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Democratization of Heritage: Sensitive Inclusivity

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Abstract

The word "inclusivity" has generally been limited to very specific social aspects, such as gender, ethnic equality, or economic equity. However, one sector of the population is often left out of the discussion in museums and cultural activities: deaf and blind people. In Costa Rica, Law 7600 addresses freedom of access and movement for people with special needs, considering infrastructure dimensions and specifications. But when we talk about interaction with the environment, it is imperative to go beyond physical access, especially when we talk about democratizing heritage. Democratizing is not just about reaching remote places or improving physical access, but also about reaching people who feel excluded because of their health condition.

Subject Areas

Culture, Pedagogy

Keywords

Accessibility, Culture, Education, Governance, Museum

1. Introduction

In contemporary discourse regarding cultural management, the term "inclusion" has gained undeniable prominence. However, its practical application has tended towards homogenization, focusing disproportionately on gender and sexual diversity claims. While these struggles are legitimate and necessary, this narrow focus has inadvertently eclipsed other population sectors marginalized by equally insurmountable barriers: economic impediments and sensory disabilities [1]. The democratization of heritage cannot be considered complete if access to culture remains a class privilege or contingent upon normative physical capacity.

Individuals with visual and auditory impairments face systemic exclusion in museums and natural spaces, which are designed under the tyranny of "ocular-centrism" and standard verbal communication [2]. This exclusion is not merely a lack of physical access, but a denial of the right to aesthetic and cognitive experience [3]. Beyond sight and hearing, proprioception—the sense that informs the organism about muscle position and the ability to feel one's own body in space—emerges as a crucial axis of study for designing inclusive experiences [4]. The integration of proprioception allows the museum visit to cease being an act of passive observation and instead become a corporeal exploration of knowledge [5].

Recent literature suggests that the lack of accessibility is not technical, but conceptual. Authors such as Candlin [6] argue that the traditional museum disciplines the senses by prohibiting touch, which directly alienates the non-sighted population. Similarly, the management of natural parks often ignores the capacity for interpreting the environment through non-visual channels [7]. Neuroscience applied to education demonstrates that multisensory learning not only benefits persons with disabilities but also enriches retention and comprehension for all visitors [8]. Therefore, inclusion must not be a corrective appendage, but a reengineering of the heritage experience [9]. It is imperative to transition towards models that consider the economic barriers preventing visitation [10] and that simultaneously implement technologies and pedagogies validating alternative ways of perceiving the world.

The objective of this article is to establish a conceptual framework for "sensitive inclusivity" within the democratization of heritage, moving beyond mere physical access to encompass sensory and cognitive dimensions. By proposing this framework, the aim is to disambiguate the concept of inclusivity in the cultural context, emphasizing its application in the design of heritage experiences that are intrinsically accessible and enriching for people with diverse capabilities, particularly those with visual and auditory disabilities, and ultimately, for all audiences.

2. Methodology

For the preparation of this study, a systematic literature review was conducted:

2.1. Systematic Literature Review

A systematic literature review was conducted across academic databases including JSTOR, Scopus, and Google Scholar, as well as critical museology catalogs. The search focused on scientific articles, technical books, and monographs published between 1980 and 2025.

The search strings employed included combinations of the following key terms, utilizing Boolean operators (AND, OR):

- ("democratización del patrimonio" OR "heritage democratization") AND ("accesibilidad" OR "accessibility")
- ("inclusión de discapacidad" OR "disability inclusion") AND ("museo" OR "museums" OR "parque natural" OR "natural parks")

- ("inclusividad sensorial" OR "sensory inclusivity") AND ("discapacidad visual" OR "visual impairment" OR "discapacidad auditiva" OR "hearing impairment" OR "sordera" OR "deafness" OR "ceguera" OR "blindness")
- ("diseño universal" OR "universal design") AND ("cultura" OR "heritage")
- ("neurobiología" OR "neurobiology") AND ("aprendizaje multisensorial" OR "multisensory learning") AND ("museos" OR "museums")
- ("propiocepción" OR "proprioception") AND ("experiencia museística" OR "museum experience")

Inclusion Criteria:

- Articles addressing the inclusion of persons with sensory disabilities (visual and auditory) in cultural and natural heritage contexts (museums, parks, historic sites).
- Studies proposing or evaluating strategies, technologies, or pedagogies to improve sensory and cognitive accessibility.
- Documents discussing the concept of heritage democratization beyond physical barriers.
- Publications in English or Spanish.

