INCLUSION AND TECHNOLOGICAL INNOVATION IN OUTDOOR LEARNING: SPECIAL PEDAGOGY PATHWAYS TO CO-DESIGN AUGMENTED REALITY EXPERIENCES

INCLUSIONE E INNOVAZIONE TECNOLOGICA NELL'OUTDOOR LEARNING: PERCORSI DI PEDAGOGIA SPECIALE PER LA CO-PROGETTAZIONE DI ESPERIENZE IN REALTÀ AUMENTATA

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Double Blind Peer Review

Santilli, T., (2025),
Inclusion and technological innovation in outdoor learning: Special pedagogy pathways to co-design augmented reality experiences education. Italian Journal of Health Education, Sports and Inclusive Didactics. 9(3)

Doi: https://doi.org/10.32043/gsd.v9i3.1604

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gsdjournal.it
ISSN: 2532-3296

ABSTRACT

The transformative potential of new technologies has unveiled unprecedented horizons for the creation of inclusive life environments, allowing the design of authentic, significant and personalised outdoor learning experiences. This study proposes a co-design protocol to develop inclusive solutions for outdoor learning in leisure contexts based on the use of Augmented Reality and 3D print to enhance equal opportunities for participation in cultural, social, and educational processes.

Il potenziale trasformativo delle nuove tecnologie ha aperto orizzonti inediti per la costruzione di ambienti di vita inclusivi, permettendo di progettare esperienze di outdoor learning autentiche, significative e personalizzate. Questo studio propone un protocollo di co-design per sviluppare soluzioni inclusive di outdoor learning in contesti di Tempo Libero basate sull'utilizzo della Realtà Aumentata e della stampa 3D per favorire pari opportunità di partecipazione ai processi culturali, sociali e formativi.

KEYWORDS

Outdoor learning, Special Pedagogy, Inclusive didactics, Co-design, Augmented Reality
Outdoor learning, Pedagogia Speciale, Didattica inclusiva, Co-design, Realtà Aumentata

Received 21/07/2025
Accepted 28/10/2025
Published 07/11/2025

Introduction

In light of contemporary social, environmental, and technological transformations, societies are called to rethink educational processes in ways that can foster interconnected, inclusive, and sustainable communities. To this end, designing life contexts that can promote collaboration, reciprocity, and shared knowledge appears to be a crucial trajectory to create inclusive learning ecosystems, from formal education to leisure settings (Giaconi et al., 2023; Giaconi & Del Bianco, 2025). As highlighted by scientific literature (Canevaro, 2006; Lepri, 2011; Giaconi, 2015), such an endeavour acknowledges the dynamic interplay between people and environments, highlighting how cultural, social and educational processes are shaped by a multitude of tangible and intangible factors within the context that generates them. As a consequence, the creation of significant opportunities for outdoor learning throughout everyday life should rely on the promotion of meaningful connections between people, communities, and contexts, highlighting the relational value of education for all people, including those with disabilities (Aiello & Giaconi, 2024; d'Alonzo & Giaconi, 2024).

Following these considerations, the creation of inclusive learning ecosystems puts forth the need to foster equity and participation, welcoming learners' diversity in all life contexts through flexible and personalised solutions that can enhance community engagement (UN, 2006, 2015; Bocci, 2020). Such a trajectory draws on the guidance offered by Special Pedagogy principles and practices, suggesting how a bio-psycho-social approach (WHO, 2001) can orient the design of inclusive contexts through the removal of barriers and the provision of facilitators, effectively addressing the dynamic and unique relationships between people and environments (Giaconi, 2015; Caldin, 2022; Giaconi et al., 2021, 2024). Accordingly, in line with the UN Convention on the Rights of Persons with Disabilities (2006), accessibility emerges not only as a fundamental right, but also as a pedagogical resource, aimed at guaranteeing social inclusion "in all aspects of life" (p. 6) by increasing opportunities for active involvement. As noted by scientific literature, the promotion of active participation can be interpreted as "the powerful level of inclusion" (Pinnelli et al., 2024, p. 349), highlighting how all life contexts represent constitutive dimensions of each person's existential path (Giaconi, 2015; Giaconi & Del Bianco, 2025). In this sense, Special Pedagogy frameworks can embrace and value diversity, generating concrete opportunities for full participation and, therefore, for the achievement of significant levels of Quality of Life in persons with disabilities (Schalock & Verdugo Alonso, 2002, 2006; Giaconi, 2015).

