hand to hand

ASSOCIATION OF CHILDREN'S MUSEUMS

CM↕RN
CHILDREN'S MUSEUM RESEARCH NETWORK

Ultimately, CMRN's goals are to gather evidence on the learning value of children's museums and disseminate findings to practitioners to help them improve their practices, strengthen their museums' case for support, and raise public awareness of children's museums' impact. Research results will also allow children's museums to differentiate themselves from other entities, thus showing the unique characteristics of children's museums within the larger museum field and among learning organizations in all communities...

Introduction

The Association of Children's Museums (ACM) and the University of Washington's Museology Graduate Program (UW) have been working to build a practicing research network in the children's museum field since 2012. However, many ACM members are unfamiliar with the project. This issue of *Hand to Hand* details the formation, participants, activities, findings, and future efforts of the Children's Museum Research Network (CMRN). This article summarizes how the project was initiated, how it has evolved, what has been accomplished so far, and what the plan is moving forward.

Network Roots

Responding to a call from professionals in the field, ACM launched its Research Agenda Project in 2012 to build an evidence base to identify and describe the learning impacts of children's museums. Funded by

The Children's Museum Research Network: Progress Report

Stephen Ashton, Ph.D., Thanksgiving Point Institute, and Kimberly McKenney, Children's Museum of Tacoma

a grant from the Institute of Museum and Library Services (IMLS), ACM and UW conducted a literature review and ACM member survey. In September 2013, over 110 museum staff, academic researchers, evaluators, and policymakers convened for a two-day symposium to determine and prioritize the most pressing evidence needed to demonstrate the learning value of children's museums. This initial work identified three themes for the research agenda, each with associated sets of questions.

1) Characteristics of Children's Museums
- The Value and Impacts of Children's Museum
- Learning Environments and Strategies

- Children's Museums as Learners

2) Audience
- Children's Learning
- Adult/Child Learning
- Ecosystem of Learners

3) Learning Landscape
- Children's Museums and Cultural/Social Issues
- The Role of Children's Museums in the Community

Webinars and InterActivity sessions followed to engage the broader field in considering these and other research priorities.

What Is It?

A second round of IMLS funding supported the formation of a research network to investigate questions prioritized in the research agenda. ACM and UW invited and reviewed applications from ACM member institutions. The ten museums selected to participate in the first cohort represent a range of sizes and geographic diversity, but all share a common interest in and capac-

ity for conducting learning research. In their applications, each museum described how its existing research and evaluation projects would be leveraged to build common questions, audiences, and experiences to help answer related research questions.

CMRN members include the following:

- Boston Children's Museum
- Children's Museum of Houston
- Children's Museum of Pittsburgh
- Children's Museum of Tacoma
- DuPage Children's Museum
- Minnesota Children's Museum
- Providence Children's Museum
- Thanksgiving Point Institute
- The Children's Museum of Indianapolis
- The Magic House-St. Louis Children's Museum.

Network Advisory Committee members include:

- Dr. Jamie Bell, *Center for Advancement of Informal Science Education*
- Dr. Kevin Crowley, *University of Pittsburgh/UPCLOSE*
- Dr. Cecilia Garibay, *Garibay Group*
- Dr. Joe Heimlich, *Ohio State University/COSI*
- Dianne Krizan, *Minnesota Children's Museum*
- Jenni Martin, *Children's Discovery Museum of San Jose*
- Dr. Elee Wood, *Indiana University-Purdue University Indianapolis and The Children's Museum of Indianapolis.*

Purpose and Importance to the Field

In its first research efforts, the network has been investigating questions generated from the 2013 agenda project, such as "What kinds of learning are effectively facilitated and supported in children's museums?" and "What are the indicators and outcomes that are relevant to measure early learning?" Ultimately, the goals of CMRN are to gather evidence on the learning value of children's museums and disseminate findings to practitioners to help them improve their practices, strengthen their museums' case for support, and raise public awareness of children's museums' impact. Research results will also allow children's museums to differentiate themselves from other entities, thus showing the unique characteristics of children's museums within the larger museum field and among learning organizations in all communities by investigating questions from the research agenda such as:

- What is the role of children's museums as change agents in communities as related to the influence of play?
- What is the role of children's museums in the larger educational system?
- Where do children's museums fit in the learning landscape?
- What are they really good at, and why?

CMRN also builds capacity within the children's museum field by fostering connections between the participating organizations, offering opportunities for collaboration, and empowering museums to learn and benefit from one another's ongoing research activities.

Network Progress to Date

CMRN has been actively working since its kickoff meeting during the 2015 ACM InterActivity conference in Indianapolis, Indiana. At that meeting, in an effort to find commonalities across the various museums, each of the ten first cohort members shared information about the major research projects already underway at their institutions.

After much discussion and comparison of research in progress, network members identified the following three research priorities: parent engagement, family learning, and learning frameworks. These were selected because they aligned with the research agenda and were already areas of research emphasis at some or all of the ten museums.

It was determined that an initial focus on learning frameworks would have the highest potential impact for change throughout the rest of the field. A learning framework is a structure of guidelines, principles, and standards that guide practice and learning in an institution. Five of the ten Research Network institutions selected to participate in a special interest group (SIG1) to study learning frameworks had already done work related to the topic in their own museums:

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What Is a Research Network?

Jennifer Rehkamp
Association of Children's Museums

What is a research network, and how do you build one? Still in its early stages, the Children's Museum Research Network (CMRN), started in 2014 with a National Leadership Grant for Museums from IMLS. As the Research Network works to determine network benefits, professional development opportunities, and potential research topics and dissemination avenues, it's also creating long-term plans to fund and govern the network beyond its initial grant period.

To better understand this task, CMRN's project team met at InterActivity 2016 to discuss the strengths and challenges of existing research network models among museums and other institutions. Taking into account feedback from network participants, the team analyzed a report by the Lego Foundation on seventy-eight different research networks around the world as well as three successful research networks among museums and science centers in the U.S.

Learning from Lego

The most salient reminder of the Lego Foundation report, *Next Generation Research & Innovation Networks: to inspire a network on learning through play,* was that networks are made up of people. And to be successful, the people involved should feel comfortable collaborating and sharing resources. A collaborative environment flourishes within a structure that enables relationship-building. Since different groups collaborate in different ways, the report suggests that networks should begin by choosing from a range of governing structures, from self-organized to the central player model (in which central players have clearly-defined roles).

Of the top twelve most successful networks in the report, six focused on research and only one of these was self-organized. Most were governed by the central player model, with members given the freedom to self-organize and conduct projects as needed. This structure reduced complexity and allowed for effective collaboration among participants. Based on this report, the Research Network's structure gives members the freedom to collaborate and self-organize, yet also defines roles to help clarify and simplify project management.

Models of Excellence

A number of research networks exists among U.S. museums, three in particular whose work bears the greatest relevance to what ACM is trying to achieve. From the very large NISE Network among science museums to two smaller networks organized by either location (Denver Evaluation Network) or topic (Making & Tinkering Community of Practice), each model offers insights to best practice in creating and managing a network offering maximum benefits to its members and to the field

Denver Evaluation Network (DEN)

Established in 2010 as a self-organized network, DEN's goal is to build evaluation capacity for museums in the Denver metro area. In 2012, with the help of an IMLS 21st Century Museum Professionals grant, the Denver Museum of Nature & Science became the lead institution, and the network shifted from self-organized to the central player model, as defined in the Lego Foundation report.

The network developed the Network Benefits Toolkit, which identifies the benefits of joining an evaluation network for both individuals and their museums. Specifically, it can be used to show supervisors and museum leaders the value of evaluation training for staff and aggregating shared resources among multiple institutions. The toolkit also clearly defines the commitment required of network members, including annual hours, meeting attendance, and committee involvement. DEN has filled a clear need for area museum professionals, providing members with evaluation training and materials. Although it is presently focused on the Denver metro area, leaders hope to expand to the Great Plains Region in the future.

> ...networks are made up of people. ...
> A collaborative environment flourishes within a structure that enables relationship-building.

Contact:
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More info:
http://www.denverevaluationnetwork.org/

Making & Tinkering CoP (Community of Practice)

Since its start in 2013, this self-organized network has grown from six members to more than 500 interested in forming relationships around making and tinkering. The CoP meets in person annually at the Association of Science and Technology Centers (ASTC) conference, where it identifies three to four research topics on which to focus in the year ahead. Thirteen core members help with logistics and meeting content, and other members' involvement ranges from active to passive engagement. The network also holds three to four Google Hangouts every year, in which members explore the chosen topics in more detail. Currently the network has no funding, but uses physical space at ASTC conferences and digital space on ASTC's CoP site.

