

Equitable Access: Leveraging Multi-sensory Strategies to Engage and Empower Museum Learners of Diverse Abilities

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Introduction

It is an ongoing imperative among museums and cultural organisations to synchronise with and sometimes spearhead changes in the museum-going audience, their expectations, and people's learning strategies. The modern museum learner anticipates an experience beyond the unilateral approach of viewing objects through glass. The imperative of adaptation is no less crucial among museums housing collections of antiquities. The city of Chicago, Illinois, is generously positioned with three major museum collections of Mediterranean and Near Eastern antiquities, at the University of Chicago's Oriental Institute, the Field Museum of Natural History, and the Art Institute of Chicago. These collections are popular attractions and focal points for learning and interpretation among scholars and visitors of all ages and all learning strategies. At the annual CIPEG conference on 7 September 2017, these three institutions co-presented on varied approaches that help empower museum visitors with and without disabilities to access, learn about, and interpret antiquities. This paper discusses the approaches taken by the Art Institute, and by the Oriental Institute.

The Art Institute of Chicago

In support of equitable access to the museum and its collection, the Art Institute of Chicago offers multiple avenues for engagement, learning, and cultural enrichment for visitors with disabilities. Within these opportunities, individuals who are visually impaired may take advantage of the complimentary *Tours with Sighted Guides* programme, while people living with Alzheimer's disease and other forms of dementia may engage in therapeutic wellness and creativity in the museum's *Art in the Moment* programme. Audiences with impaired vision and dementia, however, call attention to the challenges museums face in offering equitable access for diverse cultural consumers of the 21st century. In a largely hands-off environment where object preservation is of paramount importance, how can museums help make objects from far-flung, unfamiliar, ancient worlds now encased behind glass accessible, understandable, and meaningful to museum visitors, for whom sight may not be the most viable avenue of communication?

“Maybe I'm not an artist or artistically inclined but touching the piece wakes something up inside of you.” – Hands-on tour participant with low vision

In 2013, the Art Institute of Chicago received a *Sparks! Ignition Grant* from the Institute of Museum and Library Services to explore the question: “Can cutting edge technology such as 3D printing be used to encourage a deeper, more meaningful, engagement with museum collections?” This exceptional opportunity brought together the collaborative efforts of the museum's curators, educators, technologists, and artists from the School of the Art Institute of Chicago. During the year-and-a-half-long grant-funded project, the Art Institute explored different aspects of 3D scanning, modelling, and printing in a variety of programmes for multiple audiences, including children, teens, teachers,

families, and adults. For adult audiences, the scope involved exploring the efficacy of 3D-printed replicas as a means to provide a multi-sensory experience that would engage and empower the museum's existing audience with visual impairment and dementia (Fig. 1).

“The replica is our way of getting through the glass and 'seeing' it.”

Early in the conceptualisation phase of the grant's adult programme, dubbed *Hands on with 3D Printing*, it was decided to select works of art that could be easily replicated at the same size as their originals. While one can quite easily scale up or scale down the print of a 3D model, it was felt that an alteration of scale would artificially influence one's perception and impression of the original works of art. Additionally, in an effort to produce a cohesive theme for the programme, the selected works of art were all antiquities (the author and project leader's academic background in antiquities may also have been a factor in this selection of art works). Conveniently, all the selected works also reside on one level of the multi-story Art Institute. As with most museum gallery programmes, practical considerations such as proximity and audience mobility were taken into account. Finally, and perhaps most critically, all the works selected for reproduction originally served functional purposes that involved being touched or manipulated in some manner by their original owners. The artists who moulded and sculpted these handheld items might therefore have imbued a meaningful tactile aesthetic into the objects, which could transfer to the experience of the programme participants holding the 3D-printed replicas. For example, while examining the museum's 1st millennium BC Jomon-period ceramic dogu figurines upon their acquisition into the collection, the Art Institute's curator of Japanese art, Dr Janice Katz, commented of them: “They just feel right in the palm of your hand” (Fig. 2). In addition to the Japanese figures (2009.628, 2010.292, and 2010.293), the objects included ancient Greek rhyton drinking vessels in the shapes of sheep (1986.883) and donkey (1905.345) heads, a 2nd century Gandharan Buddhist stupa reliquary (2006.185), a 13th/14th century Colombian whistle (1986.1083), and a 5th century BC Chinese bronze suspension bell (1938.1335).

