Intersections in an Art Museum:

Where Art Meets Science

ART
INSTITVTE
CHICAGO

Contents

"Getting a close look into materials and processes makes it more realistic, it allows you to be in touch with the artist, his decisions . . . It gives you a dimension of reality . . . [you feel] closer to the artist, to actually understand how the artist works . . . [you take] a visual trip with the artist."

—Visitor to *John Singer Sargent and Chicago's Gilded Age* exhibition (2018)

Preface

"Not a place for me" is often one of the main reasons people choose not to visit art museums.

Such perceptions of art museums call for institutions to create wider and more diverse entry points for visitors. At the Art Institute of Chicago—envisioned by our first president as a "museum of living thought"—we seek to continually expand art historical narratives by bringing together a plurality of perspectives and voices to processes of research, scientific and creative inquiry, and to increasingly varied modes of public engagement with art. To achieve these goals we developed a multifaceted strategy for engaging the public with intersections of art, conservation, and science.[1] This strategy required us to revise our own areas of practice, establish institutional structures for cross-departmental work, and investigate how science can benefit visitors to an art museum.

We asked ourselves:

- What makes the engagement with both art and science special?
- How does foregrounding the intersections of art and science enhance the museum experience?
- How does this approach support interdisciplinarity and plurality of voices in the museum?

To explore how sharing conservation and science stories affects our visitors, we identified and developed two key aspects missing from both the wider body of literature and our own past outreach efforts: robust visitor evaluations and a broader theoretical framework anchored in pedagogical values that cut across individual case studies. Through interdepartmental collaboration among stakeholders from the Art Institute's departments of Conservation and Science, Learning and Public Engagement, and Experience Design, we theorized two broad impacts of integrating art and science into the public face of an art museum:

1. Visitors will expand their set of perspectives and tools to engage with and see art anew and,
2. Visitors will more deeply value art objects as objects to be experienced in person and preserved for the future.

The results of our research revealed the importance of consistently engaging conservators and scientists in the educational work of museums and integrating science research and modes of inquiry across the many dimensions of public engagement at art museums. Across all of our experiments we found that engaging the public with art and science can significantly impact visitors and museums—providing audiences with new or deeper perspectives for understanding and valuing art objects, inspiring young people to consider careers in STEM through the emotionally and intellectually engaging power of art, and helping museums transform into spaces for inquiry and creative labs with many voices.

What You'll Find

This toolkit contains reflections, case studies, recommendations, and resources that have both informed and resulted from our journey of approaching art through the lenses of conservation and science. We hope these materials enhance the work that you and/or your organization are already undertaking and provide new ways of thinking about interdisciplinarity in creating museum experiences that respond to the needs and curiosities of twenty-first-century audiences.

Strategies for Using the Toolkit

We developed this toolkit for museum professionals, students, and anyone interested in learning about interdisciplinary work in the art museum. Below we have outlined a few ways to use this resource.

Toolkit Chapters	Audience Engagement	Capacity Building	Visitor Research	Findings & Takeaways	More Resources
Preface				✓	
Why Science in an Art Museum?	✓			✓	
Identifying Intersections of Art and Science				✓	
Testing our Theories		✓	✓	✓	✓
Case by Case	✓		✓	✓	✓
Evaluation Instruments and Protocols			✓	✓	✓
For Further Exploration	✓	✓	✓	✓	✓

“Some say they see poetry in my paintings; I see only science.”

—Georges Seurat

Why Science in an Art Museum?

Georges Seurat's *Sunday on La Grande Jatte—1884*, 1884/86, Helen Birch Bartlett Memorial Collection.

School tour in front of Georges Seurat's *Sunday on La Grande Jatte—1884.*

In 2017 the Art Institute of Chicago received funding from the National Science Foundation to engage the public where art, conservation, and science intersect.[2]

Building on past outreach efforts and trends in the broader art museum field, we developed a number of case studies and evaluation tools to assess the impact of sharing conservation and science narratives with art museum visitors as well as programs that drew out conceptual and dispositional connections between artistic and scientific processes of inquiry. Many factors, both internal and external to the museum, inspired us to share these stories.

Inside the museum, the Art Institute's various specialties of conservation—several of which formerly resided under their respective curatorial departments—united under the Department of Conservation and Science in 2018. This newly consolidated department sparked greater institutional interest in sharing the work of conservation and science with museum visitors. Only a year earlier the museum had established its very first interpretation division in the Department of Learning and Public Engagement, bringing in museum education professionals to help connect visitors with

artwork across the institution's many collecting areas. The confluence of interests and values across Conservation and Science and Learning and Public Engagement—such as deepening visitor engagement with objects, providing new perspectives for understanding art, and highlighting the often profound impact of interdisciplinary thinking—laid the groundwork for this collaboration.

Simultaneously, we developed our initiative in dialogue with others exploring the intersections of art and science. We surveyed art museums doing this work and identified several key trends:

1. Art museums have piloted a number of projects and initiatives designed to connect the public with conservation through diverse modes of engagement, from open-air conservation studios and exhibitions to collection care clinics for visitors' personal belongings.[3]
2. Public awareness of the value of cultural heritage conservation is much greater in Europe than in the United States and we believe it is important to bridge this gap here at home too.[4]
3. Visitor interest in the behind-the-scenes work of conservation has only grown, along with increased coverage by the media.[5]

Right: Art Institute school tours' docent facilitating Art + Science experience.

Below: Meekyung Macmurdie, Curatorial Fellow, and Sabiha Doadwala, Pre-Conservation Intern, in the textile conservation labs.

A 2017 article published by Florence Hallett in *Apollo* queried conservation's media moment, posing the question: Is accessible conservation more than a PR trick? Hallett writes, "Couched in the seductive language of revelation and discovery, conservation is all too easily cemented in the public imagination as not just harmless but necessary, its legitimacy accepted without question. Accordingly, the lure of a newly cleaned picture has become an established means of piquing interest, and in these times . . . conservation offers an effective way of attracting both visitors and funding."[6]

There is a danger in oversimplifying and commodifying conservation and science as buzzwords within the art museum. In fact the sustained interest in engagement shown by museum professionals and visitors alike suggests that this is not a trend or gimmick riding a wave of popularity. A *New York Times* article brought up how even institutions' missions have been transformed: "Until recently, many museums had been relatively private about conservation. 'The mission used to be: display and interpret. Now it is: preserve, display and interpret."[7] Recent and more-deeply rooted shifts in the fields of art history, studio art, materials science and engineering, and neuroscience also indicate that advancements in technical studies and interdisciplinary investigations are already transforming research on art objects, the training of new museum professionals, and therefore museums. Just take the pulse of the academic environment surrounding the Art Institute in Chicago.

At Northwestern University's Center for Scientific Studies of the Arts (our partner in this grant), a new generation of material science and engineering PhD candidates are training to advance object-based and object-inspired research in order to answer problems that interest museums and cultural institutions. The center was established in 2012 and, with those at Harvard and Yale, is one of the few university centers dedicated to this type of advanced research in the United States.[8]

Julio Ottino, dean of the Robert R. McCormick School of Engineering and Applied Science, and Adrian Randolph, dean of the Weinberg College of Arts and Sciences at Northwestern University,

wrote an op-ed piece titled "Reconnecting art and science in the classroom," in which they bring forward the importance of innovation and leadership happening within multidisciplinary initiatives: "Today, economic and social growth is driven by disruption. New approaches displace the old with breathtaking speed. Surely the world needs more leaders, thinkers and practitioners who can span realms of knowledge, the more dissimilar and varied the better."[9] They argue that "radical diversity of thought is absolutely essential" and that "blending art and science in education opens the door to innovative thinking." In the article, the authors mention the partnership with the Art Institute—both the museum and the school—as an example of how this can happen in higher education classrooms.

In 2018 the University of Chicago's art history department collaborated with its institute of molecular engineering to offer conservation and conservation science seminars to art history and science students.[10] This initiative is now an endowed permanent pedagogical offering that builds upon the university's five-year conservation initiative and is open to both undergraduates and graduate students.[11] In recent years universities have begun to offer more courses about the scientific analysis of art, technical art history,[12] and conservation to art history students, particularly PhD candidates.[13] This move toward the further integration of technical studies and scientific methodologies into the field of art history—supported by the establishment of degrees dedicated to the study of technical art history[14] and a renewed interest in the material qualities of art objects as well as in how they are made[15]—is ever more apparent. As museum professionals, particularly curators, are trained in these methods of interdisciplinary investigation, the narratives museums prioritize and tell will logically shift to being plurivocal, complex, and related to the intersections of art and science.

Above: Medical groups workshops practicing close looking, narrative building and paired sketching in professional training seminars.

Right: Conservator Julie Simek works closely on the details of the Art Institute's Ayala Altarpiece.

Across the street from the Art Institute, at the School of the Art Institute of Chicago, a new generation of artists are being exposed to courses and programs around the intersection of art and science, which, as a *Chicago Tribune* article noted in 2015, "reflects growing interest around the nation. The National Endowment for the Arts and the National Science Foundation held a summit in 2010 on how artists, scientists and technology experts can work together. The NEA has funded some 30 arts-science and arts-technology projects a year since 2011."[16]

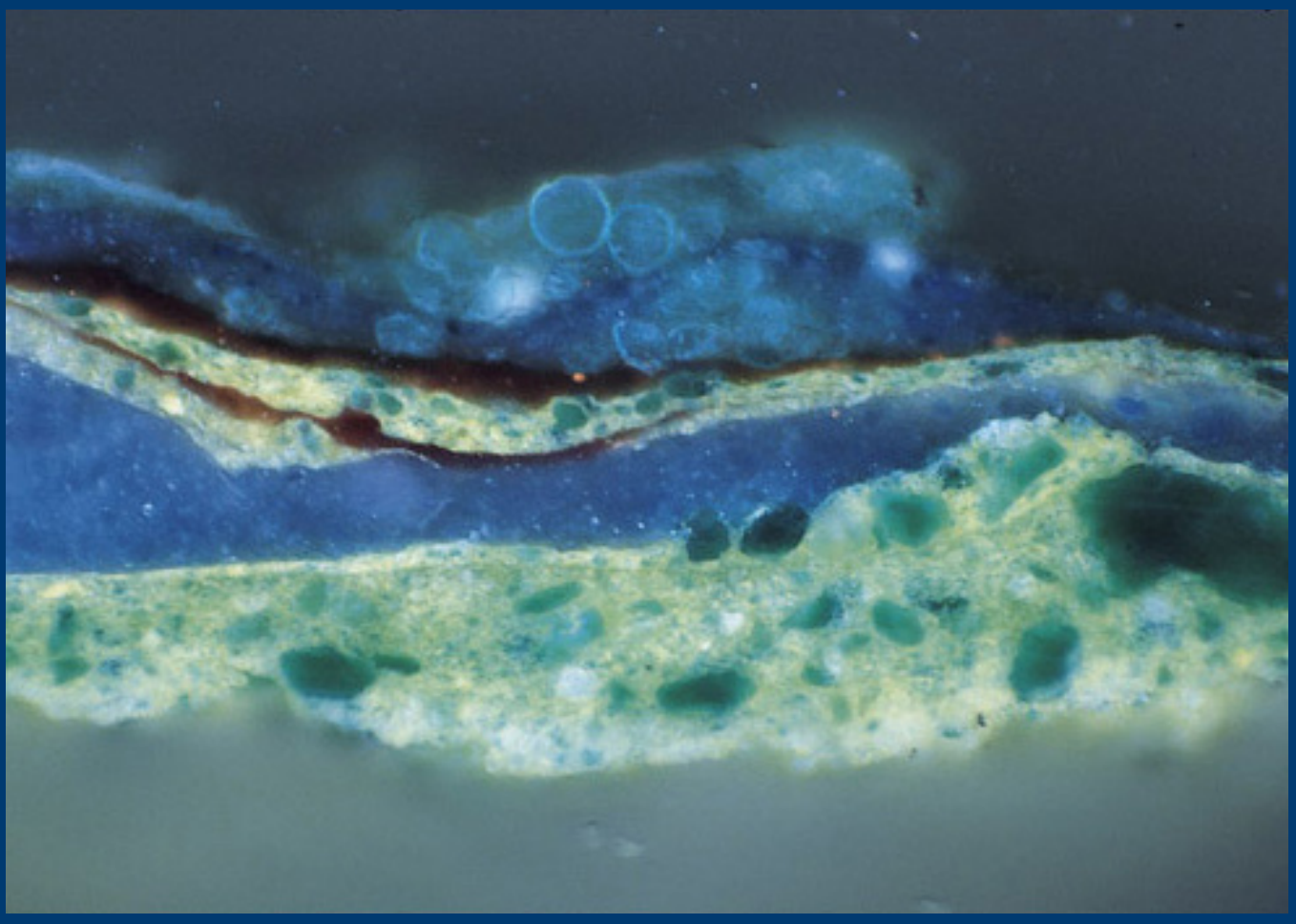
This nexus of research and education amid larger outreach efforts worldwide provided the context for the Art Institute's multi-year project to fully integrate conservation and science into the public-facing areas of the museum. We were first and foremost invested in creating sustained public engagement with conservation and science—a distinct divergence from the precedent set by case studies of one-off projects. Second, we focused on conducting a robust visitor evaluation that could contextualize individual case studies in relation to the larger values of outreach.

Ultimately we were interested in revising our own areas of practice, establishing institutional structures for cross-departmental work, and investigating how science can enhance visitors' experiences in an art museum. The publication of this toolkit reflects our effort to continue the conversation—to connect and exchange with others invested in work that is fundamental for transforming art museums into spaces of interdisciplinary inquiry. ■

1. We use the term "science" broadly to encompass a set of practices involved in conservation of works of art, scientific research, and mindsets involved in scientific inquiry.
2. This major grant followed in the footsteps of smaller awards that cemented the collaboration between the museum's conservators and scientists with museum educators. The full description of the grant and the high-level summary of the proposal, awarded in conjunction with Northwestern University, can be found on the National Science Foundation's website, NSF Award #1743748 (nsf.gov.awardsearch/showAward?AWD_ID=1743748).
3. See Emily Williams, ed., *The Public Face of Conservation* (London: Archetype Publications, 2013). The essays in this volume were drawn from the 2011 conference in Williamsburg, Virginia, "Playing to the Galleries and Engaging New Audiences: The Public Face of Conservation."
4. Sam and John Holden, *It's a Material World.* (London: Demos, 2008). Open Web Access through Creative Commons, demos.co.uk/files/Material%20World%20-%20web.pdf.
5. A notable example is the extensive media coverage of the Rijksmuseum's scientific analysis and treatment of *The Night Watch*: Nina Siegel, "Rembrandt's 'Night Watch' to Undergo Years of Restoration," *New York Times*, October 16, 2018, nytimes.com/2018/10/16/arts/design/rembrandt-night-watch-rijksmuseum.html.
6. Florence Hallett, "Is accessible conservation more than a PR trick?" *Apollo: The International Art Magazine*, April 3, 2017, apollo-magazine.com/is-accessible-conservation-more-than-a-pr-trick.
7. Geraldine Fabrikant, "Preserving the Past for Museum Visitors of the Future," *New York Times*, October 23, 2019, nytimes.com/2019/10/23/arts/design/museum-conservators-public.html.
8. See Yale University, Institute for the Preservation of Cultural Heritage (ipch.yale.edu) and Harvard University, Straus Center for Conservation and Technical Studies (harvardartmuseums.org/teaching-and-research/research-centers/straus-center-for-conservation-and-technical-studies).
9. Julio Ottino and Adrian Randolph, "Reconnecting Art and Science in the Classroom," *The Hill*, April 18, 2018, thehill.com/opinion/education/383604-reconnecting-art-and-science-in-the-classroom.
10. "The Department of Art History Starts a Conservation Science Teaching Program with the Art Institute of Chicago", University of Chicago - Division of the Humanities, Department of Art History, May 22, 2018, arthistory.uchicago.edu/happenings/news/department-art-history-starts-conservation-science-teaching-program-art-institute.
11. "Suzanne Deal Booth Gives University of Chicago $1 Million for Art Conservation", *Artforum*, August 6, 2019, artforum.com/news/suzanne-deal-booth-gives-1-million-for-art-conservation-at-the-university-of-chicago-80452.
12. For a brief history of the field of technical art history, please consult Maryan Ainsworth, "From Connoisseurship to Technical Art History: The Evolution of the Interdisciplinary Study of Art," *Getty Conservation Institute Newsletter* 20, no. 1 (2005): 4–10.
13. See also Harvard University's two-week summer intensive offered to PhD candidates: Francesca Bewer, 2017, "Art + Science at the Harvard Art Museums," paper presented at the ICOM-CC Triennial Conference, Copenhagen, 2017, icom-cc-publications-online.org/PublicationDetail.aspx?cid=5d6d5085-28624f1e-ba25-e2632386bbf3.
14. These freestanding degrees have only begun to be offered within the last decade and include an MLitt in Technical Art History offered by the University of Glasgow and a technical art history track offered by the University of Amsterdam's conservation program. Other new programs include the international master's programme in art history, technical art history, and the art museum at Stockholm University and the newly launched bachelor of arts in technical art history at West Virginia University.
15. Recent studies in the field of European art history include Pamela Smith, Amy Meyers, and Harold Cook, eds., *Ways of Making and Knowing: The Material Culture of Empirical Knowledge* (New York: Brad Graduate Center, 2017); and Sven Dupré "Doing it Wrong: The Translation of Artisanal Knowledge and the Codification of Error," in *The Structures of Practical Knowledge*, ed. Matteo Valleriani (n.p.: Springer, 2018): 167–188). Also see Jennifer Roberts's "Minding Making" project, mindingmaking.org.
16. Barbara Brotman, "Art and science intersect at the School of the Art Institute," *Chicago Tribune*, March 30, 2015, chicagotribune.com/travel/ct-math-art-students-met-20150329-story.html.