Contact:
Karen Wilkinson, Director,
Tinkering Studio, Exploratorium
More info:
http://community.astc.org

NISE Network

The Nanoscale Informal Science Education (NISE) Network, known as NISE Net, was originally established in 2005 with a ten-year grant from the National Science Foundation (NSF) to create a network for museums and science organizations to share knowledge and engage the public about nanotechnology. The governing structure consists of three core institutions and a group of advisors known as Network Executive Group, Network Operations Group (NEGNOG). The network consists of 600 members; 400 are museums, and one-third of that number are children's museums. A subset of members are regional hub representatives responsible for hosting, managing, and organizing work groups with network members in their region. In addition, the network has twelve to fifteen NEGNOG meetings annually. During the NSF-funded decade, NISE Net held biannual meetings,

As children's museums have developed, leaders in the field have recognized the value of understanding established research and theories in order to design environments and experiences that support children's learning. However, over the past two decades, researchers within the field have been working to build theories more specific to the museum environment.

How Learning Frameworks Reflect Learning Theory in the Children's Museum Field

Nicole R. Rivera, North Central College
Claire Thoma Emmons,
The Children's Museum of Indianapolis

People from a range of academic and practitioner backgrounds have shaped children's museums by working together to create experiences for children and their adult caregivers. Various educational theories have scaffolded the implementation of exhibits and programs to facilitate learning. In recent years, some museums have developed and documented institutional learning frameworks, which provide an overarching, theory-informed, institutional understanding of learning that guides planning.

An investigation of the learning frameworks from five of the ten institutions participating in the Children's Museum Research Network (CMRN) illustrates the common threads—and the diversity—that shape these institutions' approaches to learning. These five learning frameworks, which were developed to both reflect institutional beliefs and guide museum practices, highlight a range of formal learning theories. This article reviews the theoretical perspectives that inform the practices in children's museums, highlights the theories represented in the learning frameworks studied, and provides suggestions for how readers can learn from and apply these findings in their own institutions.

Defining Learning Theory in the Museum Context

Learning theory provides the foundation on which children's museums develop visitor experiences. In order to begin unpacking the idea of a learning theory, it is important to break down the phrase, starting with a definition of *learning*. Noted writer, researcher, and museum education theorist George Hein has proposed, "Learning is not linear and is not composed of progressive mastery of individual skills, but consists of the application of a combination of amassed skills and knowledge interacting with developmentally emerging human capacities" (Hein 1997, 76). This definition stresses the importance of experiences that shape and reflect a child's learning. Meanwhile, a *theory* is the working structure that assists with understanding and interpreting experiences. Therefore, a learning theory should capture

"how people learn and what it is they learn" (Hein 1998, 16). When considering how learning theories inform learning in museums, Hein suggests that it is important to note that "even though there are no absolute certainties or 'one best way' solutions, there are some valuable concepts and principles that can be derived from theory and research to guide the new museum's undertakings" (Hein 1997, 78). In children's museums, these concepts and principles help to explain how learning happens.

For many years, children's museums have drawn upon the fields of psychology and education as sources for learning theories applicable to museum settings (Bunch 1997). The work of Jean Piaget and John Dewey has driven our understanding of young children's ability to construct knowledge and the importance of experiential learning. Lev Vyogotsky illuminated the importance of social mediation in the learning process. Maria Montessori and other prominent theorists in early childhood education have also provided important foundations for the work of children's museums (Gaskins 2015).

As children's museums have developed, leaders in the field have recognized the value of understanding established research and theories in order to design environments and experiences that support children's learning. However, over the past two de-

cades, researchers within the field have been working to build theories more specific to the museum environment. One 2005 paper stated: "This community of learning researchers has identified important issues related to learning in and from museums, established theoretical foundation for such learning, and begun to build a body of knowledge about its nature." (Dierking et al 2005, 1). As a result, more and more children's museums are incorporating concepts such as "family learning" and "play" into their learning frameworks. For example, in 2000, The Children's Museum of Indianapolis engaged in an initiative to shift their focus from child-centered practices to a more family-centered mission, thus embracing family learning as one of the unique aspects of learning in children's museums.

Differences in the Learning Frameworks

For its first research project, the Children's Museum Research Network chose to focus on the learning frameworks of five museums as a way to get at the heart of what children's museums are thinking about when they do their work. One of the project's key research questions was, "What learning theories do these frameworks implicitly and explicitly reflect or endorse, and what do they tell us about children's museum beliefs surrounding learning?"

In some cases, the learning frameworks were thoroughly documented in writing, but in others, the written documents only captured narrow aspects of the framework. Therefore, for this research project, staff members from each of the five museums were interviewed about the development, content, and use of their organization's learning framework. The interviews provided a consistent basis for comparison and thus were used as the main source of data for analysis.

In examining the learning frameworks from these five institutions, it became clear that each one focuses on slightly different aspects of learning in a children's museum environment. For example, the Children's Museum of Pittsburgh's framework prioritizes

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CMRN

the learning derived from a community of "making" (tinkering, designing, and messing around with materials). The Children's Museum of Indianapolis' framework prioritizes interactions between adults and children. Providence Children's Museum's framework seeks to make visible the learning that happens through child-directed play.

Given that learning frameworks represent an institution's core values around learning, and that learning is acknowledged to have many characteristics, this variation in emphasis is not altogether surprising. Differences arise because children's museums around the world have different goals and ideas about how to best serve their communities. At first glance, the five frameworks are more disparate than similar.

Learning Theories That Underpin the Learning Frameworks

While it would be unreasonable to expect every children's museum to share the same learning framework or provide the same cookie-cutter experience to visitors, it is reasonable to expect that every children's museum has some high level beliefs, values, and goals in common. Even if learning frameworks differ in their specifics, they should all draw on similar overarching theories of learning and children's development.

The interviewees were asked whether their frameworks were grounded in any particular theory or theories. In their responses, all five institutions referenced Vygotsky and the importance of social influences on learning. Additionally, multiple interviewees mentioned several other widely-referenced learning theorists and theories, including Jean Piaget, John Dewey, Howard Gardner, and the Reggio Emilia Approach. These responses confirm that the learning frameworks share a common foundation in learning theory and indicate that socially-mediated and experiential learning is a guiding principle across all of them. The responses align with the review of learning theories in the field, outlined in the first section of this article, which showed that educational practice in children's museums has always drawn on and combined multiple theories of learning and child development.

In addition to referencing the learning theories described above, Minnesota Children's Museum, Providence Children's Museum, and the Children's Museum of Pittsburgh also indicated that their learning frameworks blend widely-referenced learning theories with contemporary and emerging research, such as the community of practice model and the work of Kathy Hirsh-Pasek and Roberta Golinkoff, to create a framework tailored to the conception of learning at their museums. Providence Children's Museum and the Children's Museum of Indianapolis also described incorporating practitioner knowledge and experience into their frameworks, in addition to pure research and theory.

Because each of the five learning frame-

CM↑RN Five of the Children's Museum Research Network's first cohort of ten institutions were selected to participate in a special interest group (SIG1) to study learning frameworks. The selection was based on work related to the topic that had already been done in their own museums. Museum learning framework profiles were prepared by Nicole Rivera.

SIG1 MUSEUM PROFILES

Children's Museum of Houston

Founded in 1980, the museum currently serves more than 800,000 visitors annually with a mission of "transforming communities through innovative, child-centered learning." The museum articulates a focus on serving community needs such as the development of Houston's child population, supporting parental involvement and formal learning, reducing the impact of poverty, supporting multicultural, multilingual programming, and the development of 21st century skills. The learning framework reinforces these values through a statement that "children will build confidence in their learning, apply basic math and reading skills, communicate their ideas, become skilled in scientific inquiry, use problem solving, and experience connections to the world."

Cody Duty

Children's Museum Pittsburgh

Opened in 1983, the museum now serves approximately 300,000 visitors annually with a mission to "provide innovative museum experiences that inspire joy, creativity, and curiosity." The museum's vision explicitly identifies a focus on learning and play; museum values include good design, opportunities to "play with real stuff," and a focus on inclusive practices. The learning framework document focuses on the museum's MAKESHOP®, "a space for children and families to make, play and design using 'real stuff'— the same materials, tools, and processes used by professional artists, builders, programmers, and creators of all kinds." The framework articulates a description of learning practices that serve as design targets to support visitor's engagement in learning as well as analytical points to track visitor learning over time. Play is explicitly identified in relation to tinkering, which is described as "learners' purposeful play, risk-taking, and evaluation of the properties of materials, tools, and processes." Other framework aspects associated with play include openness, curiosity, individual interests, and collaboration.

Minnesota Children's Museum

Opened in 1981, the museum serves over 430,000 visitors annually at its flagship location in Saint Paul, and another 176,000 through locations in Rochester, a Pop Up location in the Mall of America®, and seventeen permanent Smart Play Spot literacy sites in libraries and community centers throughout the state. Guided by its mission of "sparking children's learning through play," the museum provides immersive experiences, emphasizes play as a critical element for child development, and advocates for "Powers of Play" (a list of research-based 21st century skills). The museum-wide learning objective is to "nourish the development and strengthen the capacity of one or more of the "7 C's" (confidence, creative thinking, critical thinking, (self)-control, collaboration, and communication), which serve as the foundation for the museum's newly created learning framework.