“I might call someone when I get home; I actually touched a replica of a piece from China. That excites me.” –Tour Participant

Uniquely, the Chinese bell was not reproduced as a 3D-printed model but was cast in bronze by an Art Institute volunteer inspired by the original and given to the museum for use as a teaching aid (Fig. 3). This wild card did not prove to be a distracting element, and the bell has consistently been one of the more popular stops on the tours. The difference of material between the bronze bell and plastic 3D prints opened the discussion of materiality and how the predominately ceramic originals may feel different from or similar to their plastic replicas, whether in texture, temperature, or weight. The bell reproduction was also the singular object produced not at the same size as the original. The difference in size between the original and reproduction bells invited lively conversations about musical tone, function, and contemporary cultural associations with bells.

During the course of the programme, participants and facilitators visited each tour stop and handled the 3D-printed replica objects while viewing (where possible), discussing, and learning about the original objects. The pedagogical methodology utilised with both audiences embraced discovery and interpretation through open-ended questions, while offering factual content as appropriate. In the case of the *Art in the Moment* programme, serving individuals with dementia, the works of art served more so as catalysts for socialisation and personal expression than as subjects for learning. In the case of the programme for individuals with blindness and low vision, the facilitators provided detailed descriptions of each object as the participants handled them (Fig. 4). By means of

manipulating the replicas, the participants also offered their own descriptions, observations, and interpretations of the works of art.¹

“It's helpful to have someone describe; I can get a picture in my head. But actually being able to touch and explore with fingers and get a feel for it—that's a better and more direct connection. I really appreciate having that replica to examine by myself instead of having it described, which is the only other way I, a blind person, can experience it.”

Musical instruments—the bell and whistle—also warranted the inclusion of sounds and music, incorporating yet another sensory component in the tours. At these points along the tours, the facilitators played related musical recordings on an iPad for the participants, while inviting the participants to become musicians themselves through striking the bronze bell replica. Some participants pointed to the positive impact that the inclusion of the auditory component had on their appreciation and understanding of the works of art.

“Besides feeling it, hearing gave more details too; it was also very enriching, a deeper appreciation.” –Tour Participant

The project supported by the IMLS *Sparks! Ignition Grant* included a careful study and evaluation by an independent, professional evaluator. The project summary and evaluation report are available at <http://archive.artic.edu/museum3d/>.² Some key findings from the study demonstrate the following:

A multi-sensory approach promotes accessibility for multimodal learners

Relatively affordable and non-invasive accommodations promote an equitable environment for museum visitors with disabilities or different learning preferences.

Getting hands-on helps generate discussion about art and provokes dynamic interpretation

Through the manipulation of tangible replicas, participants with dementia demonstrated greater participation and interest in the activity and in the original works of art. Among individuals with visual impairment, tactile reproductions empower participants to make their own observations and provide their own interpretations.

“I liked the fact that we could have the representation in our hand, feel the detail and size. It was better than having someone describe it.”

“When something is described, you're taking someone else's impression/perspective. But if you give me the delicious pastry, then I can make my own decision about what it is.”

The audience is as interested in the technology of 3D printing as they are in the original work of art

With the current fascination for 3D printing technology, many participants in the programme were at least familiar with the term “3D printing” and eager to learn more about the process and closely examine the products. While it was not the intention of the programme, discussion frequently strayed into technical aspects of production, potential applications, and the future of the technology. In hindsight, the audience's interest in the technology should have been better anticipated. The facilitators were not always immediately able to address the technical aspects of the 3D printing process satisfactorily.

Relevance extends beyond targeted audience and programmes

The 3D-printed replicas produced for this singular experiment continue to enjoy a healthy vitality in the Art Institute on tours for the general public and docent-led student groups. This project is exemplary of the principle sometimes dubbed “the curb-cut effect,” where resources and accommodations intended for niche audiences invariably benefit the general population at large.³

Perhaps the greatest unintended beneficiaries of the project were the museum staff. The project was a fruitful collaboration among many departments and promoted new ways of thinking about and interacting with the collection and its installation. Opportunities for multi-sensory engagement have become increasingly present in the Art Institute's exhibitions. An additional collaboration among some of the same staff has since produced an exhibition of Japanese prints incorporating a touchable, laser-engraved replica of a 19th century carved woodblock (figures 5 and 6).