In this scenario, universities can represent key agents in the creation of virtuous and sustainable learning ecosystems, promoting innovation through the synergy with local communities and the establishment of generative networks (Del Gottardo & Rossiello, 2022; Giaconi et al., 2023). Consequently, scientific research represents a vital resource to promote an inclusive culture across life contexts (Giaconi et al., 2024), opening a fruitful dialogue with the territory to transform theoretical knowledge into impactful practices while orienting communities towards accessibility-driven innovation paths. Building on these considerations, this contribution proposes a research protocol for the development of inclusive solutions to support outdoor learning in leisure settings, illustrating an application scenario related to urban and natural heritage fruition supported by Augmented Reality technologies, co-designed with people with disabilities (Giaconi, 2015; Giaconi et al., 2024).

Leisure and technological innovation for Quality of Life

Following an ecosystemic approach, education can be understood as a process that extends beyond formal settings, reaching out to all life contexts in light of their value for personal and community growth, including leisure settings (Giaconi et al., 2023; Giaconi & Del Bianco, 2025). According to scientific studies, leisure can be defined as a complex dimension that derives from the interconnection between the availability of free time, the conduction of freely chosen activities and the personal perception of pursuing personal gratification through them (Purrington & Hickerson, 2013; Chick, 2016; Auger et al., 2018; Tokarski & Zarotis, 2020). In this sense, leisure can encompass a wide variety of experiences: from play to sports, from resting to entertainment, from cultural life to recreation (Iso-Ahola & Baumeister, 2023). As underlined by related literature (Hunnicutt, 2020; Tokarski & Zarotis, 2020), leisure represents a central and independent dimension in contemporary societies, and has experienced significant growth in its infrastructures, encompassing rights and policies, goods and services, professional roles, and scientific research. While the choice of the most relevant forms of leisure may vary between people and along the life course, studies confirm how, regardless of that, this dimension retains a crucial role in determining people's wellbeing and their level of participation in social life (Tokarski & Zarotis, 2020; Iso-Ahola & Baumeister, 2023).

In this context, the rationale for focusing on leisure settings lies in the recognition of this dimension as a fundamental human right (UN, 2006; WLO, 2020), and the acknowledgment of its relationship with Quality of Life (Felce & Perry, 1995; WHO, 1995; Iso-Ahola & Park, 1996; Cummins, 1997; Schalock & Verdugo, 2002, 2006;

Giaconi, 2015; Del Bianco, 2019). In this direction, leisure can be conceptualised both as a "life enricher" and "social indicator" (Schalock & Verdugo, 2002, p. 25), representing a central resource to promote social inclusion, active participation, self-determination and personal development (Giaconi & Del Bianco, 2025). Accordingly, the pedagogical value of leisure unfolds in the provision of opportunities to promote self-realisation, active participation and social inclusion (Aitchison, 2009; Macbeth, 2010; Giaconi, 2015; Giaconi & Del Bianco, 2025), highlighting how such a dimension can be interpreted as a source of meaning *in* life and *of* life (Iso-Ahola & Baumeister, 2023). Because of these reasons, opportunities to engage in leisure settings are closely tied to the promotion of inclusive learning ecosystems for all people, including those with disabilities (Giaconi et al., 2024; Giaconi & Del Bianco, 2025). However, as highlighted by related studies, safeguarding the right to full participation in leisure contexts still faces significant challenges, particularly related to the availability tangible and intangible resources to support the involvement of all people: from accessible settings/tools to professionals' inclusive training (Bantekas, 2022; Lansdown, 2022; Byrne, 2024; Giaconi et al., 2024). As a consequence, the dimension of leisure represents an urgent area of investigation to promote equal opportunities especially in outdoor learning, representing a generative space for the promotion of inclusive processes and meaning-oriented planning (Giaconi & Del Bianco, 2025). Therefore, exploring leisure in this perspective allows us to understand how accessible environments and practices can transform everyday experiences into meaningful learning opportunities, particularly in outdoor contexts.