Providence Children's Museum

Opened in 1977, the museum serves 161,000 visitors a year with a mission "to inspire and celebrate learning through active play and exploration." In 2014, the museum redeveloped its educational philosophy with a goal of clearly articulating the institution's beliefs about play and exploration, and their connection to learning. The current learning framework defines learning as "experiential, dynamic, physical, social, emotional, and cultural" and lists a set of "defining features," characteristics of museum experiences that support exploration, play, and learning. For example, "museum experiences support learning by providing opportunities for children to explore with their senses, to make their own decisions, to experience challenges, to learn with and from other people, and to reflect on their own ideas." The framework describes play and exploration as distinct processes and states that "by providing an environment that is supportive of children's play and exploration, the Museum also supports children's learning." Firmly rooted in research, the framework provides a foundation for the development and evaluation of exhibits and programming, as well as communications and advocacy efforts around play and learning.

Megan Fischer

The Children's Museum of Indianapolis

The world's largest children's museum, which opened in 1925, serves more than 1.2 million visitors per year. The museum stresses a sociocultural view of learning with a specific focus on family learning which is defined as "cognitive (related to knowledge, application or content, etc.) or affective (related to relationships, emotion, attitudes, etc.) and occurs when family members interact with each other verbally and/or physically." Family learning is further described as being influenced by the museum context and dependent on the family's history of shared experiences. After exploring family learning for a number of years, in 2006 the museum initiated a two-year process of formalizing the structures used to design and evaluate exhibits and programs. This effort resulted in the Assessment of Learning Families in Exhibits (ALFIE) Inventory, which includes forty-five specific behaviors in three categories: participation, problem-solving and collaboration, and enhancement. The behaviors include references to adult/child play, including parallel play and role play.

works draws on and blends multiple theories as well as practitioner understanding, none claim to represent a single learning theory. Instead, they represent each institution's values and beliefs about learning. In principle, several of these learning frameworks could be adapted for use at other children's museums—they are generally content-free and not site-specific—but it would only be appropriate if the framework in question matched the other museum's conceptualization of learning. For example, in the course of working together, one research network museum, Thanksgiving Point, in Lehi, Utah, realized that its mission "to cultivate transformative family learning" is very closely aligned with the Children's Museum of Indianapolis' mission of "creating learning experiences…that have the power to transform the lives of children and families." As a result, staff at the two museums began discussions of ways that Thanksgiving Point could use instruments developed by the Children's Museum of Indianapolis to measure family learning. Thus far, staff at Thanksgiving Point have experimented with implementing a survey and a behavior inventory developed by Indianapolis staff. The process of reflecting on and articulating institutional beliefs about learning is the critical component of building shared understanding and buy-in. That process can—and should—happen whether a museum starts from scratch or builds on an existing framework.

This investigation into the learning frameworks at five children's museums illustrates both the common threads of learning theory that form a foundation for the work at all of the museums—Vygotsky, Piaget, Dewey—and the diversity that follows when additional contemporary research is layered onto it. The frameworks were developed to reflect the museums' values and shared understandings about learning and then guide institutional practice. Staff interviews make it clear these museums do not believe their frameworks represent the only way, or even the best way, to think about learning in children's museums. But they agree that if an institution's learning framework is grounded in research and theory, it provides a valid way of defining and describing the learning that takes place in that environment. What these institutions consider important is that every framework represents a cohesive way of thinking about learning that acts as a guiding structure for practice. In interviews, all of the museums spoke about the value of a shared institutional understanding of learning in designing exhibit and program experiences, in delivering those experiences on a daily basis, and in measuring the success and effects of those experiences over time.

Takeaways for the Field

These five children's museums have found great value in convening groups of staff to examine individual beliefs and knowledge about learning and then incorporating those multiple points of view in one articulated learning framework for the institution. Readers who recognize that their institution could benefit from conversations examining and codifying core beliefs about learning should start down the path of articulating the learning theories and frameworks guiding their work. This can be a slow process involving many stakeholders and conversations. Once a learning framework is adopted, the work of grappling with its application to new projects and situations will likely continue to spark conversations for years to come. In this way, the framework serves as a foundation from which to work and the basis on which the institution's understanding of learning can continue to grow and change over time. Indeed, any learning framework will be strengthened by repeated and rigorous review. The following suggestions flow from the findings of this research study:

• Because of the diversity of experiences and backgrounds among children's museum staff and their institutional missions, it is important to create opportunities to talk about what people believe about learning and how it happens in their institution. Consider who is best prepared to lead this type of conversation and which stakeholders should be included in the process.
• Many children's museums have already developed learning frameworks that emphasize different aspects and modes of learning. It may be helpful to engage in conversations with other children's museums that have worked through the process of developing a learning framework to examine both the processes and the products. From there, institutions can work through their own internal processes which may build on the knowledge available from the field.
• If a children's museum wants to develop its own learning framework, it is important that it be grounded in learning theory.

For a learning framework to be most useful, it should reflect the institution's core beliefs about learning and build on the collective knowledge and experience of the museums' staff and educators. ☾

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Each of the five museums interviewed has taken great strides to articulate its learning value internally

and for its community in ways that are relevant to each organization.

Perspectives on Learning Outcomes

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Minnesota Children's Museum
Cheryl McCallum and Kimberlin Sturgis,
Children's Museum of Houston

As the Children's Museum Research Network (CMRN) began its examination of learning frameworks in children's museums, it became apparent that there is a wide spectrum of expected outcomes articulated by each institution, even in its initial small target sample of five museums. Most museums did agree that learning outcomes are important to their work, are more broadly grouped at the organizational level and more specifically at the exhibit/program levels, and can serve as a communication tool to stakeholders. But that's where the agreement ends. In an effort to better understand these divergent perspectives, the network conducted brief follow-up surveys with the five museums to see if we could learn more about the variations in their thinking. Here are synopses of the museum answers.

CHILDREN'S MUSEUM OF HOUSTON

Titled "Building Blocks for Learning," the museum's tiered framework of knowledge and skill objectives provides the foundation for the specific learning outcomes behind every exhibit. These outcomes can sometimes be measured at the micro level, but they are more commonly measured in broader clusters. An example of a micro level learning outcome might be: in the museum's *Kidtropolis* exhibit, children gain understandings about ways to earn, spend, save and share money. Broader clusters of learning outcomes might include "children apply basic skills in math." Multiple forms of measurement are used, typically in combination, to determine if the desired outcomes or additional unanticipated outcomes have been achieved. This includes observation of engagement behaviors, child interviews, and parent/adult surveys.

THE CHILDREN'S MUSEUM OF INDIANAPOLIS

The museum's learning framework is organized around intergenerational family learning. However, this institutional goal is viewed as a process independent of content learning outcomes. At the institutional level, the learning framework focuses on measuring observable behaviors (rather than what exactly is being learned), and measures content-specific learning outcomes at the program and exhibit levels. Staff observe visitor groups to determine how often an exhibit element is successful in fostering family learning, but that observation alone does not show how successful the element was in achieving its content learning outcome. For example, an exhibit might identify a family learning goal of encouraging children and adults to work together to complete a 3D puzzle, but the content learning outcome might be sharing how archaeologists recreate ancient artifacts using fragments.

MINNESOTA CHILDREN'S MUSEUM

During the initial stages of its current renovation and expansion project, the museum developed a new learning framework that defines the learning outcomes as a set of fundamental skills called the 7C's: critical thinking, creative thinking, collaboration, communication, confidence, control, and coordination. The 7C's are evidenced by a corresponding list of "Hot 100 Behaviors," which guide the design, development, and future evaluation of new exhibit and programmatic experiences. For example, the skill outcome of "control" is defined as knowing how to manage attention, emotions, and behavior to interface with people in a busy world. A specific observable behavior that indicates a child's progress on that front might be "cooperates with others."

> Most museums have a set of expectations for what visitors will gain from their museum visit in general, as well as a separate but related set of expectations for what might be gained from engaging with individual programs and exhibits.

CHILDREN'S MUSEUM OF PITTSBURGH

The museum focuses on seven "learning practices," rather than learning outcomes: inquire, tinker, seek and share resources, hack and repurpose, express intention, develop fluency, and simplify to complexify. These practices are evaluated through the specific lens of the *MAKESHOP®* exhibit, a dedicated space for children and families to make, play, and design using "real stuff." Museum staff believe that learners can get better or increase engagement in one or more of the learning practices through their involvement in MAKESHOP®. They measure this engagement through behaviors such as "developing comfort and competence with diverse tools, materials, and processes."

PROVIDENCE CHILDREN'S MUSEUM

The museum recently revised its learning framework to articulate how it supports exploration, play, and learning, and includes a list of "defining features of museum experiences" to be considered when planning museum experiences. Experiences across the museum should be active, child-centered, and tangible, and provide social support, choice, and challenge, among other characteristics. In turn, the learning outcomes that follow from these experiences situate within the broad categories described in the framework.

