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## Special pedagogy in Innovative Ecosystems: a pilot project for museums accessibility

## La Pedagogia Speciale negli Ecosistemi Innovativi: un progetto pilota per l'accessibilità dei musei

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### ABSTRACT

Cultural institutes and museums are crucial in fostering individual and collective identity through heritage. To achieve this, they need to actively engage with the social context in which they operate by catering to diverse social groups. Inclusion is a key aspect that museums should prioritize, aiming to address the complexities of society and ensure equal cultural opportunities for all (Vaz et al., 2020). Based on these considerations, the University of Macerata, with a vocation on humanistic knowledge, promotes highly multidisciplinary activities within the Ecosystem project (financed by PNRR), with the aims to develop and transfer innovation to make regional production systems more competitive, thus improving sustainability and quality of life (Schallock et al., 2002) in urban and rural areas, and living and working environments. In this direction, the University of Macerata is developing different actions intending to create sustainable solutions and educational programmes for fragility and inclusiveness. Specifically, in line with national and international frameworks (Mace 1985; ONU, 2006), the commitment of Special Pedagogy research group will be directed at creating accessible solutions and organizational models to support access to local cultural heritage. Specifically, the Special Pedagogy group focuses its aim of research on accessibility and sustainability of inclusive tourism for usability of museums, art galleries, ecc.

**Keywords:** Special Pedagogy | Innovative Ecosystems | Museum Accessibility

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## 1. Introduction

In the current context of digital and cultural innovation, our education-related institutions are called on to address increasingly complex challenges, as they search out new spaces for the generation of virtuous and sustainable learning ecosystems.

In this regard, the activation of the necessary value processes occurs best along horizontal trajectories, in contexts of regional realities and local communities, where it is possible to capitalise on the epistemological and generative validity of networks of shared aims and collaborative alliances, and establish correspondences between communities and territorial education (Giaconi *et al.*, 2023).

By working from theory into practice, in co-design with stakeholders, we can create opportunities for active comprehension and engagement with information. These opportunities, however, are ensured only when there is complete accessibility to all life contexts, enabling all people to make choices autonomously and enjoy full participation in society. Ensuring access to information, in this way, empowers individuals to understand their rights, assert them, and make independent choices, gaining control over their current and future lives (Gilmartin & Slevin, 2010).

The construct of accessibility must therefore include working in favour of the protection and advancement of persons with disabilities, enabling them to enact self-determination, expand their worldviews, and control their lives (Shogren & Raley, 2022; Giaconi *et al.*, 2021a; Shogren *et al.*, 2015).

Based on these considerations, the humanistic sectors of the University of Macerata have taken on intensely multidisciplinary activities within the project *Innovation Ecosystem: Innovation, digitalisation and sustainability for the diffused economy in Central Italy*,<sup>1</sup> whose macro-aims are to develop and transfer innovations for competitiveness in regional production systems, and to improve and support life quality and sustainability in all social contexts.

In regard to this latter aspect, research at both the national (Mace 1985) and international levels (UN, 2006; Schalock & Verdugo Alonso, 2006; Istat, 2019; Giaconi *et al.*, 2021ab) clearly demonstrates that increasing the offer of inclusiveness to people with disabilities always relates to their increasing involvement in cultural and social contexts. Therefore, within the very broad Innovation Ecosystem project, the role of the Special Pedagogy research group is to develop organisational models and solutions supporting inclusiveness and access in local cultural heritage.

The concepts of cultural heritage, accessibility and community participation are also found in the definition of the museum, as most recently revised by the International Council of Museums (ICOM 2022):

A permanent non-profit institution at the service of society, which researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums promote diversity and sustainability. They operate and communicate ethically and professionally and with community participation, offering diverse experiences for education, enjoyment, reflection and knowledge sharing (ICOM, 2022)<sup>2</sup>.

In the directions of accessibility and inclusiveness, museums are expected to actively engage with the diverse social groups of their specific contexts. They are called to prioritize inclusion, aiming at equal cultural opportunities for all (Vaz, Freitas & Coelho 2020), providing access to information and to social life, and thereby increasing the wellbeing of their stakeholders (Shogren & Raley, 2022; Giaconi *et al.*, 2021a; Shogren *et al.*, 2015).

