



Museum 2 You: Accessible Exploration Through Immersive and Experiential Library Kits

Charlene Hardin¹

¹ San Jose State University, San Jose, CA, USA

² Scottsdale Public Library, Scottsdale, AZ, USA
charlene.hardin@sjsu.edu

Abstract. The Museum 2 You project is a programming initiative for the City of Scottsdale and the Scottsdale Public Library (SPL). The project addresses accessibility issues encountered by patrons in the Blind and Visually Impaired (BVI) community, as well as by those experiencing mobility challenges that may prevent them from attending the museum. The immersive kits produced for Museum 2 You bring museum collections directly to library patrons while increasing discoverability of the underutilized streaming resources. Created in partnership with Scottsdale McCormick-Stillman Railroad Park Museum (MSRRP) and Western Spirit: Scottsdale's Museum of the West (WSM), these kits combine photogrammetry, AI-assisted design of 3D-printed tactile replicas, QR cubes linking to streaming content, scent boxes, and braille materials to create multisensory learning experiences. In this presentation, the development process for the pilot Museum 2 You program, from experience ideation and curation with community partners to formal addition to the Scottsdale Public Library's catalog in January 2026, is documented. The kits highlight the capacity of emerging technologies to help cultural institutions become truly accessible community resources. The presentation puts forward a replicable framework for accessible immersive kit development and identifies key barriers and solutions for scaling this model across library and museum systems.

Keywords: Accessibility, AI-Assisted Design, 3D Printing, Immersive Library Programming, Digital Literacy.

1 Introduction

Traditional museum experiences often present barriers for individuals with visual impairments and mobility limitations. Physical barriers include difficulty traveling to museum sites, navigating public spaces, and accessing exhibits designed primarily for sighted visitors. Existing accommodations often treat accessibility as an afterthought rather than a foundational design principle [1]. For adults in care facilities or with limited mobility, museum collections remain largely inaccessible regardless of interest or educational value.

In addition to challenges arising from accessibility concerns, libraries often struggle to extend beyond traditional book circulation or in-person events. Despite investment in digital collections and streaming resources, these resources remain underutilized. The challenge becomes: how can libraries leverage emerging technologies to create truly accessible cultural immersive experiences off-site while simultaneously increasing discoverability of existing digital resources? Approaching the topic from an immersive learning framework suggests that engagement necessitates the creation of presence through coordinated sensory inputs that guide learners through contextualized experiences, which is equally applicable to the exploratory learning and accessibility design for curated off-site museum encounters.

1.1 Gap

Current solutions for accessible museum experiences fall into two categories: physical accommodation at museum sites (audio guides, tactile tours) and digital offerings (virtual video tours, online collections). Physical accommodation still requires travel to the museum and often provides limited tactile engagement with replicas or

touchable exhibits. Digital solutions provide remote access but typically rely heavily on visual interfaces, offering minimal multi-sensory engagement.

Few models exist for bringing museum collections directly to patrons through library systems in formats designed from the ground up for accessibility. Existing “museum in a box programs” for schools focus primarily on K-12 education and rarely emphasize adult accessibility needs or integration with library digital resources. Research on digital storytelling and virtual museum experiences has largely overlooked older adults and disabled audiences as a primary design consideration [2].

1.2 Solution

The Museum 2 You project addresses these gaps through immersive kits that bring museum collections to library patrons while connecting them to items from the digital collection including streaming music, video guides, and the Scottsdale Heritage Collection available through the public catalog site. Created in partnership with Scottsdale McCormick-Stillman Railroad Park Museum and Western Spirit: Scottsdale’s Museum of the West, these kits combine multiple accessible elements created using emerging technologies (see Table 1).

Table 1. The following Table 1 provides a brief overview of Museum 2 You box contents and the respective technologies used to create them.

Table 1. Museum 2 You box contents.

Item type	Technology used	Box identity
3D-printed tactile replicas	Photogrammetry and AI-assisted design	MSRRP, WSM
3D-printed functional train	Bambu Labs Maker World creator BamBam Design	MSRRP
Braille materials	AI-assisted transcription, Romeo/Juliet Braille	MSRRP, WSM
QR Cubes	AI-assisted design, laser cutter/engraver	MSRRP, WSM
Scent boxes	Laser cutter/engraver	MSRRP, WSM
Audio	Playlists curated using Freegal streaming	MSRRP, WSM

The kits serve dual purposes: providing accessible museum experiences for patrons with disabilities while demonstrating library capacity to leverage emerging technologies increasingly found in library maker spaces (3D printing, photogrammetry, laser engraving, AI-assisted design) for community benefit. By integrating QR links to library streaming databases, the project addresses the persistent challenge of low discoverability for digital collections.

2 Product Description

The Museum 2 You kits consist of multiple coordinated elements designed to create multisensory experiences accessible to the broadest possible audience (see Fig. 1). These boxes focus on specific collections or themes related to their respective museum collections or themes.