Notable differences exist among these perspectives. Most museums have a set of expectations for what visitors will gain from their museum visit in general, as well as a separate but related set of expectations for what might be gained from engaging with individual programs and exhibits. The respondents mostly referred to the former, their institutional-level expectations (primarily measured by observing behaviors that indicate desired outcomes), rather than the more fine-grained outcomes related to programs and exhibits. The differences between the two levels may be worthy of further examination across a variety of museums. Or, as one network member suggested, a different approach to outcomes altogether is needed: "Perhaps children's museums are

not necessarily outcomes-oriented learning environments. Since children's and families' experiences with children's museums are one unit in a collection of learning experiences, perhaps we should measure our learning impact differently." This could include collective impact studies or other forms of measurement that look at a more complete learning ecosystem.

Shared Learning Outcomes

We asked the museums to share their definition of learning outcomes. There was some level of commonality in the responses with regard to different types of outcomes, including behaviors, skills, attitudes, and knowledge. The main difference, which is nuanced but important to consider, revolves around this distinction: Should learning outcomes be defined as a change that happens in behaviors, skills, attitudes, or knowledge? Or should they be defined by presumed indicators of learning in single instances of visitor interactions? For example, a change in skill might be noted after observing a child who spends an hour building with blocks in a children's museum and later is able to do this activity more effectively. Comparatively, by simply observing a child build with blocks in a museum setting, we might assume that this active engagement is an indicator of learning. This dilemma is not as pronounced in Pittsburgh's MAKESHOP®, where they have decided to focus on learning practices rather than outcomes related to those practices. Further investigations about how children's museums are currently defining outcomes would be valuable in reaching a consensus or even the clarity that this small group believed would be helpful.

Finally, we asked each museum if they thought that the field needed to develop a common language pertaining to learning outcomes. While they were in favor of creating a common vocabulary, including a shared definition for a learning outcome and a learning framework, this agreement did not extend to creating a common set of learning outcomes for all children's museums.
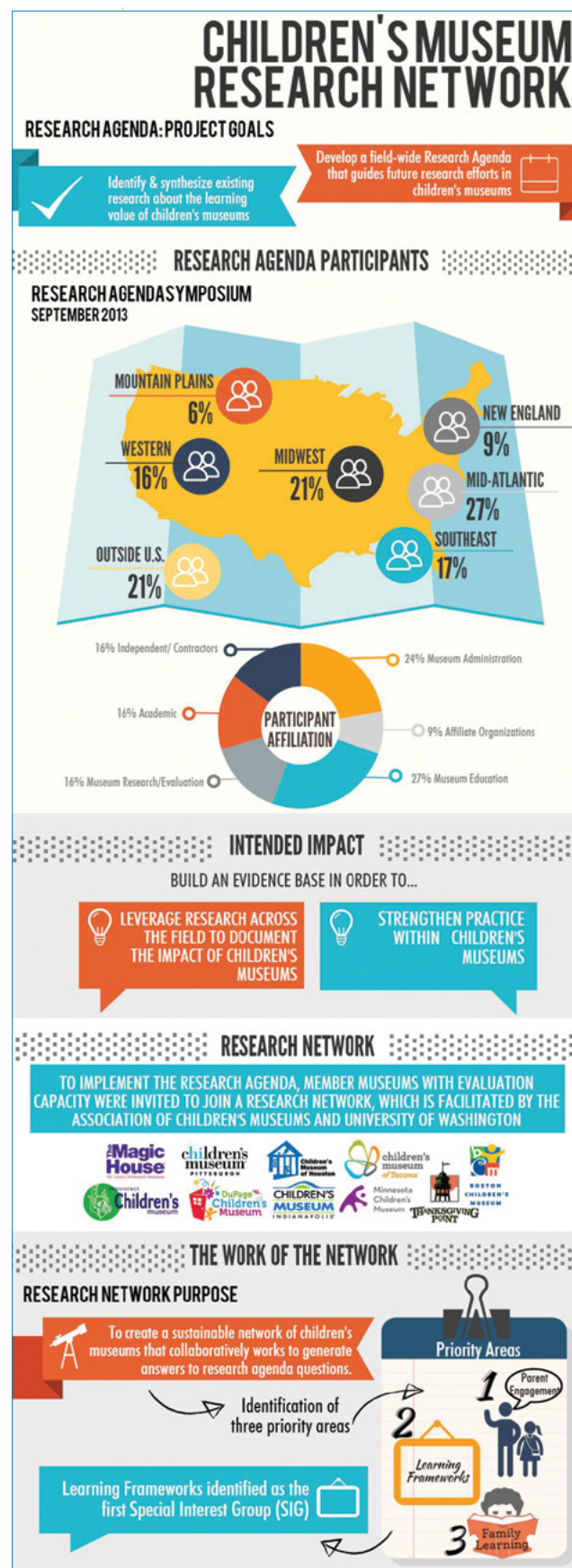
Next Steps

Each of the five museums interviewed has taken great strides to articulate its learning value internally and for its community in ways that are relevant to each organization. With the diversity of learning outcomes ap-

proaches and the lack of a common vocabulary in this small sample, it seems that collaboration and shared research like that currently underway in the Research Network may help more museums examine and even redefine their individual and collective approaches. Can children's museums agree on a common perspective on learning outcomes, and could this emerge from a shared language that each museum references in these discussions? Might the differences between institutional and program level outcomes, if investigated further, help the field further develop its perspectives on learning outcomes and related evaluation and reporting? These are two of the questions that could lead researchers further into the exploration of exactly how learning happens in children's museums and why these experiences are important.

Barbara Hahn, vice president of learning innovation, joined Minnesota Children's Museum in March 2012. Hahn oversees adult learning initiatives and experience development, which includes the development of ten new permanent galleries for the expanded and renovated museum opening in the spring of 2017.

Cheryl McCallum, Ed.D., has helped lead the education department at the Children's Museum of Houston for the past twenty-three years. McCallum recently oversaw the exhibit development for the museum's new satellite location that opened in Sugar Land, Texas, in May 2016. She is currently co-leading with Dr. Sturgis the development of a comprehensive new evaluation system for all CMH exhibits and programs.

With sixteen years experience in K-12 education, Dr. Kimberlin Sturgis joined the Children's Museum of Houston in October 2016 as its manager of curriculum and evaluation.

CHILDREN'S MUSEUM RESEARCH NETWORK

RESEARCH AGENDA: PROJECT GOALS

Identify & synthesize existing research about the learning value of children's museums

Develop a field-wide Research Agenda that guides future research efforts in children's museums

RESEARCH AGENDA PARTICIPANTS

RESEARCH AGENDA SYMPOSIUM SEPTEMBER 2013

MOUNTAIN PLAINS 6%
WESTERN 16%
MIDWEST 21%
NEW ENGLAND 9%
MID-ATLANTIC 27%
SOUTHEAST 17%
OUTSIDE U.S. 21%

PARTICIPANT AFFILIATION
24% Museum Administration
9% Affiliate Organizations
27% Museum Education
16% Museum Research/Evaluation
16% Academic
16% Independent/ Contractors

INTENDED IMPACT

BUILD AN EVIDENCE BASE IN ORDER TO...

LEVERAGE RESEARCH ACROSS THE FIELD TO DOCUMENT THE IMPACT OF CHILDREN'S MUSEUMS

STRENGTHEN PRACTICE WITHIN CHILDREN'S MUSEUMS

RESEARCH NETWORK

TO IMPLEMENT THE RESEARCH AGENDA, MEMBER MUSEUMS WITH EVALUATION CAPACITY WERE INVITED TO JOIN A RESEARCH NETWORK, WHICH IS FACILITATED BY THE ASSOCIATION OF CHILDREN'S MUSEUMS AND UNIVERSITY OF WASHINGTON

THE WORK OF THE NETWORK

RESEARCH NETWORK PURPOSE

To create a sustainable network of children's museums that collaboratively works to generate answers to research agenda questions.

Identification of three priority areas

Learning Frameworks identified as the first Special Interest Group (SIG)

Priority Areas
1 Parent Engagement
2 Learning Frameworks
3 Family Learning

The American Academy of Pediatrics states that children's play is essential to the development of cognitive abilities, social and emotional wellbeing, and other life skills (such as resilience, persistence, and self-control) that contribute to later success in and out of school (Ginsburg 2007). Despite its importance, opportunities for child-directed play have been steadily eroded by structured activities, parental fears and ambitions, commercial interests, academic pressures, and a variety of electronic devices (Singer, Singer, Agostino & Delong 2009).

While educational policies are often well-intentioned, they do not honor what research and practice have shown to be true regarding early childhood development and learning. For example, the nature of early childhood education in the United States school system has drastically changed in the past twenty years (Zigler & Bishop-Josef 2004). Preschool and kindergarten classrooms have replaced play-based practices with prescribed curricula that require direct instruction, and many children struggle to measure up to academic standards that are not developmentally appropriate (Miller & Almon 2009). As a result, play has become a low priority and stigmatized as frivolous in some cases.

With the rapid disappearance of play in and out of school settings, it is increasingly important that children's museums and other informal learning institutions continue to provide play-based experiences. The Association of Children's Museums (ACM) made this point in *A Toolkit for Reimagining Children's Museums* (2015), stating that "fewer and fewer children know the experience and rewards of unsupervised play, creating an opportunity for children's museums to provide this stimulus to intellectual and emotional development."