These principles and assumptions constitute the framework for the project pathway presented in the

1 The Innovation Ecosystem project, financed under the National Recovery and Resilience Plan, promotes network actions by nine universities of the Abruzzo-Marche-Umbria Interregional Hub (HAMU), along 10 action spokes. Within this framework, the University of Macerata Special Pedagogy Group is tasked with developing six Work Packages for sustainable solutions along Spoke No. 7, called "Smart solutions and educational programs for anti-fragility and inclusivity".

2 <https://icom.museum/en/resources/standards-guidelines/museum-definition/>



following paragraphs. We begin with a thorough review of the main guidelines on museum accessibility, and then present a prototype project currently implemented at a museum in the central Italian Region of Marche.

## 2. (Re)designing museum contexts: trajectories of accessibility

Most studies and guidelines concerning cultural venues, including museums, have focused on the requirements for development of physically accessible environments. (Leahy & Ferri, 2022; Seale *et al.*, 2021; Argyropoulos & Kanari 2015; Cho & Jolley 2016; Rappolt-Schlichtmann, & Daley, 2013). The concept of accessibility, however, goes far beyond the removal of physical barriers. Beyond simple entry into their spaces, such institutions must ensure opportunities, for all, of active enjoyment of their content and information, with true involvement in experiences, generating real opportunities to explore, participate and learn.

In promoting accessibility to cultural knowledge, we must take into account “the complex interplay between the specific person interacting with the specific contextual characteristics” (Mastrogiuseppe, Span & Bortolotti, 2021, p. 115).

For these reasons, the emphasis in museum design should shift from simply ensuring physical accessibility, to a new focus on creating flexible environments, fostering active engagement in learning (Meyer, Rose, & Gordon, 2014; Rappolt-Schlichtmann & Daley, 2013).

Comprehensive accessibility design achieves results beyond persons with disability concerns. When exhibits and programs offer accessibility and learning opportunities for individuals with disabilities, the advantages accrue to all museum visitors (Eardley *et al.*, 2016; Rappolt-Schlichtmann, & Daley, 2013). According to the Smithsonian Guidelines for Accessible Exhibition Design:

Discovering exciting, attractive ways to make exhibitions accessible will most directly serve people with disabilities and older adults. But to name an audience who will not benefit by these designs is impossible. Accessibility begins as a mandate to serve people who have been discriminated against for centuries; it prevails as a tool that serves diverse audiences for a lifetime (SI, 2000)<sup>3</sup>.

To achieve such results, as explained in the principles of Universal Design for Learning (Gibson, 1979; Story, Mueller & Mace, 1998; Rappolt-Schlichtmann & Daley, 2013), museum design must account for the different aspects of interaction between user and context. Different people perceive and understand the information around them differently, meaning that different communication and representative channels must be provided. For example, design can respond to the manners of mental representation achieved by persons with visual disabilities, such as low vision or blindness, who gather contextual information less typically than other users. Greater attention must be paid to representations in tactile relief (Fusinetti & Empler, 2019, p. 1568), or through audio descriptions (Fiorucci & Pinelli, 2019; Del Bianco, Caldarelli, D’Angelo, & Crescimbeni, 2019; Pacinotti, 2019; Perego, 2019).

In addition to having different informational perceptions and understandings of the museum environment, people will also navigate and interact with it differently (Rappolt-Schlichtmann Daley, 2013). Design must consider, for example, those who have difficulties in movement, communication, orientation or spatial organisation (Giacconi *et al.*, 2021ab), for example, found that persons with Autistic Spectrum Disorder may be less likely to create anticipatory models of experience and action (Barale *et al.*, 2009; Schmidt & Glaser, 2021), in which case designers could use virtual reality (VR) or augmented reality (AR) in the development of the museum context, to support the anticipatory view of the user.

Audience engagement varies across a vast spectrum depending on the knowledge, interests, or cul-

3 <https://cdn2.assets-servd.host/material-civet/production/images/documents/Smithsonian-Accessibility-Program.pdf?dm=1620062736>



tures of the museum visitors, (Rappolt-Schlichtmann Daley, 2013), making it important to provide options of paths and activities that will increase the engagement of the different profiles (Del Bianco *et al.*, 2019).