Against this backdrop, innovative technologies, such as Augmented Reality (AR) systems, can represent a viable resource to enhance active participation and meaningful learning in leisure. Specifically, Augmented Reality can be defined as a technology that superimposes computer-generated information on the real world, enhancing it through the provision of a composite visualisation that unites concrete reality with synthetic representations (Wellner et al., 1993; Craig, 2013). Previous studies show how AR systems can provide adaptable and flexible supports to educational processes, offering innovative opportunities for authentic, meaningful, and personalised learning experiences (Garzón & Acevedo, 2019; Quintero et al., 2019; Giaconi et al., 2021; Dhaas, 2024; Giaconi & Del Bianco, 2025). However, several limits concerning its application within inclusive perspectives are highlighted by scientific literature as well. Such limits include its widespread application as an individual support rather than a tool to enhance shared experiences, the frequent lack of accessibility features, and the nearly total absence of applications and systems that are co-developed with people with disabilities (Sheehy et al., 2019; Dudley et al., 2023; Creed et al., 2024). As a consequence, there is an urgent need to identify theoretical and practical guidelines for the

promotion of technology-driven solutions that could enhance outdoor learning in leisure settings through an accessibility-by-design and inclusive approach (Caldarelli et al., 2023; Giaconi et al., 2024; Rossi et al., 2024).

In light of these considerations, the experimentation and validation of standardised protocols and transferable procedures can support the use of AR technologies for the creation of meaningful, sustainable and accessible outdoor learning experiences in leisure settings, following an "ecological perspective of inclusion" (Medeghini, 2018, p. 118).

Research protocol

As anticipated in the introduction, this study aims at proposing a research protocol for the development of inclusive solutions to support outdoor learning in leisure settings. The protocol is built upon a participatory research approach (Hall, 1975; Cornwall & Jewkes, 1995; May, 2024), aiming at the active involvement of people with disabilities through the combination of the theoretical and operational frameworks of both Universal Design for Learning (UDL) (Savia, 2016) and co-design (Steen, 2013; Giaconi et al., 2020, 2024).

The choice of integrating UDL with co-design derives from the opportunities that both frameworks offer for the design of inclusive experiences in outdoor learning. Specifically, UDL represents a foundational paradigm to frame learning processes within the ecosystems they take place in, highlighting the value of design practices, didactic strategies and material supports in promoting inclusive actions within formal and non formal educational settings (Rose & Meyer, 2002; Izzo, 2012; Savia, 2016; Bochicchio & Pennazio, 2024), drawing from the concept of Universal Design (Mace, 1985; Goldsmith, 2007). As highlighted by previous studies in Special Pedagogy (Aiello & Giaconi, 2024; d'Alonzo & Giaconi, 2024), UDL serves as a crucial resource to promote an informed and meaningful use of technologies to support accessible and inclusive outdoor learning experiences, responding to all people's personalisation needs (Rose et al., 2014; Cottini, 2019; Caldarelli et al., 2023; Giaconi et al., 2021, 2024). In this sense, UDL can support the use of technologies as facilitators across life contexts, enhancing social participation through an accessibility-by-design approach (WHO, 2001; Goldsmith, 2007). In parallel, co-design (Giaconi et al., 2020, 2024), can be understood as a collective process of exploration and creativity, where multiple actors are actively and equally engaged to find solutions aimed at fostering communities' wellbeing (Titchkosky, 2011; Steen, 2013). In this sense, within co-design experiences, participants can collaborate to identify unique needs and challenges, propose potential solutions,

and experiment with them in practice, with the ultimate goal of generating positive transformations (Sarmiento-Pelayo, 2015; Del Bianco et al., 2024). The perspective of co-design adopted in this study is therefore based on the dynamic intersection between Special Pedagogy theoretical expertise and community involvement, promoting critical inquiry and imagination as key resources to foster social innovation and inclusion (Shogren et al., 2022; Del Bianco et al., 2024; Giaconi et al., 2024). Overall, the combination of UDL and co-design principles and practices can ensure the compliance to accessibility standards while making space for context-specific needs and challenges based on stakeholders' feedback, leading towards the design and development of inclusive, creative and community-led solutions for outdoor learning.

