RECONCEPTUALIZING INCLUSION IN MUSEUM SPACES: A MULTIDISCIPLINARY FRAMEWORK

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Abstract

This paper describes an exploration into technology design to make cultural spaces accessible to people with mild or moderate intellectual disabilities (IDs). We start by considering the role technology can play in promoting the engagement and enjoyment of cultural heritage and move on to explore how to design for rewarding user experiences in that context. For that purpose, we have recruited a multidisciplinary team of experts, including researchers in Users Experience (UX) research, psychology, and education, to work together with practitioners skilled in the care of people with IDs. Crucial members of our research team are a small group of people with IDs who have been working with experts in education over the years and have an established emotional relationship with them. Together, we set out to learn from each other while exploring the design space for producing technical solutions to enhance accessibility, usability, and the overall quality of the interaction with content available to museum visitors. We describe the lesson learned in terms of the framework we devised, reflect on its implications and suggest possible steps towards designing tools to enhance accessibility and engagement.

Keywords: Accessibility, Intellectual Disabilities, Experts, Co-design, Inclusion, Framework.

1 INTRODUCTION

Making culture accessible to people with Intellectual Disabilities (IDs) represents an ethical imperative and a technical challenge that may open interesting implications for research and educational practice [1, 2].

In the last few years, a growing interest in understanding how to promote access to knowledge for people with IDs has been fueled by increased legislative priorities and societal expectations for individuals in this population. Life environments and their organization have been increasingly considered as having a substantial impact in favoring or hindering the functioning of people, affecting the ability of an individual to deal independently with the circumstances of everyday life (ICF, [3]).

Previous studies have mainly focused on investigating what factors should be considered in building accessible environments for people with motor and sensory impairments [4, 5, 6]. However, the current focus on the participation *for all* highlights the importance of reconceptualizing inclusion in museum spaces, considering the variability of potential visitors and extending the concept of accessibility to all its dimensions (communicative, cognitive, cultural, social, physical, etc. [7]). In this direction, the use of information and communication technologies (ICTs) may help remove cognitive and communicative barriers by encouraging flexibility in identifying multiple ways of understanding, processing, and elaborating content.

ICTs are certainly a valuable support for increasing participation of people with IDs in cultural and social life, but simply stating that technologies are useful poses the risk of increasing attention to products rather than their applicability, usability, and effectiveness in meeting people's needs [8]. There is a need to investigate the processes behind the introduction and use of ICTs within museum spaces. It is imperative when we talk about people with disabilities because a thorough understanding of the specific ways in which learning, communication, and engagement occur is necessary.

The Convention on the Rights of People with Disabilities [9] highlights the application of two principles to avoid any form of discrimination (art. 2). These principles are: "Reasonable accommodation", i.e., necessary and appropriate modification and adjustments to ensure to persons with disabilities the enjoyment or exercise on an equal basis with others of all human rights and fundamental freedoms; "Universal design", i.e., the design of products, environments, programs, and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design, including the assistive devices for particular groups of persons with disabilities where this is needed.

If we consider the population with intellectual disabilities, a current interpretation according to the bio-psycho-social perspective as opposed to an outdated conception of "mental retardation", conceives the importance of the interaction between the person and the context in which they are placed in determining their disability. The large variability characterizing people with IDs receiving the same diagnosis is not only the result of quantitative and qualitative differences in the cognitive (i.e. language, memory, attention, visual-perceptual, and visuomotor skills) and personality characteristics [10] but is also determined by the interaction between these factors and the context. In fact, different physical, social, communication contexts with whom the person interacts can lead to different manifestations and characteristics related to the same disability. Based on the presence of barriers or facilitators, different environments may be more or less disabling or enabling to the same person.

In order to avoid barriers and promote facilitators to communication and learning, the Convention on the Rights of People with Disabilities [9] highlights that accessible ICTs should be included when designing "reasonable accommodations" according to the design for all principles. Communication includes "languages, display of text, Braille, tactile communication, large print, accessible multimedia as well as written, audio, plain-language, human-reader and augmentative and alternative modes, means and formats of communication, including accessible information and communication technology" (art. 2). ICTs could account for different profiles within the large population of intellectual disabilities by considering other ways of representing, expressing knowledge/needs/ideas, and a variety of ways to engage with culture.