Rather than proceeding in “single lanes” in setting out environments and activities, all those involved in museum design must envisage different possibilities of interaction, with supports for different customised engagements. Routes must offer multiple channels for the use of the content, opening to diverse opportunities for construction of representations and meanings.

These points of reflection prompt lead into the next section, in which we review the main legal and institutional references concerning the accessibility of places of cultural interest. Moving from the international to the national level, there are several documents advocating inclusive policies for the enjoyment of cultural heritage.

## 2.1 Existing accessibility guidelines

Among the many normative documents concerning the accessibility of cultural places, the *Smithsonian Guidelines for Accessible Exhibition Design* (SI, 2000) remain particularly relevant for museum contexts. The Guidelines promote maximum accessibility and the guarantee of usability for all, such as persons with visual, hearing, motor or intellectual disabilities, the elderly and the very young. Integrating Universal Design principles, the Guidelines cover issues ranging from physical, sensory and cognitive to digital accessibility, ensuring that visitors can participate in and understand the content of exhibitions.

At the global level, geared specifically to museums and their personnel, we have the *ICOM Accessibility Guidelines* and training manuals on accessibility and inclusion.<sup>4</sup> At the European level, the Council of Europe has endorsed the *Recommendation of the Committee of Ministers to member States on the European Cultural Heritage Strategy for the 21st century of 2017* (CM/Rec, 2017).<sup>5</sup> In this document, the second of the three strategic axes spelled out is to “Make heritage more accessible”, and under this, specific recommendations are made on increasing the participation of site users with physical and sensory disabilities, and the development of different routes and modes of presentation to respond to the diversity of target audiences and their interpretations of heritage.

In Italy, the *Guidelines for drawing up Plans for the Elimination of Architectural Barriers (PEBAs) in museums, monumental complexes, archaeological areas and parks* (D.D., 2017)<sup>6</sup> confirm the multidimensional conception of accessibility:

The concept of architectural barriers [...] is not limited to physical obstacles, which could hinder the mobility of anyone, or prevent or limit anyone in the comfortable and safe use of areas, components or equipment, but also perceptual obstacles due to the lack of devices and signs that enable orientation, the recognition of places and understanding of the contents and cultural activities that constitute the *raison d'être* of the museum (Ivi, p. 2).

The PEBA document sets out operational guidelines for opening cultural resources to all, regardless of physical-intellectual capabilities or background of any kind. The Directorate of Museums (Ivi, p. 6) has also called for all institutions to appoint an accessibility coordinator with responsibilities in drawing up and implementing the plan for elimination of architectural barriers, and more in general to increase access and participation through the design, implementation and monitoring of interventions and activities (Caldarelli *et al.*, 2023; Leopardi *et al.*, 2021).

4 <https://icom.museum/en/resources/standards-guidelines/>; <https://www.icom-italia.org/accessibilita/>

5 <https://rm.coe.int/16806f6a03>

6 <http://musei.beniculturali.it/wp-content/uploads/2018/12/Linee-guida-per-la-redazione-del-Piano-di-eliminazione-delle-barriere-architettoniche-P.E.B.A.-Circolare-26-anno-2018-e-allegati.pdf> mibact



### 3. Research design and activities

Given the key literature and guidelines outlined above, our main aim is to implement practices that increase the participation of persons with disability in museum contexts. In the context of the Innovation Ecosystem project, we developed a research team of educators and pedagogists, art historians and archaeologists, architects and engineers, also including a range of persons with disabilities from various associations in the Marche region, with the objective of redesigning a specific museum environment to meet criteria of both physical and cultural accessibility and inclusivity. Within the chosen environment, the (re)design hypothesis was to develop an integrated system enabling the different museum visitors to customise their visit, with the possibility of selecting, even before entering, the route best suited to their needs and interests.

Given the inclusion of stakeholders with disabilities in the research team, we were able to apply a methodology of participatory research, with the following step-wise experimental procedure:

- a. mapping of critical issues in the physical and cultural accessibility of the chosen museum context (4 months);
- b. co-planning, through focus groups including the main stakeholders, of accessible and inclusive museum routes, preparatory to construction and testing (4 months);
- c. development of integrated solutions for multiple the usability of spaces and contents, among which: tactile and multisensory paths; stations with haptic devices for the exploration of 3D objects; paths in Easy-to-Read text and with vocal aids; virtual paths; apps for inclusive museum education (6 months).