While children's museums around the world are unique institutions with individual visions and missions, there are clear commonalities—the most prominent being to promote children's learning with high-

How Do Children's Museums Talk about Play?
Where it fits in five learning frameworks
Susan Letourneau, Robin Meisner, Providence Children's Museum, and Alix Tonsgard, DuPage Children's Museum

The network is currently embarking on a large-scale research study to investigate how a larger sample of children's museums across the country talks about play and learning.

quality experiences. In addition, children's museums as a field "employ play as the accepted methodology for how a child learns" (ACM 2012, 3). However, like other educational institutions, children's museums face many pressures and challenges in supporting play and arguing for its value. As a result, there is a variety of perspectives on how and whether play should be incorporated into education, communications, and development efforts within individual institutions. This raises the question: How do children's museums talk about play and its role in children's learning? How do different institutions balance play with other priorities and goals?

The Children's Museum Research Network was formed in part to answer such questions. One of the key tasks of the institutions involved in the network is to find common ideas about children's learning by comparing existing internal documents. Research network members gathered in Seattle in February 2016 to review the learning frameworks of five network institutions and analyze staff interviews from each site. The interviews addressed a variety of questions about the museums' learning frameworks,

including the role of play in each museum and beliefs about how play is connected to learning. The entire research network read the transcripts of these conversations to look for common themes around play.

The key finding from this analysis was that each institution described play in a different way. Four different perspectives were represented among the five museums:

❶ **Play was a key element of the learning framework and a definition of play was used within the institution.** For Providence Children's Museum, play was explicitly defined as "being freely-chosen, personally directed, intrinsically motivated, and involving active engagement." This institution's framework also described how learning at the museum takes place through both play and exploration.

❷ **Play appeared as an important element in the learning framework, but play itself was not defined.** Minnesota Children's Museum's learning framework was based on the idea that "children learn best through play," and stated that play is an entry point for skills called the "Seven Powers of Play"—creative thinking, critical thinking, self-control, confidence, collaboration, communication, critical thinking, and coordination. Although play was central to this institution's philosophies about children's learning, the word "play" was never explicitly defined. For the Children's Museum of Indianapolis, behaviors indicative of family learning included the word "play" when describing how family members interacted with one another or with exhibit elements (e.g., "family members participate in simple play from the outset," and "child asks or tells [family] member to begin or repeat play.")

❸ **Play was mentioned in passing but was not a main focus.** The learning framework of the Children's Museum of Pittsburgh's MAKESHOP® focused specifically on learning practices that visitors use within that space. The word play appeared in the description of "tinkering" (described as in-

volving "extended purposeful play") but was otherwise not included.

④ Play was intentionally not included in the learning framework. The Children's Museum of Houston focused on specific aspects of learning along with their relationships to academic achievement, and did not include language about play in its learning framework.

The interviews showed that in some cases, museums did not define what they meant by "play" because they felt it was self-explanatory. Yet, different qualities of play stood out to different museums. Indianapolis most valued the social interactions that occur through play. Pittsburgh saw "joy" as an inherent part of visitors' experiences. Minnesota emphasized children being "fully active with their minds and their bodies." These descriptions not only show that play is complex and multifaceted, but that museums conceptualize play in slightly different ways.

In addition, this diversity of responses showed that while play was a key element of some learning frameworks, the five museums emphasized a variety of other learning processes as well, including academic learning, making, exploration, family learning, 21st century skills, etc. Based on their stated missions, the needs of their communities, and/or the need to articulate their value for funders and other stakeholders, different museums chose to focus on different aspects of learning, and used language about play in ways that aligned with their specific goals. For some, this meant that play was not featured prominently, or at all.

Finally, the learning frameworks and interviews revealed that museums had different perspectives about how play relates to learning. All five institutions believed that play could not occur without learning. However, some described play as supporting general engagement and motivation in a topic or activity, allowing learning to take place. Others said that play and learning were simultaneous or intertwined (i.e., that children develop skills or knowledge about the world by playing). Of course, these possibilities are not mutually exclusive, but the discrepancies showed that museums

were using play in different ways in their practices—as a way to spark interest in learning, or as a valuable learning experience in itself.

More critically, this study revealed that children's museums often are not documenting how they define play and their institutions' perspectives about how play relates to learning, even if they have strong beliefs about these concepts. Without defining play, it is difficult for children's museums to communicate about the kinds of experiences they are supporting, and they risk others assigning their own meaning to this term.

Part of the challenge is the fact that there is no one single definition of play that applies in all contexts. Researchers and theorists throughout history have defined play in many different ways (for reviews, see Saracho & Spodek 1995; Sutton-Smith 1997):

- **Dewey** (1910) defined play as activities that are performed for their own sake, not for any other result or reward.
- **Vygotsky** (1966) described play as involving imaginary situations and rules.
- **Rubin, Fein & Vandenberg** (1983)

> **How do children's museums talk about play and its role in children's learning?**
>
> **How do different institutions balance play with other priorities and goals?**

described play as being intrinsically motivated and focused on means over ends.

- **Piaget** (1962) described children progressing from sensorimotor to symbolic play to games with rules.
- **Fagen (1981); Fein (1981); and Hughes (2002)** have differentiated dramatic play, object play, social play, and many other play types.

Although there are many ways of describing what makes play unique, a handful of qualities are mentioned most often in the literature (see Gray 2013 and White 2012 for two freely-available summaries of these ideas):

- **Process orientation:** The satisfaction of playing lies in the process and not the final product. When playing, children might look for the most interesting or novel ways of doing something, rather than the fastest or easiest ways.
- **Intrinsic motivation:** Play is motivated by one's own interests and desires, rather than by an external reward or consequence (e.g., prizes, grades, etc.).
- **Self-direction:** Play is voluntary and freely chosen, not mandatory or directed by others; children themselves decide what to do, how to do it, and when to stop.
- **Active engagement:** Play requires personal involvement and participation, and can even lead to a highly focused mental state described as "flow" (Csikszentmihalyi 1990).
- **Non-literality:** Play involves pretending, imagination, or symbolic thinking. It might involve fantasy (e.g., dramatic play), or it could be a representation of something real (e.g., constructing a house from blocks).
- **Positive affect:** Play is enjoyable, fun, and involves positive emotions.
- **Mental rules:** Play involves a structure that is invented and flexible. For example, children might create a game or choose roles in a pretend scenario. The rules are decided on together, updated, negotiated, and even subverted.

Because play is a central issue for the children's museum field, we argue that all children's museums should consider how they define play,

especially when creating institutional learning frameworks. This is not to say that all of the qualities of play described above apply equally well to children's museums as a whole, or to individual museums with varying physical environments, goals, and values. But children's museums may be able to find common ground by using some, if not all, of these characteristics to describe their own practices. In doing so, individual museums might better communicate what they mean when they are using the word "play," connecting their work to a broad research base.

Having a common understanding and language around play within an institution is critical so that everyone responsible for creating the conditions for play and learning—from exhibit, program, and development staff to the frontline team—can support a cohesive visitor experience. For example, if an institution believes that play must be self-directed and involve active engagement, it has implications for facilitation strategies as well as parent messaging, exhibit design, and program planning. If staff across departments do not have a common understanding of what play means within their institution, they might be presenting conflicting messages to visitors, funders, and other audiences.

Internal discussions may reveal that some of the things children do at any one museum are not play, or that play is not an institution's main priority. Indeed, the interviews conducted by the research network showed that play might take a back seat to other issues and interests, and that children's museums support a variety of learning processes including but not limited to play. Adopting an internally-used definition of play does not mean an institution has to change its mission or focus. In fact, it would allow museums to more clearly articulate the range of learning experiences they support, and to be more effective advocates for the value of play, if they choose. The variety of perspectives represented in this small study might provide a starting point for other institutions to consider how they define and use play. The research network plans to publish a more detailed summary of its analyses in a peer-reviewed journal to encourage museums to begin these internal conversations.

Of course, the network also recognizes that a more diverse range of perspectives about play exists within the wider field, beyond the five institutions in this study. The network is currently embarking on a large-scale research study to investigate how a

The interviews showed that in some cases, museums did not define what they meant by "play" because they felt it was self-explanatory. Yet, different qualities of play stood out to different museums. Indianapolis most valued the social interactions that occur through play. Pittsburgh saw "joy" as an inherent part of visitors' experiences. Minnesota emphasized children being "fully active with their minds and their bodies." These descriptions not only show that play is complex and multifaceted, but that museums conceptualize play in slightly different ways.

larger sample of children's museums across the country talks about play and learning. This study will set the stage for an urgently needed discussion about the role of play in children's museums, both in general and within institutions of different sizes, locations, demographics, and missions.