Following the complementarity of these approaches, the proposed research protocol is composed of the following key steps, as illustrated in Figure 1:

1. Identification of Universal Design for Learning requirements within the specific outdoor learning application scenario;
2. Preliminary prototype creation, following the identified UDL requirements;
3. Co-design: testing of the preliminary prototype with participants;
4. Co-design: joint work to identify challenges and solutions through participatory research methodologies;
5. Co-design: refinement of the prototype according to the identified solutions;
6. Reiteration(s) of co-design phases;
7. Creation of the inclusive learning experience for outdoor learning.

With reference to the specific methodological tools implemented to support the co-design activities, focus groups (Liamputtong, 2011) involving people with disabilities were held to discuss accessibility needs and identify strategies and solutions aimed at increasing the inclusive potential of the prototypes. Participants' insights were then analysed through the use of Qualitative Content Analysis (Schreier, 2012) in order to structure and clarify their feedback and insights, providing a coherent overview of the refinements to be made.

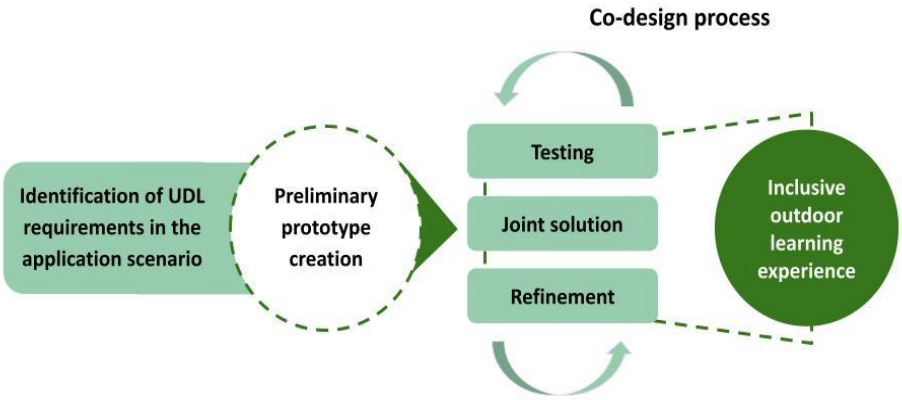

Figure 1: Proposed research protocol

As anticipated, the proposed research protocol was tested within a specific application scenario related to outdoor learning in urban and natural heritage fruition. In relation to the focus of this contribution, we will present the preliminary prototype construction and the first iteration of co-design activities involving a group of people with disabilities (steps #1, #2, #3 and #4) in the following paragraph.

Co-design application scenario

The research protocol presented in the previous paragraph was applied to the design and development of an AR-based system consisting in an interactive map reproducing the territory of Macerata (Italy), aimed at creating an inclusive experience to support outdoor learning in the exploration of the area's urban and natural heritage.

The identification of Universal Design for Learning requirements (step #1) consisted in a brainstorming among researchers regarding the possible solutions and strategies to ensure that the interactive map would follow UDL main principles. To this end, the research team focused on providing multiple means of interaction with the prototype, choosing to integrate visual, tactile and auditory information by combining AR technology, 3D print, a programming board and touch sensors.

Following these directions, the preliminary prototype development (step #2) consisted in the creation of a 3D-printed tactile map of the city of Macerata and its surrounding areas, connected to a speaker and a projector through a conductive system, as illustrated in Figure 2. The technological setup, supported by an Arduino-based programming board, enables tactile exploration to trigger both videomapping effects and the playback of music or customisable sounds. Specifically, by touching the elements of the map, people can activate the satellite view projection of the city's urban and natural landscapes while listening to audio descriptions related to the elements they are interacting with (e.g., monuments, natural areas, and other points of interest). Through the integration of multiple means of interaction and communication, every person can choose their preferred solution to learn about the city of Macerata's urban and natural heritage, supporting their outdoor learning experience.