Identifying Intersections of Art and Science

This cross section—a slice through a minuscule paint fragment embedded in resin—visualizes the original paint layers from Georges Seurat's *A Sunday on La Grande Jatte—1884.*



Identifying Intersections of Art and Science

"I have a greater appreciation of what I'm seeing now that I see in great detail the process by which the artist created this work."

—Visitor to Materials of the Medieval World in-gallery program

This section helps answer:

- What is the place of science in the stories art museums tell about the lives of objects?
- What role might science play in how artists' processes are discussed and displayed within a museum?
- How do art and science intersect in your museum?
- What projects or areas of research does your institution currently engage with? How can they be amplified through the lens of scientific inquiry? How can you identify these opportunities?

Summary

Identifying how your art museum or cultural institution defines science is integral to understanding the value of exploring objects from multiple, and often unexpected, disciplines. In the summer of 2018, staff from the Art Institute joined counterparts at the Rijksmuseum in Amsterdam for two days of conversation and exploration of ways science manifests itself in an art museum. Although we determined there is no single definition of science in museums, we noted science's relevance in five distinct areas that relate to the care of, display of, and public engagement with art: artistic practice; materials, techniques, and processes; preservation; history of science and technology; and conservation, conservation science, and technical art history. Additionally, we acknowledge that art and science intersect in the museum through the science of perception and attention. Identifying the overlap of art and science enabled us to reflect upon our own areas of practice, establish institutional structures for cross-departmental work, and investigate how science can be valuable for our visitors.

Recommended action steps

- Create a list of past educational or interpretive projects your institution has undertaken that relate to process, preservation, or technology.
- Complete the "Questionnaire for Locating Science in Your Museum" (pg. 15).
- Prioritize goals according to your institution's capacity and interests.
- Read the American Institute for Conservation (AIC) Wikipedia page and STITAH's resource page, which lists conservation outreach resources (kressfoundation.org/stitah/resources).

Recommended articles:

- Geraldine Fabrikant, "Preserving the Past for Museum Visitors of the Future," *New York Times*, October 23, 2019, nytimes.com/2019/10/23/arts/design/museum-conservators-public.html.
- Huntington Art Gallery, "Project Blue Boy," *The Huntington*, September 2019, huntington.org/project-blue-boy.

Methods in Action: Art and Science in the Art Institute of Chicago

Clearly a single definition of science would not suffice.

We looked to various places in the museum where science lives. Some were obvious: On the walls, object labels conveyed information gained through scientific inquiry and research. In the Art Institute's conservation labs, the tools and equipment of professionals engaged in preserving and treating works of art were clear indicators of science at work. Within our educational programs, an Art + Science (artic.edu/collection/resources/educator-resources/7-thematic-curricula-art-science) school tour was developed in 2015 to support dialogue and collaboration between middle school art and science teachers, with the goal of inspiring art and science integration in curriculum (for further information, see case study on page 45). Other aspects were less obvious, such as the threads of scientific history that parallel, diverge from, and run through art history; the scientific practices embedded in an artist's process; and the hygrothermographs nestled in the corners of galleries—monitoring humidity and temperature to help preserve art. One element threaded all of the instances we found: inquiry processes used by scientists, conservators, and artists.

The following applications of science in the museum became the foundation of our work and the cornerstones of our theories about the impact of conservation and science outreach.

Above: *A Sunday on La Grande Jatte—1884*. George Serat. Oil on canvas. Helen Birch Bartlett Memorial Collection.

Left: Rug. Sheila Hicks. Cotton, plain weave; wool latch-hooked pile; braided and wrapped in wool. Gift of Shilea Hicks.

Artistic Practice

Art and science are both processes of inquiry, with artists and scientists often engaging with concepts that mirror each other across fields. Scientific research, material properties, and experimental processes factor into past and contemporary artistic practices. Georges Seurat's *A Sunday on La Grande Jatte—1884* (1884/86) epitomizes a work of art deeply informed by science. Inspired by research in optical and color theory, Seurat used the pointillist painting technique to create luminous hues and forms.

Materials, Techniques, and Process

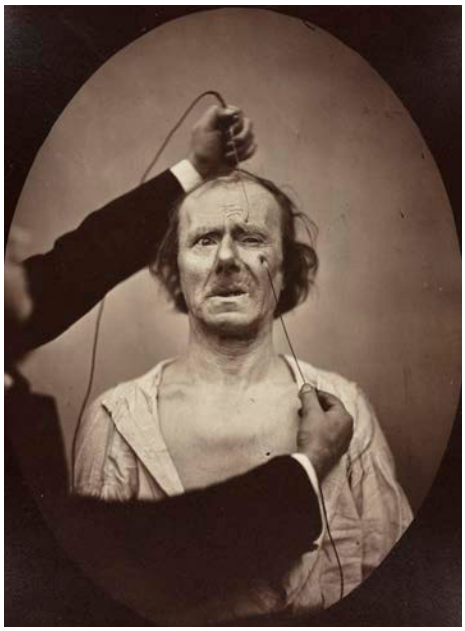
Materials, techniques, and an artists' processes are often illuminated by the work of conservators and scientists. By understanding how objects are made, visitors gain insight into the ways artists work and think, as well as the physical qualities of an artwork. Take a rug created by Sheila Hicks around 1965, an object that needs to be understood not as a painting on the wall but as a textile created from cotton and wool latch-hooked piles and braids. Knowing Hicks's process is fundamental to understanding the texture, character, and context of this work, one of her early- to mid-career forays into creating experimental fiber works.

Preservation

Museums dedicate significant resources to collection care and preserving works of art in our holdings.

Above: *Under the Wave off Kanagawa (Kanagawa oki nami ura)*, also known as *The Great Wave*, from the series "Thirty-Six Views of Mount Fuji (Fugaku sanjurokkei)." Color woodblock print; oban. Clarence Buckingham Collection.

Right: Plate 49 from *The Mechanism of Human Facial Expression*. Albumen print. Photography Purchase Fund.



Below: Retired conservator Frank Zuccari works to remove varnish from El Greco's *The Assumption of the Virgin*.

Having a better understanding of how museums preserve art objects empowers visitors to consider their own role in sustaining the lives of art objects as well as the many issues that arise in this quest. For example, the Art Institute of Chicago's three Katsushika Hokusai (1760–1849) prints of *The Great Wave* (1830/33)—iconic and much beloved by visitors—can only go on view for three months at a time. Their fragility and color sensitivity to light, demonstrated by the pink sky still visible in one print compared to the faded backgrounds of the other two, can reveal to visitors the value of preservation and help them understand art objects as constantly changing rather than fixed in time.

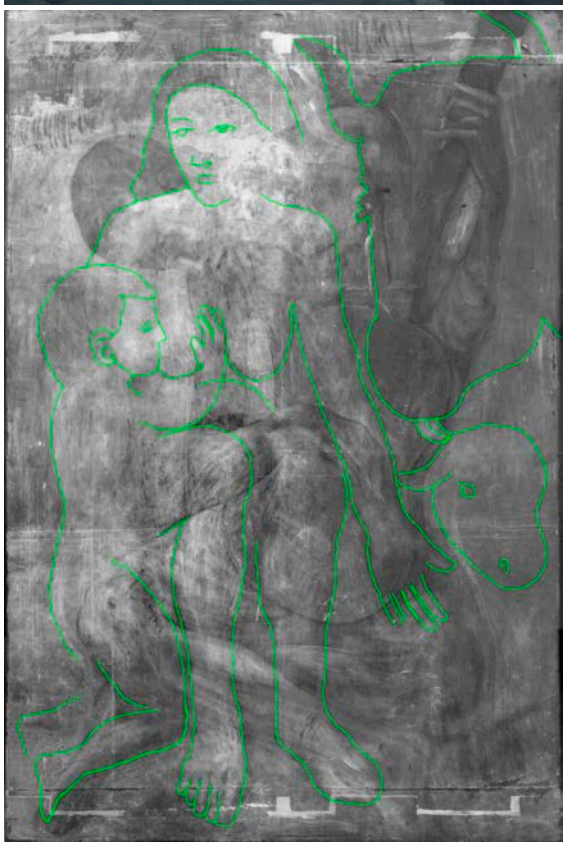
History of Science and Technology

Objects in our collections can tell us about the history and philosophy of science, as well as historical advancements in technology. Some artists are inspired by inventions in scientific fields, while others influence the trajectory of scientific experimentation. In collaboration with photographer Adrien Alban Tournachon (1825–1903), French neurologist Guillaume-Benjamin-Amand Duchenne de Boulogne (1806–1875) recorded electrically induced facial expressions to illustrate his work on the mechanisms of human facial expression. This albumen print offers a rare example of brown and purple tones that look as vivid as the day the print was made. The rich color comes from the addition of salt of gold (a chemical compound) to the processing bath, a step that increases the stability of the silver image. Albumen images are generally sharp in detail because the albumen binder prevents silver particles from sinking into the fibers of the paper support. Such sharpness is especially useful for scientific images.

Conservation, Conservation Science, and Technical Art History

These areas are perhaps the most obvious intersections of art and science in an art museum, intersections that underlie much of the work outlined above. The work of conservation, conservation science, and technical art history has transformed our understanding of art and artists. Conservation and conservation science outreach can also provide many directions for public engagement.

Exposing the materials, techniques, and processes of conservation gives visitors greater insight into the construction and meaning of works of art. For instance, in treating *The Assumption of the Virgin*



X-radiography reveals two underlying paintings below the surface of Pablo Picasso's *The Old Guitarist,* outlined below left. The original painting is shown at left.

The Old Guitarist. Pablo Picasso. Oil on panel. Helen Birch Bartlett Memorial Collection. © 2018 Estate of Pablo Picasso / Artists Rights Society (ARS), New York.

(1577–79) by El Greco (1541–1614), conservators had to methodically clean many layers of varnish with cotton swabs. The varnish had discolored over time so much that it obscured the bright light emanating from behind the Virgin Mary's head, a light indicating her assumption into heaven and linking her figure to a painting of the Holy Trinity that resided above this painting in its original altarpiece.

Scientifically analyzing artworks also yields a greater understanding of how artists worked and how professionals today use advanced technologies to look below the surfaces of objects. Take, for instance, *The Old Guitarist* (1903–4) by Pablo Picasso (1881–1973); x-radiography revealed that Picasso created this work over two other paintings, one of which is outlined in the drawing below.

Finally, conservation science can highlight issues surrounding preservation, art, and heritage. This helmet mask, possibly made in the early to mid-1900s in western Africa, was intended to be worn only by members of Kono, a power association based in Mali. The materials and sacrificial patination of this mask give clues to object's use during ceremonies in which transfers of power or knowledge occurred. That the meaning behind the mask's materiality is tied to knowledge intentionally kept within the power association necessitates the museum's careful and considerate approach to analyzing the mask's material qualities in order to devise a plan for treatment and preservation. ■

Below right: Helmet Mask (Kono Kun). Wood, horn, quills, and sacrificial material. Through prior gifts of Mr. and Mrs. Herbert Baker, Mr. and Mrs. Dave Chapman, Dr. H. Van de Waal; through prior acquisitions of the Robert A. Waller Fund

Questionnaire: Focusing art and science at your museum

Step 1: For each of these categories, brainstorm with other colleagues a list of relevant objects or stories.

Materials, Techniques, and Process: How does scientific investigation increase public understanding of the material history and conditions of objects and the processes and materials that produced them? How does illuminating craftsmanship shape an understanding of an object's aura or unique physical qualities?

Preservation: How does dedicating resources to collection care and preserving collection works advance your institution's mission? How might you increase public awareness about this aspect of your mission?

History of Science and Technology: In what ways do collection objects reveal something about the history and philosophy of science? How do histories of science and art intersect in your collection(s)?

Conservation, Conservation Science, and Technical Art History: In what ways do technical studies transform your understandings of objects and inform the stories you tell about art? How can technical studies illuminate artists' decisions? How do advances in conservation and conservation science help visitors better understand objects? What aspects of conservation and conservation science, as professional fields, might interest the public?

Other: What other stories are relevant to highlighting the intersections of art and science at your institution? For example, could the psychophysical perception of art be an area that could resonate with your staff and visitors? What available resources, knowledge, and/or staff could enhance your initiatives? What programs developed by your colleagues and peer institutions might inspire and inform your work?

Step 2: Now **prioritize** these categories by their **relevance** to your institution. Here are some questions to ask in determining relevance:

- What is the breadth and diversity of stories that your institution(s) can tell?
- Do the objects and collection areas of your institution support these stories?
- How do the categories above fit into the overall mission of your institution?
- Who in your institution can contribute expertise to these areas?

Priorities for My Institution

1.

2.

3.

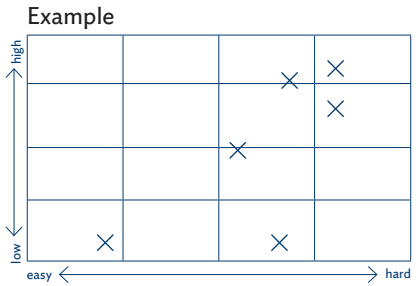
4.

5.

Resource Spotlight

Prioritizing Matrix

This Prioritizing Matrix[16] can help you decide where to start, thinking about areas, objects, and artists from your collection in order to determine next steps in your art and science projects.



What's the level of impact?

high

low

easy

hard

How easily can we execute?

16. Inspired by Prioritization Matrix, at Workshop Bank, s3-eu-west-1.amazonaws.com/workshopbank-tools/Prioritization+Matrix.pdf?__s=pdpgwdp1ygt4ii9wj3gp.

Checklist and Questions for Developing Institutional Support:

Developing support for this work is critical. Here is a checklist with questions aimed at building internal capacity.

☐ **Bring together an interdepartmental group of staff members to support and organize this work.**

Which departments would be fundamental to getting this work off the ground?

Who are key stakeholders? Do we have the capacity to hire a full-time staff person, fellow, or intern to act as the primary organizer for our work?

☐ **Secure external funding to pilot a design-thinking phase.**

If funding is an issue, what external sources can help pilot a project?

Which national or international foundations might be interested in funding this work? What local resources can be leveraged?

☐ **Partner with a university or other institutions to leverage resources and potential impact.**

What necessary skills or areas of knowledge for undertaking this work are missing?

How might university partnerships help us cover these missing facets?

Which other museums could act as helpful complements or foils to your work?

What degree of collaboration is appropriate for your institution's capacity?

☐ **Track measures for both success and improvement.**

In what ways can you evaluate and keep track of your work?

Do you have the staff capacity to undertake rigorous visitor research?

Do you have staff capacity to track analytics and collate quantitative data where appropriate?

How might you leverage partnerships with universities if your institution does not have internal capacity to carry out this work?

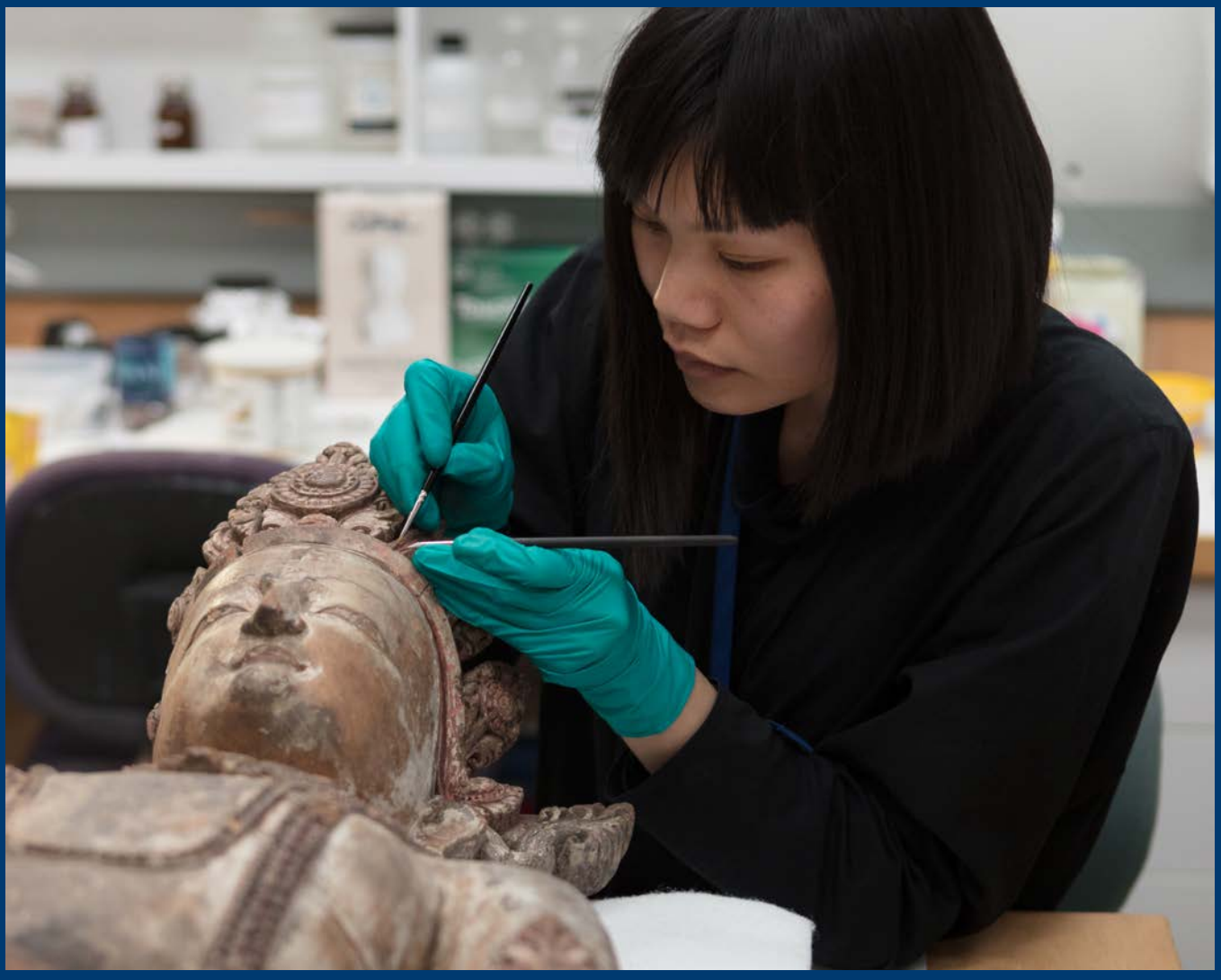
☐ **Share findings at internal staff meetings across departments and at external conferences.**

How can you share this work with other staff who are not directly involved in the project?