By examining the range of ways in which children's museums talk about play, the field might achieve greater clarity about this issue and perhaps develop a common language. If multiple institutions were to adopt similar vocabulary around play, they would be able to engage in deeper discussions and debates, making the field stronger by encouraging museums to challenge their own assumptions and understandings. By applying existing knowledge about play to museum settings, the field might generate new theories about how children's museums create conditions that support multiple aspects of play. Most importantly, children's museums would be able to collaborate more effectively to demonstrate their learning value by developing a common language—identifying common aspects of children's museum experiences and gathering evidence that is comparable across settings. Ultimately, children's museums have a great deal of knowledge about play that can be formalized, making a stronger case for their impact on children, families, and communities. 🐰

Susan Letourneau, PhD, is research & evaluation specialist at Providence Children's Museum and postdoctoral research associate with the Causality & Mind Lab at Brown University. She conducts collaborative research on children's play, exploration, and learning at the museum, as well as internal evaluations of exhibit materials and environments.

Robin Meisner, PhD, is the director of exhibits at Providence Children's Museum. She oversees the design, creation, assessment and maintenance of the museum's exhibits and environments, and has worked in museums since high school.

Alix Tonsgard, MS, is the early learning specialist at DuPage Children's Museum. Acting as the museum's advocate for early childhood development and learning, she ensures that the latest research in early childhood education is represented in all museum exhibits, professional development initiatives, and public programs. She also represents the early childhood mission of DuPage Children's Museum to outside agencies and institutions.

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The Children's Museum Research Network
continued from page 2

Children's Museum of Houston, Minnesota Children's Museum, Providence Children's Museum, Pittsburgh Children's Museum, and The Children's Museum of Indianapolis.

Over the course of several months, staff from these five institutions studied the group's learning frameworks, all of which featured different areas of focus and views about learning. By exploring a small but varied sample, the network hoped to understand what learning frameworks revealed about learning in the children's museum field. A team from the UW Museology Department interviewed a representative from each of the SIG1 institutions in an effort to answer the following research questions:

1. What major vocabularies do these frameworks share? Where do they diverge?
2. What constructs do children's museums use and prioritize in their learning frameworks?
3. What learning theories do these frameworks implicitly and explicitly reflect or endorse?

In February 2016, during a meeting in Seattle with all ten of the CMRN institutions, SIG1 and the UW Museology team shared results of their exploration of learning frameworks, including conference call discussions and UW team interviews of SIG1 representatives. Working in small groups, network members, searching for connections among the five frameworks, looked at interview data through the lens of "What are children's museums beliefs about learning?"

They discovered that each of the five SIG1 museums addressed, defined, and approached learning frameworks differently. The learning frameworks were varied, due to their geography, community contexts, historical background, and the varying professional and academic backgrounds of their employees. Rather than considering this a weakness, the network members saw it as an illuminating point of richness that bore further investigation.

Three major themes emerged worthy of future study: outcomes, learning approaches, and play (topics of other articles in this issue). Not all of the five SIG1 institutions focused on these three areas in their individual learning frameworks. However, the network felt these elements were pivotal for the children's museum field as a whole.

The Research Network also builds capacity within the children's museum field by fostering connections between the participating organizations, offering opportunities for collaboration, and empowering museums to learn and benefit from one another's ongoing research activities.

Additionally, the Research Network has disseminated some of its findings thus far on the CAISE spotlight blog and during a roundtable discussion and poster session at the 2016 InterActivity Conference in Connecticut last May. Finally, it intends to publish additional findings in journals that reach the museum field more broadly in the near future.

Moving Forward

At the end of the Seattle meeting, network members decided that play should be the focus of the next special interest group (SIG2). While play is a dominant subject in the field, it can be difficult to draw meaningful conclusions about play's benefits (or even its definition) due to divergent understandings throughout the field and even in the community at large.

Rather than conduct play research internally, as was done with learning frameworks in SIG1, all ten network museums will conduct research within the larger children's museum field. During a second in-person meeting at InterActivity 2016, network members decided to conduct interviews with representatives from fifty different ACM member museums to gain a deeper understanding of the wider field's perception of play. (Interviews are nearing completion at the time of this article's publication.) Following another meeting in October 2016 to discuss the data, the research network will share its findings on play with the field in 2017.

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Conclusion

The Research Network takes a research-to-practice approach with the intent of providing findings that can be applied at the practitioner level at any children's museum. In fact, this is already happening among network member museums on an informal level. For example, network member Thanksgiving Point has been incorporating research from its involvement with the network with its own in-house research to better inform practice. Thanksgiving Point staff are using the aggregate research to improve evaluations, grant proposal messaging, visitor engagement, and stakeholder communication. Aligning many of its goals with the work being done by the network gives Thanksgiving Point the confidence they are moving in the right direction.

It is hoped that through the focused work of the Research Network, the entire children's museum field will be re-energized to think and talk more about important topics such as outcomes, learning approaches, and play. The network's ultimate goal—to build the case for the unique learning that happens in children's museums—is one that museums and the audiences we serve can all benefit from.

Stephen Ashton, Ph.D., has been working in the museum field for six years. He received his doctorate in instructional psychology and technology from Brigham Young University. His research interests include visitor identities, informal learning, and museum impacts.

Kimberly McKenney joined the Children's Museum of Tacoma staff in 2000 to research and develop exhibits and programs. In 2008 McKenney carried her early education background and knowledge of the museum to her new role as grants and assessment director.

A learning framework is a strategic expression of the museum's long-term learning interest. It shows that the museum values learning for visitors and staff, and outlines the important dimensions of learning and how they fit into the museum's vision, mission, and audience. As such, it nests under the umbrella of a museum's multi-year strategic plan, on par with multi-year fundraising plans or audience development plans. Exhibit plans, program plans, or interpretive plans flow from the learning framework—they operationalize what the learning framework covers.

Learning Frameworks Decoded: What They Can Tell Us about a Museum

An Interview with Jeanne Vergeront

INTRODUCTION

Mary Maher

It is not surprising that when members of the Children's Museum Research Network began looking for an anchor point at which to begin their work, they chose museum learning frameworks as a key source of data.

Learning frameworks have become an increasingly essential tool for children's museums as they ground and plan their work. But what are they, and how are they developed? In the following interview, museum planner Jeanne Vergeront discusses the intent behind a learning framework, the process of developing one, and how it fits into a museum's work. While there is no template, there are guiding principles that can help any museum seeking to build a new framework, or update an existing one.

Based in Minneapolis, Minnesota, Jeanne is a seasoned museum professional with extensive background in placing stakeholders at the center of creating, and implementing organizational plans, supporting museum leadership, and developing learning experiences in exhibits and programs. After years of experience in early childhood education, she served as the director of exhibits and education at Minnesota Children's Museum from 1987 to 1997. Jeanne has been developing learning frameworks with museums since 2000, and writes about them on her "Museum Notes" blog.

MAHER: The term "learning framework" is used to describe all kinds of institutional guides for defining and measuring learning. Is an institutional guide the same as a learning framework?

VERGERONT: Some institutional guides are learning frameworks, but not all learning frameworks are institutional guides. An institutional guide, such as a strategic plan or a business plan, brings a long-term, institution-wide perspective to a high priority area of museum's functioning.

MAHER: How does a museum start building a learning framework?

VERGERONT: There's no one particular place to start developing a learning framework and no single process for building one. I recommend doing some groundwork first. Read about learning frameworks. Check with museums that have them and find out what they contain, what has worked, what hasn't. Then plan the process, thinking about your museum's needs, who should be involved, and what information about the community is relevant. Gather the museum's mission, vision, and values statements and strategic plan; develop a table of contents for the framework identifying what it will cover.

Frameworks have five major components: the community context, the museum's view of learning, the learning audience, the learning focus and approach, and the experiences and environments through which it delivers learning value (including exhibits and programs, and possibly also events, resources, collections, and a school).

Start with exploring the community context. Gather the readily available information about the challenges and promise of the community's children and families that are relevant to the museum's interests. A community's priorities might be related to a school readiness gap for young children, a drop in reading skills among fourth graders, available out-of-school time for middle schoolers and teens, 21st century skills, new immigrants, graduation rates for minority students, or workforce capacity. A synthesis of these issues becomes the learning backdrop to which a learning framework responds; this is not just what interests three or four people. Discussions about how the museum views learning can serve as an anchor or reference point for other parts of the framework.

MAHER: What learning theory or theories are most likely to underpin learning frameworks?

VERGERONT: A unified theory of learning in museums doesn't exist, so a museum must find theoretical underpinnings that align with how it views learning for its audience and community. There's a lot to choose from and it can become overwhelming.

Keep a few things in mind while looking for resources. First, the museum field is arguing for a broader definition of learning, recognizing the visitor as an integral part of the process. Learning in museums is not limited to information processing; it is cognitive, social-emotional, and physical. Consider theories such as constructivism (making connections between prior knowledge and new experiences to build, or "construct," meaning) and Vygotsky's sociocultural theory of learning (learning as a social process occurring through interaction with others in a cultural context).