Exclusion Criteria:

- Articles focused exclusively on architectural barriers or physical accessibility without sensory or cognitive components.
- Studies where the word "inclusivity" referred predominantly to themes of gender ideology, sexual diversity, ethnicity, or socioeconomics without addressing sensory disabilities as the primary focus of the study.
- Opinion pieces or editorials lacking clear empirical or theoretical support.
- Articles unrelated to heritage, culture, or formal education within these contexts.

Over 150 documents were initially identified. A two-phase selection process involved the review of titles and abstracts, followed by a full reading of potentially relevant articles. 35 publications were selected that directly addressed the needs of visually and hearing-impaired individuals in heritage spaces, prioritizing those offering practical solutions grounded in neuroscience or universal design. The selected documents were categorized into key thematic areas to ensure a multidisciplinary approach. The final selection prioritized the quantity and quality of proposed techniques for disability inclusion, provided they were executable and replicable in museum or park environments.

2.2. Case Analysis

The case analysis was conducted by reviewing concrete examples of the implementation of inclusive strategies identified in the literature. Although the reviewed literature includes multiple references to innovative practices in museums and parks globally, those illustrating the application of sensitive inclusivity principles were highlighted. These cases served to validate the feasibility and impact of the proposed strategies.

At the international level, examples analyzed included:

- Museo del Prado (Madrid, Spain): Known for its tactile exhibitions such as "Touching the Prado" (Hoy Toca El Prado), where 3D replicas of masterpieces allow visually impaired people to experience art through touch [11]. Its selection is justified by its status as a benchmark in integrating tactile experience into a classical art museum.
- Saguaro National Park (Arizona, USA): Features interpretive trails with tactile signage and sensory stations allowing exploration of local flora textures and scents [12]. It was selected for its focus on multisensory interpretation of natural heritage.
- The British Museum (London, UK): Offers "touch tours" and tactile replicas, as well as resources in British Sign Language (BSL) for specific collections [13]. Its relevance lies in its multidisciplinary approach to sensory inclusion.

To connect the recommendations with the national context, specific examples from Costa Rica are included which, although potentially requiring further development, illustrate the application potential of "sensitive inclusivity":

- Jade and Pre-Columbian Culture Museum (San José, Costa Rica): Although the implementation of tactile replicas is not widespread, the Jade Museum, with its rich collections of artifacts with distinctive shapes, offers exceptional potential to develop tactile exhibitions allowing direct exploration of the morphology and texture of Pre-Columbian pieces through 3D printing or artisanal replication. This museum is selected for the richness of its three-dimensional pieces, ideal for haptic interpretation.
- Carara National Park (Puntarenas, Costa Rica): Famous for its biodiversity, it could develop an accessible sensory trail incorporating interpretation stations for non-stinging plant textures, characteristic scents of fauna (through controlled olfactory stations), and audio guides with evocative descriptions of the jungle's soundscape. It is justified by being a park with high visitation and a diverse natural environment that would allow for multisensory experimentation.

The selected documents were categorized into key thematic areas to ensure a multidisciplinary approach. The categories and main references reviewed are detailed below:

2.2.1. Exhibition Proposals for the Visually Impaired and Replicas

Analysis of success cases regarding the use of haptic models, 3D printing, and "touch to see" strategies [11]-[16].

2.2.2. Neurobiology, Sensory Stimulation, and Proprioception

Studies on how the brain processes alternative sensory information and its application in the design of learning environments [12] [17]-[20].

2.2.3. Strategies for the Deaf and Sign Languages (LESCO/ASL)

Research on Deaf culture, the use of vibrations, and technological integration for interpretation in museums [21]-[25].

2.2.4. Immersive Exhibitions and Universal Design

Review of museographic trends integrating technology and atmosphere to create total experiences [26]-[35].

3. Results

Based on the literature review and case analysis, the following sensory inclusion strategies are proposed as synthesized findings, divided into three fundamental axes, each supported by specific evidence:

3.1. Strategies for the Visually Impaired

Inclusion for persons with visual impairments has surpassed the mere translation of texts into Braille, focusing on a haptic and olfactory approach.

