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#### **Abstract**

Situated at the nexus between research and education, and set within a larger context of international outreach efforts, the Art Institute of Chicago embarked on a multiyear project that integrates conservation and science into the public-oriented institutional programming structure of the museum. While trends in the art museum field often present science as supplementary or as one-off projects, an initiative was developed that sustained public engagement with conservation and science in multiple modes. Establishing institutional structures for cross-departmental work and investigating how science can be valuable for visitors in an art museum were at the core of this public initiative, while robust visitor evaluation contextualized individual case studies within the larger values of outreach. The results demonstrated the success of Art + Science programming in leading the public to think more deeply about the artistic process and the preservation of works of art, increasing a sense of empathy with artists as makers.

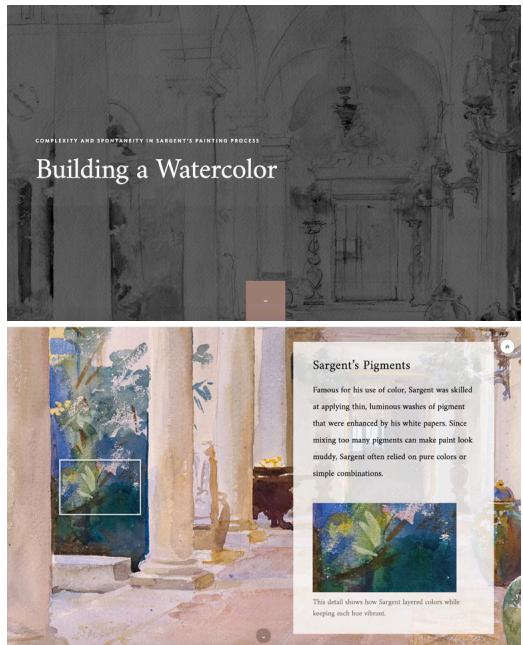
## **Execute, evaluate, repeat: Implementing an integrated Art + Science interpretation strategy at the Art Institute of Chicago**

### **INTRODUCTION**

“It’s not a place for me” is a consistent reason people give for not visiting art museums. To counterbalance this impression and as part of a radical process of transformation of our “institute” into a multivocal, inclusive, and porous museum, a multi-faceted program strategy was developed at the Art Institute of Chicago to engage the public with the intersections between art, conservation, and science. Supported by the Samuel H. Kress and National Science foundations, and building on past outreach efforts and trends in the broader field, the initiative has led to the development of case studies and evaluation tools to assess the impact of sharing conservation and science narratives with art museum visitors. The development of these case studies emphasizes sustained institutional and cross-departmental efforts, while the visitor research outcomes illuminate the public value of conservation and science outreach.

### **CONSERVATION AND SCIENCE OUTREACH EFFORTS AT THE ART INSTITUTE OF CHICAGO**

Few foundational texts concerning the theoretical and measurable impacts of conservation and science outreach exist (Williams 2013). Most literature about conservation outreach includes in-depth examinations of singular case studies and highlights the perspectives of conservators (Hirsch and Silverman 2000, Brajer 2008, Lithgow 2012, Chitty 2016). Surveying the work of art museums in this area reveals a few key trends that have emerged over the last couple of decades: 1) that art museums have piloted a number of initiatives connecting the public with conservation through diverse modes of engagement, from open-air conservation studios and exhibitions to collection care clinics for visitors’ own personal belongings (Williams 2013); 2) in the United Kingdom and Europe, conversations about the relationship between public awareness and the value of cultural heritage conservation are far more advanced than public awareness of the values and issues involved with art conservation in the United States (Jones and Holden 2008); and 3) visitor interest in the behind-the-scenes work of conservation has only grown, along with increased coverage by the media.<sup>1</sup> A 2017 article published by Florence Hallett in *Apollo* queried the media spotlight on conservation, posing the question: Is accessible conservation more than a PR trick? Hallett writes,



**Figure 1.** Screenshots of John Singer Sargent's digital label on an iPad (the landing and a content page are illustrated here): the narratives on the scientific discoveries related to John Singer Sargent's watercolors attracted over 12,000 among the 184,000 visitors to the exhibition

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. (Hallett 2017)

Although there is a danger in oversimplifying and commodifying conservation and science as buzzwords within the art museum, it was sensed that the value of sharing these stories with the public sparked not only immense interest but also deeper engagement with art objects in our collection and their makers.