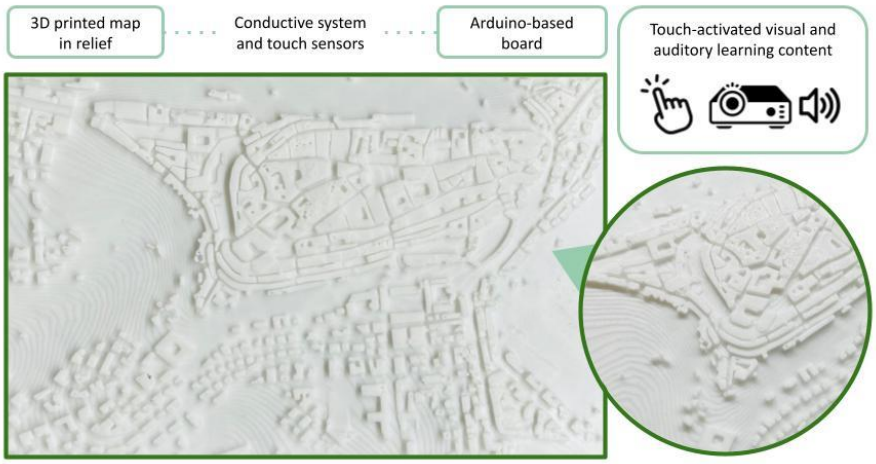

Figure 2: AR-based interactive map preliminary prototype

The co-design activities (steps #3 and #4) involved a group of 12 participants with and without disabilities. In the testing phase (step #3), participants were firstly briefed on the scope of the co-design session and the features of the AR-based technology. After signing informed consent and providing anagraphic data, every participant was allowed to freely interact with the prototype for approximately 10 minutes, with the support of a researcher as facilitator. Lastly, a focus group was held with all participants to identify their unique needs, gather feedback and discuss possible refinements (step #4), using the following guiding questions:

- What are the main limits and challenges you faced during the interaction with the AR-based map?
- What solutions could be implemented to overcome such limits and challenges and create an inclusive system for outdoor learning?

The focus group discussion resulted in the joint identification of three main challenges and their corresponding solutions, which are synthetised in the analysis of the insights shown in Table 1.

In the first place, participants noted that the use of an interactive map to support outdoor learning of urban and natural heritage could benefit personalisation features not only at the level of interaction, but also with reference to the specific contents related to urban and natural heritage that one wishes to learn about. While discussing this aspect, participants underlined the added value of creating different paths to support outdoor learning in the exploration of a city or a territory, stating how they usually utilise mobile devices to navigate urban and natural environments to have this kind of flexibility of paths and contents. Following this suggestion, researchers proposed the integration of NFC sensors into the tactile map: by bringing the smartphone close to different points of interest in the map, the NFC sensors can launch specific heritage routes via Google Maps on the user's device. Through this solution, the interactive map can be complemented by the use of personal devices, ensuring a more flexible and customisable experience in which each person can select their preferred contents.

Secondly, participants expressed how they experienced challenges concerning autonomy in both the use of the map and the conceptualisation of its embedded contents. After discussing possible suitable solutions to deliver a support system that could better contextualise the elements in the map, the group agreed upon the idea of including an interactive legend containing visual and tactile symbols, enabling people to recognise and differentiate the various points of interest and areas of the map (e.g., natural landmarks, cultural sites, other points of interest, and so on). This proposal reflects participants' broader concern with ensuring that accessibility solutions go beyond functional navigation to support meaningful cultural engagement in outdoor contexts. According to participants, such a solution can enhance the outdoor learning experience not only by supporting comprehension and cultural accessibility, but also by fostering autonomy in the interaction with technology.

Lastly, participants highlighted the need to create distinct supports according to the informational purpose of the map, stressing the need to differentiate between orientation-related content and content concerning urban and natural heritage. To

address this challenge, they proposed the creation of two separate tactile maps: one dedicated to spatial orientation and another focused on urban and natural points of interest. This distinction, according to participants, would make the experience clearer, allowing people to approach the outdoor learning experience in a more structured and accessible way. Together, these tools can jointly support outdoor learning without generating overlaps between different types of information. This insight underscores that accessible technological solutions should be conceived and designed not merely as navigational aids or informational supports, but rather as true mediators of cultural participation and inclusive learning.