Which interdepartmental staff meetings might act as an appropriate forum for sharing work and receiving feedback? Which conferences will help advance this work?

Testing our Theories

Assistant Objects Conservator Cybele Tom conserves a Nepalese bodhisattva sculpture.



Testing our Theories

"One of the challenges of telling conservation stories to the public is telling complicated stories in a simple manner, because you could write books about these topics."

—Ken Sutherland, Conservation Scientist at the Art Institute of Chicago

This section helps answer:

- How do you measure impact within your institution and what methodologies work for evaluating visitor perception and experience?
- How can you test your assumptions about a topic in your institution?
- What are ways to assess the impact of interdisciplinary work on the visitor experience?
- What are the opportunities and areas for growth in your project?

Summary

Collecting data on visitor experiences can illuminate visitor impact, public benefit, and areas for growth. By creating an evaluation plan for all case studies, we were able to compare impacts across various modes of programming and interpretive initiatives. To guide our visitor evaluation we followed the National Science Foundation's "Framework for Evaluating Impacts of Informal Science Education Projects" and The Smithsonian Institute's Office of Policy and Analysis's standards and protocols for evaluating museum visitors. It was crucial to embrace an evaluation methodology that was flexible enough to adapt to various contexts and modes of engagement. This section will walk you through our evaluation design process: defining framework and scope, sample size, visitor research tools and protocols, coding visitor responses, and more.

Recommended action steps

- Read "Visitor Research on Conservation," Museum of Fine Arts Boston in *The Public Face of Conservation* (see "For Further Exploration", pg. 73) for an example of another institution that has been conducting visitor research.
- Decide the scale of your evaluation plan. What kinds of staff or financial resources do you currently have? What do you need? See the questionnaire below to help you determine your capacity for evaluation.
- Fill in "Designing Your Evaluation Study" (see pg. 27).

Method in Action: Researching and Defining Impact

There are four key steps for establishing objectives and intended impacts once you have developed an overarching conceptual framework for art and science at your museum:

- Define intended impacts, both general and specific.
- Define methods for evaluating your work. You can use existing protocols or create your own.
- Choose case studies that can help evaluate and better understand the value of your framework and your hypotheses about impacts.
- Design and implement evaluation and visitor research.

Note: We purposefully decided not to number these steps because these may and should be happening simultaneously.

Defining Impact

After defining art and science, as explained in the previous chapter, and selecting the definitions that are most pertinent to the institution's mission of deepening visitor engagement with art objects, we theorized **two broad impacts** of integrating art and science into the public face of the Art Institute:

- Visitors would have an expanded set of perspectives and tools to engage with and see art anew.
- Visitors would more deeply value art objects as objects to be experienced in person and preserved for the future.

We then developed an evaluation activity that we applied within each case study in order to generate a larger set of quantitative and qualitative data. This protocol took the form of either a participant approach or a survey format depending on the nature of the program, interpretative material, or exhibition that was being evaluated.

We proposed the following **specific impacts**, which reveal whether or not visitors benefit from the museum sharing conservation and science narratives:

- Gain a new lens for engaging with art objects
- Have a deeper understanding of materials and techniques used to make art
- Have a deeper understanding of an artist's process
- Develop their curiosity
- More deeply value the experience of seeing an object or work of art in person
- Place a greater value on the preservation of art objects
- Think more deeply about the relationship between art and science

These were used as prompts in a "card sort activity." (see pg. 35) Visitors who engaged with our case studies rated the specific impact cards on a scale of 1 of 5 to indicate whether or not the display, digital platform, or program met any of these impacts.

Note: To develop the wording of these cards, we consulted the National Science Foundation's "Framework for Evaluating Impacts of Informal Science Education Projects," (see pg. 23) which provides a number of evaluation strategies and case studies designed to help the reader construct a summative evaluation plan.

> *"We know that the scientist's laboratory and the artist's studio are two of the last places reserved for open-ended inquiry, for failure to be a welcome part of the process, for learning to occur by a continuous feedback loop between thinking and doing."*
>
> John Maeda

Creating Your Case Studies:

To test our theories, we developed a number of case studies. We strove to implement these case studies within the framework of our definitions and overall theorized impacts. Our case studies spanned four areas of public engagement both digital and analog: exhibition display, digital experiences, public programs, and programs designed for students.

Defining and Creating Evaluation Methods:

In evaluating our case studies, we drew from two well-established models of visitor research:

- The National Science Foundation's framework for evaluating the impacts of informal science projects.
- The Smithsonian Institute's Office of Policy and Analysis's standards and protocols for evaluating museum visitors.[17]

Using these existing models, we sought to answer two key questions: What are the impacts of sharing conservation and science narratives with visitors? Which strategies are more effective? We collected and compared data across all case studies in an effort to answer these questions, yielding a sample size of 359 visitors evaluated for this initiative.

We selected a sample size of at least 300 data points in order to draw conclusions about the effectiveness of our own practices and at the same time balance operational costs and consider minimizing our margin of error. Art museums frequently do not achieve the 400 data points that are considered optimal for statistical significance with their evaluation findings.[18] We originally aimed for the optimal sample, but due to the time-consuming nature of evaluation and internal capacity we collected instead over 300 data points. Even though evaluation protocols differ from each case study to the next, the sample size of 300 evaluated a consistent set of indicators across almost all of our case studies.

17. Smithsonian Institution, "The Evaluation of Museum Educational Programs: A National Perspective", Office of Policy and Analysis, Washington DC, March 2004, repository.si.edu/bitstream/handle/10088/17237/opanda_EvaluationMuseumEducationalPrograms.pdf?sequence=1.

18. See Amanda Krantz, "Sample Size: How many questionnaires is enough," *Intentional Museum Blog*, February 24, 2016, rka-learnwithus.com/blog/2016/02/24/sample-size-how-many-questionnaires-is-enough.

A participant in the Materials of the Medieval World program applies foil and glue to a wood frame with conservation technician Christopher Brooks.

Case Studies Overview

The **exhibition** *Conserving Photographs* illuminated the relationship between conservation and the technical history of photographs. See page 33.

In-gallery iPads were developed to share three different stories about conservation in the museum. The interactive features are now available online: artic.edu/interactive-features. See page 37.

In public programming, **Materials of the Medieval World** event featured pop-up talks and demonstrations by conservators, scientists, and educators in the galleries. See page 41.

The **Art + Science tour** is offered to middle school student groups and promotes collaboration between art and science teachers. A complete curriculum manual for Art + Science is available on our website: artic.edu/collection/resources/educator-resources/7-art-science. See page 45.

Professional development opportunities give higher education students and scholars the opportunity to develop interdisciplinary work in the museum context, using art as a vehicle to develop skills in professional practices beyond our walls. See pages 49 and 53.

**See the next chapter, Case by Case, to read specifics about each case study.*

Image by Alice Feldt

Resource Spotlight

National Science Foundation's Impact Categories for Informal Learning[18]

Impact Category	Generic Definition
Awareness, knowledge, or understanding	Measurable demonstration of assessment of, change in, or exercise of awareness, knowledge, understanding of a particular scientific topic, concept, phenomena, theory, or careers central to the project.
Engagement or interest	Measurable demonstration of assessment of, change in, or exercise of engagement/interest in a particular scientific topic, concept, phenomena, theory, or careers central to the project.
Attitude	Measurable demonstration of assessment of, change in, or exercise of attitude toward a particular scientific topic, concept, phenomenon, theory, or careers central to the project or one's capabilities relative to these areas. Although similar to awareness/interest/engagement, attitudes refer to changes in relatively stable, more intractable constructs such as empathy for animals and their habitats, appreciation for the role of scientists in society, or attitudes toward stem cell research.
Behavior	Measurable demonstrations of assessment of, change in, or exercise of behavior related to a STEM topic. These types of impacts are particularly relevant to projects that are environmental in nature or have some kind of a health science focus; action is a desired outcome.
Skills	Measurable demonstration of the development and/or reinforcement of skills, either entirely new ones or the reinforcement, even practice, of developing skills. These tend to be procedural aspects of knowing, as opposed to the more decorative aspects of knowledge impacts. Although they can sometimes manifest as engagement, typically observed skills include a level of depth and skill such as engaging in scientific inquiry skills (observing, classifying, exploring, questioning, predictions, or experimenting), as well as developing/practicing very specific skills related to the use of scientific instruments and devices (e.g., using microscopes or telescopes successfully).
Other	Project specific

18. Alan Friedman, ed., "Framework for Evaluating Impacts of Informal Science Education Projects: Report from a National Science Foundation Workshop," (February 2008): 19, informalscience.org/sites/default/files/Eval_Framework.pdf.

Art Institute of Chicago: Impact Category Framework

Impact	Impact Category	Audience Objective	Evidence
A New or Additional Lens for Engaging with Objects (Materials, Techniques, Processes; the Physical Properties; the Making of an Object; and the Science behind an Object)	Awareness, Knowledge, and Understanding	Visitors will be presented with and engage with objects from a new perspective (science, material/techniques/ processes, physical understanding of an object, etc.)	Visitors will rate the following cards highly in terms of impact and be able to point to specific examples: *I have a deeper understanding of the materials and techniques used to create works of art.* *I have a greater understanding of an artist's (or artists') process.*
Curiosity as a Condition and a Result of Engagement with Art and Science	Engagement	Visitors will feel a sense of discovery when engaging with stories of art and science; in turn, this may provoke questions on the part of the visitor.	Visitors will rate the following card highly in terms of impact and be able to point to specific examples: *My curiosity has been sparked. I am curious about . . .*
Value of an Immediate Experience with an Object	Attitude	Visitors will note the importance of seeing an object in person rather than through other modalities.	Visitors will rate the following card highly in terms of impact and be able to point to specific examples: *I more deeply value the experience of seeing a work of art in person.*
Value of Preserving and Conserving Art for the Future	Attitude	Visitors will express a valuation of preserving and conserving objects (additionally, they might note their own roles as visitors in preserving and conserving art).	Visitors will rate the following card highly in terms of impact and be able to point to specific examples: *I place a greater value on the preservation of art objects.*

Evaluation and Visitor Research

Methods: This project consisted of front-end, formative, and summative evaluations (see pg. 27). We also implemented additional protocols for each individual case study; examples of these instruments include intercept interviews, focused observations, and written surveys (see protocols at the end of the next chapter, "Case by Case"). Analytics from our Digital Experience team measured visitor engagement with digital interactives. Summaries of the evaluation instruments and sample sizes for each case study group are listed in the chart to the right. The next chapter, "Case by Case", will delve into the background, evaluation instruments, and findings from each case study.

Sample Size: Keeping in mind the restrictions on sample size in our studies and the general lack of statistical significance attained in museum studies, we are cautious about making generalized statements from the data. Instead, the evaluation metrics collected here are contextualized within our institution, even though general best practices may be extrapolated.

Human Subject Research: We did not pursue International Review Board approval for conducting human subject research, as we found that our research did not aim to create generalizable data. To better understand if your research qualifies as human subject data, please consult a research university's IRB guidelines. Often, evaluation studies conducted in museums are considered program evaluations rather than human subject research.

Control Group: We created a control group for some of the studies (whether this manifested as a separate control group or a pretest activity) so we could assess if the Art Institute was already achieving these impacts without our case studies. To allow for identifying unintended outcomes not listed in our intended impact chart, intercept interviews included open-ended questions.

Coding Responses: To account for self-response bias, visitors were asked to elaborate on their card-sort ratings in interviews, and their answers were categorized as "unrelated," "general," "specific," or "Art Institute of Chicago (AIC) specific" to get a better idea of how deeply the actual case study being tested informed visitors' thoughts. The overall aim was for visitors to be able to articulate answers specific to their experience at the museum (AIC Specific I–III). ■

Evaluation Methods and Sample Size

Case Study	Evaluation Instruments	Control	Sample Size
Student Tours and Youth Groups	• Reflection activity: students and teachers • Written survey: Art + Science Tour	No Control Group	159
Programming	• Written survey • Creative response • Teen focus group	No Control Group	243
Digital Experiences	• Focused observations • Intercept interviews • Analytics	Control Group	76
Exhibitions and Displays	• Pre- and post-intercept interviews	Pre/Post Control	200
Total			**679**

Rubric for Coding Visitor Responses

Unrelated: Not related to the question asked

General: For very vague, non specific answers

Specific: For answers that reference something specific with example(s) or explanations but are not specific to the visitor's museum experience

AIC Specific I: Specific to the visitors' experience at the museum but without examples or explanations

AIC Specific II: Specific to the visitors' experience at the museum with either example(s) or explanations

AIC Specific III: Specific to the visitors' experience at the museum with both example(s) and explanations

Designing Your Evaluation Study

Evaluating and building capacity for evaluation

Do you have a history and/or current practice of evaluation?

Who on staff, from marketing to data analytics, performs visitor research in any form?

What resources might you need to conduct an evaluation plan?

How can you take advantage of partnerships with other museums or universities to build your capacity for evaluation?

Determine your overall evaluation questions

Develop 1–3 overarching questions you want to answer.

1.

2.

3.

What parts of your program are most important to evaluate based on your intended impacts?

**Follow the "Logic Model Development Guide" from the W.K. Kellogg Foundation (pg. 27) to frame your questions.*

Develop intended impacts, indicators, and evidence

Impacts:	What do you want to evaluate?
Indicators:	What will show you or make visible that impact?
Evidence:	How will you record, collect, and analyze the data?

**For reference, see "National Science Foundation Framework for Evaluating Impacts of Informal Science Education Projects" (pg. 23).*

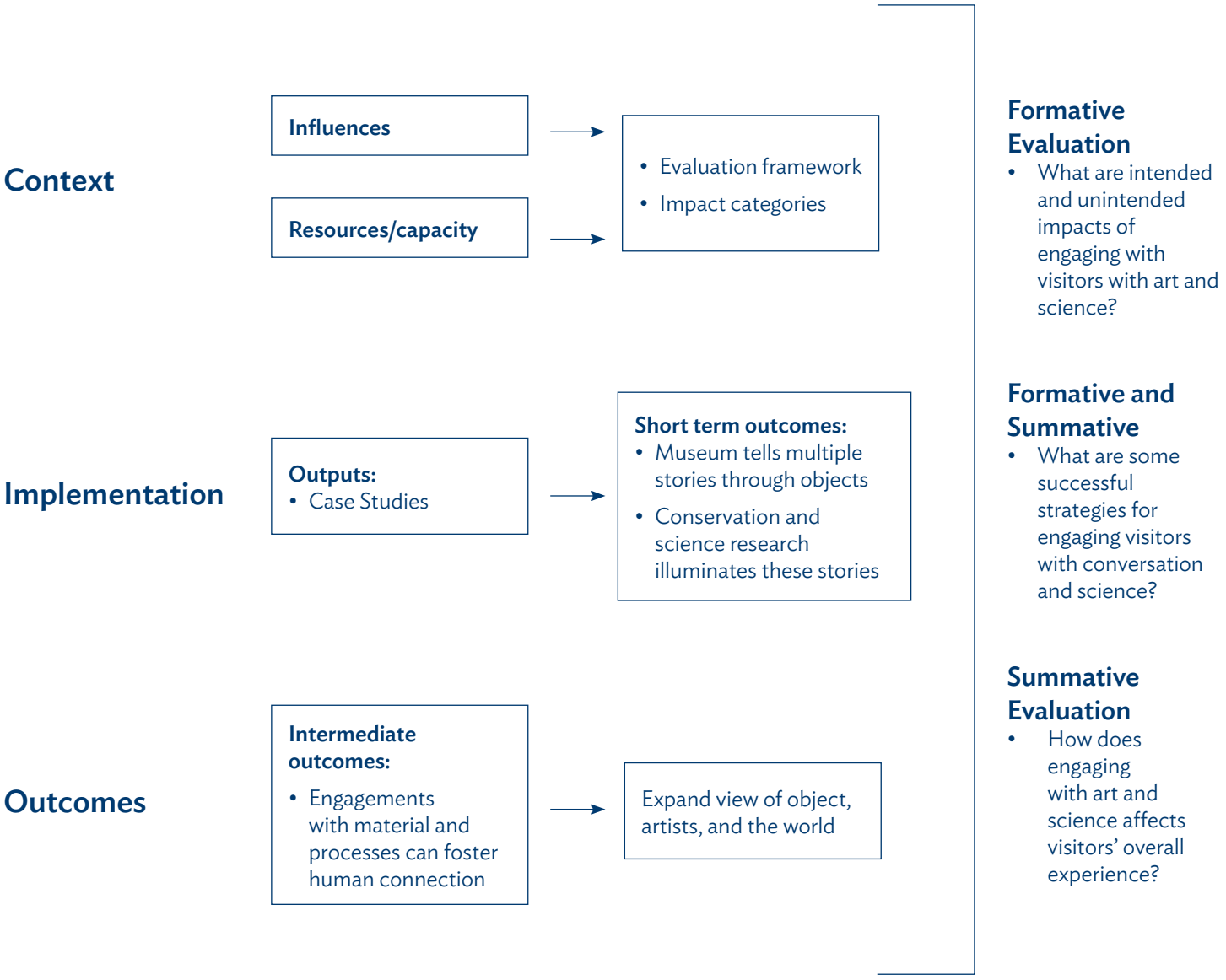
Determine the evaluation and visitor research methods:

Is it to assess need or knowledge before you design an intervention (front-end)?
To shape the intervention (formative)? Or to assess the impact of an intervention (summative)?