- **Use of exact replicas and "tactile sculptures":** The use of exact replicas of archaeological artifacts and natural history specimens, created through scanning and 3D printing or traditional sculpture, is fundamental [14] [16]. These "tactile sculptures" allow the non-sighted user to comprehend dimensions, shapes, and textures that verbal description cannot convey [13]. (Evidence well established: multiple studies [13] [16] [18]).
- **Interpretation of natural texture in parks:** In the context of national parks, the strategy expands towards the interpretation of natural textures. Trails with podotactile guidance and exploration stations permitting the touching of bark, rocks, and plants (non-urticating) are essential [12]. (Illustrative evidence: a case study [12]).
- **Controlled olfactory stations:** Furthermore, the incorporation of controlled olfactory stations allows for the association of specific scents (wet earth, endemic flowers, animal musk) with educational information, creating a lasting sensory memory [12]. (Illustrative evidence: a case study [12]).
- **Ergonomic Braille signage and descriptive audio guides:** Braille signage must be ergonomic, located at accessible heights, and accompanied by descriptive audio guides that narrate not only data but atmospheres [15]. (Evidence well established: multiple studies/arguments [15] [16]).
- **Multimodal interaction and NFC:** To overcome the limitations of static Braille, the integration of "audio beacons" or soft auditory stimuli that trigger when a visitor approaches a label, guiding the hand to the Braille text, is proposed. Hybrid systems combining Braille with NFC (Near Field Communication) technology allow visitors to tap their smartphones against a label to trigger an extended audio description [15] [36]. (Evidence well established: multiple studies [15] [36]).

3.2. Strategies for the Deaf

For the Deaf community, the barrier is not merely the lack of sound, but the lack of access to information in their native language (sign language):

- **Visual and vibratory technology:** Traditional audio guides are rendered use-

less. The solution lies in visual and vibratory technology. The use of QR codes deploying videos in LESCO (Costa Rican Sign Language) or the local sign language, with high-contrast subtitles, is a minimum accessibility standard [23]. These videos must be produced with native signers rather than digital avatars to ensure naturalness and correct grammatical expression [25]. (Evidence well established: multiple studies [23] [25]).

- **Vibroacoustics in natural heritage:** Innovatively, natural heritage management can utilize vibroacoustics. A person with hearing loss or profound deafness can perceive frequencies through conductive surfaces (floating wood floors or resonant platforms) [21]. Through audio transducers, it is possible to convert a jaguar's roar or a bird's low call into tangible vibrations felt in the feet or chest. This allows for the distinction of intensities and rhythms, granting a physical dimension to sound [24]. (Evidence well established: multiple studies [21] [24]).
- **Augmented Reality (AR) for interpretation:** To democratize content, interpretations in sign language must be ubiquitous. The use of Augmented Reality (AR) glasses or dedicated tablets that overlay a life-sized interpreter onto the exhibit can provide a more immersive and equivalent experience [37]. (Illustrative evidence: a case or argument [37]).

3.3. Sensory Immersion

"Sensory inclusion" reaches its zenith when designed for total immersion, benefiting all audiences:

- **Spaces where visual hierarchy dissolves:** Modern museography, supported by engineers and artists, creates spaces where visual hierarchy dissolves [26]. (Illustrative evidence: an argument [26]).
- **"Sensory tunnels":** Strategies such as "sensory tunnels" compel all visitors to use touch and hearing, leveling the experiential playing field [29]. (Illustrative evidence: an argument [29]).
- **Design of spaces with multisensory stimulation:** Collaboration between architects and neurobiologists has enabled the design of spaces where temperature, humidity, and airflow shift according to the exhibition's narrative (e.g., feeling humid heat upon entering a room about the tropical rainforest) [20]. These proprioception and multisensory stimulation strategies not only democratize access but generate deep empathy, allowing the normative visitor to experience, however briefly, other modes of navigating the world [30]. (Evidence well established: multiple studies [15] [20]
- **Olfactory and vibrotactile stimulation:** The use of smell, which is directly connected to the limbic system, can contextualize a historical era or a natural ecosystem more instantly than a thousand words of description [12] [18]. Similarly, vibrotactile technology can translate acoustic information into kinetic energy, allowing deaf visitors to "feel" the soundscape [21] [22] [24]. (Evidence well established: multiple studies [12] [17] [18] [21] [24]).

4. Discussion

The transition from a theoretical framework of inclusion to the practical reality of museum visits reveals a profound disconnect between institutional discourse and the lived experience of visitors with sensory disabilities. While the concept of the "inclusive museum" is widely circulated in heritage management literature [28], the physical execution often fails to address the most basic navigational and cognitive needs of blind and deaf populations. This section critically analyzes these specific deficits, contrasting the current state of neglect with the potential offered by existing technologies and neurobiological understanding.

4.1. Navigational Deficits and the "Hostile" Floor

For a person with visual impairment, the museum floor is not merely a surface to walk on; it is a primary source of information. However, the prevailing aesthetic of modern museography—characterized by polished concrete, expansive open spaces, and minimalist design—often creates a "haptic void" for the non-sighted visitor. One of the most glaring omissions in heritage spaces is the lack of podotactile flooring or tactile guide paths [38]. Without these tactile cues, the blind visitor is forced to rely entirely on a cane or a sighted companion, stripping them of autonomy. As defined by orientation and mobility studies, autonomy is not just about moving from point A to B, but about the ability to make independent decisions about where to go and how long to stay [39].