The results of this study demonstrate that tactile replicas can help make unfamiliar ancient artefacts encased behind glass accessible, understandable, and meaningful to all museum visitors. Patrons with sensory or cognitive impairment will also enjoy a more equitable museum experience through hands-on learning opportunities. New technologies, such as 3D printing and laser engraving, present relatively simple, inexpensive, and effective solutions for producing tactile replicas of museum objects.

When incorporated into exhibitions and educational programming, these affordable replicas lower the threshold for museum patrons with sensory or cognitive impairment to enjoy equal access, engagement, and learning. Visitors without sensory or cognitive impairment also benefit from opportunities for hands-on learning.

“There is nothing like standing in front of the original art, but the copies make it possible for people who can't see the original. Sometimes the relationship with the copy can be better than with the original.”

Access to 3D printing and laser engraving technology is increasingly available through community resources, such as libraries, maker labs, and hacker spaces. Online resources such as Thingiverse.com and Sketchfab.com maintain substantial user-generated 3D model archives available under a Creative Commons license. These archives include models of ancient and modern works of art from notable museums around the world, which organisations and individuals are welcome to download and print. Such resources enable educational and cultural institutions to bypass the scanning and modelling phase of the process, which are generally the most costly and time-consuming aspects of creating 3D-printed replicas. Although downloaded models may not necessarily precisely replicate objects in one's own collection, they may nevertheless serve as helpful tactile didactic aids. Among the 3D prints housed in the Art Institute's Department of Learning and Public Engagement, for example, is a very useful *kylix* cup developed by West Chester University of Pennsylvania (see Heather F. Sharpe and Andrew Snyder, *Experimental Archaeology with the Kylix: Drinking and Playing Kottabos* <<http://www.academia.edu/10182062>>) and Rodin sculptures scanned from casts not in the Art Institute's collection (figure 7).

The Oriental Institute

The Oriental Institute Museum has a strong history of public programming, beginning with the establishment of a volunteer programme in 1966. In 2016, the Public Education and Volunteer Services Department developed two accessibility programmes, Multi-Sensory Tours and Verbal Imaging Tours. These programmes primarily serve people who are visually

impaired, but participants have included many other visitors as well. After a year of offering these programmes, we have seen the value of offering touch-focused accessibility programmes for all visitors, both with and without disabilities, and we are excited to continue to develop and improve our offerings.

Access programmes had been discussed long before 2016, but finding funding, staffing, and materials was a challenge. Though the programme needed to be self-sustaining, we were determined to offer it for free, in order to ensure access for as many visitors as possible. We thus explored the resources already in our education collection.

Object replicas play an important role in the Oriental Institute's youth and family programmes, so the museum already had a wide variety of resources on hand. To select objects for our access programmes, we sought pieces that had good tactile quality—pieces of diverse textures, that were meant to be held in the hand, or that had an interesting form. We also prioritised objects that were general enough to be of use in many different contexts, and that related to our permanent collection; this would allow us to incorporate these replicas into a variety of multi-sensory educational programmes. We wanted the replicas not only to provide a palpable sensory connection with the material culture of the ancient Near East, but also to be representative of our holdings.

After assessing our resources, we reached out to other institutions with accessibility programmes to learn from their experiences. We collected information from the Milwaukee Public Museum, the Frank Lloyd Wright Trust, the Art Institute of Chicago, and others. They shared information on their offerings and gave advice on practical logistical information, such as the ideal length of tours. After collecting this information, we turned to those we hoped to serve: people who are blind or have low vision.

To develop high-quality programming, we opened a dialogue with several organisations serving our target communities. We worked with a writer from the Frank Lloyd Wright Trust who is blind, and used her advice to develop effective language for communicating visual information. We worked with Friedman Place Residences and the Barrington Council on Aging to source helpful information on programming for individuals with disabilities. We also worked with Bill Green at the Blind Services Association, who was instrumental in helping develop and test our programmes.