Resource Spotlight

Logic Model Development Guide[19]

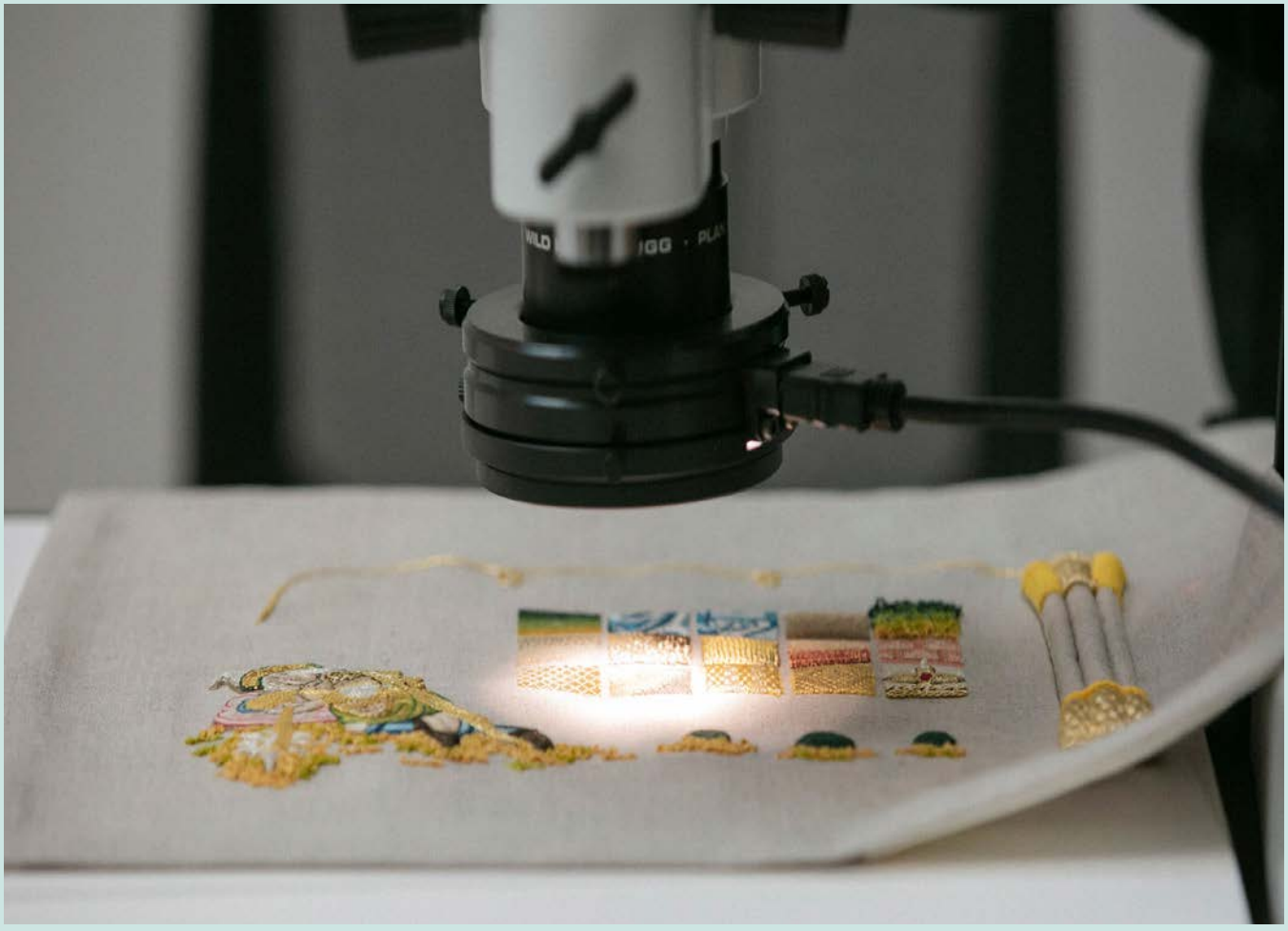
Brainstorming impacts by their categories can help organize initial thoughts. After brainstorming a list of intended impacts, narrow them down to impacts or goals that are achievable and measurable. We developed this "Logic Model Development Guide" based on based on the W.K. Kellogg Foundation Logic Model.



19. Inspired by the W. K. Kellogg Foundation, *Logic Model Development Guide* (Battle Creek, MI: W. K. Kellogg Foundation, 1998), 43.

Case by Case

Embroidery reconstruction commissioned from textile artist Katherine Diuguid, showcasing techniques found in the Art Institute's medieval retable.



Case by Case

"I haven't ever thought about relationships of art and science before—I had no idea paintings could be changed so dramatically!"

—Visitor using El Greco digital label

This section helps answer:

- What modes of engagement are appropriate for your institution and visitors?
- How do interdisciplinary narratives yield opportunities for visitors to personally connect with a topic or idea?
- Does foregrounding art and science enhance engagement and to what degree can it change visitor perception?
- Does this type of programming, especially for school tours, inspire youth audiences to consider STEM careers by discovering science in an art museum?

Summary

Our case studies were designed to span different modes of audience engagement: object display and interpretation, digital experiences, school tours, public programming, and professional development. For the case study focused on installation and display, we evaluated the exhibition titled *Conserving Photographs*. The findings revealed that this exhibition helped visitors think about conservation across media and about the value of the science behind preserving photographs. By implementing digital labels, we learned the degree to which interactive media can successfully foreground materials, techniques, and artistic process, creating stronger emotional connections between the public and makers. And through our program evaluation, we learned that having in-person interactions with conservators and scientists sparked visitors' curiosity and appreciation for art objects. These case studies, paired with our evaluation findings, illuminate the ways in which addressing works through the lenses of both art and science fosters greater empathy between visitors, artists, and artworks, enhancing visitor appreciation for the professionals working behind the scenes at the museum.

Recommended action steps

- Read Ann Blokland's "Interpreting Vincent van Gogh: Telling New Stories, Tackling Old Myths" for an example of a great digital case study. See For Further Exploration, page 72.
- Take inventory of what case studies you are already implementing or thinking of implementing across different types of engagement. See the chart on the next page to help organize your thoughts.
- Review the evaluation instruments and protocols used for our studies. Adapt one of the protocols for an existing or upcoming case study to test your own intended impacts.

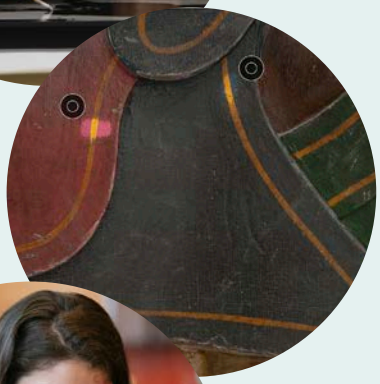
Worksheet Format:

Taking inventory: defining current and potential projects or case studies

- Are you already implementing projects that feature the intersection of art and science?
- What future projects are you planning that could become case studies?
- What other categories for engagement do you anticipate, such as programming or lectures?

Display and Interpretation	Digital Experience	Programming	Other

Case Studies



Case Study

Display and Interpretation: **Conserving Photographs**

"I never really thought of the conservation of photography. We are really obsessed with the conservation of paintings so it is nice to see. And I think getting to know how these elements affect photography is important."

—Art Institute of Chicago visitor to *Conserving Photographs* exhibition

Sylvie Pénichon, Head of Photograph Conservation, in action.

The Basics

On view from November 21, 2018, to April 28, 2019, the exhibition *Conserving Photographs* served as our gallery display case study for the National Science Foundation grant. Presenting a wide selection of works from the nineteenth century to the present that showcase the technical history of photographic processes, as well as the related conservation, preservation, and connoisseurship issues that attend them, the exhibition afforded visitors the rare opportunity to look at the collection through a conservator's eyes and see photographs anew.

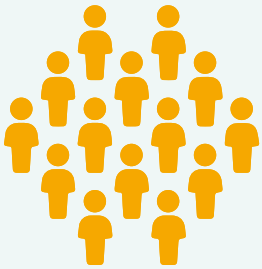
In collaboration with the exhibition curator Sylvie Pénichon, Head of Photograph Conservation, we developed three main audience outcomes for the exhibition:

1. Awareness: visitors will gain a richer understanding of the diversity of photographic processes and thus the diversity of approaches and tools conservators must use to approach preservation and treatment.
2. Close observation: visitors will look closely at the works with a newfound understanding of process, material, and current practices of treatment and preservation.
3. A tertiary outcome for this exhibition was to expand visitors' notions of conservation, beyond the conservation of paintings, and to understand photography conservation's emphasis on preservation rather than treatment.

Installation of *Conserving Photographs* exhibition: daguerreotype with didactic label showing details of conservation processes.

Artist unknown, "S.P. Peck Apothecary", c. 1850. Daguerreotype, 8.8 × 12.1 cm (3 1/2 × 4 3/4 in.) Gift of the Blum-Kovler Foundation.

By the Numbers



175,884 visitors

Estimated to have engaged with *Conserving Photographs*

17 minutes

Estimated time intercepted visitors spent in the exhibition

100 pre- and 100 post-

interviews conducted by evaluators

Installation view of *Conserving Photographs.*

Evaluation

We primarily conducted intercept interviews to assess the goals of this exhibition. A control group was established for comparison: visitors were intercepted before walking through the exhibition to establish this control. The test group involved some of the same visitors who also interviewed after walking through the exhibition.

To ensure a randomized sample, the next available sample was used. Evaluators intercepted visitors at different entrances of the exhibition after observing a visitor engaging with the exhibition (e.g., reading a label, looking at an object, etc.) In these interviews, visitors were asked the same questions before and after walking through the exhibition. Visitors were asked a general question to gauge their perceptions of conservation prior to and after spending time in *Conserving Photographs*. All visitors were also asked to participate in the card sorting activity explained in the following pages.

Note: All evaluation protocols can be found at the end of this chapter.

Above: Thomas Struth. *The Restorers at San Lorenzo Maggiore, Naples, 1988*. Chromogenic print, 121.0 × 161.3 cm (48 ¼ × 63 ½ in.). Gift of Barbara Gladstone, 2004.760.

Findings

Our findings indicate that many Art Institute visitors have prior basic knowledge about the role of conservation in an art museum context, but the exhibition *Conserving Photographs* helped visitors 1) better understand the complexities and decision-making processes behind conservation, 2) more deeply value the preservation of a diversity of art forms, and 3) have a clearer understanding of the materials and techniques used to both produce and conserve photographs. The highest-rated card of the test group was the following: "I place a greater value on the preservation of art objects." Rated on average 4.48 out of 5, and also representing a 0.75 increase on average rating from the control group, this card resonated with visitors on both intellectual and personal levels. After walking through the exhibition, 96 percent of visitors were able to elaborate on their ratings with answers specific to the exhibition, as opposed to only 36 percent of the control sample participants, who provided answers specific to their museum visit.

How to do a card sort

1. **Intercept interviews** with visitors before (control group) or after (test group) the experience
2. **Invite** visitors to rate five prompts from 1-5 (1=least applicable, 5 most applicable)
3. **Ask** visitors to comment on two cards, picked randomly by the interviewer
4. **Process data** both quantitatively (rating averages) and qualitatively (elaboration comments coding)

Conserving Photographs Card Sort Results

Highest-rated card of the test group

"I place a greater value on the preservation of art objects."

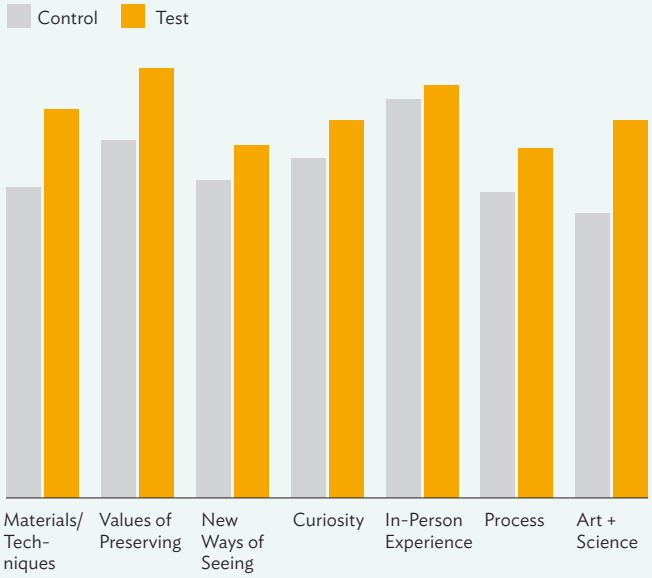
Average card rating

4.48/5

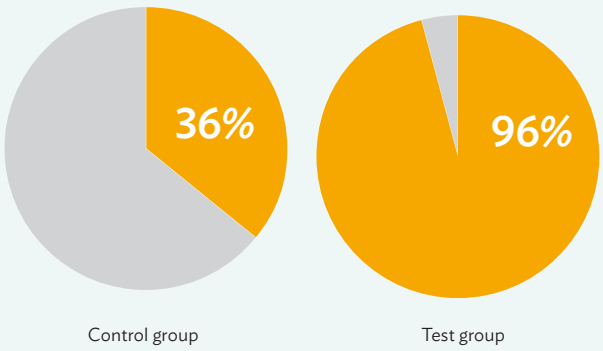
Average increase from control group

.75↑

Card Sorting Averages



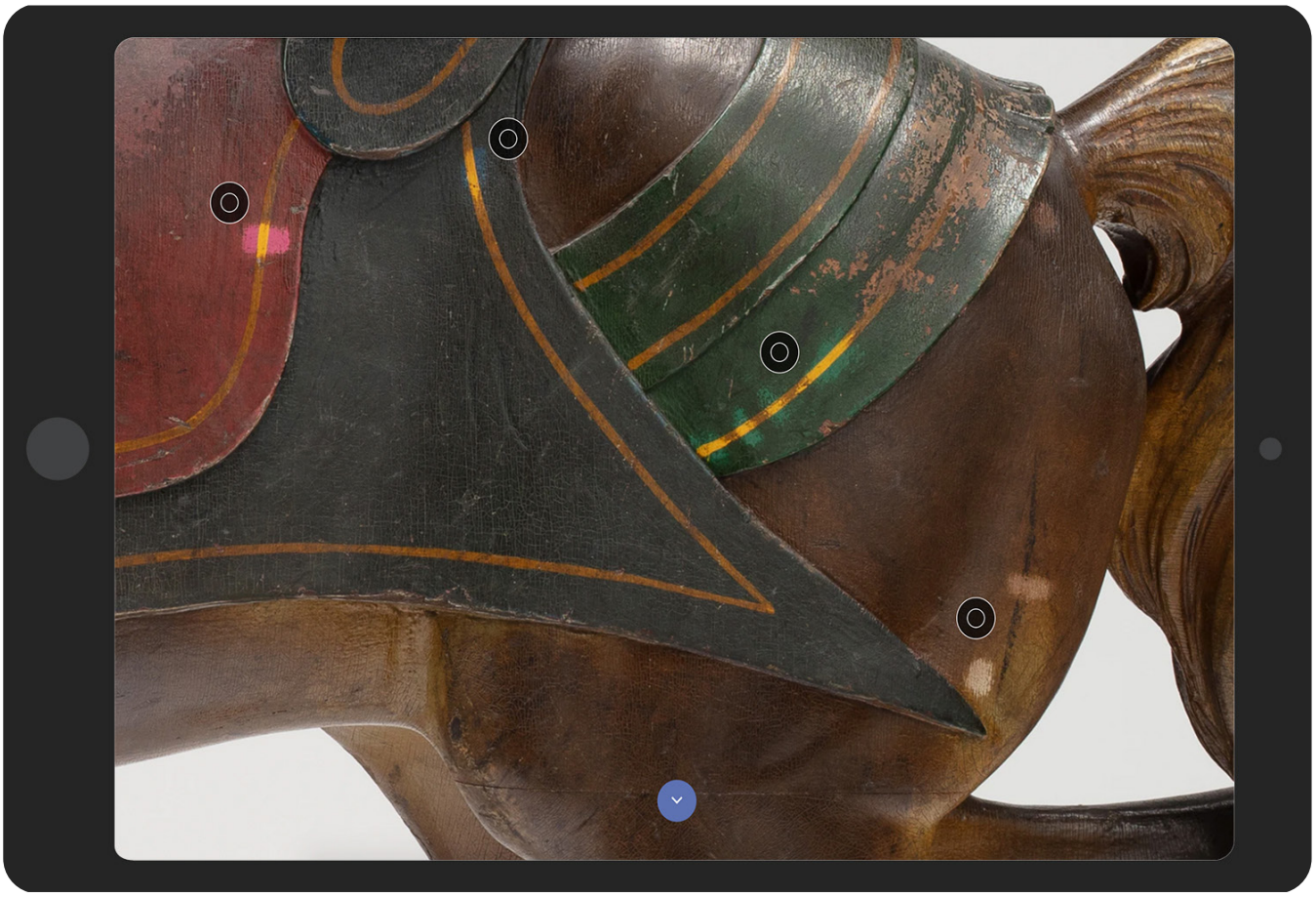
Ability to elaborate on their ratings with answers to specifics



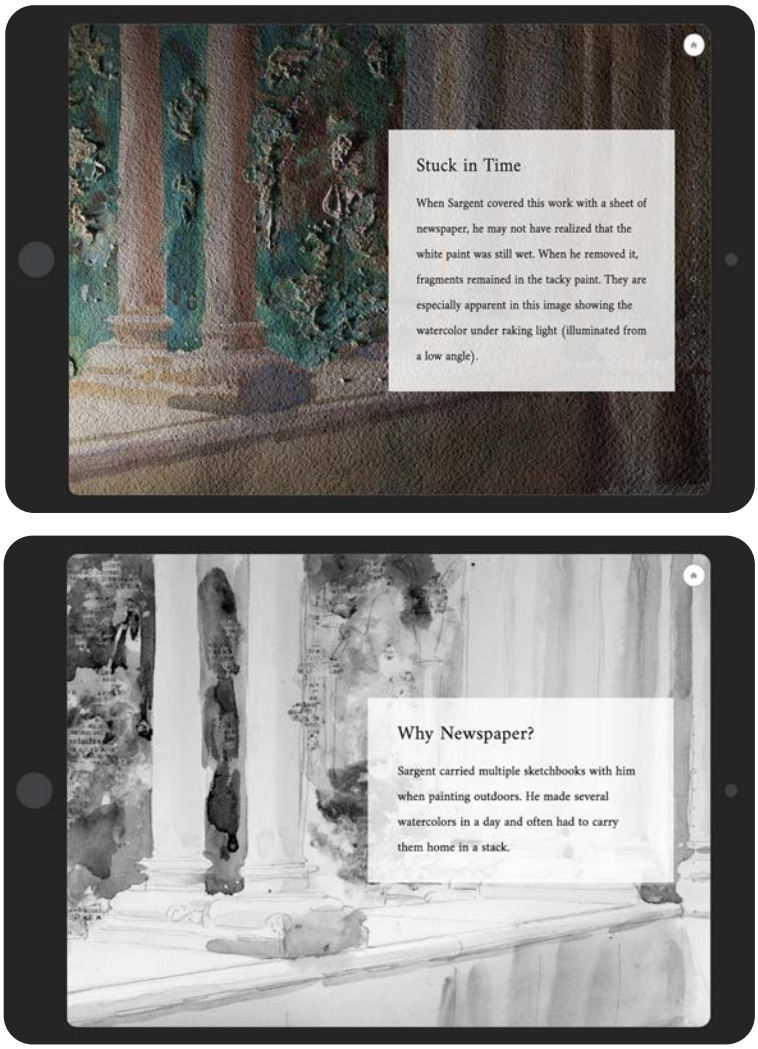
Digital Experiences: **Interactive iPads**

"[This digital interactive] makes the art more real world. There's a humanity to carrying your artwork around. I can actually picture him [Sargent] working, can have greater empathy with his life." —AIC visitor

A digital label shows details revealed on the Carousel Horse.