Identified challenges	**Co-designed solutions**
Need to support personalised outdoor learning	Creation of a NFC system embedding Google Maps contents
Need to support conceptualisation and understanding in outdoor learning	Creation of an interactive tactile legend illustrating key points of interest
Need to support outdoor learning through multiple supports	Design of two distinct maps: one for spatial orientation and one for heritage information

Table 1: Challenges and solutions related to the AR-based interactive map

Overall, participants appreciated the idea of providing multiple means of interaction with the map, underlining its potential to meet diverse learning styles in outdoor experiences. Moreover, they recognised the interactive map's potential to foster social experiences and situated learning, as the AR-based system encouraged collaborative exploration and dialogue among people when discovering the contents of the map. In this sense, the exploration of urban and natural heritage through the prototype was perceived as an opportunity to share interpretations, exchange perspectives, and co-construct meaning in outdoor learning experiences. Accordingly, the experience offered a context in which experimentation, reflection, and collaboration could converge to generate new ways of engaging with heritage in outdoor settings. Such dynamics highlight how AR can amplify participation and social interaction in outdoor learning experiences.

Perspectives and conclusions

This research experience highlights how leisure settings can represent privileged contexts for developing inclusive environments aimed at guaranteeing accessibility

and full participation for all people in outdoor learning. Specifically, the proposed protocol was shown to effectively support the promotion of inclusive processes within outdoor learning, leveraging innovative technologies while maintaining a person-centred approach in the provision of situated and authentic educational experiences. Providing a frame of reference to orient the use of supports like AR technology, 3D print, touch sensors and NFC systems, the illustrated research protocol can represent a scalable and transferable resource to orient teachers, educators and institutions in the creation of meaningful opportunities for outdoor learning. To this end, integrated systems such as the presented interactive map can be proposed as didactic mediators in workshop-based activities, supporting interconnected, inclusive, and sustainable educational processes in outdoor contexts. Such a perspective resonates with the idea that learning represents a dynamic and relational process based on the interaction between people, communities, and environments, acknowledging how every life context retains a pedagogical value and represents a living ecosystem that can foster social inclusion, active participation and personal development, enhancing Quality of Life (Giaconi, 2015; Giaconi et al., 2023; Aiello & Giaconi, 2024; d'Alonzo & Giaconi, 2024; Giaconi & Del Bianco, 2025) (Figure 3).

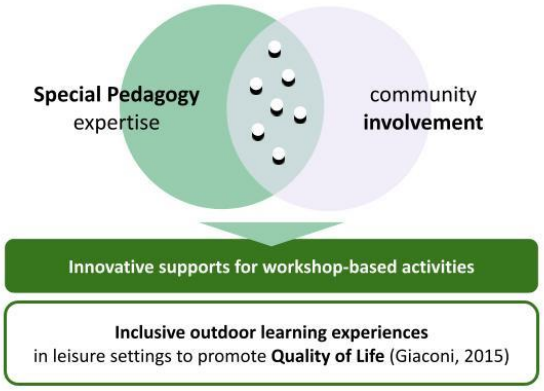

Figure 3: Creation of the inclusive learning experience for outdoor learning

The co-design process illustrated in this contribution appears to confirm that technological innovation, when framed within Special Pedagogy expertise and leveraged through active community involvement, can represent a crucial asset to