The absence of directional floor textures creates a chaotic spatial experience. In a typical museum setting, the "path" is visual, defined by light pools or color changes on the walls, which are invisible to the blind. The implementation of universal design principles requires the integration of different floor textures—smooth for transit, rough for warning or stopping points—to create a "tactile map" of the exhibition [40]. Furthermore, the lack of acoustic boundaries often exacerbates this disorientation. In large, echoing galleries, the inability to echolocate effectively due to poor acoustic design can lead to sensory overload and anxiety, transforming the cultural visit into a stressful navigational challenge rather than an educational experience [2].

4.2. The "Do Not Touch" Paradigm and the Cognitive Gap

Perhaps the most significant barrier for the visually impaired is the "ocularcentric" hegemony of the glass case. The traditional museum operates under a strict regime of preservation that privileges the visual consumption of objects while strictly prohibiting tactile interaction [6]. For a blind person, an object behind glass does not exist; its form, weight, temperature, and surface texture are inaccessible data points. This creates a severe cognitive gap. As Pallasmaa argues, "touch is the sensory mode that integrates our experience of the world with that of ourselves" [2]. By denying touch, museums deny the confirmation of reality.

The current lack of sensory replicas is a critical failure in heritage democratization. While some museums offer sporadic "touch tours," these are often segre-

gated events requiring advanced booking, rather than an integrated part of the exhibition design [13]. The solution lies in the systematic production of high-fidelity replicas placed adjacent to the original artifacts. Studies in haptic aesthetics suggest that the cognitive processing of shape and texture activates the lateral occipital complex in the brain, an area also used for visual object recognition [41]. Therefore, providing a 3D-printed replica of a pre-Columbian ceramic or a taxidermy specimen allows the blind visitor to build a mental image that is neurologically comparable to sight [14]. The technology to scan and print these replicas is now ubiquitous and affordable; the failure to implement them is an issue of prioritization, not feasibility.

4.3. The Location and Interactivity of Braille

Even when Braille is provided, its implementation is often flawed. A common complaint among visually impaired visitors is the difficulty in locating the Braille signage itself. A label that cannot be found is useless. Standard practice often places labels at inconsistent heights or distances from the object, forcing the visitor to grope surfaces blindly—an undignified and unhygienic process [16].

To rectify this, signage must be multimodal. We propose the integration of "audio beacons" or soft auditory stimuli that trigger when a visitor approaches a label, guiding the hand to the Braille text [36]. Furthermore, static Braille is often insufficient to convey the complexity of curatorial text. Hybrid systems that combine Braille with NFC (Near Field Communication) technology allow visitors to tap their smartphones against a label to trigger an extended audio description [15]. This "smart labelling" bridges the gap between the limited physical space for Braille and the depth of information available to sighted readers.

4.4. Beyond the Audioguide

For the Deaf and Hard of Hearing (DHH) community, the museum is often a silent movie without subtitles. The reliance on audio-visual installations in contemporary exhibitions creates a new form of exclusion. Videos, soundscapes, and oral histories are frequently presented without adequate captioning or sign language interpretation [23]. It is crucial to understand that for many prelingually deaf individuals, the spoken language of the region (e.g., Spanish or English) is a second language, and reading high-level academic text on captions can be fatiguing and less effective than communication in their native sign language, such as LESCO or ASL [25].

The problem is compounded by the "auditory arrogance" of museum design, which assumes hearing is the primary mode of receiving secondary information (alerts, background context). To democratize this content, interpretations in sign language must be ubiquitous. However, simply placing a small interpreter box in the corner of a screen is insufficient. The use of Augmented Reality (AR) glasses or dedicated tablets that overlay a life-sized interpreter onto the exhibit can provide a more immersive and equivalent experience [37]. This technology allows the

deaf visitor to look at the object and the explanation simultaneously, rather than looking away to read a text panel, mirroring the auditory-visual integration experienced by hearing visitors.

4.5. Olfaction and Soundscapes

Finally, the discussion must address the underutilized potential of non-visual and non-verbal senses: smell and vibration. The "sanitized" environment of the modern museum removes olfactory cues, yet smell is the sense most directly wired to the limbic system, the brain's emotional center [12]. The exclusion of olfactory design represents a missed opportunity for deep pedagogical impact. For a blind visitor, the smell of damp earth, resin, or specific spices can contextualize a historical era or a natural ecosystem more instantly than a thousand words of description [18].