Daniel Müller. Middle Row Jumping Horse (Carousel Figure). Basswood, paint, glass, and metal. Gift of Larry and Gail Freels.



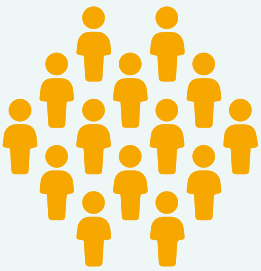
Digital labels describing Sarent's use of newspapers in his artistic process.

The Basics

In 2017 the Art Institute of Chicago debuted a new in-gallery digital experience for visitors. Called digital labels, these interactive iPads provide an in-depth story about one object in a gallery. To reinforce this one-on-one engagement, the iPad is placed in front of or next to its respective artwork; it is designed to encourage visitors to look at the artwork anew after engaging with the digital interface. These types of interactives allow us to tell full and nuanced conservation and science stories, with greater possibilities for visual aids, animations, and text.

Three digital labels with conservation and science content were produced and evaluated for our initiative. The digital label "Making Headlines" was developed for the Art Institute's 2018 summer exhibition *John Singer Sargent and Chicago's Gilded Age*. This iPad told the story of John Singer Sargent painting outdoors and the unexpected newspaper fragments that became stuck to his watercolor *Tarragona Terrace and Garden* as a possible consequence of interleaving wet watercolor with newspaper. The second digital label "El Greco's *The Assumption of the Virgin*" detailed the first large-scale cleaning and treatment process the painting underwent in over one hundred years. Finally, "Conserving a Carousel Horse" described the historical context and modern-day conservation treatment of a Dentzel Carousel Company horse.

By the Numbers

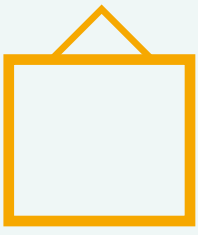


25, 941 visitors

Estimated to have engaged with digital labels featuring conservation and science stories

90%

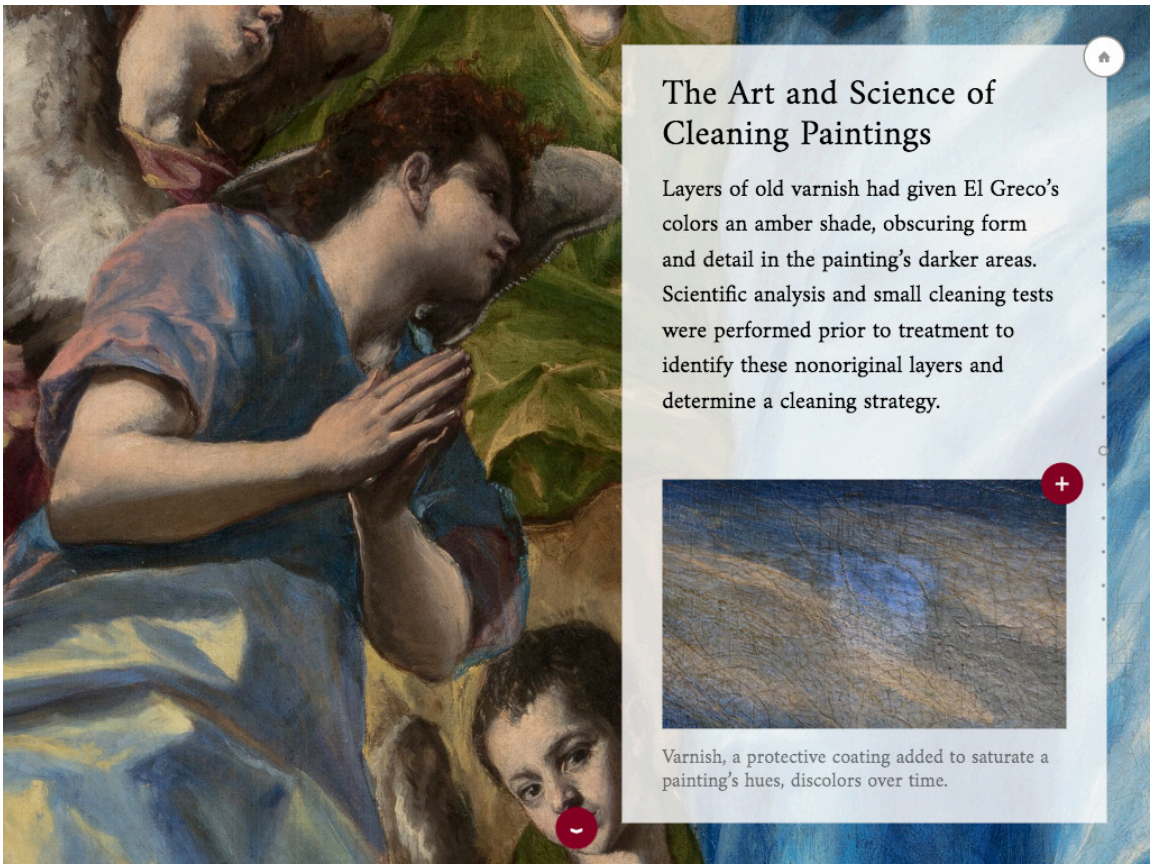
Average of observed visitors who swiped through each digital label

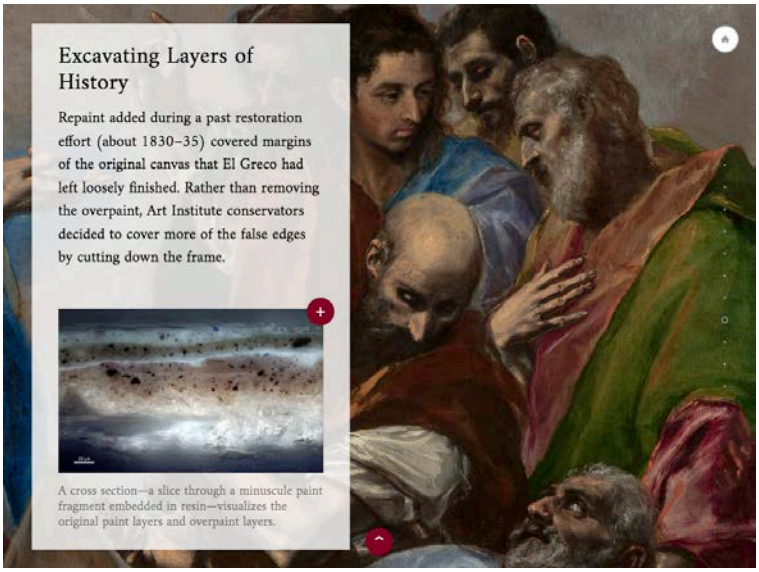


98%

Average of observed visitors who looked back at the object after using the digital label

Digital labels from "El Greco's The Assumption of the Virgin," describing conservation process on cleaning the artwork.





Evaluation

Two different methods of data collection were employed for this study. The protocols and instruments for both of these methods can be found in at the end of this chapter. A focused observation study was used to measure visitors' engagement with the digital label and to track visitor behavior. Intercept interviews probed visitors about the impact of using the digital label. A control group was established for comparison; visitors were intercepted at the same point of the exhibition or gallery as those using the digital label, but visitors who did not use the digital label were interviewed for the control group. Both groups of participants (test and control) were interviewed and performed the card sorting activity. To ensure a randomized sample, every fifth person who walked by the benches or space next to the digital label was intercepted for the control group. For the digital label users, a next available sample was implemented.

Findings

The "Making Headlines" digital label covered John Singer Sargent's 1908 watercolor titled *Tarragona Terrace and Garden*, which depicts the external arcade of a cathedral and which through technical examination the audience was able to spot newspaper fragments stuck in the paint. This digital label had the greatest impact on visitors' understanding of Sargent's process and his materials and techniques. From the control group it became clear that, in general, the Art Institute's displays and interpretive materials reinforce the importance of seeing a work of art in person. Visitors in both the test and control groups did not feel prompted to think about the relationship between art and science, but this was one of the most notable indexes or differences in impact between the test and control groups, with test group members rating this impact 3.3 on average in contrast with the control group's average rating of 1.7.

One important unexpected finding emerged from the interviews with visitors who used the digital interactives. Almost half of visitors who used the interactive were more likely to talk about or model empathy, make connections to their own lives, and discuss how using the digital interactive brought Sargent and his process of painting to life. As one visitor said, **"[This digital label] makes it more realistic, it allows you to be in touch with the artist, his decisions...It gives you a dimension of reality...[you feel] closer to the artist, to actually understand how Sargent works...[you take] a visual trip with the artist. You get to be closer to the artist. Here it made Sargent real. I can imagine him painting in Tarragona, the way he was painting outdoors."**

Visitors brought up historical information about artists processes and decision making for both the *Assumption of the Virgin*'s canvas and the *Carousel Horse* in the Folk Galleries in some of their answers to the questionnaire:

- For El Greco: "I would say the artist had a lot of trouble to get the canvas because there was not such a big size at the time, however he solved the problem, he was an innovator of his time, and this piece is representative because of the size."
- For the Carousel Horse: "They would figure out things like how fast or slow the artists put the paint, based in layers of painting, it's impressive how they can piece together information like this way."

"Interactive iPads" Card Sort Results

Highest-rated card of the test group

"I place a greater value on the preservation of art objects."

Amount of visitors who felt prompted to think about the relationship between art and science

1.7% Control group

3.3% Test group

Control vs. Test comparison of AIC Specific III responses

18.4% Control group

37% Test group

Amount of visitors who used the interactive that were more likely to talk about or model empathy, make connections to their own lives, and discuss how using the digital interactive brought Sargent and his process of painting to life.

50%

Digital labels have the greatest impact on giving visitors the tools and instruments to think about the value of preservation and the uniqueness of seeing works of art in person. Even though the indicator that refers to the relationships with art and science was the lowest among all cards sorted, the difference on the specificity of comments before and after using the digital labels grew significantly, from 18.4 percent to 37 percent in AIC Specific III, meaning that the audience both mentioned examples and explained how the statements related to their experience.

Programming: **Materials of the Medieval World**

"It is nice to appreciate artistry for its finished product, but I have a greater appreciation of what I'm seeing now that I see in great detail the process by which the artist created this work."

—Art Institute of Chicago visitor

Participants from Material of the Medieval World evening program, were invited to use gold leaf to experience part of the work frames conservators undertake.

Image by Alice Feldt

The Basics

Secrets of the Collection: Materials of the Medieval World was developed as our programming case study for considering how live programming can activate objects and illuminate the behind-the-scenes work of conservators and scientists. The event was also part of a series of ongoing lectures entitled *Secrets of the Collection*. These lectures, delivered every couple of months in 2019, explored the Art Institute's wide-ranging and varied collection through the lens of conservation and science. For the May iteration of this series, we aimed to break the format of a traditional lecture and create an evening of short talks and demonstrations that activated an entire collection area, the Art Institute's Deering Family Galleries of Medieval and Renaissance Art, Arms, and Armor. During the program, conservators and scientists facilitated a number of talks, demonstrations, and interactive stations about a wide range of materials in the medieval galleries, including arms and armor, embroidery, polychrome sculpture, frames, ceramics, and paintings.

Above: Conservators and scientists give in-gallery demonstrations and facilitating interactive stations to explore techniques, materials, and processes used to create many works of art in the medieval collection at the Art Institute.

Below: Textile conservator Isaac Facio inviting visitors to explore embroidery techniques found in the Art Institute's medieval retable. Embroidery reconstruction commissioned from textile artist Katherine Diuguid.

Images by Alice Feldt

By the Numbers

486 engagements

recorded for the duration of the event on May 2nd, 2019 from 5:30–7:30pm

193 visitors

participated voluntarily in a creative response station

50 visitors

interviewed for evaluation purposes

Evaluation

We developed a five-part strategy to evaluate this event.

Quantitative Data: Because visitors were not required to register for this event, we did not obtain any demographic data from emails or registration. We were interested in counting the number of engagements with the program. Staff stationed in each of the galleries and areas of programming were responsible for counting the number of engagements during the entire evening.

Surveys: We also developed a survey for visitors to fill out. Visitors who participated in any aspect of programming were asked to fill out the surveys available on clipboards.

Creative Response: This response station designed by graduate students at the School of the Art Institute of Chicago served as an interactive way for visitors to leave feedback about the event and as an experiment of a participatory evaluation approach to complement the other strategies of engagement. The station prompted visitors to reflect on the question, "What did you discover tonight?" In addition to pre-set answers based on conservation and science staff's content goals, there was space for open-ended answers.

Teens: Some conservators mentioned an interest in engaging younger audiences. Within the larger NSF initiative, we have also focused on engaging with students and younger audiences. A group

Visitors from Materials of the Medieval World program participating in a creative response evaluation. They were invited to place colored rubber bands, which represented different engagement responses on a miniature cathedral diagram.

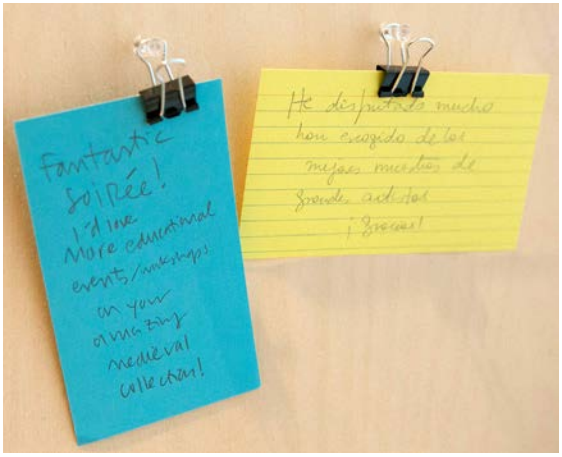
Image by Alice Feldt

of teens were invited to the event on a special schedule. At the end of the evening, teens debriefed by filling out a survey.

Internal Staff Evaluation: We conducted a reflection session for staff who assisted with the event. During this meeting, we reflected on the positives of the event and areas for improvement.

Findings

The highest-rated statement of the evening was about curiosity, with visitors rating on an average 4.76 out of 5 that the evening program made them curious about new things. Visitor comments also highlighted that understanding the material and technical properties of a work of art increased their appreciation for the object and the artist. In particular, visitors commented on how high-quality reconstructions of historical materials and techniques (we had commissioned tempera painting and embroidery reconstructions for the evening) helped them understand materials and techniques for making medieval art: "Being able to see the piece [embroidery reconstruction] magnified helped me to see the techniques of 'weaving' and understand how the artist considered the value of materials and visual impact."



Participants are invited to leave notes describing favorite parts of the evening and sharing what they learned.

Conservators and scientists give in-gallery demonstrations to share techniques, materials, and processes used to create many works of art in the medieval collection at the Art Institute.

Images by Alice Feldt

Student Engagement: **School Tours**

"The interdisciplinary nature of studying artworks from a science perspective can therefore make entry into STEM fields more attractive and accessible for those who may not have otherwise considered a career in the sciences." —Art Institute of Chicago visitor

School tour in the Asian Art galleries, looking at artworks from China's Tang dynasty, first half of the 8th century.