promote inclusive processes across life contexts, offering innovative pathways of research and experimentation (Giaconi et al., 2024). In this sense, the application of Universal Design for Learning principles was complemented by the fundamental contribution of people with disabilities, through their unique insights and feedback. Such an approach allowed the researchers to identify innovative strategies to bridge technological development with pedagogical principles. Specifically, the co-design process facilitated the identification of functional requirements, the testing of inclusive prototypes, and the definition of concrete improvements. In this sense, the proposed approach allowed for the generation of effective, context-related solutions which could respond to diverse needs and enhance active participation. As highlighted by previous works (Giaconi et al., 2020, 2021, 2024), the adoption of participatory methodologies shows how accessibility is not a mere checklist to complete, but rather a dynamic and relational process that can foster empowerment and self-advocacy (Del Bianco, 2019), guarantee equal rights and social impact (Taddei, 2017), strengthen community involvement (Titchkosky, 2011; Shogren et al., 2022), and, lastly, lead to the generation of meaningful opportunities for authentic outdoor learning experiences. In this direction, the involvement of people with disabilities as active protagonists of the research process led to "some better, more lively and imaginative ways to conceive of a collective's version of problems as well as its versions of answers or solutions" (Tichkosky, 2011, p. 131).

In conclusion, in the creation of inclusive learning ecosystems, ecological awareness appears to represent both a means and an end, situating this endeavour in the continuous dialogue with stakeholders and the capacity to generate synergies between micro-level practices (such as co-design) and macro-level strategies (such as institutional policies for accessibility and inclusion) (Giaconi et al., 2023; Giaconi & Del Bianco, 2025). In this context, technologies are not conceptualised as an alternative to traditional outdoor learning experiences, but rather as an amplifier that can promote social inclusion through innovative means, supporting their educational impact in terms of learners' participation. As a result, the generative and dynamic intersection between Special Pedagogy knowledge, technological innovation, and participatory research approaches represents a promising trajectory to support inclusive and meaningful outdoor learning experiences, enhancing Quality of Life (Giaconi, 2015) and leading communities towards more inclusive, interconnected and sustainable cultural, social and educational processes.

References

Aiello, P., & Giaconi, C. (2024). *L'Agire inclusivo. Interfacce pedagogiche e didattiche. Manuale per l'insegnante*. Brescia: Morcelliana Scholé.

Aitchison, C. (2009). Exclusive discourses: leisure studies and disability. *Leisure Studies*, *28*(4), 375–386. https://doi.org/10.1080/02614360903125096.

Auger, D., Roult, R., & Gravelle, F. (2018). *Introduction aux études en loisir*. Repentigny: Les éditions Reynald Goulet inc.

Bocchicchio, F., & Pennazio, V. (2024). Progettare l'inclusione nella prospettiva dell'Universal Design for Learning. In P. Aiello & C. Giaconi (Eds.), *L'agire inclusivo. Interfacce pedagogiche e didattiche. Manuale per l'insegnante* (pp. 119–132). Brescia: Morcelliana Scholé.

Bocci F. (2020), L'inclusione come spinta istituente. Immaginare, abitare e cambiare i contesti educativi e formativi. In M. C. Rossiello (Ed.), *Narrare l'inclusione. Riflessioni e prospettive nell'educazione alle diversità* (pp. 143–168). Roma: Edizioni Conoscenza.

Bantekas, I. (2022). The right of access to sport and recreation for disabled persons under international law: What does it really entail?. *Loyola of Los Angeles International and Comparative Law Review*, *45*, 157. https://digitalcommons.lmu.edu/ilr/vol45/iss3/1.

Byrne, S. (2024). The Right to Leisure for Children with Disabilities: Towards Greater Awareness and Implementation. *International Journal of Law and Societal Studies*, *7*, 369–390. https://doi.org/10.1007/s41978-024-00171-3.

Caldarelli A., D'Angelo I., & Del Bianco N. (2023). Digital Inclusion: le percezioni dei docenti di sostegno in formazione. In F. Peluso Cassese (Ed.), *Ricerche in neuroscienze educative. Il futuro prossimo dell'educazione nell'universo digitale* (pp. 158-159). Roma: Edizioni Universitarie Romane.

Caldin, R. (2022). *Pedagogia speciale e didattica speciale/2: Le origini, lo stato dell'arte, gli scenari futuri*. Trento: Erickson.

Canevaro, A. (2006). *Le logiche del confine e del sentiero: una pedagogia dell'inclusione, per tutti, disabili inclusi*. Trento: Erickson.

Chick, G. (2016). Leisure. In J. Jafari & H. Xiao (Eds.), *Encyclopedia of Tourism*. (pp. 548–551). Cham: Springer.