Theories of children's development are also relevant. John Falk and Lynn Dierking's Contextual Model of Learning integrates learning research and theories to help understand learning in a museum. The following books are also helpful: Deborah Perry's What Makes Learning Fun?, Falk and Dier-

king's The Museum Experience, and George Hein's Progressive Museum Practice. Some learning frameworks identify "educational ancestors" such as Piaget and Dewey or pedagogies like the Reggio Emilia Approach. Some learning frameworks mention neuroscientists because of recent research on brain development.

MAHER: Speaking of ancestors, where did learning frameworks originate, and why is everyone so focused on them now?

VERGERONT: This is an interesting question. Frameworks that touch on learning have been around for a long time, often in the form of exhibit master plans or interpretive plans that select themes and content. But most of the other elements of a learning framework, such as a long-term view of learning, learning strategies, and learner outcomes, don't have a presence in those documents. The increased focus on learning frameworks is partly due to museums' increased awareness of their value as informal learning environments, a response to pressure for accountability, and a desire to define and grow their impacts.

MAHER: Where does the learning framework fit among other museum plans? Is there an order of importance or a common structure whereby all of these different plans are prioritized and aligned?

VERGERONT: Both learning frameworks and strategic plans have a horizon of about five to seven years. A learning framework is a strategic expression of the museum's long-term learning interest. It shows that the museum values learning for visitors and staff, and outlines the important dimensions of learning and how they fit into the museum's vision, mission, and audience. As such, it nests under the umbrella of a museum's multi-year strategic plan, on par with multi-year fundraising plans or audience development plans. Exhibit plans, program plans, or interpretive plans flow from the learning framework—they operationalize what the learning framework covers.

MAHER: How much detail is necessary to make a learning framework usable?

VERGERONT: That is the challenge in any plan: how do you get what's essential without giving too much detail? What a learning framework needs most are clearly-articulated big ideas about learning, audience, and experiences. Like a strategic plan that develops detail through implementa-tion, a learning framework becomes more specific by operationalizing it in planning an exhibit, developing a set of family programs, updating initiatives, or training floor staff. If a museum's learning framework focuses on curiosity, as part of its implementation, the museum might release a white paper that explores what curiosity looks like for children at different ages, experiences that encourage children' curiosity, the staff training needed to encourage children asking questions, and measures for success.

MAHER: How are the broad goals of a learning framework translated into reality?

VERGERONT: Through actions, choices, options, and allocation of resources in developing individual exhibits and programs with guidance from the framework.

MAHER: If a learning framework prioritizes "creative problem solving," how does that phrase specifically guide an exhibit designer in deciding what components to put on the floor?

VERGERONT: If that phrase is important in the framework, then exhibit developers and designers should find ways to create experiences that engage children in creative problem solving. What materials encourage creative problem solving? What are the challenges? What context supports it? The framework is a tool that helps them know it is important and, in general terms, what it looks like. By stating what's important in the framework, a museum points to where its exhibit planners and program developers can focus their creativity and problem solving.

MAHER: What are the other different uses of the framework (i.e. implementation by exhibits/design; programs/facilitation; evaluation/research/development/administration)?

VERGERONT: All of those are possible. Take the framework goal of creative problem solving, for example. If a museum is interested in encouraging children and adults to engage in creative problem solving, floor

Frameworks have five major components: the community context, the museum's view of learning, the learning audience, the learning focus and approach, and the experiences and environments through which it delivers learning value...

staff are key. In effect, the framework directs floor staff to become sharp observers of creative problem solving in the museum setting, to develop fluency in talking about it and posing questions that encourage it. Evaluation and research staff will explore questions related to creative problem solving in a program or exhibit and gauge the impact of the museum's experiences. Development staff will find the framework helpful in describing why the museum's work is important and how a funder's support can help the museum act on its learning interests. The grant writer will look at the framework to incorporate language about learner impacts. The program developer will check the experience criteria in developing a program. A museum's learning framework should be referred to often, by many people, for specific questions, and as a refresher.

MAHER: Is there anything that would not be included in a learning framework?

VERGERONT: It doesn't need a budget or a timeline. Responsibility for implementation is reflected in position descriptions and integrated with other museum practices and procedures like exhibit planning, the annual budget cycle, etc. Once it gets developed it gradually becomes part of everyone's work.

MAHER: Who's "in charge" of the learning framework?

VERGERONT: That will depend on a museum's organizational structure and differ for every museum. There isn't a "learning framework czar." General oversight is likely to be located in a department with a major role in developing learning experiences. At the same time, it's important that ownership not be too narrowly assigned since a learning framework needs to be played out across many fronts—exhibits, programs, events, graphics, staff interactions, fundraising, etc.

Several people may be "in charge" of developing the learning framework and that's valuable because it shares responsibility and taps into strengths. A point person is needed to bring the right people together, keep the framework on course, and make sure it gets done. The work of a team will benefit from a skilled facilitator managing discussions, articulating connections among ideas, and pushing the thinking forward.

Aligning all museum activities—including experiences and environments—with the framework is virtually the same as aligning everything with a mission statement, strategic plan, or safety plan. Every

person needs to translate it into how they do their job. This gets established in position descriptions, happens through hiring, is supported during orientation, reinforced during performance reviews, and shared and practiced in staff training and professional development.

MAHER: Once the learning framework is completed, is it done?

VERGERONT: Yes and no. When a group assigned to develop a learning framework feels it has completed its work, then the framework is ready to be shared with museum leadership—board and staff, museum supporters, partners, and staff who will be operationalizing it in exhibit planning, staff training, and program development. It should be flowed into museum processes and documents. The bottom line is, a learning framework is a "use-dependent" tool: the more it's used, the better it will be understood. Staff will gain more fluency with it and find more opportunities to strengthen exhibits, refine program activities, facilitate interactions with visitors, and communicate the museum's value.

MAHER: In creating a mission statement, the process is as important as the product. Is it the same with a learning framework?

VERGERONT: The process can be very powerful and have long-term impact on the people who are engaged in it. By working with ideas, deepening understanding of what makes the museum's work important, and producing something tangible of value, colleagues will interact in a way that is much more than simply putting in time in a meeting. Bringing together a committed group is key and should include staff, and maybe the board, but not community members or partners. The group needs the freedom to have lively discussions that might be hampered by bringing in people less familiar with the museum. However, community members and partners could be involved in gathering information or perspectives at specific points in the process.

A learning framework builds on and aligns with a museum's mission. Some missions are more explicit about learning than others and that's just one reason the process varies among museums. The five components of a learning framework (community context, the museum's view of learning, learning audience, learning focus, and experiences) mentioned earlier may also be the broad sequence of topics discussed in the process.

A unified theory of learning in museums doesn't exist, so a museum must find theoretical underpinnings that align with how it views learning for its audience and community.

Regardless of the precise steps, the process should involve lots of discussion, information gathering, interactive exercises, review, and revision. While we can describe a basic set of steps for developing a learning framework, each museum's framework can and should be different. A museum's mission, community, audience, and how it decides to respond to these, have a major influence on the framework.

MAHER: Would a learning framework ever be defined or limited by a museum's size or budget?

VERGERONT: Physical size, attendance, or budget do not affect a museum's learning framework. Nor does a museum's stage of organizational development, or whether it is urban, suburban, or rural. I have worked on developing learning frameworks with museums that are starting up, expanding, or reinventing themselves, museums that are 100 years old and five years old, 9,000 square feet and 300,000 square feet. Because a learning framework reflects the museum's learning interests, mission, community, and audience, perhaps through a focus on family learning, play, inquiry, wellbeing, or STEAM. How a museum plays these interests out—from a custom built museum to a

Aligning all museum activities—including experiences and environments—with the framework is virtually the same as aligning everything with a mission statement, strategic plan, or safety plan. Every person needs to translate it into how they do their job. This gets established in position descriptions and hiring, is supported during orientation, reinforced during performance reviews, and shared and practiced in staff training and professional development.

mobile unit—will vary. There's no limit on ideas. Small museums can have big, roomy concepts that they understand well and know to carry out for their audience.

MAHER: Should a museum's learning framework align with state standards of learning?

VERGERONT: Each museum must decide that for itself. Standards are viewed differently from one locale to another. But in general, since this is a learning framework for a museum, for guiding its learning practices, the framework has to first identify the museum's driving ideas, framing them clearly and supporting their relevance for the museum and its audience.

Deeper into the process, a museum could map standards onto their framework. Focus areas like STEM, early literacy, or creativity connect with standards of learning. There's no "should" here.

MAHER: The Children's Museum Research Network looked at a number of children's museum learning frameworks to determine what key concepts and issues museums are focused on now. Three main focuses emerged: learning approaches, outcomes, and play. What other focuses might you expect to find in a learning framework?

VERGERONT: The more museums develop, update, share, and use learning frameworks, the greater clarity we will have among the terms and hierarchy of ideas in them; but we don't have it now.

Play is both broader and more specific than learning approaches or outcomes. Play might be a driving idea that comes directly from a museum's mission. It might be a museum's overarching learning interest, as it is for The Strong National Museum of Play in Rochester, New York, that collects around play, publishes a peer-reviewed journal (American Journal of Play), creates exhibits and programs that are play driven, features a Toy Hall of Fame, and has a preschool. Other museums focus on family learning, inquiry, creativity, or early literacy. In yet others, there might not be a single idea; the interaction among multiple ideas can be rich and still focused. NYSci has a learning framework built on three ideas: Design, Make, Play.