#### 3.1 Mapping critical accessibility issues in the museum context

The first step was to map the critical issues in physical and cultural accessibility of the selected museum context. To this end, focus groups of 12 persons with and without disabilities were set up for visits to the physical space, and tasked with identifying the barriers present, as well as their considerations on the existing and desired aspects that would serve as facilitators for a meaningful museum experience.

The discussions and conclusions of the focus groups were recorded and transcribed.

The analysis of the texts followed the Grounded Theory procedure (Strauss & Corbin, 1994; Giacconi, 2012), and was conducted by experts performing recursive analysis for identification of conceptual labels and captions. The results from this first analysis were then returned to the focus groups for assessment and possible additions, allowing us to group the labels that emerged into two macro-sections, traced to the concepts of “barriers” and “facilitators” for a meaningful museum experience (Fig. 1).

The macro-section emerging from the analysis of the labels on barriers is conceived as “fragmented experience”, under which we collect four labels emerging recursively from the reconstructed captions on the analysis of the texts: “partial experience”; “disconnected information”; “abstract information”; “function of spaces”. In regard to this macro-section, it was found that due to fragmented perceptions, there were significant barriers to the advance or immediate construction of a satisfying and meaningful museum experience. The fragmentation descended in part from the difficulty of integrating the different information acquired during the visit, which was often too abstract and/or divided in time horizons, and the further difficulty of recognising the functions assigned to the different museum rooms.

The macro-section concerning the facilitators of the museum experience is instead conceived as “involvement”. From the analysis of the captions identified from the significant parts of the focus-group transcriptions, this macro-section again reconstructs four labels: “experiential and concrete information”; “possibilities of choice”; “possibilities of interaction”; “constructing a narrative”. The focus groups interpreted and expanded on these four labels of involvement, leading into specific operational methods. The first label refers to the possibility of revisiting and transposing museum content along a concrete and physically experienced plane. The second refers to visitor options in the construction of customised uses



of the same content, including via tactile paths and audioguides. The third refers to the possibility of interacting with the museum environment, including through digital devices. Finally, there is the construction of storytelling, guiding the visitor and immersing them in the museum spaces.

From the work of the focus groups, then, we were able to investigate and analyse which characteristics of the physical spaces and cultural content of the museum could constitute barriers or potentially serve as facilitators to be respectively eliminated or integrated in the design of accessible and inclusive museum visits. Figure 1 summarises some of these findings.

Macro-sections	Labels
Fragmentary experience	<ul style="list-style-type: none"> <li>– partial experience</li> <li>– disconnected information</li> <li>– abstract information</li> <li>– function of spaces</li> </ul>
Involvement	<ul style="list-style-type: none"> <li>– experiential and concrete information</li> <li>– possibilities of choice</li> <li>– possibilities of interaction</li> <li>– building a narrative</li> </ul>

Fig. 1 – Labels of the “Barrier” and “Facilitator” macro-sections

### 3.2 The co-planned solutions

Both the documents regulating the adequacy of museum accessibility and inclusion plans (D.D., 2017; Leahy & Ferri 2022) and the published research (Balcazar *et al.*, 1998; Coons & Watson, 2013; Giaconi *et al.*, 2021b; Shogren, *et al.*, 2022) stress the centrality of sharing design actions with the relevant stakeholders. For these reasons, we initiated the design of new routes to be integrated into the selected museum context in collaboration with persons with disabilities, but also with the museum and other sectoral experts of the multi-disciplinary project team. Recalling the criticalities and potentials that had emerged through analysis of the focus group transcripts, we were able to identify the specific contents and activities requiring redesign and new development. From this stage, the results were four co-planned macro-paths.

The first, called the “haptic and tactile” macro-pathway, was co-designed by a team consisting of an architect, a museum expert, two pedagogues and four visually impaired people. This pathway features: enhanced interpretive panels in Braille (Fusinetti & Empler, 2019); LOGES-language tactile flooring (INMACI, 2023); accessible audioguides (Packer, Vizenor & Miele, 2015; Perego, 2019); 3D reproductions of selected meaningful objects. This pathway also provides haptic stations for the user, simulating the sense of touch in a virtual environment, offering tactile sensations of force or vibration when “touching” the virtual objects (Butler & Neave, 2008; Paladini *et al.*, 2023; Ceccacci *et al.*, 2023).