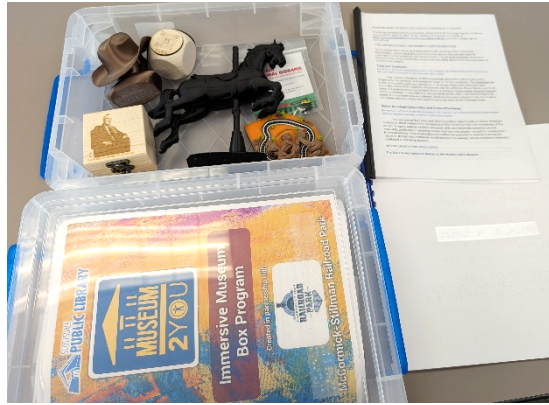


Fig. 1. Museum 2 You contents for MSRRP boxed kit including 3D-printed carousel horse generated from photograph.

2.1 Components

Components of each kit include tactile elements, informational materials presented as regular print and Braille guide, digital access points, and custom scent boxes laser engraved with images to match their contents. Scents were chosen to capture the essence of the theme: for WSM the box contained the smell of creosote bush, while the MSRRP box featuring the Pullman Presidential Car holds the smell of coffee. Each item also possesses a Braille label. All 3D models were generated using images taken of items or artifacts at the museum processed using a mix of free AI tools and Blender, except for the functional miniature gauge railroad diorama print file which SPL was granted permission to use for the project by the creator, BamBam Design [3]. The Western Spirit Museum Director of Education, Wade Weber, received permission from the Clymer Foundation to use two of John Ford Clymer's paintings in the kits. The two-dimensional paintings were then recreated as three-dimensional bas relief 3D prints to allow those with visual impairments to enjoy the artwork. High quality, laminated reproductions of the art were attached to the back of the bas relief prints, as well. The QR cubes were inspired by the work of the Maricopa County Library District's Sun City West Library which uses QR cubes as a means of providing quick access to library services. These items allow for a novel, tactile, and durable way to present users with links via tablets or mobile devices to curated lists relevant to thematic elements of the immersive museum themes.

2.2 Criteria for Inclusion

Component selection followed an accessibility-first design ethos informed by museum partners and experts to address criteria across multiple dimensions of immersive experience from sensory engagement to narrative context. Additionally, practical factors, such as keeping the box elements limited to easily reproduced, but durable 3D-printed or other items, ensured that the loss of any component could be easily rectified using in-house equipment such as 3D printers and laser-cutting equipment.

The multisensory approach draws on research demonstrating that sensory stimulation therapies improve cognitive function and reduce social isolation in older adults [4, 5], while inclusive design principles reliably enhance experiences for all users.

3 Development process

The development process involved significant technical as well as budgetary design challenges and required extensive work with various the City of Scottsdale departments beyond the library itself and community partnerships with museums interested in extending their collections beyond the standard physical visit.

3.1 Partnership Model

Museum 2 You began through outreach to local museums and cultural institutions for guidance and support. These included the Old Town Scottsdale Parada del Sol Rodeo Museum, the McCormick-Stillman Railroad Park Museum (MSRRP), the Arizona Museum of Natural History, and Western Spirit: Scottsdale's Museum of the West (WSM). While WSM and MSRRP ultimately contributed to the pilot project, the Arizona Museum of

Natural History staff provided helpful observations about their own museum boxes geared toward K-12 usage. Arizona Talking Book Library, the Foundation for Blind Children, Phoenix Public Library, and Maricopa County Library District's Sun City West Library staff assisted with information resources, Braille proof-reading for AI-transcriptions, Braille printing services, and additional information about the integration of QR cubes as digital access point. Partnering with enthusiastic local teams provided invaluable assistance in gathering materials, permissions, and validation of AI-generated outputs.

3.2 Technical and Material Challenges

Creating tactile replicas required a novel combination of multiple technologies. Photogrammetry apps such as Kiri Engine and Reality Scan were employed initially, with a plan to add the resulting scans to virtual environments. MiDaS AI was also initially used to create depth maps for import to Blender to create displacement maps. This method worked, but the most effective tool proved to be the MakerLab AI-enhanced tools accessible through Bambu Labs combined with refinements to the mesh in Blender before printing. Braille print outs required learning some Braille (through free online resources provided by the National Federation of the Blind) but primarily involved the use of free Braille Blaster transcription software which was proofread after print-out on Phoenix Public Library's Juliet Brailler by staff at the Foundation for Blind Children. The QR cubes and scent boxes were the least challenging, with results easily achieved using xTool and available images.

3.3 Iteration

The development process required multiple rounds of testing and refinement across components. Initial 3D prints from photogrammetry-generated models contained excessive artifacts requiring manual correction in Blender, while bas-relief depth settings needed calibration for each image type to create sufficient tactile differentiation. Later, AI-generated models based on multiple high-quality photographs proved less problematic and easier to correct in Blender modeling software. These tools were freely available through BambuLabs' MakerLab. Specifically, the Relief Sculpture Maker, Image to 3D Model, and Make My Statue were used. It must be noted that in each case some refinements of the mesh were required in Blender to attain a more accurate model. Each element went through revisions based on partner feedback and information provided by the Foundation for Blind Children. Calibration of the scent boxes to an ideal level of scent, as well as formatting and binding the Braille handouts proved challenging, but manageable. Some leakage of essential oils dissolved Braille labeling, leading to alternative placement on the box to avoid accidental contact with the oil. The Braille handouts, themselves, required spiral binding and careful consideration of page margins using Juliet Brailler.