An investigation of the process behind the introduction and use of ICTs within cultural spaces needs to be taken in order to promote the application of the two principles outlined above. The aim of the present paper is twofold. The first aim is to understand the role of new technologies in promoting the fruition of cultural heritage, including the perspective and needs of people with Intellectual Disabilities. For that purpose, we recruited a multidisciplinary team of experts, including researchers in Users Experience (UX) research, psychology, and education, museum didactic, to work together with practitioners skilled in the care of people with IDs. The experts were asked to investigate the processes – i.e., *why, what, how* – behind the introduction and use of ICTs within cultural spaces. The second aim is to model a co-design procedure to simplify museum textual resources with the active contribution of adults with a mild-moderate intellectual disability. This initial theorization will outline methodologies, procedures, and standards to be applied in the co-design of innovative technological solutions, subject to a subsequent work by the authors.

2 METHODOLOGY

There is the need to investigate the processes – i.e. *why, what, how* - behind the introduction and use of ICTs within museum spaces.

To comprehensively explore these processes, we used a multidisciplinary research framework involving a group of experts from different backgrounds (i.e., one psychologist, one pedagogist, two computer scientists and UX researchers, two social workers, and one museum curator).

In a first research phase, the multidisciplinary team participated in ten meetings (10 hours duration) to build a discussion on issues related to the following topic: *"Which is the role of new technologies in promoting the fruition of cultural heritage including the perspective and needs of people with Intellectual Disabilities?"*. After these joint meetings, a moment of individual reflection was promoted so that each expert could respond to the following research questions:

- The first question was related to the comprehension of *why* ICTs may be useful and functional for people with ID within museum spaces. In other words, which are the motivations behind the introduction of ICTs within museums for the scope of enhancing cognitive and communication accessibility?
- The second question was related to understanding *what* ICT-based products could be successfully adapted to current museum themes, spaces, and exhibits to facilitate communication and learning for people with IDs.
- The third question was related to the comprehension of *how* to realize ICTs-based products that are able to meet the different needs of people with IDs. For example: How to run a co-design process with people with IDs accounting for and respecting diverse abilities? How to avoid poor usability, cognitive overload, and techno-frustration?

This research phase took place remotely. Each expert individually created their own visual board with the concept Canvas, including their point of view on the questions outlined above.

In a second research phase, the goal was to explore the third question further - *how* to run and validate co-design procedures with people with IDs accounting for and respecting diverse abilities? We directly involved experts in psychology, special pedagogy, and educational sciences in the observation and analysis of co-design sessions aimed at simplifying museum textual resources with the active contribution of adults with a mild-moderate intellectual disability. The co-design sessions were led by a social worker expert in easy-to-read procedures (www.life-long-learning.eu). The observation was conducted at the Anffas Association ("Cooperativa Sociale Trieste Integrazione a m. Anffas Onlus"), which has extensive and consolidated experience in easy-to-read methodologies. Crucial members of our research team were a small group of people with IDs who have been working with experts in education over the years and have an established emotional relationship with them. Together, we set out to learn from each other while exploring the design space for producing technical solutions to enhance accessibility, usability, and the overall quality of the interaction with content available to museum visitors. The co-design sessions were video-recorded and were subsequently analyzed by the experts in psychology, special pedagogy, and educational sciences. The analysis allowed us to outline the first modeling of a social-worker-led co-design intervention based on scaffolding methodologies to promote the full participation of people with IDs during the entire process.

3 RESULTS

Results of the two research phases are reported separately.

3.1 Why, what, and how?

Each expert individually created their own visual board with the concept Canvas, including their point of view on the questions outlined above. The individual answers were then collected by the authors of this contribution and merged in a visual board. Different colors represent the contribution of experts in various disciplinary fields: in blue computer scientists and UX researchers, in green social workers, in orange pedagogues and psychologists, in bright pink museum curators. While we present each contribution separately in this research stage, in future studies, our goal will be to involve both the users with IDs and the stakeholders in some brainstorming sessions to create an affinity diagram on the relevant themes (clusters) and together extract related user requirements to guide the design of new tools to increase accessibility and engagement in museum visitors.

