Digital Interactive Experiences in a Children's Museum

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Introduction

Interactivity is at the heart of the Please Touch Museum, The Children's Museum of Philadelphia (PTM). The museum was founded in 1976 by Montessori educator Portia Sperr to engage children ages seven and younger in playful learning through interactive exhibitions and programs, and began as a 2,200-square-foot pilot project nestled among the dinosaur skeletons and woolly mammoths in Philadelphia's Academy of Natural Sciences. Today, it is located in Memorial Hall in Fairmount Park, a building originally erected for the 1876 Centennial Exposition, and attracts more than 500,000 visitors to a dozen permanent and temporary exhibitions spread out over two floors and nearly 70,000 square feet. At PTM, exhibitions and programs are intended to spark children's creativity, imagination, and learning through hands-on, interactive experiences and multigenerational play (fig. 1).

Today, the way children learn and what we understand about the role and importance of play is evolving – especially when it comes to digital experiences. Children growing up in 2018 are digital natives; they do not remember a time before computers, touchscreens, smartphones, and tablets. At the same time, educators agree that children must learn a new set of skills to succeed in the 21st century, frequently referred to as the "four Cs": critical thinking, communication, collaboration, and creativity.[1] At PTM, we are seeking ways to develop experiential, play-based learning opportunities that support 21st-century learning skills *and* respond to the way digital natives interact with their world.

fig. 1. Interior view of Please Touch Museum's Hamilton Hall during a performance, with the Statue of Liberty's torch made of recycled toys, by artist Leo Sewell.

1   See *Preparing 21st Century Students for a Global Society: An Educator's Guide to the "Four Cs"* (Washington, DC: National Education Association, 2012), www.nea.org/assets/docs/A-Guide-to-Four-Cs.pdf.

In 2016, the museum undertook a strategic planning initiative to consider its role in relation to the learning landscape of the 21st century, and how this new environment might impact our institutional goals and methods of engagement. Out of the strategic plan emerged a decision to realign exhibitions and programs to provide deeper levels of engagement grounded in developmental theory and create connections to visitors' lives for greater relevancy.

We decided to reimagine and transform a cornerstone exhibition about the 1876 World's Fair in Philadelphia – *Centennial Exploration* – into an immersive experience that highlights the themes of innovation, technology, creativity that were central to the World's Fair and continue to be relevant today. The new exhibition, *Centennial Innovations*, will incorporate digital learning experiences (which we define as experiences that utilize digital interfaces to present or enhance content such as text, images, audio, and video, with the goal of creating a learning experience for the user) as a way to develop these themes.

The central and largest feature in the current exhibition is a glass-encased model of the Exposition with all original buildings constructed for the World's Fair (fig. 2). While interesting, it currently does not provide opportunities for hands-on engagement. Digital learning experiences will be one way to allow visitors to better explore components of the model. Additionally, the new exhibition will create opportunities for individuals to connect the history, present day, and future of the city and their roles in its future.

Centennial Innovations will be the first major exhibition developed by PTM to incorporate new technology. Therefore, early on we made a decision to conduct background research to better understand how to

fig. 2. View of the model for the 1876 Centennial Exhibition World's Fair grounds, including the current home of Please Touch Museum, Memorial Hall. This model is a component of the current exhibition that visitors will be able to explore more fully through digital learning experiences.

responsibly integrate digital learning experiences for multigenerational audiences that include young children. The museum partnered with RK&A, a museum evaluation and research firm, to research trends in digital learning experiences in formal and informal settings; learn from colleagues who had embarked on related projects in museums; and gain an understanding of audience needs and expectations around this topic. From the outset of the project, we quickly realized there is a growing need for more information to help guide museums in integrating digital learning experiences for children into their exhibitions and programs. We decided to focus on three distinct areas: 1) the general state of digital learning experiences for children in museums; 2) adult caregiver and educators' perceptions of digital learning experiences in children's museums; and 3) the possibilities in combining digital interactives with physical ones.

Digital Learning Experiences for Children in Museums

For the first phase of PTM's and RK&A's work together, we sought to understand the current landscape of knowledge about digital learning for children in museums. We did a literature review and conducted interviews with museum professionals who had firsthand experience with digital experiences for children in their museums or had published on the topic. Interestingly, we found that little research and evaluation is available about digital learning experiences for children in museums – digital interactives for children in exhibitions are rarely the primary focus of evaluations and/or the results are not often easily accessible to other museums because the reports are produced primarily for internal use. Moreover, in our interviews with museum professionals, we found that few felt comfortable identifying themselves as an expert on the subject (although they were referred to us by colleagues as knowledgeable on the topic) and many felt uneasy with the data available to guide and support the process of designing museum experiences for young children using digital technology.