The second macro-pathway involved the construction of panels according to the Easy-to-Read language (Nomura, Nielsen & Tronbacke, 2010; Del Bianco, 2018). The co-working team for this pathway consisted of a museum expert, two pedagogues, two educators and seven young people with intellectual disabilities. Starting with the reading of the existing panels, the children and educators, supported by the pedagogues, identified words and phrases that were difficult to read. These were then re-written in facilitated language. Following the reorganisation of the text, team members then re-read and assessed the captions, preparatory to changes or modifications, with the final versions submitted for validation by the museum expert<sup>7</sup>. The new captions were also audio-recorded for Easy-to-Listen content.

The third macro-pathway creates new modes of physical accessibility, in particular by drawing on VR

7 For insight into the Easy to Read caption construction process, see Shogren *et al.*, 2022; Giaconi *et al.*, 2021; Del Bianco N., 2018.



and AR for development of inclusive social contexts with fuller participation by people of diverse needs (Giaconi *et al.*, 2019).<sup>8</sup> On the basis of previous research (Giaconi *et al.*, 2021ab; Campitiello *et al.*, 2022; Caldarelli *et al.*, 2023), the team of pedagogist, art historians, archaeologists, and VR experts selected the most relevant cultural contents to be transposed in the VR environment and AR object, which were then included in the haptic station and the museum-tour computer application. The virtual objects and environments are currently being tested with the support of 10 museum users, both with and without disabilities.

The fourth macro-pathway gathers didactic content for use in organising educational activities, both prior to and during the museum visit, and also afterwards, in consolidation of the learning experience. The contents are accessed through a specially designed App, explained more fully in the next section. Educators are invited to use the app for the planning and organisation of the museum visit, systematically integrating it into other curriculum activities, and in particular, enabling anticipation of the museum visit with students with Autistic Spectrum Disorders (Giaconi *et al.*, 2021a).

### 3.3 Embedded solutions

As explained above, the experimental aim was not only to improve accessibility, but also, through opportunities for personalisation of the museum visit, to develop inclusion in general. In this direction, the four macro-pathway outputs were integrated in an overall solution, enabling response to the specific needs and interests of individual visitors (Fig. 2). In this manner, the individual visitor can achieve nearly full customisation of their visit, in line with the criteria of sustainability and reasonable accommodation.

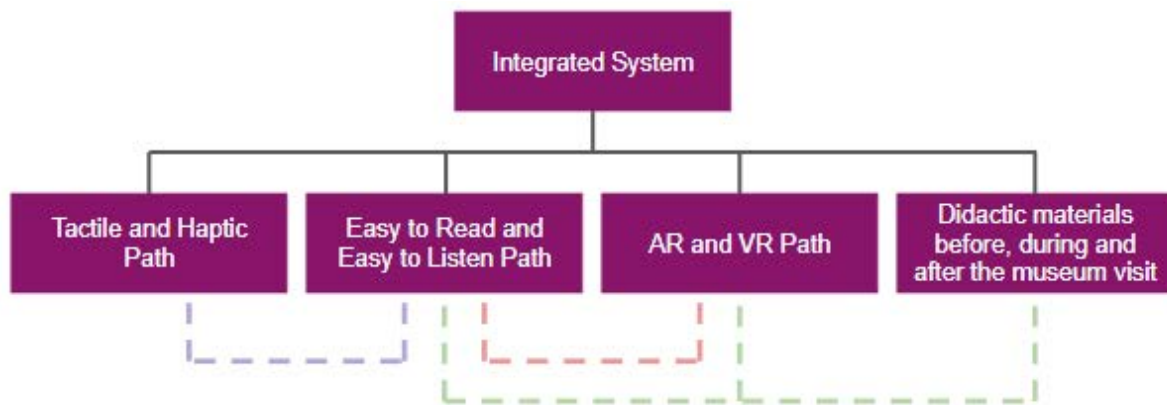


Figure 2 - The Integrated System

The newly created multimedia content, as shown in Fig. 2, is integrated with the support of a specially developed App, offering the visitor the planning of routes with textual insights, images, audio guides and 360° videos, as well as objects viewable in VR/AR.