Cultural institutions hoping to initiate access programmes will find a wealth of helpful resources and guidelines online. The Chicago Cultural Accessibility Consortium provides many valuable resources on working with people who have disabilities. We consulted Kansas University's Research and Training Center on Independent Living's "Guidelines on How to Write & Report About People with Disabilities."⁴ We also made use of Art Beyond Sight's resources on giving Verbal Imaging Tours, and found many helpful examples of the tours on YouTube.⁵

After a period of information gathering, we decided on two types of programmes: Multi-Sensory Tours, and Verbal Imaging Tours. Multi-Sensory Tours would focus on engaging multiple senses in the exploration of a specific topic, such as mummification, senses in archaeology, or food and drink. An expert in a particular field would guide visitors through visual descriptions, tactile experiences, smells, and sounds to create a rich sense of the material culture of the ancient Near East. For the Verbal Imaging Tours, docents would lead groups around the galleries, covering highlights of our collections, as is done in our usual tours. Artefact replicas would supplement rich verbal descriptions of the gallery spaces and objects.

With our material resources gathered and a clear vision of the types of programmes we wanted to offer, we began to staff them. For the Multi-Sensory Tours, we worked with graduate students in the Near Eastern Languages and Civilizations Department, who would be able to give detailed information and present original research to visitors. For the Verbal Imaging Tours, we identified docents who were interested in learning new tour techniques and developing this programme with us. We held several training sessions focusing on verbal description, and the docents practised giving their tours to each other. In conjunction with the tours, we developed a replica loan box, from which docents could check out objects to use during their tours. The replica loan box is composed of replicas that already existed in our collection, as well as replicas made for the Oriental Institute by one of the volunteer docents (Fig. 8).

After developing the programmes and training the docents and graduate students, we began offering tours to the Blind Services Association and members of the public and gathered their feedback (Fig. 9). After a Multi-Sensory Tour, “Archaeology in Five Senses,” we surveyed the group of 20 participants to discover what aspects of the tour were most useful to them and what needed improving. Approximately 58% of respondents (11 of 19; one participant did not record a response) indicated that the “unique experience of touching the artefact replicas” was the most enjoyable part of the tour, and many of the additional comments reiterated the importance of this experience. Suggestions for future tours centred around having smaller groups, so that participants would have more opportunities to touch the replicas (Fig. 10). While engaging the other senses was of value, and a few people indicated that they wanted to see more use of taste and smell, touch was by far the most important aspect.

The first Verbal Imaging Tour was piloted with a group of students from the Blind Services Association. While the docents had practised presenting to each other, this was the first time they engaged with a group of students who were blind or had low vision. Each docent presented one gallery, using visual description to describe and analyse artefacts, and to paint a picture of the museum space and the way the group moved through it. Presentations were supplemented by object replicas, some of which were replicas of artefacts discussed, while others were used to show the texture or shape of another object (Fig. 11). This tour showed the importance of a clear, organised description, and of using one replica at a time to illustrate the artefacts. Although we did not survey the students, they wrote us thank-you letters, and indicated that they had a positive learning experience and greatly enjoyed handling the object replicas.

In total, we were able to offer four Verbal Imaging Tours and six Multi-Sensory Tours throughout 2016 and in early 2017. Both were put on hold temporarily after staffing changes in the Education Department, but are set to resume in 2018. While there is still more to learn and improve in our offerings, we have had several realisations while offering these tours, both on the administrative side, and for the tours themselves.

Administratively, these tours presented a challenge, because they fell in between tours and programming, which are handled by two separate systems in the office; tours must be scheduled by a group in advance, while programmes run at set times and individuals register for them. We decided to treat them like programmes and make them publicly registerable events. Having regularly occurring programmes ensured their availability, but attracted larger numbers of visitors who were interested in general museum tours, not specifically in access programmes. Offering these as tours would have ensured that groups were able to access these tours when they wanted them, but could have prevented interested individuals from taking part, if they were not a member of a relevant organisation. For future tours, we will be experimenting with offering publicly registerable

Multi-Sensory Tours, allowing us to schedule our speakers far in advance, a necessity when working with graduate students or faculty. We will offer the Verbal Imaging Tours, run by docents, as private tours that groups can arrange with us. With this division, we hope to provide tours that are accessible to individuals and the public as well as specially arranged tours for groups of people who are blind or have low vision.

Another lesson learned dealt with the content of the programmes. The Multi-Sensory Tours were generally content-heavy. The focus on in-depth information was valuable for individuals who had a good knowledge base on the ancient Near East, but for some people, especially families, having objects described and being able to touch was more important. Still, we were excited to be able to offer programmes at both levels. Those led by PhD candidates included their first-hand research, something unique that the Oriental Institute is able to offer to its visitors. The Verbal Imaging Tours, led by docents trained to engage with the public, highlighted the aspects of our collection of interest to more casual visitors.