Despite the limitations of existing research and evaluation, and the prevailing feeling of uncertainty among museum professionals about best practices for digital learning experiences for children, we did find some useful guidance from the studies we were able to find, as well as from resources graciously shared with us by colleagues from fellow children's museums and universities.

The research we did suggests that successful digital learning experiences for children in museums share certain characteristics:

1. **They combine physical with digital learning experiences** (i.e. exhibits that combine a digital experience with a physical component, whether that is an object linked to the digital experience or a digital exhibit that responds to the physical movements of the user). Museums are experimenting with combining digital elements with physical experiences or objects in exhibits for all ages – for example, a projection wall with content activated by the user's shadow or a digital interactive map where content is activated by moving an RFID-enabled object. Merging digital and physical experiences may help create an integrated experience because the emphasis is shifted away from screens and instead accentuates connections to the physical world; this is important because hands-on learning is often a key aspect of children's museums and important in early childhood education.

2. **They create digital learning experiences that are social** (i.e. exhibits that encourage social interactions between two or more children, between children and adults, and/or between visitor groups). Research shows that social digital experiences that incorporate multiple users can help avoid creating an isolating experience.[2] Social digital experiences can also improve learning outcomes for children – for example, an adult can scaffold a child's learning and help them make real-world connections both during and after

2   See for example: Lori Takeuchi and Reed Stevens, "The New Coviewing: Designing for Learning through Joint Media Engagement," *The Joan Ganz Cooney Center at Sesame Workshop and LIFE Center*, 2011, http://www.joanganzcooneycenter.org/wp-content/uploads/2011/12/jgc_coviewing_desktop.pdf.

the experience, or children can learn social skills through teamwork and collaboration. While social digital learning experiences are important, it is also helpful to keep in mind that everyone learns differently and media experiences focused on the individual may be appropriate in some cases.

3. **Their digital learning experiences are child-directed** (i.e. exhibits that allow the child to influence the outcome of the experience). Generally, professional organizations, including the National Association for the Education of Young Children (a nonprofit organization focused on early childhood education) and the U.S. Department of Education, encourage creating an "active" digital media experience versus "passive" consumption of digital media for children.[3] In our interviews with museum professionals, all expressed the importance of creating active experiences with digital media – experiences that require some interaction and feedback from the child – to encourage "minds-on" engagement and stimulate learning.

Adult Visitor Perceptions of Digital Learning Experiences in Children's Museums

We also worked with RK&A to conduct audience research to better understand adult caregivers and educators' perceptions about digital experiences for children in general, and digital learning experiences for children in children's museums specifically. This was an important step, considering we knew anecdotally that digital media use among children is a controversial topic for many caregivers and educators. Moreover, we are not aware of any published data on caregiver perceptions of experiences that incorporate digital technology in children's museums prior to this evaluation (although museum professionals we

3   Joan Lee, *Early Learning and Educational Technology Policy Brief* (U.S. Department of Education and U.S. Department of Health and Human Services, 2016), 10, 13, https://tech.ed.gov/files/2016/10/Early-Learning-Tech-Policy-Brief.pdf. *Position Statement: Technology and Interactive Media as Tools in Early Childhood Programs Serving Children from Birth through Age 8* (National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children's Media, 2012), 7, www.naeyc.org/files/naeyc/file/positions/PS_technology _WEB2.pdf.

interviewed shared anecdotal observations that parents seem to be apprehensive about screen time for their children, both in general and in a museum context). We conducted interviews with adult walk-in visitors and held focus groups with three stakeholder groups – PTM members, members of a community advisory council,[4] and early childhood education teachers. All participants had visited the museum before, and are referred to subsequently as "visitors" here. We asked some broad questions about their feelings and perceptions of digital experiences for children in general. We also asked them to respond to a few video clips showing examples of digital learning experiences for children in museums. The audience research yielded several key insights for museums that are thinking about adding digital experiences for children:[5]

1. **Visitors associate "digital" with "screens."** This is not surprising, given that screen-based media (television, touchscreen, tablet, or smartphone) is the most widely available technology for personal devices. Many visitors have concerns about their child's use or exposure to screens ("screen time") and the age-appropriateness of digital formats for children (particularly children under five). Concerns about screen time mean that museums have to be thoughtful about how they present digital experiences and the words they use to describe these experiences. Screens perhaps should not be the primary method of engagement, and messaging about digital learning experiences may need to de-emphasize the digital format and instead focus on the *experience*.