To explore exactly how sharing conservation and science stories impacted our visitors, two key aspects missing from the wider body of literature and our own past outreach efforts were developed: robust visitor evaluation and a broader theoretical framework that could identify the larger values of outreach across individual case studies. Through interdepartmental collaboration between stakeholders from the Art Institute's Departments of Conservation and Science, Learning and Public Engagement, and Experience Design, two broad impacts of integrating art and science into the public face of an art museum were theorized: 1) that visitors will have an expanded set of perspectives and tools to engage with and see art anew; and 2) that visitors will more deeply value artworks as objects to be experienced in person and preserved for the future.

## EVALUATING OUR CASE STUDIES

To test our theories, a number of case studies were developed that spanned four areas of public engagement: display, digital experience, public programs, and programs designed for students. The first case study involved the development of an exhibition, *Conserving Photographs* (November 21, 2018–April 28, 2019), which strove to illuminate the relationship between conservation and the technical history of photographs. For the second case study, in-gallery digital labels displayed on iPads were developed to share three different stories: for a temporary exhibition, we developed narratives on the scientific discoveries related to John Singer Sargent's watercolors (Figure 1), while our permanent galleries featured the restoration of an early 20th-century carousel horse and a yearlong conservation treatment and material study of El Greco's *The Assumption of the Virgin* (1577–79). On May 2, 2019, an evening program, *Materials of the Medieval World*, featured pop-up talks and demonstrations by conservators, scientists, and educators, all aimed at activating medieval objects through their materials, techniques, and processes of production. This was the culminating event of a lecture series titled “Secrets of the Collection” that illuminated the composition, techniques of fabrication, and making of meaning for objects in the collection, as revealed through close observation and scientific examination typical of conservation research. Finally, a number of behind-the-scenes tours of the Art Institute's conservation facilities, combined with career panels, were hosted for K-12 students and youth groups. In the 2019 academic year, over 126 students participated in an Art + Science

Tour developed by educators at the Art Institute from a previous National Science Foundation grant. Since it first started being offered in 2015, over 1,079 students and their adult chaperones have now taken this tour.<sup>2</sup>

In evaluating our case studies, two well-established models of visitor research were drawn upon—the National Science Foundation’s framework for evaluating the impacts of informal science projects (Friedman 2008) and the standards and protocols for evaluating museum visitors used by the Smithsonian Institute’s Office of Policy and Analysis (Pekarik et al. 2014). Using these existing models, answers were sought to two key questions about our interconnected initiatives: What are the impacts of sharing conservation and science narratives with visitors? Which strategies were more or less effective? Data were collected and compared across all case studies in an effort to answer these questions, yielding an eventual evaluation sample size of 359 visitors (Table 1). To analyze the impacts across all case studies, we developed an activity that was used in each evaluation to establish a larger set of quantitative and qualitative data. The following intended impacts were proposed, which test whether or not sharing conservation and science narratives helps visitors to obtain: a new lens for engaging with art objects; a deeper understanding of art materials, techniques, and production processes; greater curiosity; a more deeply valued experience of seeing an object or work of art in person; a deeper sense of the value of preserving art objects; and greater reflection on the relationship between art and science.

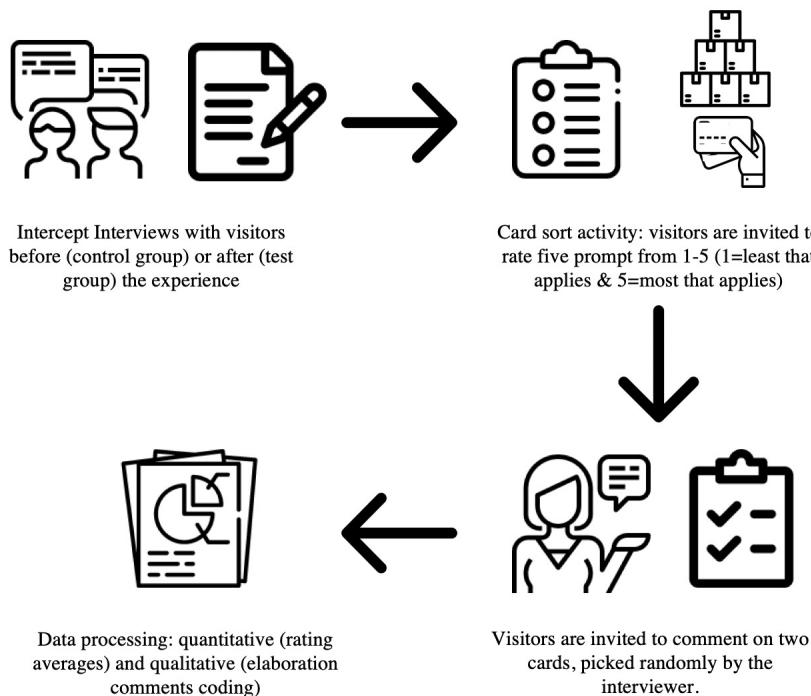
**Table 1.** Summary of case studies, evaluation, and sample size