8 None of the various national and international museum guidelines provide specific indications on accessibility in relation to VR or AR, nor any advice on the construction of virtual user points (Caldarelli *et al.*, 2023). For this reason, the current experimental design of the virtual museum experience draws on the more general guidelines for accessibility in immersive VR games. See “Accessibility guidelines for VR games - A comparison and synthesis of a comprehensive set” (Heilemann, Zimmermann & Münster, 2021).

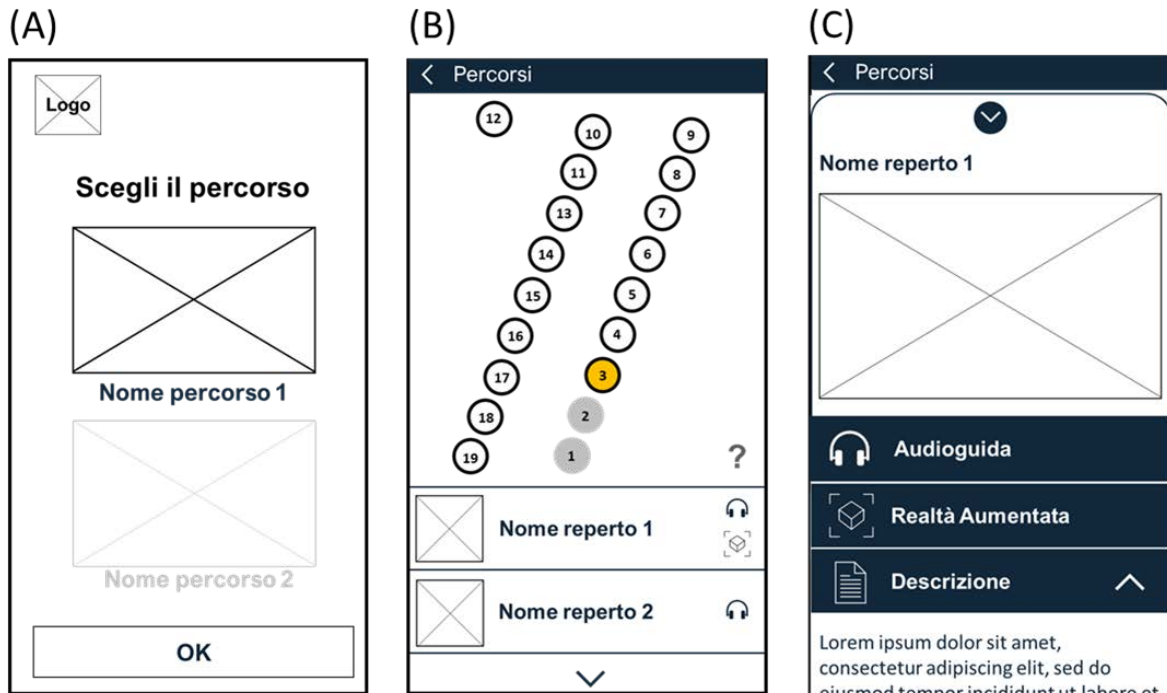


Figure 3 - Wireframe details: customised pathways

The main gateway for the provision of customised solutions is the specially designed App. Fig. 3 shows some details of the wireframe. After a brief tutorial, users can choose from a list of visit routes (Fig. 3, A). Once selected, they are presented with an interactive map of the chosen route, with the various points of interest, ranging from exhibit sections to shops. For each point of interest, the app provides a list of the various exhibit and multimedia contents. Selecting each item of interest, the user can then choose between two or more modes of receiving information: Easy-to-Read descriptive text; audioguide content in multiple languages; in some cases, via high-fidelity 3D reconstruction in AR. On approaching the relevant exhibit points the user activates the AR visualisation by simply framing the QR codes on the display cases.

Through the innovation of interactive modes and customisable solutions, the specially designed App provides access to the museum experience for widely diverse audiences. The app also allows interactive previews of the museum visit, for enrichment of the on-site experience of contents and spaces, or even for access without ever attending the physical museum.