2. **Visitors see value in certain kinds of digital learning experiences for children.** Adults recognize that digital literacy is a necessary skill for children, especially as digital media becomes increasingly ubiquitous, and thus see value in some digital learning experiences

when balanced with non-digital experiences. Our interviews and focus groups indicated that visitors most value digital learning experiences in museums that offer something unique and not otherwise available, and/or include an interactive physical or tactile component (such as manipulating a physical object or an activity that responds to full-body movement).

3. **Visitors have concerns about children sharing digital interactives**. Our study revealed an apparent contradiction in adults' perceptions of play as a valuable tool for teaching social skills. Adults in our study generally viewed play as a social activity that teaches skills like sharing and cooperation, but at the same time they have a high level of anxiety about digital experiences causing sharing conflicts among children due to their anticipated popularity. Concerns about sharing digital interactives may be heightened in the context of a children's museum specifically, as opposed to other types of museums, because of the high concentration of children with differing levels of social skills around sharing and cooperation. Designers may need to consider adults' concerns about sharing when considering the multi-user experience in digital interactives designed for children.

Multisensory Engagement

Multisensory engagement is central to the experience at Please Touch Museum, and best practice for many museum experiences for children. Children learn first by engaging in activities to explore the world around them (), and these experiences can be enhanced by social interactions with peers, parents, caregivers, or teachers. The combination of digital and physical experiences can help move digital learning experiences beyond screens and incorporate physical interaction, which is important for several reasons:

1. **Blending physical and digital learning experiences can support a children's museum's mission to provide hands-on, interactive, social, and child-centered experiences.** By introducing digital

4   The community advisory council is composed of leaders from local organizations who meet regularly with PTM. The community advisory board and PTM work together to share information and build mutually beneficial partnerships that strengthen community resources.
5   Examples shown included a physical/digital experience with a building block challenge with sensors linked to a digital screen, a large-scale projection screen responsive to visitors' movement, and an interactive digital table with content activated by RFID-enabled objects.

fig. 3. Visitors engage in pretend play in the supermarket exhibit. Exhibit experiences encourage an understanding of healthy foods, financial literacy, language development, and social-emotional skills.

components to multisensory, object-based play experiences, objects can be used in new and exciting ways that would not be possible without digital enhancement. This strategy can also help to make digital components feel integrated into the existing fabric of a museum rather than appearing to be a separate, standalone experience.

2. **Combining physical and digital learning opportunities helps keep exhibitions developmentally appropriate for a museum's younger visitors.** Many children who visit PTM are very young, with the majority between the ages of two and seven. While the museum seeks to start developing exhibitions that appeal to slightly older children, this core audience of two to seven-year olds is still a primary focus; therefore, object-based experiences should be central in order to engage our youngest visitors. The use of objects such as sand, blocks, and other manipulatives combined with digital interactive elements will offer experiences that are accessible and developmentally-appropriate for young visitors.

3. **The combination of digital and physical play will be appreciated by caregivers and educators alike.** Our audience research found that many caregivers choose PTM (and museums in general) when seeking leisure-time experiences for children because it offers something unique, with real objects and experiences that they cannot find at home or in the classroom. There is the perception that screens are ubiquitous throughout our culture. Some museum visitors view places like PTM, which have active play opportunities (versus passive media consumption), as antidotes to a world filled with screens. Integrating physical and digital experiences preserves the opportunities for physical, tactile play visitors expect at a children's museum, while also remaining current with evolving trends toward digital experiences and developing 21st-century skills.

Next Steps and Lessons Learned

As we write this article, we are still in the early stages of developing PTM's new *Centennial Innovations* exhibition, and we are testing ideas and prototypes with visitors for the proposed digital learning experiences along the way. We will continue refining our approach. The literature review and audience research conducted early on in the project have been integral in shaping the direction of the museum's first foray into developing digital learning experiences in our exhibitions. They have also helped us anticipate roadblocks before they arise. In particular, PTM continues to return to these key takeaways for developing interactive digital learning experiences for children:

1. Combining digital and physical interactives will be important in exhibition design to remain true to PTM's mission *and* meet visitor expectations.

2. Digital learning opportunities should enhance visitors' experiences in ways that would not be possible otherwise.

3. Creating multi-user digital learning experiences will promote social learning important to the PTM's mission, but should be carefully conceived considering adults' concerns about sharing.

4. PTM must be thoughtful in how we define and communicate what we mean by "digital learning experiences for children" to the public.

We hope that others can learn from our experiences and will share their own challenges and successes around digital learning experiences for children, so that our collective body of knowledge can continue to grow.

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