3.1.1 Why?

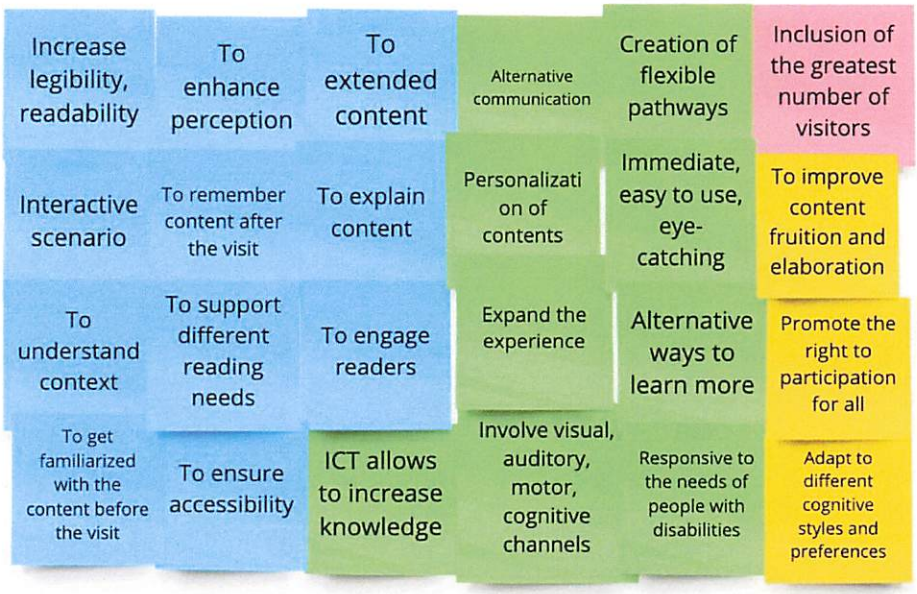

Figure 1. Why should we introduce and use ICTs within museum spaces?

The main motivations behind the introduction of technology are that it could:

- Increase legibility and readability: using ICTs to read content presented in different font sizes, colors, languages, and text lengths;
- Encourage interaction: ICTs can avoid users' abstractions with hands-on prototypes and multisensory experiences;
- Extend, explain and understand content: technology can help people with ID to understand the museum content, explain them in various ways, and extend what is available in an exhibition;
- Engage and get familiarized with the content: making users more engaged and prepared for the exhibition;
- Help recalling the content: using ICTs to access and retain the museum visit;
- Support different forms of reading and ensure accessibility: considering different abilities and forms of reading can ensure that people with ID choose what fits the most with their preferences and, consequently, ensure accessibility;
- Improve fruition: ICT's could be used to strengthen the fruition of tangible and intangible heritage in museum contexts;
- Promote the right to participation for all;
- Provide flexibility and adapt to different cognitive styles and preferences.