## 4. Conclusions

This contribution presents a proposal for the implementation of accessibility in cultural heritage contexts. As stated in the ministerial guidelines on Plans for the Elimination of Architectural Barriers:

The museum, as an institution at the service of society and its development, develops credibility and authority on issues of cultural accessibility, in relation to regional and local government agencies and with the communities themselves (D.D., 2017, p. 1).

Thus, museums are tasked with fostering individual and collective identity through the co-construction of strategies for accessible heritage, and the initiation of projects that draw in increasingly important collaborations with stakeholders, nurturing an inclusive culture.



As shown in previous research (Giaconi *et al.*, 2021a; Shogren *et al.*, 2022), when museums and the related professionals collaborate with persons with disability, this can result in significant benefits in developing cultural contexts accessible for all. The current contribution reports on a specific case of co-design work with people with disabilities, resulting in the enhancement and development of inclusive museum routes: work that develops virtuous circuits of mutually strengthened museum cultural activity and general social inclusion (Shogren *et al.*, 2022; Giaconi *et al.*, 2021a).

The present contribution provides a model for implementation, a starting point for the increment of co-design work with people with disabilities that builds self-determination skills and personal and social empowerment (Del Bianco *et al.*, 2019). Our fundamental aim is to provide:

... a framework for thinking about systems of supports for self-determination that are strengths-based, recognize the role of person-environment fit, and highlight how supports can be leveraged to create supportive environments and enhance personal abilities to promote personal self-determination while also changing the context and recognizing the role of the person with disability in making such a change (Shogren *et al.*, 2022, p. 216).

Starting from work that can increase the active participation of persons with disabilities, the values of this contribution lie in its attention to rethinking and creating new generative spaces of development, centred on the principle of reciprocity and understood in the profoundest senses of relationality, dialogue and exchange (Bruni, 1998). Through the conception of further micro- and macro-actions in ecosystemic contexts, it should be possible to further capitalise on

... the ability to share perspectives of the future, to get involved with others immersed in our life contexts, to turn our gaze towards values of fraternity and social friendship, and to strive for reciprocity in the safeguarding of common goods, human relations and the environment (Molinari *et al.*, 2022, p. 1035).

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**DICHIARAZIONE SOSTITUTIVA DELLA CERTIFICAZIONE (Art. 46 - D.P.R. 28 dicembre 2000, n. 445)**

La sottoscritta Catia Giaconi, c.f. GCNCTA79D54G157Y, nata a Osimo il 14.04.1979 e residente in via Regina Margherita 85, Civitanova Marche (MC), 62012, consapevole che:

- è soggetto alle sanzioni previste dal codice penale e dalle leggi speciali in materia qualora rilasci dichiarazioni mendaci, formi o faccia uso di atti falsi od esibisca atti contenenti dati non più rispondenti a verità (art. 76 D.P.R. 28.12.2000, n. 445);
- decade dai benefici eventualmente conseguenti al provvedimento emanato sulla base della dichiarazione non veritiera qualora dal controllo effettuato dall'Amministrazione emerga la non veridicità del contenuto della dichiarazione (artt. 71 e 75 D.P.R. 28.12.2000, n. 445).

**DICHIARA**

Che dell'articolo "Special pedagogy in Innovative Ecosystems: a pilot project for museums accessibility", ha curato la stesura delle pagine 25-32. Dichiaro inoltre che le coautrici Arianna Taddei, Noemi Del Bianco, Silvia Ceccacci e Ilaria D'Angelo hanno curato la stesura delle pagine 24, 31-34 (Conclusioni e References).

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Dichiaro, altresì, di essere informato, ai sensi e per gli effetti di cui all'art. 18 del D. Lgs n. 196/2003 che i dati personali raccolti saranno trattati, anche con strumenti informatici, esclusivamente nell'ambito del procedimento per il quale la presente dichiarazione viene resa.

**Il dichiarante**

Catia Giaconi  


Ai sensi dell'art.38, D.P.R. 445 del 28 dicembre 2000, la dichiarazione è sottoscritta dall'interessato e presentata insieme alla fotocopia, non autenticata, di un documento di identità del dichiarante.

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**FANASCA MARIA ANTONIETTA**  
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