Case study	Evaluation instruments	Control	Sample size
Student tours & youth groups	Written survey (33)	No control group	33
Programming	Written survey (50)	No control group	50
Digital experiences	Intercept interviews (56)	Control group (20)	76
Exhibitions & displays	Pre- & post-intercept interviews (100)	Pre-/post-control (100)	200
<b>Total</b>	<b>239</b>	<b>120</b>	<b>359</b>

These intended impacts were used in a card sorting activity (Figure 2), where visitors who engaged with our case studies rated the cards on a scale of 1–5 as to whether or not the display, digital platform, or program had any of these impacts. To account for self-response bias, visitors were asked to elaborate on their 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, which corresponded to AIC specific I, II, or III (Table 2).

**Table 2.** Rubric for coding visitor responses

Category	Category description
Unrelated:	Not related to the question asked
General:	Very vague, unspecific answers
Specific:	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 visitors’ experiences at the museum with example(s)
AIC Specific II:	Specific to visitors’ experience at the museum with elaborations or explanations
AIC Specific III:	Answers that are specific to visitors’ experiences at the museum and both reference something specific with example(s) and elaborations



**Figure 2.** Card sorting activity. Visitors who engaged with our case studies rated the cards on a scale of 1–5 as to whether or not the display, digital platform, or program had any of the impacts listed in Table 3

A control group was also created for some of the studies (whether this manifested as a separate control group or a pretest activity) so we could assess whether or not these impacts were already being achieved by the Art Institute without our focus on conservation and science. To allow for unintended outcomes not listed in our intended impact chart, intercept interviews included open-ended questions. Overall, this project consisted of front-end, formative, and summative evaluations.<sup>3</sup> Additional evaluation protocols were implemented for each individual case study; examples of these instruments included intercept interviews, focused observations, and written surveys.

## RESULTS AND KEY TAKEAWAYS

Analyzing the data across all of our case studies reveals that after engaging with one of our displays, digital interactives, or programs integrating conservation and science content, visitors developed a better understanding of the materials, techniques, and artists' processes, they had a deeper sense of the value of preserving art objects, and they were more likely to be curious about new things. Table 3 shows the average rating of each card for all visitors who engaged with one of our initiatives ( $n = 239$ ) and the average rating of each card for visitors in some of our comparative control groups ( $n = 120$ ). Figure 3 delves deeper into these results by focusing on the two cases where both a pre- and post-engagement evaluation was conducted. The graph clearly indicates increased awareness in visitor ratings between the control and test groups, especially for the categories "Materials and techniques," "Art & science," and "Value of preserving" (Table 3 and Figure 3).

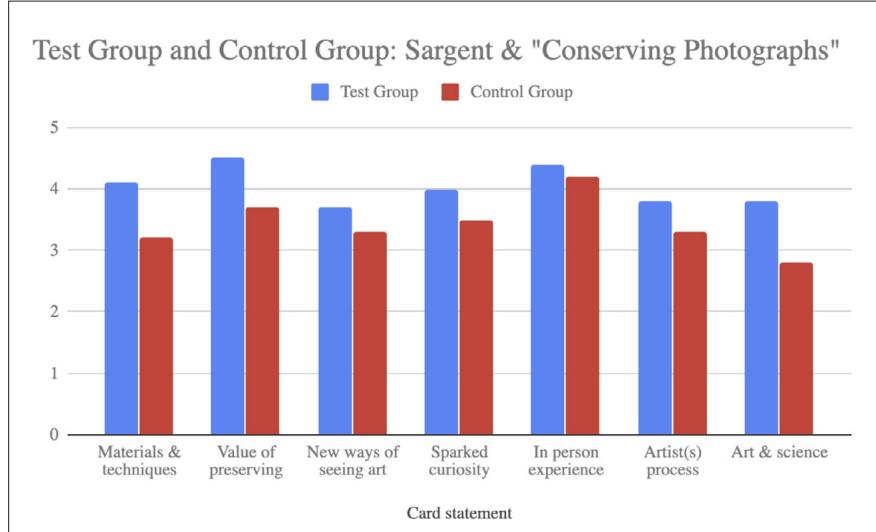
Visitors' elaborations on their card sorting ratings were also collated and analyzed according to their specificity. Overall, 156 responses in the

