more open-ended questions while building in the exhibit than those that weren't. Their reflective narratives in the photo-narrative experiences (created immediately after building their structures) were also impacted, and included more science and engineering principles. This and other experimental work by Haden (Benjamin et al. 2010) provides causal evidence connecting the richness of language (question asking, science and engineering talk) during an experience with the ways in which children recall the experience immediately and even weeks later.

### Using Stories to Enhance Learning

When learning experiences involve rich and interesting things—as is so often the case in museums—it can be hard to see the whole for all the parts. Essentially, visitors need to construct some distance between themselves and the bits and bobs of the experience. In the research literature, this distancing is known as "concreteness fading"—creating representations of experience that focus less on specific objects and more on abstract knowledge or concepts that can be learned from them (Goldstone & Sakamoto 2003; Sigel 1993). This concept is critical to making museum learning portable and relatable across contexts and times. Fostering opportunities for visiting families to formulate rich narratives during their visits can be

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Visitors, children and adults alike, play in our museums. They engage with objects and interact with staff and with each other. But for any of these experiences to generate lasting learning requires connections to what visitors knew before they came and to what happens after they leave. How these connections are made is a question driving research and practice at Chicago Children's Museum (CCM), working in collaboration with Loyola University.

The collaboration began as a shared interest in how we could use narrative to illuminate, deepen, and extend learning for both caregivers and children. Inspired by Italy's Reggio Emilia schools, which use visual displays of children's work and words to "make learning visible," we decided to harness "visible listening" techniques to find methods of extending learning beyond the length of the museum visit. The promise of narrative reflection was supported by a number of earlier studies and became a rich intersect between the museum and ongoing research into how informal learning happens.

Experiences—including museum-based experiences—that are packaged as stories are more likely to be remembered by both children and adults. For museum visitors, the simple act of narrating what they've done even no more than ten minutes ago can make their experience more meaningful and memorable. Describing an experience provides the kinds of tags that can help connect it to later experiences. If you're a child, there is an added bonus in constructing this narrative with an adult caregiver, because that adult can scaffold (or support) your ability to narrate what happened and refer back to it once you go home. Both Catherine Haden's research in our museum and studies elsewhere show the power of reflection, particularly when children reflect on experiences with their parents. This process can help children make sense of and represent knowledge gained from hands-on activities and create broader, longer lasting, and more flexible learning.

### Telling Stories in and about Exhibits

With over-the-top demonstrations (giant catapults, falling objects, small explosions), wearable products (crowns, face paint, book necklaces), and projects to take home and/or gift, CCM's programmatic

key to memory making and lasting learning.

To provide some illustration of how this works, consider the following photo-narrative in which a family describes how they engaged in science and engineering practices to build a sturdy structure in the *Skyscraper Challenge*. In a video, a young female cartoon character introduces the family to the activity and once they finish building she asks them a series of questions. To facilitate our research, we recorded a number of different prompts, both in English and Spanish, but only six are activated at one time. The family members in the following transcript excerpt tell their story using language and ideas they might not have expressed during their actual building experience moments earlier:

*Narrator: How did you figure out how to start building?*

Child 1: We wanted to make it sort of tall and square.

Mother: And we thought we needed to at least get four corners started that were connected.

Child2: And to attach them all so they were all even.

*Narrator: What was each of you thinking as you built?*

Child 1: I was thinking that we should start making it taller and more sturdy so that we can work our way up to making it look more like a building.

Child 2: So that it won't fall.

Mother: And I thought everyone had their own ideas about how to make it artistic.

*Narrator: What problems did your team have as you built?*

Child 1: Um, it wasn't sturdy and it kept falling and falling and falling.

Child 2: And we wanted to make it even but it didn't work out that way.

Mother: We all used different pieces and had to connect them to make them turn out even.

Child 1: It got really complicated.

### Studying Stories to See How Learning Evolves

The photo-narrative experience of *Skyscraper Challenge* supported storytelling in a single exhibit while supporting research into visitors' narratives about their experiences, structured by pre-formulated prompts. *Story Hub* offers fewer prompts than the *Skyscraper Challenge*, providing an opportunity for visitors to structure their own narratives across multiple museum exhibits. *Story Hub's* simple storytelling prompt is: "Talk together about what you did." They

can say anything, resulting in narratives that provide a window into families' learning process and how adult caregivers scaffold children's recall. Consider this example of a family talking about building a birdhouse in CCM's *Tinkering Lab*. In the video, the child is holding the birdhouse, pointing to different areas of the structure while speaking.

Child 1: Well, we made a birdhouse. There's a little space right there (points to an opening in the birdhouse) where the bird will come out. And then this lever (undoes a leather strap that is affixed to the birdhouse, and opens this bird feeder). And you open it up and put the food in.

Father: What were some of the challenges that we faced in getting to our goal?

Child 1: Well, some of the nails were like too small or too big and it was hard to make this all stay down but...

Father: But then you found these leather straps and that was our solution. You created a hinge.


Child 1: It worked! Yay!

It is important to note that narratives are included in our research only with visitors' consent. Visitors who takes part in either *Skyscraper Challenge* or *Story Hub* have access to their recorded narratives, either by downloading them from the museum's website or through email. Once they download their story, they can watch it again or share it with friends or relatives. Each opportunity for reflection, whether it's immediately after a rich hands-on activity or weeks later, provides families with a chance to talk about things that were not discussed in the moment. And each new round of reflections can extend the learning process. In some cases families remember more details weeks after the experience than immediately afterward. We're still learning how the experience at the museum may be being supplemented and reactivated in the days and weeks after the experience to clarify the stories and expand understandings.

### Incorporating Stories in STEM Learning

Research about narrative and its power to increase learning and memory-formation continues with our current project, TRAIL: Tinkering, Reflection and Engineering Learning, recently funded by the National Science foundation (collaborative grants #1515771 (PI Cohen)/#1516541 (PI Haden)). In addition to analyzing the *Story Hub* narratives for the *Tinkering Lab* exhibit, we're implementing simple facilitated strategies for sparking visitor stories—

for example, a photo and a simple prompt: "Talk about what you did." With this project we're looking at how providing multiple opportunities to tell stories across an experience—during, immediately after and days later—can reveal and advance science and engineering learning processes.

We may never know entirely what sticks in the minds of our audience. Perhaps a more important question is how we can make museum experiences stickier, or more likely to be remembered and connected to subsequent experiences. Stories are powerful. Creating a story allows visitors' to select and organize what happened during their busy day at the museum. Stories resonate with emotion. They're packed with problems that were and weren't solved. When children and caregivers create a story together, they take an experience that they shared and put it into a form that allows them to recall and understand what happened. Stories make memories out of a day in our museums, but more than that, they make meaning. 

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