Providing a variety of content was another challenge that we faced. Creating an entirely new tour on a new theme for each programme was unsustainable, because a great deal of research, development, and training went into each tour. While we offered different Multi-Sensory Tours on themes such as “Archaeology in Five Senses” and “Mummification Workshop,” and a Verbal Imaging Tour of highlights of the collection, there were still guests who had repeat experiences. Although we did not offer new content each time, the experience was valuable for returning visitors. They were able to get something new out of the experience, and were interested in returning, even if the programme offering was the same on paper.

Lastly, and perhaps most significantly, this experience highlighted the importance of collaboration. For the success of these programmes, it was necessary to build relationships with community organisations. They provided guidance about their needs, their members’ interests, and how we could support their efforts. By engaging with communities, we intended to serve, we were able to develop effective programming and build an audience.

During 2018, we hope to revive these programmes and continue to expand them to serve audiences who have traditionally been on the periphery of museum programming. With a year of experience, we have a solid foundation of content and programme staff. Our experience has shown that there is a market for these programmes, both among people who are blind or have low vision, and those who are not. Offering programmes that make use of object replicas increases accessibility, and makes our programmes more compelling and informative for all visitors.



Fig. 1: People with visual impairments in the Art Institute of Chicago discuss original works of art while manipulating 3D-printed replicas. Photo: The Art Institute of Chicago. Reproduced with permission.



Fig. 2: 3D-printed replicas of Japanese Jomon-era dogu figures. Photo: Lucas Livingston. Reproduced with permission.



Fig. 3: Modern bronze suspension bell inspired by examples from ancient China. Photo: Lucas Livingston. Reproduced with permission.



Fig. 4: Tour participants explore works of art through multi-sensory engagement. Photo: The Art Institute of Chicago. Reproduced with permission.



*Fig. 5: Visitors touch a laser-engraved replica of a 19th century woodblock in the exhibition *The Making of a Woodblock Print* (Art Institute of Chicago, February 4-April 16, 2017). Photo: The Art Institute of Chicago. Reproduced with permission.*



Fig. 6: Detail of a laser-engraved replica of a 19th century Japanese woodblock in the Art Institute of Chicago. Photo: Lucas Livingston. Reproduced with permission.



Fig. 7: 3D-printed replica of a Greek kylix cup set against ancient examples in the Art Institute of Chicago. Photo: Lucas Livingston. Reproduced with permission.



Fig. 8: Replica loan box of the Oriental Institute. Photo: Peyton Walker. Reproduced with permission.



Fig. 9: Tour participants who are visually impaired examine a replica of a mummy mask during a mummification Multi-Sensory Tour. Photo: Carol Ng-He. Reproduced with permission.



Fig. 10: Tour participants who are visually impaired touch a replica of a Lamassu on a Verbal Imaging Tour. Photo: David Turner. Reproduced with permission.



Fig. 11: Tour participants from the Blind Services Association touch a replica of a bevel-rimmed bowl. Photo: Calgary Haines-Trautman. Reproduced with permission.

¹ For more information, see Lucas Livingston, Gerri Fiterman Persin, and Deborah Del Signore, 'Art in the Moment: Evaluating a Therapeutic Wellness Program for People with Dementia and their Care Partners', *Journal of Museum Education* 41:2 (2016), 100–109.

² Art Institute of Chicago, 'Final IMLS Evaluation Report (PDF)', *Museum3D: Experiments in Engaging Audiences Using 3-D Printing and Scanning* (December 18, 2014) <<http://archive.artic.edu/museum3d/museum3d.artic.edu/resources/planning-documents-2>> accessed 21.2.2018.

³ Angela Glover Blackwell, 'The Curb-Cut Effect', *Stanford Social Innovation Review* (Winter 2017) <https://ssir.org/articles/entry/the_curb_cut_effect> accessed 20.12.2017.

⁴ *Guidelines, 8th Edition* <<https://rtcil.drupal.ku.edu/sites/rtcil.drupal.ku.edu/files/images/galleries/Guidelines%20th%20edition.pdf>> accessed 16.02.2018.

⁵ *Art Beyond Sight Museum Education Institute* <<http://www.artbeyondsight.org/mei/>> accessed 16.02.2018.