3.1.2 What?

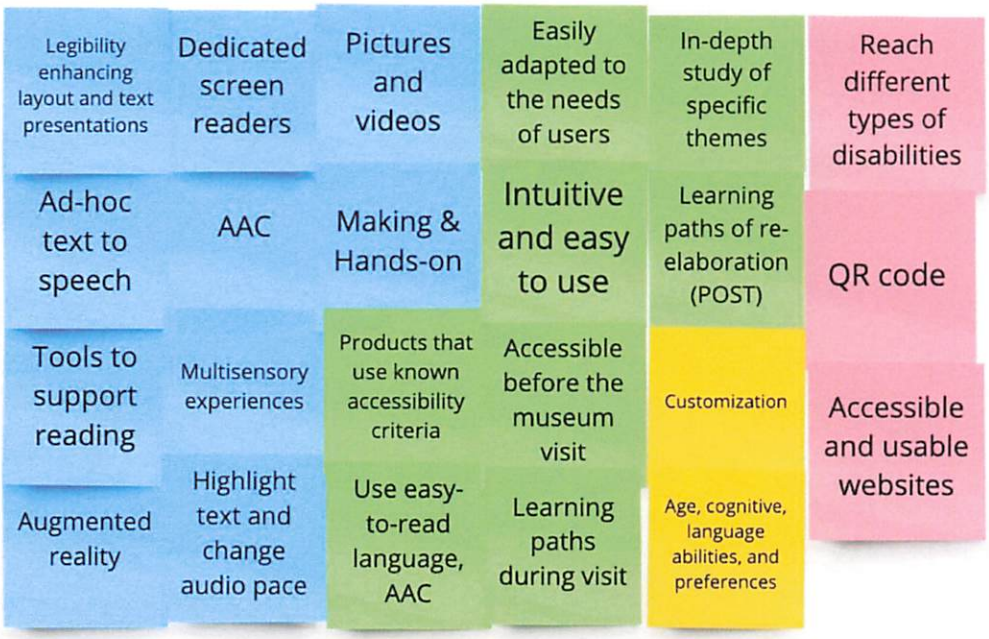

Figure 2. What could be successfully adapted to current museum spaces?

Fig. 2 displays the second question: what ICT-based products could be successfully adapted to current museum themes, spaces, and exhibits to facilitate communication and learning for people with IDs? Our results showed that technology could help in many ways by:

- Enhancing legibility by providing many alternative layout and text presentations: using ICTs, we can display and evaluate different designs and ways to present content;
- Giving alternatives to reading aa in the Text-to-speech approach where people can listen to content benign read by different voices and at different paces;
- Supporting active reading, with tools to highlight text during reading as to increase the focus and visual involvement with text;
- Providing assistive technology, such as screen readers, to read the entire screen content;

- Extending the real world with Augmented Reality, such as 3D objects, textual and audio feedback;
- Adding or replacing textual elements to make people with ID and other disabilities able to understand the content, as with Augmentative and Alternative Communication (AAC);
- Reinventing and expanding objects and artworks to use several senses at the same time (see, feel, hear, smell, taste) to produce Multisensory experiences;
- Accessing non-textual material extra photos and videos with ICT devices;
- Using technology hands-on, thus promoting an active learning paradigm for creating content;
- Customizing content based on age, cognitive and language abilities, and preferences.

3.1.3 How?

Finally, we report the results related to the third point on how to realize ICTs-based products that are able to meet the different needs of people with IDs.

This research question aims to encourage a twofold analysis: (i) how to run co-design with people with IDs accounting for and respecting diverse abilities? (ii) how to avoid poor usability, cognitive overload, and techno-frustration?

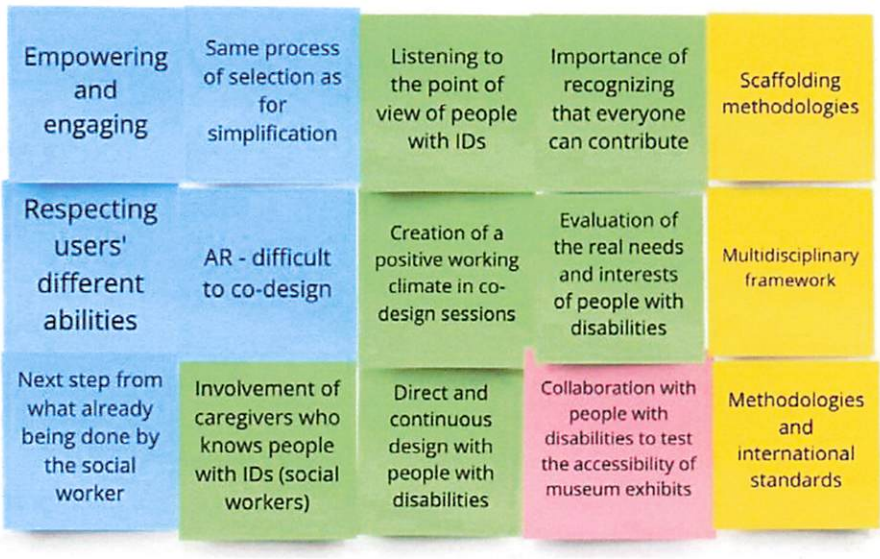

Figure 3. How to co-design with people with IDs accounting for and respecting diverse abilities?