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**Table 3.** Summary of visitor ratings (average) in the card sorting activity highlighting a shift in perception. Test: *Conserving Photographs* exhibition; Sargent, Carousel Horse, El Greco Digital Labels (239) / Control: *Conserving Photographs* exhibition; Sargent Digital Label (120)

Card statement	Materials & techniques	Value of preserving	New ways of seeing art	Sparked curiosity	In-person experience	Artist(s) process	Art & science
Test Group	4.1	4.4	3.8	4.1	4.4	3.9	3.8
Control Group	3.2	3.7	3.3	3.5	4.2	3.3	2.8
Change in average	+0.9	+0.7	+0.5	+0.6	+0.2	+0.6	+1

**Figure 3.** Graph indicating the differences in visitor ratings between the control and test groups for the *Conserving Photographs* exhibition and John Singer Sargent's digital label, for which both a control and test group were evaluated

test group were analyzed; only exhibition and digital displays included elaborations on card sorting.

For example, visitors in both the test and control groups were able to give specific and museum-specific answers when asked to elaborate on how their visit to the museum or engagement reinforced the value of seeing art in person (Table 4). Interestingly, from the card sorting ratings—the rating of the value of the in-person experience of seeing art only increased by

**Table 4.** Deeper evaluation of the impact of the case studies on visitors' perceptions analyzed based on the rubric of Table 1, including elaborations on card sorting for the test groups of the *Conserving Photographs* exhibition and digital label (DL) evaluations (Sargent, El Greco, and Carousel Horse). Visitors were asked to elaborate on two or three of their highest rated cards

Group Case/No. answers	Unrelated	General	Specific	AIC Specific I	AIC Specific II	AIC Specific III	AIC Specific [cumulative I-III]
Sargent DL (46)	0	5	6	8	10	17	35
Carousel DL (50)	0	10	5	11	15	9	35
El Greco DL (21)	0	5	4	3	6	3	12
<i>Conserving Photographs</i> (211)	4	23	15	53	49	67	169
<b>Total (328)</b>	<b>4</b>	<b>43</b>	<b>30</b>	<b>75</b>	<b>80</b>	<b>96</b>	<b>251</b>
<b>Total %</b>	<b>1.22</b>	<b>13.11</b>	<b>9.15</b>	<b>22.87</b>	<b>24.39</b>	<b>29.27</b>	<b>76.52</b>

0.2 between the control and test group—it was clear that the Art Institute already reinforces this value without the need for 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 the materials, techniques, and processes, as well as why they valued the preservation of art objects, which were two of our highest ratings by card sorting. This is an extraordinary result.

For our exhibition *Conserving Photographs*, we conducted intercept interviews. A control group was established for comparison: visitors were intercepted before walking through the exhibition to establish this group. The “test group” involved the same visitors being interviewed after walking through the exhibition. Visitors were asked a general question to gauge their perceptions about conservation prior to and after spending time in the exhibition, and all the visitors were also asked to participate in the card sorting activity both before and after. By cataloguing visitors’ responses into categories of specificity, it became clear how the exhibition prompted visitors to give much more in-depth answers in response to understanding materials and techniques. Prior to walking through the exhibition, about 50% of visitors’ comments were general when asked to elaborate on why they rated the card “I have a deeper understanding of the materials and techniques used to create art” highly. About 96% of responses after walking through the exhibition were specific to the exhibition and about 41% of those specific responses gave examples and elaborated or explained beyond just giving examples, a deeper level of comprehension that visitors did not express in the pre-interviews (Table 5).