The Basics

The Art Institute of Chicago's Department of School Programs has undertaken an ambitious plan to reconceive their offerings for guided tours for K–12 school groups. The museum plans to expand opportunities for students to engage with increasingly diverse perspectives about art, identity, and the larger world. We selected the Art + Science tour as a case study because it allowed us to evaluate the effectiveness of our new direction for school programs and because we wanted to consider the intersections of art and science in the museum across a spectrum of audiences. One aspect that stands out from this tour is that it includes two parts: a visit to the museum galleries led by a museum educator, and an art-making activity in the studios led by a teaching-artist who engages students in different ways during their visit. Attending to students and school audiences stood out among the various initiatives that incorporate science inside the art museum because it focuses on the importance of developing programs and opportunities for young audiences to (re)consider STEM careers. These tours also raise questions about art, as well as about visitors and the larger world, through the lenses of science and conservation. One of the key focuses leading this experience is the similarity between artistic and scientific inquiry: students are encouraged to think about the similarities between artists' and scientists' skills, to be mindful of methods these professionals use to record information (places where these overlap and diverge), and think about how both artists and scientists use reasoning and imagination to pursue their curiosity. To encourage school groups to take the tour, we centered our program on the Illinois Next Generation Science Standard of "Stability and Change," both the tour and studio sections used these concepts to drive the experience. [21]

Since their inception in 2015, school tours have provided opportunities for students, ranging from primary to post-baccalaureate, to see the intersections of art and science in practice at the Art Institute of Chicago.

21. NextGenScience. "Next Generation Science Standard–For states, By States", in *A Framework for K-12 Science Education*, nextgenscience.org.

Evaluation

The first step in beginning the evaluation was considering the alignment of the outcomes and indicators of the overall Student Tours objectives and goals with the National Science Foundation framework that has guided other programs and case studies. We used two different methods of data collection for this study: surveys and observations. We created a student survey, a teacher survey, and an observation protocol while also designing short questionnaires to understand the docent (tour facilitator) and the teaching-artist (leader of studio activity) perspectives.

The teacher and student surveys were mirror images with minor changes in language. Ten statements were provided with closed-ended options for response, allowing students and teachers to respond from 1–5 with their agreement or disagreement with the statement (mimicking the card sort activity of the other case studies). In addition, two open-ended questions were asked of both students and teachers. Students and teachers were provided hard copies of the surveys to fill out at the end of the studio portion.

Observers were asked to use a student lens in collecting data, documenting student behavior and/or comments as evidence of achieving outcomes. Observers met after data collection to discuss agreement about similarities in how the tour achieved the student outcomes identified.

Findings

The tour was found to meet stated objectives, with strengths in students imagining new possible understandings or interpretations of a work of art, expressing curiosity and asking questions about different perspectives, and describing themselves as thinkers and makers. Students readily shared new thoughts about the connection between art and science, as well as surprise and interest in seeing more of the museum.

More than **1050 students and chaperones** have participated in student tours since its start in 2015.

Professional Training: **Scholarship and Accessibility**

"Watching how an exhibition comes together and interacting with the public around the exhibition gave me an understanding that there is a world outside the academia, it illustrated a way on how museums matter. Thinking about options for my future career have expanded to the possibilities of being a curator, engaging with the public, taking the lessons back to my undergraduates, professorship... now, paper writing is just one option."

—Olivia Dill, Ph.D. student and a participant in the Chicago Objects Study Initiative (COSI) collaboration

Participants practice public speaking skills by recording each other in pairs.

The Basics

The Art Institute supports a number of pathways programs and collaborations that provide training for students pursuing museum careers, as well as for those for whom object-centered art historical research is central to professional development along diverse trajectories beyond museums.

This case study illustrates the ways in which the museum serves advanced-level students by cultivating skill sets that sharpen expertise in researching art objects. In addition to this scholarly transformation, the museum seeks to disseminate more broadly work that is produced in the academic sphere. Students in our professional development programs design and conduct their research with an eye to making it accessible to a wider variety of audiences—not only to colleagues in other departments and disciplines, but also to the general public through exhibitions, catalogues, and talks.

"The framework provided [in the public speaking training] about interacting with the public in a way that makes them feel empowered and engaged, that doesn´t patronize them or condescend [to] them, that aims to elevate them, that perspective I've taken back in working with undergraduates."

—Olivia Dill (below)

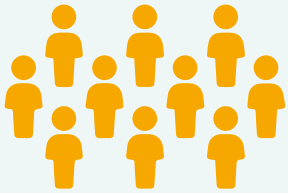
We interviewed Olivia Dill, a doctoral candidate at Northwestern University, to get a nuanced perspective on her experiences.

Two collaborations between Northwestern and the Art Institute have brought new research opportunities to Olivia Dill. Both collaborations leverage the museum's strengths in object-based inquiry, one centered on science and a second on diversifying skill sets of art historians. Olivia's research focuses on historical scientific drawings and illustrations on paper. At Northwestern, she is advised jointly by the department of art history and also by scientists in the Northwestern University/Art Institute of Chicago Center for Scientific Studies in the Arts (NU-ACCESS)—a collaborative endeavor in conservation science that pursues object-based and object-inspired scientific research to advance the role of science within art history, curatorial scholarship, archaeology, and conservation.[1] Through the department of art history's partnership with the museum under the Chicago Objects Study Initiative (COSI), Olivia participated in a hands-on training seminar focused on methods of materials-driven research, where she studied a Rembrandt drawing with mentorship from the museum's paper conservators, art history faculty and NU-ACCESS staff.[2] The research paper she produced for the COSI seminar later served as the groundwork for her MA thesis. In addition to providing academic training supported by both the Art Institute and Northwestern, the NU-ACCESS and COSI collaborations enabled Olivia to share her work with the museum's public audiences through publication and in-gallery talks. Olivia's research was cited in the catalogue for the show *Rubens, Rembrandt, and Drawing in the Golden Age*, and she received public-talk training with mentors from the department of Learning and Public Engagement to prepare for a series of presentations open to the general public in the exhibition's galleries.

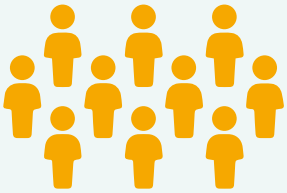
By the Numbers

The museum's academic training programs touch hundreds of students and faculty in Chicago, fostering a networked community of arts-dedicated researchers. In 2017, the Art Institute established the Department of Academic Engagement and Research (AER) to further advance mission-driven exploratory research on the museum's collections through strategic collaborations—both internal and external. AER's projects serve to bridge research-dedicated departments within the museum and create opportunities to network professors, students, scholars, and artists with museum staff. In a typical year, the museum **hosts 12 courses taught in-depth** from the museum's collection (high-impact) and we can estimate another **220 courses have a moderate-impact relationship** with museum resources.[3]

20 AER fellowships
per year across all museum departments



75 students
trained through the Mellon Undergraduate Summer Academy



72 PhD students
trained through the Mellon COSI graduate seminar

Evaluation

The museum's academic training programs are highly individualized. On an ongoing basis we revisit and reassess goals, adapting them to staff and student objectives, as well as to research interests and public impact. Evaluation is addressed at multiple levels, in terms of skill-building in individuals as well as how much of an impact customized training can make on content and experiences consumed by public audiences. Sometimes our effectiveness can be measured in numbers—for instance, how many people attended a gallery talk. Other times results are more qualitative and elusive, pertaining to the reach of our publications, quality interactions with visitors, or relationship-building among generations of museum professionals.

Success is also measured through individual students' career trajectories as they move into full-time positions. Longitudinal evaluation that tracks the impact of museum research and public audience-focused training on the evolution of museum accessibility broadly, as well as how museum experts are perceived and engaged by both the field and the general public, could be quite informative but it has not yet been implemented across the field.

"That gallery talk and my participation in that exhibition, there is another layer of engagement with the museum that kind of happens off the record. I've never been exposed to the process of curating an exhibit. Also, I was part of discussions about structures that are appropriate to communicate scientific methods, and what it means to distill an 8,000-word paper into a 250-word wall label."

—Olivia Dill

Findings

Participants in programs such as the Chicago Objects Study Initiative (COSI) frequently report that their decision to apply to a given university was influenced by that university's relationship with the Art Institute; the museum's collections, equipment, resources, and staff can make a significant contribution to a candidate's research projects.

In an interview we did to Olivia Dill, we found that students benefit from out programs in the following ways:

- They gain access to resources beyond their university campus
- They have proximity to the objects of study and the ability to explore the Art Institute's collection
- They encounter questions and subjects they might not otherwise have considered in their research
- They bring together art historical questions and material and scientific inquiry
- They learn to view their work through pedagogical and interdisciplinary lenses
- They build relationships with museum professionals and learn from staff expertise
- They come to understand the process of putting together an exhibition, caring for a collection or writing a publication
- They acquire different frameworks for research
- They consider a variety of professional paths (curatorial, scientific, educator, editorial, etc.)
- They come to a deep understanding of why museums matter.

"The experience of doing the gallery talk was affirming for me in terms of things that I know that I thought no one would have ever been interested in knowing. Like I [explained] how ink was made and everyone goes, 'OOOHHH!' It was just affirming to have people interested and excited about things I assumed nobody would be interested or excited about."

—Olivia Dill

Workshop participants, primarily graduate students in art history and science and engineering, were asked to pair up and practice public speaking while giving gallery talks.

1. The Northwestern University/Art Institute of Chicago Center for Scientific Studies in the Arts (NU-ACCESS) has as the goal of the collaborative program to enrich the breadth, scope, and reach of scientific studies in the arts and in the wider field of conservation in the United States and abroad by leveraging resources at the Art Institute and materials-related departments at Northwestern University. This research and education initiative also provides enhanced training opportunities for participants through involvement in university-museum multidisciplinary programs.
2. Established in 2014 with support from the Andrew W. Mellon Foundation, the Chicago Objects Study Initiative (COSI) is a tri-institutional collaboration based at the Art Institute and aimed at enhancing object-based art-historical training for doctoral students in art history at Northwestern University and the University of Chicago.
3. In FY18 COSI hosted three courses taught exclusively from the museum's collection and supported an additional six courses for behind-the-scenes teaching engagements in the museum collection (in FY19 this was closer to 10-12); in FY18 three museum-based courses were taught by staff in Learning and Public Engagement; the Ryerson and Burnham Libraries hosted 70 class visits; Prints and Drawings hosted 102 visits, Architecture and Design hosted five and the Photography study room 40. Course visits during public hours to the museum's public galleries are not individually tracked, but we can envision this figure for annual visits would be in the hundreds.

Professional Training: **Medicine and Art Workshops**

"Use art/appreciation of art as a way to defuse/meditate on difficult situations. It can open your eyes to new perspectives and ways of thinking about a problem."

—Medical Group Participant

Encouraged to practice listening and close looking, participants draw while listening to a verbal description their partner gives about a painting of their choice. The participant who's drawing is not looking at the painting.

The Basics

Medicine and Art Workshops primarily take the form of two-hour gallery sessions providing vocational training for students and professionals in the healthcare fields. Most often students are brought to the museum by their faculty to engage in facilitated encounters with artwork with the objective of supplementing skill and concept-based training in a range of areas. These areas can include:

- Observation
- Communication
- Collaboration
- Comfort with ambiguity
- Slowing down
- Empathic thinking
- Implicit bias awareness
- Complicating notions of "Objectivity"
- Reflecting on grief and trauma

A typical session begins with an introduction to close looking and collaborative narrative/interpretation-building. Additional exercises are informed by conversations with the faculty identifying workshop learning objectives. Exercises can involve paired sketching, durational looking, reflective writing, and small group storytelling, all generated by artwork on view. Typically a workshop includes four stops, beginning with a narrative work and concluding with abstract and conceptual works. Sessions are highly conversational, and rely heavily on dialog. They are also adaptable to the needs of each group, and are therefore dynamic in form and content.

By the Numbers

7 workshops
facilitated in 2019

15–35 students
per session

Evaluation

Most recently evaluation has taken the form of written reflections discussed and collected during the session. Students respond in writing to the question: "What portions of this workshop are applicable to your professional practice?" Students then share their observations with one another, and again as a full group. The format of the evaluation emphasizes student awareness of workshop relevance to their training, and prioritizes the immersion of the evaluation process into the workshop experience.

"Check my assumptions to make sure I'm objective. Being able to put myself in someone else's shoes and imagine how they're hearing/understanding me is crucial. Collaboration is key because others are probably going to think about things I haven't considered."

—Workshop participant

Sam Ramos, Educator of Adult Learning, facilitating Medicine and Art Workshop to medical professionals.

Findings

Our work with medical groups advocates for the value of art in society beyond the disciplinary context of art itself. We seek to foster an aspect of social justice and empathy building. When this collaborative program began in the 1990s, faculty and museum staff focused on visual literacy strategies and outcomes, including sharpening observational skills. We now adopt a much more holistic approach that recognizes the social and emotional dimensions of medical work, and the value of engaging with works of art to develop empathy and cultural competence. There has also been an important consideration on components of wellness in justice and the value of collaboration rather than solo practice.

"Observing artwork is similar to observing patients and taking a history and physical. One must look into details and holistically at a patient. One should always consider the context within a person comes from. Reflection on death, on experiences, on problems, and looking at them in different ways can help solve problems, heal. Medicine is collaborative, we can benefit from talking with each other." —Workshop participant

Participants during paired-sketching exercises.

Evaluation Instruments and Protocols

Creative response close-up, from Materials of the Medieval World evening program.

Intercept Interview Protocol (as used in *Conserving Photographs*)

Evaluator's Initials: EF Date: 5/29/19

Number: 3 Interception Point: Next to intro text by door

Day of Week: Weekday Monday Weekend _____ Free Thursdays _____

Hello, my name is Emily, and I work in the Education department here at the Art Institute. We are talking to people today to enhance the way we present special exhibitions and rotations of photography. I have a few questions for you that will take about 5 minutes now, and then another 5 minutes or so after you see the see the exhibition. Would you be interested in helping us today?

Pre-Visit Interview/Exercise:

First I would just ask you to fill out this one-question survey rating your overall experience at the museum today. Please circle one answer.

Rating: Good

OK great, my first question has to do with this term: conservation. And I just want you to tell me what words come to mind when you hear conservation. **Probe or ask elaboration questions if the visitor struggles to think of an answer*

Stabilization, repair, reconstruction

OK now I have a series of cards I want you to sort these cards, on a scale of 1–5, 1 being that you feel it applies the least and 5 being the most, if you feel like any of these apply to your experience today at this museum and whether the museum has had any of these impacts.

So for instance, do you feel that anything in your visit today allowed you to better understand the relationship between art and science?

Prompt	Rating
I have a deeper understanding of the materials and techniques used to create works of art.	2
I place a greater value on the preservation of art objects.	2
I am seeing art or artists in a new way.	3
My curiosity has been sparked. I am curious about . . .	4
I more deeply value the experience of seeing a work of art in person.	2
I have a greater understanding of an artist's (or artists') process.	2
I am thinking more about the relationship between art and science.	4

Intercept Interview Protocol (as used in *Conserving Photographs*) cont.

Now let's look more closely at two of these cards. *Probe visitor to elaborate on why they rated these cards highly. Example questions: What made you say that? Was there a specific moment during your museum visit today that impacted this for you? Do you have an example of how "your curiosity has been sparked"?*

Card 1: Relationship between art and science
It's interesting to see the conservator's point of view when thinking about art

Card 2: Sparked curiosity
It is not common to know about the conservators' side of things.

Great now I am going to give you time to look through this exhibition. Take as much or as little time as you need, and then when you come back, I'll have just a few questions for you.

Time in Rotation 34 mins

Welcome back! I would just ask you to fill out this one-question survey again rating your overall experience at the museum today. Please just circle one answer.

Rating: Excellent

Ok great, now I want to return to the first question I asked you, which was about the following word: conservation. And I just want you to tell me what words come to mind when you hear the term conservation after walking through this exhibition. Does anything new come to mind?

Stabilization

Ok, now let's return to the series of cards that you sorted earlier. After walking through this rotation, have any of these ratings changed for you? If so, just take a minute to re-sort and re-rate. If nothing has changed, just leave the cards as is.

Prompt	Rating
I have a deeper understanding of the materials and techniques used to create works of art.	4
I place a greater value on the preservation of art objects.	4
I am seeing art or artists in a new way.	4
My curiosity has been sparked. I am curious about . . .	5
I more deeply value the experience of seeing a work of art in person.	4
I have a greater understanding of an artist's (or artists') process.	4
I am thinking more about the relationship between art and science.	5

Now let's look more closely at some of these cards. *(Select cards that changed in rating; if none changed in rating, ask them to elaborate on how their experience reinforced the cards they rated more highly. It's ok if the cards as the same as part 1; you are asking them to talk specifically about how this exhibition reinforces these cards.)*

Card 1: Value in preservation
Makes me think we couldn't see the artwork this way otherwise.

Card 2: Relationship between art and science
The photographic process itself is a science. Also the preservation process is scientific.

Focused Observation (as used in evaluating digital labels)

Evaluator Name: Giannella Ysasi

Start Time: 3:05pm

Date: 7/14/19

Finish Time: 3:35pm

Visitor Group #	Not Engage	Time Elapsed	Number of Screens Swiped	Read Text	Comparative Looking	Talked with Family or Friends
1		3:10-3:20	All	yes		N/A
1	X					
1	X					
1		3:10-3:20	6	yes		N/A

Test Group Intercept Interview (as used in evaluating digital labels)

Hi, my name is Sarah and I work at the Art Institute of Chicago and we are asking people for feedback on your visit, specifically your thoughts about the iPad in this gallery. I noticed you looking at the John Singer Sargent [exhibition name] label. Would you mind answering a few questions? It would take about 5 minutes.

To begin with, I just want to have you rate your overall experience today in the museum and answer a few demographic questions.

Now let's talk about the iPad. What was most interesting to you? What about that interests you?
Easy to use, it brought up something I would not be able to see otherwise, would have never noticed if I didn't have this information in the iPad. I wonder "Why would Sargent do that?"