Regarding the first question, the main findings available in Fig. 3 are that when co-designing with people with IDs we should aim at:

- Empowering and engaging: making users engaged and empowered by listening and always considering their voice;
- Respecting users' different abilities: by respecting the users' preferences and skills, the co-design sessions can be faster and more effective;
- Being aware of complexity: to co-design new or unknown technologies, such as Augmented Reality, can be difficult;
- Replicating successful processes: applying text simplification techniques can be similar to adapting the user interface (UI);
- Setting up a Multidisciplinary framework: evidence-based educational (EBE) practices could be translated into innovative methodologies, protocols, procedures for co-design;
- Designing scaffolding methodologies with experts: guidance from practitioners on how to engage people with special needs.

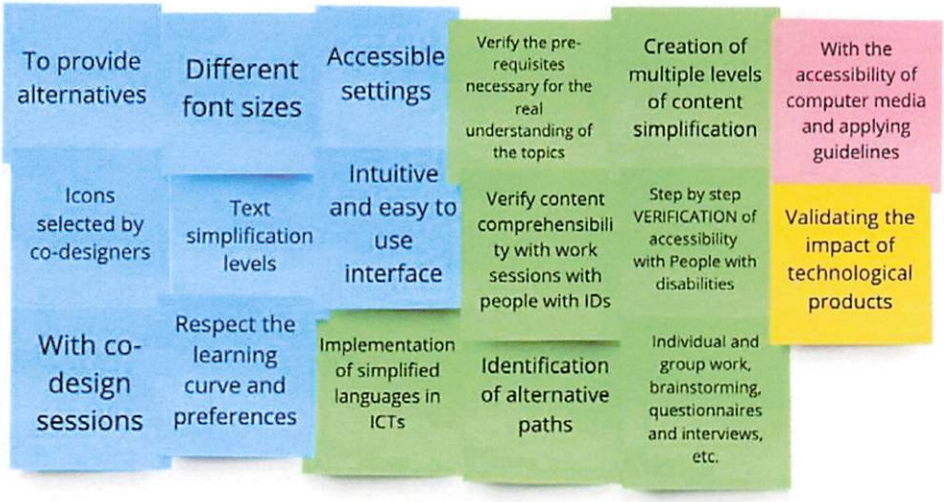

Figure 4. How to avoid poor usability, cognitive overload, and techno-frustration?

Concerning the second question (how to avoid poor usability, cognitive overload, and techno-frustration), the main results available in Fig. 4 suggest that we should be looking at:

- Providing alternatives: having choices or settings that the participants can choose from;
- Selecting carefully icons and symbols: the semiotic should make sense for the users;
- Having co-design sessions: avoiding designing for them but instead with them;
- Enabling accessible settings: Choices ranging from color scheme to audio pace and font size;
- Offering easy-to-read content: available in different simplification levels;
- Respecting the learning curve and preferences: each participant will take a different time to understand and feel comfortable with the use of ICTs;
- Designing intuitive and easy-to-use interface: too many commands to execute a simple task can easily frustrate the participants;
- Requiring validation: Rigorous methodologies for validating the involvement and impact of technological products.

3.2 Preliminary ideas on running co-design with people with IDs

In the second research phase, the experts in psychology, special pedagogy, and educational sciences observed and analyzed the procedure used by a social worker while running co-design sessions aimed at creating easy-to-read museum written contents with the active contribution of adults with a mild-moderate intellectual disability. The analysis allowed to outline an initial modeling of a social-worker-led co-design intervention based on scaffolding methodologies, aimed at promoting the full participation of people with IDs during the entire process. Here we describe it in its fundamental steps. Scaffolding is an evidence-based education (EBE) practice with a long history of application and success in facilitating learning for people with learning disabilities. It typically involves helpful, structured interaction between an adult and a child, with the aim of helping the child achieve a specific goal. Based on Wood [11] the experts identified some steps of scaffolded instructions that the caregiver used as general guidelines while running the co-design.

1 *Pre-engagement with the participant:* caregiver considers the participant's cognitive and affective needs to personalize task-related instructions (e.g., they determine how to simplify the language with which they provide instructions)

2 *Provide tailored assistance:* The caregiver uses some strategies and adjusts them to meet the participant's needs. This means that the caregiver is particularly receptive to the participant's thoughts/needs and attuned to their feelings, grasping the expressed ideas and emotions. Moreover, the caregiver could give active support to the participant by cueing or prompting, questioning, modeling, telling, or discussing in order to elicit the expression of new ideas/needs/feelings.