4 Implementation and Impact

Following informal review by the Foundation for Blind Children in Phoenix, Arizona, the kits were iterated into Scottsdale Public Library's catalog in January 2026. The kits were promoted on the portion of the library website that promotes citizen science kits, free museum passes, board games, video games, seeds, and crafting kits [6].

4.1 Catalog Integration

SPL's Collections Management team finished documenting and tagging the kit materials for the Online Public Access Catalog (OPAC) including appropriate metadata and other descriptive information as well as the placement of physical identifiers (including external Braille labels) and barcodes. Where appropriate, digital items such as the photographs and videos used to create the bas reliefs were added to the Scottsdale Heritage Collection. Additionally, the curated Freegal playlists "Into the West" and "Tracks Through Time" were added to the SPL official playlists on the streaming service.

4.2 Patron Use and Early Feedback

Early circulation generated strong interest from caregivers seeking programming for elderly relatives and from patrons with visual impairments seeking novel take-home cultural experiences, though formal usage data collection is limited by the recent January 2026 implementation timeline. Informal feedback gathered through library staff interactions and checkout records indicates particular interest from assisted living facility activity directors seeking multisensory programming options and from individual patrons with visual impairments seeking

independent cultural exploration opportunities. Anecdotal reports from circulation staff (including informal feedback from the Arizona Talking Book Library staff and correspondence with the Foundation for Blind Children's community) indicate that patrons appreciate the tactile elements and express surprise at the quality and detail of 3D-printed replicas, with several patrons specifically requesting notification when additional kits become available. Kelly Pritts, Braille Program Coordinator, specifically had her adult students group explore the boxes with feedback that the students read the Braille pamphlet, finding it "very educational." She also stated that the consensus was that the students "loved them" with only potentially negative feedback relating to the scent boxes. Plans are in development to incorporate the kits into Memory Cafes which offer community members with Alzheimer's or dementia, in addition to their caregivers, the ability to participate in stimulating interactive activities that combat cognitive decline. Future assessment will employ structured feedback mechanisms including post-use surveys distributed at checkout and return, circulation analytics tracking repeat usage patterns and demographic data, and qualitative interviews with patrons and caregivers to systematically evaluate educational impact, accessibility effectiveness, and user satisfaction across different patron populations.

4.3 Scalability and Considerations for the Future

The Museum 2 You framework demonstrates a replicable model for libraries with access to maker space equipment, although barriers include equipment costs, staff technical expertise requirements, and partnership development capacity. Successful scaling depends on consistent and continuous efforts to build and maintain relationships with museums in addition to growing staff technical skills relevant to maker space equipment usage. Future areas for expansion include additional collections, incorporation of web-based virtual reality or augmented reality platforms and adapting the framework to diverse content types beyond museum artifacts and nonfiction to more imaginative or literary territory. Staff at MSRRP and WSM expressed a strong desire to recreate environments or experiences in virtual spaces. However, the addition of such elements will require buy-in from the IT department, which remained cautious regarding third party applications or potential user privacy concerns. Initial exploration of FrameVR as a potential platform included evaluation of SOC2 compliance status and configuration of settings to allow guest visitor access without requiring user account creation, minimizing data collection from library patrons. Despite these considerations, IT department concerns raised wider institutional liability questions: data privacy implications of third-party virtual reality platforms, user tracking within web-based VR environments, and content hosted outside library-controlled systems. These concerns reflect broader challenges libraries face when integrating emerging technologies that depend on external service providers, requiring careful evaluation of terms of service, data collection practices, and accessibility of platform privacy controls. Future implementations will need to balance the educational benefits of immersive virtual environments against institutional risk management and patron privacy protection, potentially requiring selection of privacy-focused platforms, the development of institutional hosting solutions, or hybrid approaches that prioritize physical components while offering optional digital enhancements. These activities may entail some level of staff supervision in the virtual environment, like moderation duties currently associated with video conferencing activities.

4.4 Limitations

Key limitations of the current implementation include the pilot scale (two museum partnerships, limited kit quantity producing two complete kits), the absence of longitudinal patron usage data due to recent launch, reliance on in-house makerspace equipment that may not be available to all library systems, and the time-intensive nature of photogrammetry processing and Braille transcription workflows. The ability to produce Braille handouts requires access to specialized printing equipment or services. The framework assumes access to museum partnerships willing to grant reproduction rights. All these factors may present challenges in communities without local cultural institutions or in contexts where museums are protective of intellectual property. Additionally, the multisensory approach, while beneficial for many users, may present challenges for patrons with scent sensitivities or allergies, requiring careful material selection and clear labeling of kit contents to ensure patron safety and comfort. Future efforts should address these concerns directly.

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