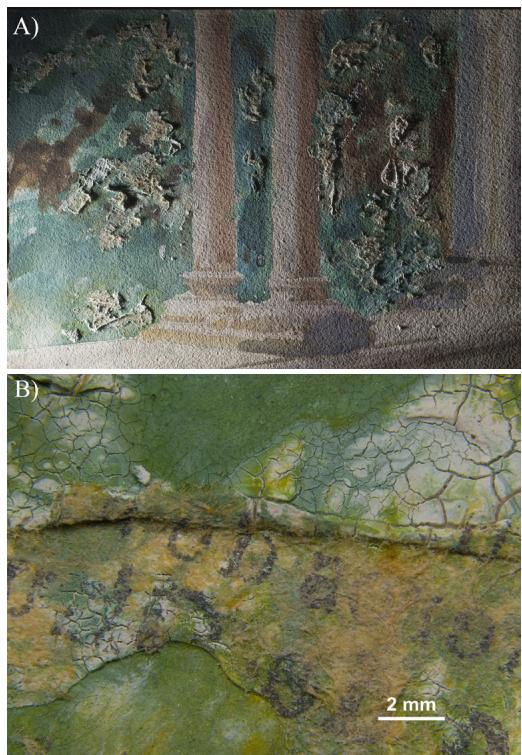
**Table 5.** Specific results from the evaluation of the exhibition *Conserving Photographs* on the indicator “I have a deeper understanding of the materials and techniques used to create art”. Only visitors who rated this card highly were asked to elaborate

Group	Unrelated	General	Specific	AIC Specific I	AIC Specific II	AIC Specific III	AIC Specific [cumulative I-III]
Control no.	0	7	2	5	0	0	5
Control percent	0%	50%	14%	36%	0 %	0 %	36%
Test no.	1	1	0	15	10	19	44
Test percent	2%	2%	0%	33%	22%	41%	96%

For instance, one visitor made many specific references to objects from the exhibition and explained why they imparted a deeper understanding of the materials and techniques used to both create and conserve photographs:

Instant photography, the plaques talked about how there are so many layers of an instant photo that you can’t do much about damage; then the two violins, you could really see the difference between how two different types of photos age over time; particular techniques caused particular types of damage like how vulnerable color dyes are to lights.

The differences in average rating by card sorting between the test and control groups indicate that the second greatest variance between the two groups came from the rating of the materials and techniques card, with visitors expressing a much deeper understanding of the material and immaterial aspects of making objects.



**Figure 4.** John Singer Sargent. *Tarragona Terrace and Garden*, ca. 1908. Watercolor and opaque watercolor with printed paper fragments over traces of graphite on ivory wove paper; 30.5 × 45.9 cm (12 × 18 1/16 in.). The Art Institute of Chicago, Anonymous loan, 11.9.1989. a) raking-light detail emphasizing the dimensionality of the zinc white impasto with embedded newspaper fragments in the upper left quadrant of the work; b) photomicrograph of one of the fragments. Photo: Mary Broadway

The greatest difference in average rating by card sorting related to the statement “I am thinking more deeply about the relationship between art and science.” Although visitors who engaged with the case studies rated this card much higher than the control group, it was rated an average of 3.95 for this exhibition, compared, for example, to a score of 4.6 attributed to “value of preserving”. Analyzing the visitor comments also indicates that the test group tended to give more general answers when asked to elaborate on the statement. These findings suggest that our case studies did not provoke visitors to think about this relationship in deep or compelling ways. They also indicate that connections between art and science should not be facile or only targeted at understanding art objects. As future case studies are created, these results have taught us to question how scientific information can be better formulated to help visitors create deeper connections between the disciplines of art and science when appropriate or relevant.

Sometimes, the results between case studies diverged or illustrated an interesting finding specific to the content or method of engagement. Unexpectedly, some of our case studies were found to elicit a deeper, social-emotional response to objects and artists. For example, when evaluating our digital interactives focusing on John Singer Sargent’s working process, about 50%, or half, of all visitors who used the interactive were more likely to talk about or model empathy, make connections to their own lives, and discuss how using this interpretive tool brought Sargent’s painting process to life. Many visitors were struck by the story illustrated in the digital label: the unexpected newspaper fragments that became stuck to his watercolor *Tarragona Terrace and Garden* (ca. 1908) while painting outdoors, and the possible consequence of interleaving wet watercolors with newspaper to facilitate carrying the finished works with him (Figure 4) (Broadway et al. 2018).