3 *Maintain pursuit of the goal*: The caregiver adopts strategies to help participants remain focused on their goals. The caregiver could ask few and frequent questions, request clarification as well as offer praise and encouragement. By using these strategies, the caregiver aims to support metacognitive processes and maintain an active level of engagement.

4 *Give feedback:* To help participants learn to monitor their own progress, the caregiver could summarize current progress and explicitly note behaviors that contributed to each participant's success.

5 *Control for frustration and risk*: The caregiver could create an environment where participants feel free to take risks with learning by encouraging them to try alternatives.

These strategies were applied by involving one participant at a time or an entire group of participants with IDs through brainstorming activities. The advantage of group activities is that they support cooperative structured and/or incidental learning processes, especially when the affective-relational dimension is placed at the foundation of the group work. The theorization of a social-worker-led co-design intervention based on scaffolding methodologies will serve to outline methods, procedures, and standards to be applied in the co-design of innovative technological solutions, the subject of a subsequent contribution by the authors of the present paper.

4 CONCLUSIONS

Museums are increasingly considered places of great interest to encourage the inclusion of visitors who are still excluded from regular attendance due to barriers that limit their ability to use and access the content. This is the case, for example, of people with intellectual disabilities, but also of visitors who tend to be excluded due to different social, cultural, linguistic, and age variables [12].

The advent of new technologies for the promotion and enhancement of cultural heritage requires the activation of a multidisciplinary debate that should involve experts from different backgrounds in understanding which might be the role of new technologies in removing these barriers. ICTs could be of great importance in promoting the fruition of cultural heritage for people with special educational needs [13, 14, 15, 16]. The scientific community must address how to design and use technologically innovative solutions that meet the needs of different visitors, allowing the participation *of all* in cultural and social life.

The first objective of this paper was to outline the perspectives that emerged from a multidisciplinary debate involving a group of experts from different backgrounds (i.e., psychologists, pedagogists, computer scientists, UX designers, social workers, museum curators) in investigating the processes – i.e., *why, what, how* – behind the introduction and use of ICTs within museum spaces.

Answers given to the first two questions – *why* ICTs may be useful and functional for people with IDs within museum spaces? and *what* ICT-based products could be successfully adapted to current museum themes, spaces, and exhibits to facilitate communication and learning for people with IDs? – showed that reasonable accommodations are needed, especially concerning adapting the ways in which cultural information is transmitted. With particular importance are technological solutions geared to improve the legibility and comprehensibility of textual information. These vary from providing personalized layouts (enabling users to adjust font and size) to the availability of screen readers, reading aloud just when and what the visitor needs, and the representation of textual content in alternative forms to appeal to different sensory channels. Augmented alternative communication being a starting point to explore the potential of augmented reality, where instead of non-legible text, we could present visitors with 3D objects, and audio feedback.

Results from the third question - *how* to run and validate co-design procedure with people with IDs accounting for and respecting diverse abilities? - showed that there is a need to translate tools and methodologies currently in use by practitioners in their daily activities with people with disabilities into standards that could be applied by researchers, computer scientists, and ICTs experts, in running participatory design activities in a number of contexts and with different communities. Co-design has proved successful in including users' perspectives in the early production of tools for them to use. In particular, there is a rich literature [e.g. 17] reporting on the positive impact of engaging children in co-design activities where they are the protagonists while playing different roles from informant to investigator and evaluator. Here, we emphasize the importance of an experienced educator for facilitating communication among researchers and co-designers, defining activities to offer the right level of engagement but, more importantly, helping co-designers find and play the most suitable role to empower and involve them actively as the protagonists of the process.

In a second research phase, the goal was to further explore the third question in order to outline the initial modeling of a social-worker-led co-design intervention based on scaffolding methodologies. Scaffolding methodologies have long been applied to enhance the participation and engagement of people with learning difficulties. Here, we want to highlight the fact that some evidence-based education (EBE) practices, like scaffolding methodologies, could be effectively used to support the co-design of technological solutions. These results underline the importance of emphasizing a multidisciplinary dialogue that can activate cross-disciplinary encroachments to outline methodologies, programs, procedures, and international standards to foster inclusive access to cultural heritage.

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