Similarly, sound has a physical dimension often ignored. As noted in the results, vibrotactile technology can translate acoustic information into kinetic energy [26]. This is not science fiction; the technology exists in high-end gaming and cinema (4D systems) but is rarely applied in educational settings. Installing resonating floors or handrails that vibrate with the intensity of a jaguar's roar or the rhythm of a ceremonial drum allows deaf visitors to "feel" the soundscape [24]. This validates the concept of "sensory substitution," where the brain uses input from one sense (touch) to build a perception usually handled by another (hearing) [17].

4.6. Legal and Ethical Imperatives

The persistence of these barriers is not only a pedagogical failure but a legal one. In Costa Rica, Ley 7600 mandates equality of opportunity, yet its application in cultural spaces remains largely architectural (ramps and elevators) rather than informational [42]. The Convention on the Rights of Persons with Disabilities (CRPD), specifically Article 30, explicitly recognizes the right to take part on an equal basis in cultural life [43]. This implies that providing a "simplified" or "reduced" version of the exhibition for disabled visitors is discriminatory.

4.7. Limitations and Trade-Offs in Implementation

The implementation of sensory inclusivity strategies entails practical considerations and challenges that institutions must address to ensure the sustainability and success of initiatives. It is fundamental to interpret the proposals as viable design options, recognizing potential limitations:

- **Risks to conservation and contact:** The integration of tactile experiences, especially with replicas of historical artifacts, requires strict protocols to prevent damage to the original heritage. Direct contact with valuable pieces can compromise their conservation. 3D replicas and interactive materials must be designed to be durable and safe.
- **Hygiene:** Tactile surfaces and shared devices (such as audio guides or AR

glasses) present hygiene challenges, especially in high-traffic environments. It is necessary to establish rigorous cleaning and disinfection routines, and to consider solutions that minimize direct contact or facilitate sterilization, such as the use of antimicrobial materials or disposable personal devices.

- **Staff Training:** Museum or park staff must receive specialized training not only in handling new technologies and inclusive resources but also in sensitivity towards the diverse needs of visitors with disabilities. This includes training in basic sign language, tactile guiding, and promoting a welcoming and understanding environment.
- **Device Maintenance:** Technological systems (vibroacoustic sensors, NFC audio guides, AR glasses) require regular maintenance and technical support. Institutions must allocate resources to ensure the proper functioning of these devices and their periodic updates. The initial investment must be accompanied by a long-term maintenance plan.
- **Trail Safety (Parks):** The implementation of sensory trails in natural parks demands careful design to ensure the safety of all visitors. Podotactile guides must be clear and continuous, Braille signage and tactile elements must be well-lit and protected, and natural hazards (uneven terrain, vegetation) must be minimized or effectively communicated.

5. Conclusions

- **Comprehensive Democratization:** The democratization of heritage must transcend gender rhetoric to be truly inclusive. It must address economic barriers excluding lower classes and rural populations, as well as physical and sensory barriers. A museum or park is not democratic if it is only accessible to those who can see, hear, and pay.
- **Limitation Note:** Although the barrier of economic access is recognized as a crucial factor for heritage democratization, the present synthesis focuses primarily on the sensory and cognitive dimensions of inclusivity. Detailed strategies to address economic access (such as pricing policies, transport collaborations, or specific subsidies) are conceptualized but not developed in depth in this study, which represents a limitation in the scope of the proposed solutions.
- **Technology and Ethics:** Currently, technology, neuroscience, and engineering offer sufficient tools to eliminate nearly any access barrier. Failing to utilize these resources is not a technical limitation but a political and ethical decision. The omission of these strategies constitutes an act of systemic indifference and a total lack of empathy by cultural institutions.
- **Necessary Interdisciplinarity:** Creating a truly inclusive exhibition cannot rest solely on the curator. It requires a transdisciplinary team including artists, anthropologists, neurobiologists, engineers, pedagogues, and, crucially, persons with disabilities. It is not about "decorating" a scene, but designing a message that is cognitively accessible to all.
- **National Strategy:** Although Costa Rica possesses Law 7600, it has focused

primarily on physical accessibility (ramps, restrooms). It is imperative to develop a National Strategy for Cognitive and Sensory Accessibility for heritage. This implies public policies that finance and mandate the adaptation of cultural and natural content, guaranteeing the constitutional right to the enjoyment of culture and a healthy environment.

Conflicts of Interest

The author declares no conflicts of interest.

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