To complement the quantitative data captured in Figure 3, it is interesting to note here some of the more salient visitor impressions and quotes:

... [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.

[This digital interactive] makes the art more real world. There’s a humanity to carrying your artwork around. [You] can actually picture him working; [you] can have greater empathy with his life.

That he took an umbrella, a chair, and his paints, and decided what to do, an island unto himself, it’s not spontaneous exactly but much more casual than I imagined ... I imagined something fancier with assistants helping him ... Makes [the experience] more intimate, personal, and connected, connected to how he was able to make it all come alive: from setting himself up, to using newspaper between his paintings to transport [them].

These findings suggest the potential of conservation and science stories to foreground empathy between visitors, objects, and artists. Digital



**Figure 5.** Interactive evaluation station developed for the “Secrets of the Collection: Materials of the Medieval World” event

platforms might allow for such deep-dive and socioemotional connection because they provide space for this kind of narrative not always possible in labels on the walls of an exhibition or gallery. Looking closely at an artist’s process through the lenses of conservation and science can give visitors a deeper understanding of an artist’s life and creative processes. Analogically, the same deep emotional connections between making and meaning were activated during our live event “Secrets of the Collection: Materials of the Medieval World.” During the program, conservators and scientists facilitated a number of talks (10), demonstrations, and interactive stations (3) about a wide range of materials in the medieval galleries, including arms and armor, embroidery, polychrome sculptures, frames, ceramics, and paintings. During the event, 486 engagements were recorded, 50 visitors interviewed for evaluation purposes, and a participatory, interactive evaluation station developed to solicit a creative response (Figure 5). 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. By asking visitors “What did you discover tonight?”, the station was designed to prompt visitors to reflect on what they discovered during the evening. In addition to pre-set answers based on the content goals of the conservation and science staff, there was space for open-ended answers. The highest rated statement of the evening was about curiosity, with visitors giving an average rating of 4.76 out of 5 to the question as to whether the evening program had made them curious about new things. The visitor comments also highlighted that understanding the material and technical properties of a work of art increased their appreciation of the object and the artist. In particular, visitors commented on how high-quality reconstructions of historical materials and techniques (tempera paintings and embroidery reconstructions had been commissioned for the evening) helped them understand the materials and techniques used to create medieval art:

Being able to see the [embroidery reconstruction] magnified helped me to see the techniques of “weaving” and understand how the artist considered the value of materials and visual impact.

## CONCLUSION

The results of this research provide a strong argument for integrating conservation and science outreach into the public-oriented institutional structures of art museums, as opposed to creating discrete or standalone endeavors.<sup>4</sup> Conservation and science outreach can have a significant impact on both visitors and museums—providing our audiences with new or deeper perspectives for understanding and valuing art objects; inspiring young people to consider careers in STEM subjects through the emotionally and intellectually engaging powers of art; and helping transform the museum into a plurivocal space of inquiry.

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## NOTES

- <sup>1</sup> Recent examples are the extensive media coverage of the Rijksmuseum's scientific analysis and conservation of Rembrandt's *The Night Watch*. See Nina Siegel, "Rembrandt's Night Watch to Undergo Years of Restoration," *New York Times*, October 16, 2018, and Geraldine Fabrikant, "Preserving the Past for Museum Visitors of the Future," *New York Times*, October 23, 2019.
- <sup>2</sup> An Art + Science curriculum resource for middle school teachers was developed thanks to NSF grant DMR-1241667. The resource is available on the Art Institute of Chicago's website: [www.artic.edu/collection/resources/educator-resources/7-art-science](http://www.artic.edu/collection/resources/educator-resources/7-art-science)
- <sup>3</sup> The W.K. Kellogg Foundation's *Logic Model Development Guide* was used as an aid to develop overarching evaluation questions. See chart on p. 43 at [www.btop.org/sites/default/files/public/W.K.%20Kellogg%20LogicModel.pdf](http://www.btop.org/sites/default/files/public/W.K.%20Kellogg%20LogicModel.pdf)
- <sup>4</sup> To further expand the reach of the initiative, an Art+Science toolkit is freely available for download on the Art Institute's website ([www.artic.edu/about-us/departments/conservation-and-science-2](http://www.artic.edu/about-us/departments/conservation-and-science-2)). The link to the PDF is under Resources/Intersections of Art and Science and the toolkit can be adapted by other institutions to their own needs.

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