Anything confusing or unclear? Something that could be improved? Was the language clear?
I could not find the arrow in an animation, didn't know how to navigate that part of the interactive.

Based on everything you saw in this iPad, did any key ideas or themes emerge for you?
What did you see or read that made you think about that?
The newspaper of course and that the artist painted "plein air." I thought about it because of the images and the descriptions included.

Did anything surprise you as you used this iPad? Anything unexpected?
It is exciting to discover that he used to take care of his "plein air" painting putting newspaper around them. The unexpected was that it brought me into the painting and the process of how it was originally made.

Now I'm going to show you a series of cards that have prompts on them. I want you to sort these cards, on a scale of 1–5, 1 being that you feel it applies the least and 5 being the most, if you feel like any of these apply to your experience with this iPad. For instance, do you feel that this iPad allowed you to have a deeper understanding of the artist's process? For any of these, are they rated low because, for example, you have always felt strongly about the value of [XX]? If so, did this digital label reinforce [XX] or not?

Prompt	Rating
I have a deeper understanding of the materials and techniques used to create works of art.	4
I place a greater value on the preservation of art objects.	4
I am seeing art or artists in a new way.	4
My curiosity has been sparked.	3
I more deeply value the experience of seeing a work of art in person.	5
I have a greater understanding of an artist's (or artists') process.	5
I am thinking more about the relationship between art and science.	3

Test Group Intercept Interview (as used in evaluating digital labels) cont.

Now I want you to choose 2 cards that we can discuss more deeply.

Card 1: See artists in a new way

I always think of Sargent as a portraitist, so this gave me a deeper look into how he was painting in plein air.

Card 2: Relationship between art and science

The studies and detail images show you more details that you couldn't be able to see in simple sight.

Is there anything else you would like to add?

This made me think about how other artists store their artworks and other methods while they are working on these great pieces of art we see in big museums now.

Control Group Intercept Interview (as used in evaluating digital labels)

Hi, I work at the Art Institute of Chicago and we are asking people for feedback on your visit, specifically your experience in special exhibition [exhibition name]. Would you mind answering a few questions; it would take about 5–10 minutes?

To begin with, I just want to have you rate your overall experience today in this exhibition and answer a few demographic questions.

What is something that connected with you today in this exhibition?

I didn't realize the artists painted so much, it was good to see the breadth of his work in the exhibition.

What was something unexpected about your visit?

Surprised how big it is, the exhibition itself!

Anything that could have improved your visitor experience?

The second part of this intercept interview is identical to the latter part of the test group interview for carousel horse (from the card sort activity to the end). The difference between these questions and the test group questions is that these questions are directed to the overall experience and not to the specifics of using an interactive label.

Post-Visitor Program Survey (as used in evaluating public programs, *Materials of the Medieval World*)

Please check all of the events you attended this evening.

- ☑ Materials Table
- ☐ Water Gilding Demonstration
- ☐ Q&A Session in Gallery 238
- ☑ Gallery Talk(s)

If you attended more than one gallery talk, please list the number you attended: 2

Please rate on a scale of 1–5, how much you agree or disagree with the following statements (with 1 meaning you strongly disagree and 5 meaning you strongly agree).

Because of this evening's event(s) . . .

A. I have a deeper understanding of the materials and techniques used to create works of art.

1 2 3 (4) 5

B. I place a greater value on the preservation of art.

1 2 3 4 (5)

C. I am seeing art or artists in a new way.

1 2 3 (4) 5

D. I am curious about new things.

1 2 (3) 4 5

E. I more deeply value the experience of seeing a work of art in person.

1 2 3 (4) 5

F. I have a greater understanding of artists' process(es) for making art.

1 2 3 (4) 5

G. I am thinking more deeply about the relationship between art and science.

1 2 3 (4) 5

Post-Visitor Program Survey (as used in evaluating public programs, *Materials of the Medieval World*) cont.

Choose 1 of the above statements that you strongly agreed with, if any. What about the program led you to strongly agree?
Statement letter: B

Please rate the following statement on a scale of 1–5.
Ideas and information discussed in talks or demonstrations were clear and engaging.

1	2	3	(4)	5
Strongly disagree				Strongly agree

What, if anything, could have improved your experience at this event?

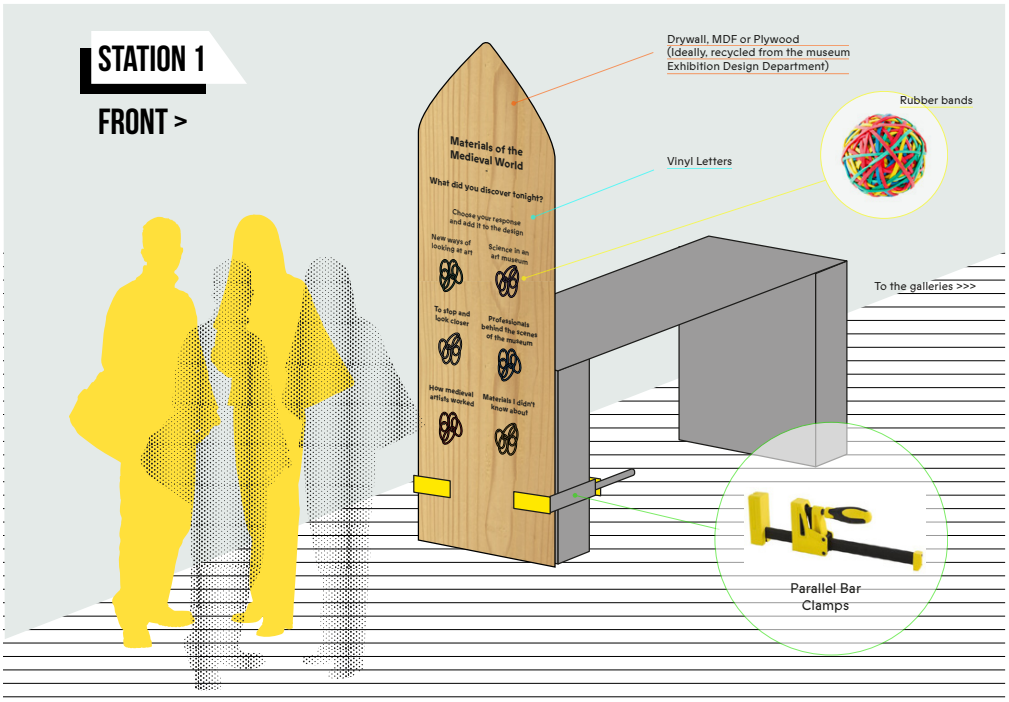
Smaller groups or taking place during day with lectures repeated

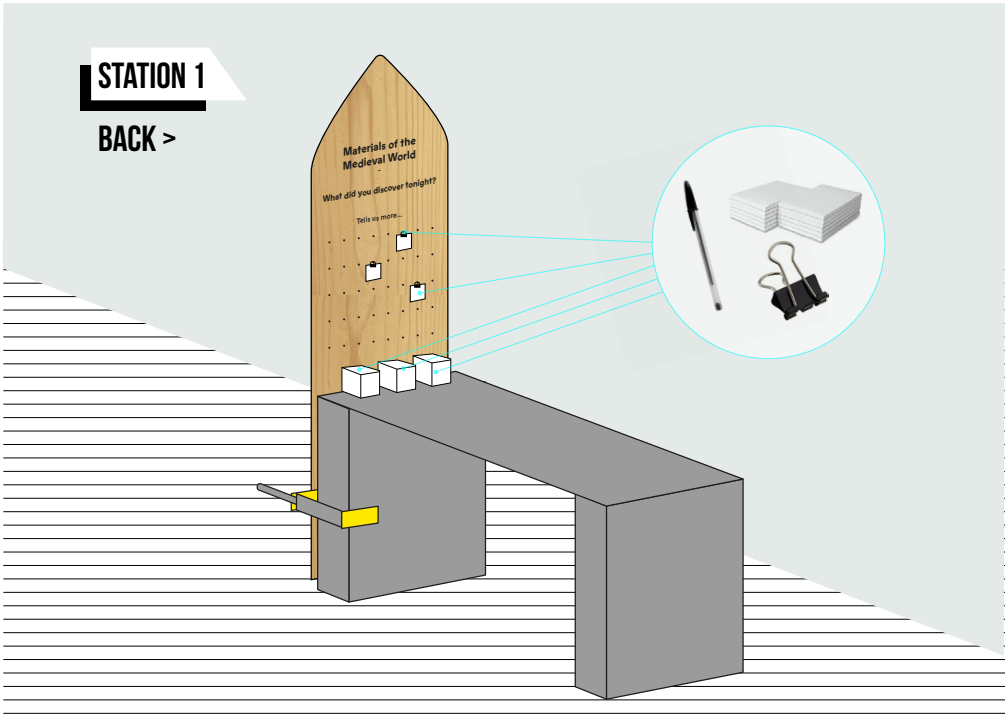
Please rate your overall experience at the museum today. Circle one answer.

Poor	Fair	Good	(Excellent)	Superior

Creative Response (as used in public programs, *Materials of the Medieval World*)

Giannella Ysasi Tavano, a Museum Education Graduate Seminar student, and Daniel Salamanca-Nuñez, an MFA candidate in painting and drawing at the School of the Art Institute of Chicago, collaborated to produce a creative response activity. The response involved participants of the evening matching colored rubber bands to pre-set answers to the question: **What did you discover tonight?** *Inspired by medieval stained-glass windows, this activity allowed visitors a creative space for reflection.*





Student Exit Slip Tour and Studio Workshop (as used for Art + Science School Tour)

Think about your experience at the Art Institute today. Remind yourself of each work of art that you explored, the conversations and activities you participated in, how you responded, and what you created. Answer each of these questions about your Art + Science Tour and Studio experience today. Answer each of these questions about your Art + Science Tour and Studio experience today. Reflect about the main topics covered on "Stability and Change," and how these bridge disciplines.

For the first 10 questions, please rate on a scale of 1–5, how much you agree or disagree with the following statements.

1. Art + Science helped me see that I have the thoughts and skills of an artist.

1 2 (3) 4 5

2. It helped me see that I have the thoughts and skills of a scientist.

1 2 3 (4) 5

3. Because of the Art + Science experience, I am thinking more about the relationship between art and science.

1 2 3 (4) 5

4. It made me ask questions about how scientists look at the world.

1 2 3 (4) 5

5. It made me ask questions about how artists look at the world.

1 2 3 (4) 5

6. It made me ask questions about change and stability in the world.

1 2 (3) 4 5

7. It made me ask questions about how works of art change based on the materials used and how science is involved.

1 2 3 4 (5)

8. Because of Art + Science, I am seeing art or artists in a new way.

1 2 (3) 4 5

9. Because of Art + Science, I have a greater understanding of an artist's (or artists') process.

1 2 3 4 (5)

10. Because of Art + Science, I have a deeper understanding of the materials and techniques used to create works of art.

1 2 3 4 (5)

Please write your response to the final two questions below each question.

11. What is one idea or thing that you learned or saw today that you had never thought about or seen before?

How patient artists had to be

12. Because of participating in Art + Science, I wonder . . .

What art conservation will look like in 100 years

Teacher Exit Slip Tour and Studio (as used for Art + Science School Tour)

Think about your experience at the Art Institute today. Remind yourself of each work of art that your students explored, the conversations and activities they participated in, how they responded, and what they created. Answer each of these questions about your Art + Science Tour and Studio experience today.

For the first 10 questions, please rate on a scale of 1–5, how much you agree or disagree with the following statements.

1. Art + Science helped my students see that I have the thoughts and skills of an artist.

1 2 3 (4) 5

2. It helped my students see that I have the thoughts and skills of a scientist.

1 2 3 (4) 5

3. Because of the Art + Science experience, I am thinking more about the relationship between art and science.

1 2 3 4 (5)

4. It made my students ask questions about how scientists look at the world.

1 2 3 4 (5)

5. It made my students ask questions about how artists look at the world.

1 2 3 4 (5)

6. It made my students ask questions about change and stability in the world.

1 2 3 (4) 5

7. It made my students ask questions about how works of art change based on the materials used and how science is involved.

1 2 3 4 (5)

8. Because of Art + Science, I believe my students are seeing art or artists in a new way.

1 2 3 (4) 5

9. Because of Art + Science, I believe my students have a greater understanding of an artist's (or artists') process.

1 2 3 (4) 5

10. Because of Art + Science, I believe my students have a deeper understanding of the materials and techniques used to create works of art.

1 2 3 (4) 5

Please write your response to the final two questions below each question.

11. What is one idea or thing that your students learned or saw today that they likely never thought about or saw before?

The role natural elements play in the creation of an artwork

12. What questions do you have as a result of attending this tour?

How can I create more creative and interdisciplinary projects in the science curriculum.

I think a general perception for the visitors is that the artwork has always looked that way, and that is so far from the truth with most objects. Objects that look static or fixed are not that way at all, they are changing in many ways and also what they have meant for the audience.

—Cybele Tom, Assistant Object Conservator

Overall Takeaways

Analyzing the data across all of our case studies reveals that after engaging with one of our displays, digital interactives, or programs that integrate conservation and science content, visitors developed a better understanding of materials, techniques, and an artist's process;

more deeply valued the preservation of art objects; and were more likely to be curious about new things. One unexpected impact was realizing that sharing stories with conservation and science perspectives could help visitors feel a deeper connection with the artists as makers, and even experience feelings of empathy with the artists' processes.

The chart below shows the average rating of the indicators we established when defining our impact framework and objectives. This average is taken from visitors who engaged with the various initiatives described in each case study, what we called our "test group" (n=239). To have a comparative reference and also look into the impact that our initiatives had on visitors, we also approached audience members who did not engage with our initiatives, our "control group" (n=120), and evaluated the differences between the two sample groups.

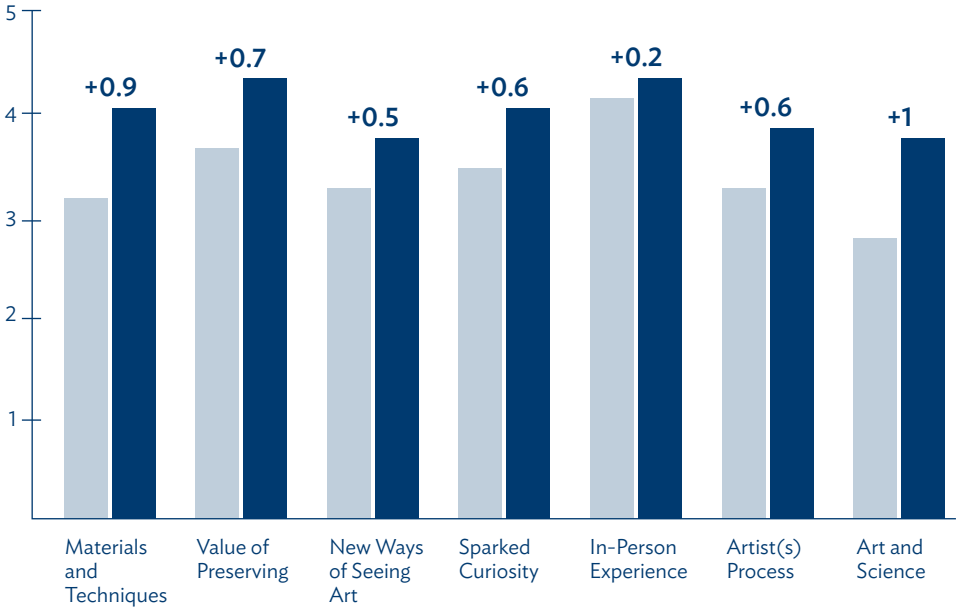
The chart and graph indicate differences in visitor ratings between the control and test groups. An example that illustrates this impact is the indicator on the "relationship of art and science." Even though it didn't have the highest rating compared to other indicators, the difference between the control and the test group was the most significant corresponding to one point. This might mean that visitors are not initially thinking about this intersection; however, after going through any of our experiences a significant number of visitors were driven to rate this prompt higher.

Nonetheless, the higher averages in the test group that emphasized materials, techniques, and the value of preservation suggests that visitors think more deeply about processes of both artists and conservators/scientists in the museum when engaging with any of our offerings that offer this perspective or content.

Card sort results

Control Test

Evaluation methods included control and test groups to compare how visitor's understood and engaged with art and science in the museum. Visitors were invited to participate in a card sort activity before and after their experience to track changes in perception and engagement.

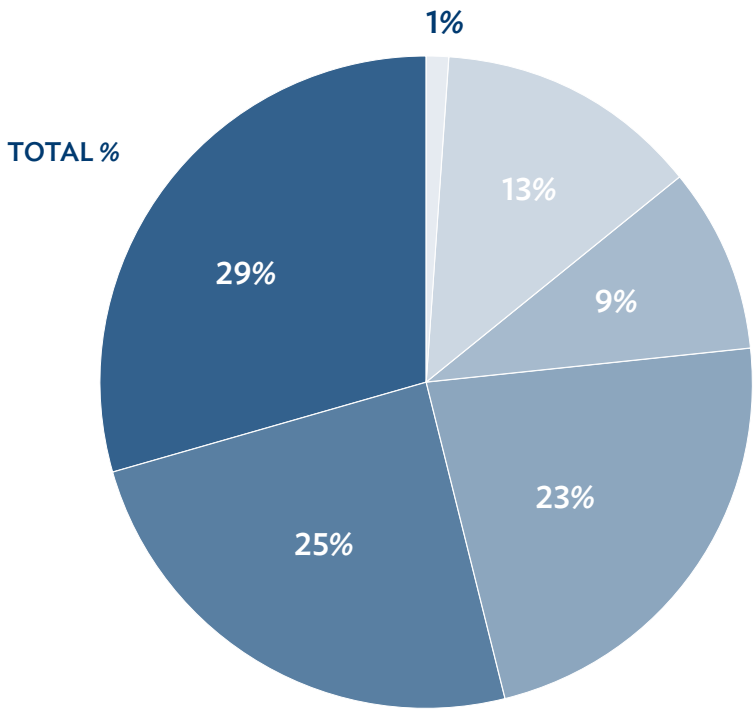


After visitors rated the indicators, they were asked to elaborate on a couple of prompts, which facilitated a qualitative analysis in addition to the quantitative averages presented above. Visitors' elaboration comments were also collated and analyzed according to their specificity (see the "Rubric for Coding Visitor Responses" below). All 239 responses in the test group and the 120 responses in the control group were analyzed. We found that overwhelmingly the data supported visitors' personal ratings for the card sort. For example, visitors in both the test and control groups were able to give specific and museum-specific answers when asked to elaborate on their visit to the museum or on what forms of engagement reinforced the value of seeing art in person. Accordingly, from the card sort ratings, it was clear that the Art Institute already reinforces this value without telling conservation and science narratives. On the other hand, visitors who engaged with the art and science initiatives (our test group), were able to give much more specific answers to questions regarding materials, techniques, and process, as well as why they valued the preservation of art objects, which were two of our most highly rated cards.