No one museum's framework is going to explain it all. But articulating the connections one framework at a time and drawing on theory and research is going to provide an increasingly robust platform for planning and evaluating experiences, focusing on and changing outcomes.

MAHER: Is there a common language that could be understood beyond any single institution—field-wide or by other museums—creating its own framework? People often assume they know what a word or phrase means ("play," for example), but how do we assure that everyone has the same, clear understanding of terminology?

VERGERONT: A core part of the process is developing a shared understanding of important ideas or constructs, which might include play, learning, inquiry, and early literacy. All terms should be understood in the same way across an organization. Even without a learning framework, it benefits the museum little if marketing staff uses one definition of a word such as play, development uses another, the executive director uses a third, programs and exhibits use a fourth, and floor staff use even more.

I think it's too soon to develop or impose a common learning framework language. First, every framework is different because it emerges from a museum's mission. Also, just as museums need to be grounded in their communities to become a valued resource, a museum's view of learning also needs to be grounded in its community. There are many views, constructs, and theories about learning. One museum's view of learning will likely emphasize something different than another museum's. This doesn't mean making up idiosyncratic definitions for your museum. It means grounding all definitions in current thinking and literature on those priority areas.

Learning frameworks have only recently become established practice in museums; children's museums are moving faster here. The resourcefulness, knowledge base, and local circumstances at different museums will result in productive and interesting variations on learning frameworks. In standardizing any part of a learning framework so soon, if ever, we would lose innovation and variety. Instead, we need a standard that museums will have collaboratively developed and reviewed and periodically updated learning frameworks.

MAHER: How does a museum's learning framework relate to its intended learning outcomes? If the outcomes are not being achieved, is the weakness likely in the framework or the translation into practice?

VERGERONT: The outcomes part of a learning framework is probably the most challenging. Our field is struggling with how we can show change as a result of our work.

> The outcomes part of a learning framework is probably the most challenging....Learning is complicated. It doesn't happen in a single episode; it occurs over time, the result of lots of experiences.

Learning is complicated. It doesn't happen in a single episode; it occurs over time, the result of lots of experiences. Unlike schools, museums don't have visitors returning day after day all year.

In some frameworks, I have developed a logic model to show what a museum is investing in to achieve its outcomes. Learning outcomes will vary among museums but they should be aligned with the framework's overarching interests. If a museum is focused on play, for example, the outcomes should relate to play and might include that:
• parents recognize the multiple benefits of play;
• children take safe risks during play;
• fewer children experience barriers to play in exhibits;
• children create more elaborate structures during play.

MAHER: What are some of the commonly overlooked steps in creating a learning framework?

VERGERONT:
• Clarifying terms. It's easy for a group that works together and uses the same words

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frequently to assume they mean the same things. We all know what "play" is, right?
• Dissemination. A team is understandably eager to move on when the framework is finished. But don't skip an opportunity to share how the museum intends to grow its learning value and benefit to the community with funders and supporters. Sharing the framework should also be part of onboarding all staff.
• Incorporating the framework's fundamental ideas and intentions into the website, annual plan, and marketing materials. A museum's big ideas can show up in the events that are highlighted, the photos selected, and who is in them even without posting a statement like, "Our museum focuses on creativity, critical thinking, and global awareness." Museums are learning how to tell their stories better. A learning framework can reinvigorate the museum's language and provide an opportunity to say, "We want to tell you about what we've been working on and where we are going."

MAHER: What new kinds of learning research are needed to better support the goals of learning frameworks? What are the big questions still hanging out there?

VERGERONT: More research on play in museums will strengthen our understanding of how children play in museum settings, whether indoors or outdoors. It will help us understand more about different types of play, about children's conversations and vocabulary related to play, and about the role of adults in play. We think we know more about play in museums than we actually do.

More use of the Reggio style of documentation to study play would be great. Documentation is a shared, iterative, and reflective process that involves gathering information and interpreting traces of children's work and words. It's collaborative, following the child, looking at what she does in order to glimpse how children think and learn. This fits well in a museum setting with a focus on what children are doing—we have lot to learn from what is going on.

There are about 35-40 preschools in museums. At least fifteen are in children's museums. These would be interesting settings for research on children's play.

A case study of a learning framework would be interesting. Focusing on a framework's implementation and integration into a museum's practices could tell us about the real life of learning frameworks—not just our intentions for them.

which were instrumental in establishing the relationships needed for large-scale collaborative work. Now that funding has shifted from NSF to NASA (National Aeronautics and Space Administration) and others, network leadership is working to continue the in-person meetings.

One of the most impressive results of the NISE Network is its open source resources library, consisting of 200 programs, exhibits, activities, and toolkits around nanotechnology, more than fifty professional development resources, and more than 250 other shared resources. The network also developed an approach to data collection called Team-Based Inquiry (TBI), which is now being used by institutions outside of NISE Net.

With the NSF grant period at an end, the network has been shifting its focus from nanotechnology to the more encompassing domain of STEM education while using the same structure and partners (and acronym, now short for National Informal STEM Education Network). The shift allows the network to tackle several different STEM education projects and create opportunities for diversified funding sources while continuing the ongoing challenge of building relationships among network participants.

As the network participants and planning team strive toward their goal of providing the field with empirical evidence showing the learning value of children's museums, they know this is just the beginning. Continuing this research and analysis will not only strengthen the role of children's museums as leaders in informal learning, but improve the visitor experience for all children and families while helping contributing to the ever-growing body of literature about how people learn.

Contact:
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More info:
http://nisenet.org/

Children's Museum Research Network Launches

Currently, the Children's Museum Research Network operates with a central player governance structure led by ACM and the University of Washington Museology Department, with its first cohort of ten children's museums. A second cohort will join the network in 2017 following an application process to be launched by the winter of 2016. (For more information, contact Jennifer Rehkamp, Director, Field Services, ACM or Jessica Luke, Director, Graduate Museology Program, University of Washington, or visit http://www.childrensmuseums.org/research-network.)

With existing research and the above three networks as models, the Cildren's Museum Research Network has begun discussion and planning for sustainability beyond its initial IMLS grant period. As the network participants and planning team strive toward their goal of providing the field with empirical evidence showing the learning value of children's museums, they know this is just the beginning. Continuing this research and analysis will not only strengthen the role of children's museums as leaders in informal learning, but improve the visitor experience for all children and families while helping contributing to the ever-growing body of literature about how people learn. 🌀

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WHY DOES THE SCHOOL BUS STOP AT ROTO?

Roto is pleased to announce the renewal of its annual partnership with Dublin City Schools, comprising 12 elementary, 4 middle and 3 high schools surrounding Roto's central Ohio headquarters. The partnership provides Roto's museum projects with a diverse pool of participants for our extensive in-house exhibit development and evaluation efforts, while students and teachers enjoy expert support for their innovative in-class projects. Together with our museum and science center colleagues, Roto relies on practices like these to produce some of the most effective and durable exhibitions and cultural experiences in the field.

MUSEUM MASTER PLANNING • FULL-SERVICE EXHIBIT DESIGN • EXHIBIT DEVELOPMENT & EVALUATION
THEMING AND ENVIRONMENTAL DESIGN • INTERACTIVE ENGINEERING & PROTOTYPES
FABRICATION & TURNKEY INSTALLATION

Learning Frameworks Decoded
continued from page 17

This could be a very long list.

MAHER: It's been said that reading between the lines of a profit and loss statement can tell you more about an organization than just its finances. What does a learning framework say about a museum?

VERGERONT: Simply having a learning framework says a great deal about a museum. It says that a museum takes seriously its responsibility to be a valued learning asset in its community. It is clear about the learning value the museum brings to its visitors, staff, board, and volunteers, and the community. A museum shows this by acting on its framework: dedicating staff resources to developing it, fully integrating it into the work of the museum, stating what aspects of learning are most important (play, early literacy, critical thinking, strengthening relationships), and holding itself accountable by identifying intended outcomes and tracking its progress.

What that framework says specifically is also important: the ideas are grounded in theory and research and are relevant to the community and to the museum's audience. It is an expression of what the museum is.

The other telling feature of a good learning framework is the extent to which staff (and board members and volunteers) are familiar with it. By applying the framework, they find new ways to add to it, update it, and use it. Consider, for example, specifically how a learning framework makes its appearance every day on the exhibit floor by following the thread of how staff greet visitors at the door. In its learning framework, The Children's Museum of Indianapolis adopted family learning as a driving focus. As a result, they changed how museum greeters spoke to visitors at the door. Previously, when a family came in, a greeter would kneel down, look at the child and say, "What do you like to do?" Now, greeters look at everybody in the family as they ask, "What do you like to do together as a family?" This embodies the museum's focus on families and family learning. Small actions that flow from the big ideas articulated in a learning framework can say a lot about what's important to a museum.

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