X-ray fluorescence spectroscopy is used to examine Pierre-Auguste Renoir's *Madame Léon Clapisson*. Pierre-Auguste Renoir, *Madame Léon Clapisson*, 1833. Mr. and Mrs. Martin A. Ryerson Collection.

Analysis and Coding of Visitor Responses

Deeper evaluation of case studies' impact on visitors' perceptions analyzed based on the rubric of the graph, include elaboration on card sorting for *Conserving Photographs* exhibition and digital labels (DL) evaluations (Sargent, El Greco, and Carousel Horse).



Rubric for Coding Visitor Responses

Unrelated: Not related to the question asked

General: For very vague, non-specific answers

Specific: For answers that reference something specific with example(s) or explanations but are not specific to the visitor's museum experience

AIC Specific I: Specific to the visitors' experience at the museum but without examples or explanations

AIC Specific II: Specific to the visitors' experience at the museum with either example(s) or explanations

AIC Specific III: Specific to the visitors' experience at the museum with both example(s) and explanations

Takeaways Summary

From these results we have summarized a number of takeaways for engaging the public with conservation and science and a number of questions with which we continue to grapple:

- **A better understanding** of materials, techniques, and processes was gained, and visitors saw greater value in the preservation of art objects; they also became curious about new things.

- **Sharing a diversity** of conservation stories can help visitors better understand and more deeply value the preservation of art in its many forms. It is key to present stories that represent a variety of media, cultures, and time periods. For example, a majority of our scientific research has been undertaken on historical European paintings. To truly represent the variety of conservation specialties at our institution and move beyond this narrative bias, we need to ensure that we tell diverse stories.

- **Outreach efforts** should present the many complexities of conservation and highlight conservation as a scientific and humanistic decision-making process. Surfacing the issues and, at times, controversies in conservation can help visitors engage with objects in new ways and compel the public to take their own stances on these choices. These issues can range from matters of competing cultural values in terms of preservation methods, the relationship between artistic intent and an object's afterlife, and understanding artworks as continuously changing objects rather than static entities.

- **Looking closely** at an artist's process through the lenses of conservation and science can spark visitors' empathy and understanding of an artist's life and processes for making. How might we use these conservation and science narratives to also draw visitors into the worlds of unknown artists and makers?

- **Providing opportunities** for the public to engage with conservation and science professionals through live programming in galleries sparked visitors' curiosity. How can we better embed or model this spirit of inquiry into other modes of engagement?

- **Drawing connections** between art and science should not be facile or in service of only understanding art objects. How can we better scaffold scientific information to aid visitors in creating deeper connections between the disciplines of art and communicate increasingly complex scientific and artistic concepts?

> *Both [art and science] are dedicated to asking the big questions placed before us: 'What is true? Why does it matter? How can we move society forward?' Both search deeply, and often wanderlust, for these answers*
>
> —John Maeda

Reflections of Practice

How has your involvement in this NSF initiative help you approach your work in the museum more deeply?

Staff from different departments involved in the Art Institute's National Science Foundation Stakeholders committee and in the work of case studies featured in this toolkit, look back on their experiences on bringing forward the intersections of art and science in the art museum context.

"Exploring the intersections of art and science at the Art Institute, gave me both the language and a better understanding of how art museums are truly interdisciplinary spaces. **It has elevated the way we collaborate among departments and teams, placing inquiry at the center of our areas of expertise.**"

—**Emily Fry**, Director of Interpretation, Department of Learning and Public Engagement

"**Inquiry, and specifically shared inquiry, has been the anchoring value of this initiative. It is both subject and method.** Early on, nuanced conversations with colleagues working across fields of practice and across institutions deepened my understanding of the many ways in which art and science intersect. They attuned me to why these intersections held value for museum audiences and guided me and others as we tested these through research and evaluation and as we reflected on results. … Over the course of the months and then years, the initiative gained yet another layer of meaning; it became for me a case study about institutional change."

—**Jacqueline Terrassa**, Woman's Board Vice President for Learning and Public Engagement, Department of Learning and Public Engagement

"As a digital and design strategist, this project gave me an opportunity to engage with international and interdisciplinary colleagues, ultimately leading to constructive conversations around art and science and how the two subject areas interact. As someone who is personally interested in these areas, the initiative gave me a chance to bring in designers and filmmakers to help explore the intersection of art and science with the intention of distributing our ideas to a larger audience. **We had an opportunity to bring our subject matter closer together, finding the commonalities rather than the differences, between the creative and scientific practices**."

—**Michael R. Neault**, Executive Creative Director, Experience Design

"Working closely with Sarah Molina, in the context of the National Science Foundation initiative, was stimulating. It helped me stay grounded and focused on our public while defining the goals of the exhibition *Conserving Photographs* and during its development. In addition, **the study provided precious insight on the perception of conservation by our visitors, which I will use in future programs to continue to engage our audiences and promote a heightened awareness and support of conservation.**"

—**Sylvie Pénichon**, Photography Conservator, Head of Photograph Conservation

"Coming into this project, I brought the specific lens of formal learning and a focus on student agency for learning and engagement with the world. In this vein, the intersection of art and science is about the fluidity of human creative thought and active inquiry across disciplines. **Participating in collective explorations of art and science with my peers, from other areas of the museum and from other museums, my eyes were opened wider to the multiplicity of ways we, and our audiences, can understand art and science.** This project reinforces the role of the museum as a forum for exploration of ideas, questions, and perspectives that ultimately defy categorization in one area of study and instead reflect our common humanity and innate curiosity about our world and our place within it."

—**Sarah Alvarez**, Director of School Programs, Department of Learning and Public Engagement

"This work has deeply impacted my process when thinking about the importance of collaboration and creating working structures that are sustainable, flexible and relevant when working interdepartmentally. In conversation with both internal and external stakeholders, doing audience research, and coordinating colleagues from various departments, **I've reflected on the importance of listening as part of my practice in aligning interest and visions.** Coordinating the edition of this publication has allowed me to reflect on the importance of being accountable to our institutional goals as well as making our work accessible to the broader field."

—**Giannella Ysasi Tavano**, Woman's Board Fellow, Department of Learning and Public Engagement

"This initiative has given me a deeper understanding, and a more comprehensive framework of what the practice of scientific research in an institution like the Art Institute really means. **I am now more deeply attuned to considering the expansive influence for our publics—both in person and on the web—of the narratives (with words, images, and in person-experiences) that can be generated from the questions we ask of artworks as objects of inquiry, using scientific tools**. This has been a process of exhilarating discoveries in itself, and I have been amazed by the tremendous impact that these combined trans-disciplinary and sometimes trans-national approaches have brought to bear on the initiative. I am in awe of the energy, creativity and passion that all the members of this collective have deployed for this project "

—**Francesca Casadio**, Grainger Executive Director of Conservation and Science

"My work with medical students and professionals has deepened and enhanced my understanding of what is possible in museums and with art more generally. **It is striking to witness the ways in which artwork and ideas that are profound for one audience, and in one context, can be just as profound for an entirely different audience and context.** This is a lesson that is endlessly fascinating, and it continues to inform all of my teaching."

—**Sam Ramos**, Assistant Director of College and Professional Learning

"This initiative helped me understand how innovative thinking in a museum happens in collaborative and interdisciplinary spaces. My time as the National Science Foundation Fellow convinced me that these spaces are necessary for progress, and when I return to the museum**, I hope to not be defined by a professional title or by a single department but by shared inquiry and a commitment to taking risks."**

—**Sarah Molina**, former National Science Foundation Fellow

For Further Exploration

Foundational Reading

Williams, Emily, ed. *The Public Face of Conservation*. London: Archetype Publications, 2013.

One of the most comprehensive books to detail public engagement with conservation and science. Published in 2013, these essays mostly focus on case studies, but there are also interviews with conservators and an in-depth literature review. Papers for this book emerged from a conference held in 2011 in Williamsburg, Virginia, "Playing to the Galleries and Engaging New Audiences: The Public Face of Conservation."

Peer-Reviewed Articles from Interpretation and Museum Education Sources

Blokland, Ann. "Interpreting Vincent van Gogh: Telling New Stories, Tackling Old Myths." *Interpreting the Art Museum: A Collection of Essays and Case Studies, ed. Graeme Farnell.* Edinburgh and Boston: MuseumsEtc, 2015.

This article outlines in-gallery and digital interactives involving conservation and science installed at the Van Gogh Museum in Amsterdam. These installations activate van Gogh's life and artistic practice for visitors through hands-on tools like a microscope table (to examine reconstructions of van Gogh's paintings) and a perspective frame (with which visitors could digitally draw a landscape). Multimedia interactives like the Touch van Gogh app allow visitors to digitally erase and look under the painting's surface as well as remove varnish, transforming visitors into "co-researchers."

Monti, Francesca and Suzanne Keene. *Museums and Silent Objects: Designing Effective Exhibitions*. Surrey and Burlington: Ashgate, 2013.

Although this book is largely focused on gallery design and visitor evaluation studies, it also includes case studies about in-gallery interactives from the British Museum and the Victoria and Albert Museum that incorporate conservation knowledge and practices.

Richards, Wade H., and Margaret Menninger. "A Discovery Room for Adults." *Journal of Museum Education* 18, no. 1 (1993).

This article describes various case studies implemented to educate the public about conservation at the J. Paul Getty Museum.

Interpretation and Audience Research

Diamond, Judy, Jessica J. Luke, and David H. Uttal. *Practical Evaluation Guide: Tools for Museums and Other Informal Educational Settings*, 2nd ed. Lanham, MD: Altamira, 2009.

Samis, Peter and Mimi Michaelson. *Creating The Visitor Centered-Museum*. New York: Routledge, 2017.

Farnell, Graeme, ed. *Interpreting The Art Museum A Collection of Essays and Case Studies*, Boston: MuseumsEtc, 2015.

Fritsch, Juliette, ed. *Museum Gallery Interpretation and Material Culture*,New York: Routledge, 2011.

Other Resources to Should Consider for Developing Your Evaluation Study

Your local university. The Institutional Review Board (IRB) office at a nearby research university can help answer questions about human subject research. Relevant professors can also be helpful consultants in designing a study.

InformalScience.org. This website offers project, research, and evaluation resources designed to support the informal STEM education community.

Evaluation Center at Western Michigan University. The Evaluation Center at Western Michigan University hosts a checklist project on their website, which provides rigorous checklists to guide evaluation practice.

Center for Culturally Responsive Evaluation and Assessment. An initiative of the College of Education at the University of Illinois at Urbana-Champaign, this center provides resources for evaluators to consider the cultural competence of their evaluation methodologies and practices. Their website lists many helpful publications: crea.education.illinois.edu/home.

Peer-Reviewed Articles & Books from Conservation Studies

Brajer, Isabelle. "Values and Opinions of the General Public on Wall Paintings and their Restoration: A Preliminary Study." *Studies in Conservation.* 53, (2008), 33-38. Contributions to the London Congress.

This article explores visitors' opinions and expectations in relation to the restoration of medieval wall paintings in Danish churches. This type of study represents the kind of interactive cultural heritage restoration projects that have been undertaken in Europe.

Chitty, Gill. *Heritage, Conservation, and Communities: Engagement, Participation, and Capacity Building.* London and New York, (2016).

This book focuses on international case studies (primarily UK institutions) of conserving cultural heritage in conjunction with communities (concerning how conservators engage with the public). Danai Koutromanou's contribution is particularly relevant as it explores how museum visitors have responded to conservation in UK museums. Her unpublished dissertation explored this topic fully, "Public Engagement in Cultural Heritage Conservation: An Investigation of Museum Visitors' Views" (submitted to the University of York, August 2015).

Lithgow, Katy. "A 'Once in a Lifetime' Experience 'Conservation in Action' for Thornhill's Wall Paintings at Hanbury Hall, Worcestershire, UK." *Studies in Conservation.* 57 (2012), 181-190.

This paper describes conservation of the early eighteenth-century Baroque wall paintings decorating the staircase of Hanbury Hall in Worcestershire, UK. Visitors' response to the restoration project are presented and discussed in the context of other "conservation in action" projects across the National Trust.

Lithgow, Katy. "Communicating Conservation Science," *Studies in Conservation*. 60(2016), 57-63.

To my understanding, this is the first time that interpretation as a discipline and conservation science have been discussed together in a peer-reviewed publication. This article gives a short overview of combining the two disciplines in a UK-specific context. Much can be done to expand and create a more substantive conversation around the integration of interpretation and conservation.

Narkis, Iris and Helena Tomlin. "Close Encounters: Enabling Access to Museum Collections." *Studies in Conservation.* 53 (2013), 166-169.

This paper discusses the tension between making museum collections more accessible to the public and balancing this desire for access with conservation concerns.

Podany, Jerry and Susan Maish. "Can the Complex Be Made Simple? Informing the Public about Conservation Through Museum Exhibits?" *Journal of the American Institute for Conservation.* 32, No. 2 (1993), 101-108.

Focusing on an exhibit at that was held at the Getty, Preserving the Past (revealing conservation techniques applied to the museum's ancient objects), this paper describes the efforts to establish guiding principles and accessible approaches to presenting complex subject matter to the museum visitor.

Pye, E. "The Benefits of Access Through Handling Outweigh Risks." D. Saunders, J. Townsend, and S. Woodcock. *Conservation and Access: Contributions to the London Congress, 15–19 Sep* (Dorchester: International Institute for Conservation of Historic and Artistic Works, 2008), 162-165.

Thoughtful analysis on the benefits of letting visitors handle objects (and how in certain cases, the benefits outweigh the risks, particularly in the context of long-term engagement with museums and employing different strategies for learning).

Shenton, Helen. "Public Engagement with Conservation at the British Library." *Studies in Conservation*. 53 (2008), 130-135. Contributions to the London Congress. tandfonline.com/doi/abs/10.1179/sic.2008.53.Supplement-1.130.

Description of the programs and features of the British Library's conservation center designed for the public. Some of these features included an exhibition titled "Conservation Uncovered," behind-the-scenes tours, conservation advice clinics, advice on caring for family archives, and other classes.

Watts, Siobhan, Dave Abbott, David Crombie, Agnus Gunn, and Annemarie Le Pennsée. "Science Revealed: The Hidden Stories of Objects." *Studies in Conservation*. 53 (2008), 146-150. Contributions to the London Congress. orcp.hustoj.com/wp-content/uploads/2015/10/2008-SCIENCE-REVEALED_THE-HIDDEN-STORY-OF-OBJECTS.pdf.

This article focuses on the case study of the National Museums Liverpool's Conservation Centre and its exhibition, "The Hidden Stories of Objects."

Vervoorst, Juergen. "New Conservation Opportunities in a World of Digitization and Access." *Studies in Conservation*. 53 (2008), 175-177. Contributions to the London Congress.

This article provides an overview of how conservation has come to function online and how digitization is making conservation available to the public and for the future.

Non-Peer-Reviewed Sources and Think-Pieces

Frost, Stuart. "Behind the Scenes: Conservation and Audience Engagement." *Conservation Journal*. 58, special edition (Autumn 2009). vam.ac.uk/content/journals/conservation-journal/autumn-2009-issue-58/behind-the-scenes-conservation-and-audience-engagement.

This online article outlines the Victoria and Albert Museum's strategies for engaging audiences with conservation and science, such as open-air conservation programs, blog posts, touch objects, and the development of facsimiles.

Hallett, Florence. "Is accessible conservation more than a PR trick?" *Apollo: The International Art Magazine.* April 3, 2017. apollo-magazine.com/is-accessible-conservation-more-than-a-pr-trick.

Hallet discusses the "gimmicky" quality of open air conservation (the impression these kinds of programs give to the public about conservation versus the reality).

Jones, Sam and John Holden. *It's a Material World*. London: Demos, 2008. Open Web Access through Creative Commons, demos.co.uk/files/Material%20World%20-%20web.pdf.

Heavily filtered through the lens of conservation as a profession in the UK, this book nevertheless provides invaluable insight into how UK museums have made conservation and public engagement a priority.

Awards

Keck Awards. International Institute for Conservation of Historic and Artistic Works.

Awarded to an individual or a group "who has in the opinion of the Council contributed most towards promoting public understanding and appreciation of the accomplishments of the conservation profession." Presents examples of projects undertaken at museums, like the Royal British Columbia Museum's "The Chinese Freemason's Lantern" in 2014.

The American Institute for Conservation (AIC) has a Wikipedia page listing all recent exhibitions focusing on conservation and a list of K12 resources. conservation-wiki.com/wiki/Main_Page.

Acknowledgments

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This set of case studies, audience research and program development reflects a strong and sustained collaboration between the Learning and Public Engagement Department and the Conservation and Conservation Science Department at the Art Institute of Chicago to bring public awareness to the work of conservation and science in the art museum.

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