Cornwall, A., & Jewkes, R. (1995). What is participatory research?. *Social science & medicine*, *41*(12), 1667-1676. https://doi.org/10.1016/0277-9536(95)00127-S.

Cottini, L. (2019). *Universal Design for Learning e curricolo inclusivo*. Firenze: Giunti Edu.

Craig, A. B. (2013). *Understanding augmented reality: Concepts and applications*. San Francisco: Morgan Kauffman.

Creed, C., Al-Kalbani, M., Theil, A., Sarcar, S., & Williams, I. (2024). Inclusive augmented and virtual reality: A research agenda. *International Journal of Human–Computer Interaction*, *40*(20), 6200-6219. https://doi.org/10.1080/10447318.2023.2247614.

Cummins, R. A. (1997). *Comprehensive Quality of Life Scale - Intellectual/Cognitive Disability. Fifth Edition (ComQol-I5)*. School of Psychology Deakin University.

d'Alonzo, L., & Giaconi, C. (2024). *Manuale per l'inclusione*. Brescia: Morcelliana Scholé.

Del Bianco, N. (2019). *Autodeterminazione nelle persone con disabilità intellettive. Studi, ricerche e questioni di pedagogia speciale*. Milano: FrancoAngeli.

Del Bianco, N., D'Angelo, I., Caldarelli, A., Shogren, K., & Giaconi, C. (2024). Co-designing Inclusive Museums with People with Intellectual Disabilities: A Pilot Study in Immersive Virtual Environments. *The International Journal of the Inclusive Museum*, *18*(1), 63-81. https://doi.org/10.18848/1835-2014/CGP/v18i01/63-81.

Del Gottardo, E., & Rossiello, C. M. (2022). Terza missione e innovazione sociale: lo spin-off universitario "Io faccio futuro". In M. Pavone, A. Arenghi, E. Borgonovi, F. Ferrucci, E. Genovese & A. Pepino (Eds.), *Un ponte tra l'Università e mondo del lavoro per l'inclusione e la vita indipendente* (pp. 220-233). Milano: FrancoAngeli.

Dhaas, A. (2024). Augmented reality in education: a review of learning outcomes and pedagogical implications. *American Journal of Computing and Engineering*, *7*(3), 1-18. https://doi.org/10.47672/ajce.2028.

Dudley, J., Yin, L., Garaj, V., & Ola Kristensson, P. O. (2023). Inclusive Immersion: a review of efforts to improve accessibility in virtual reality, augmented reality and

the metaverse. *Virtual Reality*, *27*(4), 2989–3020. https://doi.org/10.1007/s10055-023-00850-8.

Felce, D., & Perry, J. (1995). Quality of life: Its definition and measurement. *Research in developmental disabilities*, *16*(1), 51-74. https://doi.org/10.1016/0891-4222(94)00028-8.

Garzón, J., & Acevedo, J. (2019). Meta-analysis of the impact of Augmented Reality on students' learning gains. *Educational Research Review*, *27*, 244-260. https://doi.org/10.1016/j.edurev.2019.04.001.

Giaconi, C. (2015). *Qualità di Vita e adulti con disabilità. Percorsi di ricerca e prospettive inclusive*. Milano: FrancoAngeli.

Giaconi, C., Ascenzi, A., Del Bianco, N., D'angelo, I., & Capellini, S. A. (2021). Virtual and Augmented Reality: A Pilot Study. *The International Journal of the Inclusive Museum*, *14*(1), 95-106. https://doi.org/10.18848/1835-2014/CGP/v14i01/95-106.

Giaconi, C., D'Angelo, I., Marfoglia, A., Gentilozzi, C. (2023). *Ecosistemi formativi inclusivi*. Milano: FrancoAngeli.

Giaconi, C., & Del Bianco, N. (2025). *La Pedagogia Speciale per il Progetto di Vita*. Lecce: Pensa MultiMedia.

Giaconi, C., Del Bianco, N., D'Angelo, I., Ceccacci, S., Borsini, L., & Shogren, K. (2024). Museum accessibility and people with disabilities: the challenge of co-designing pathways. *Giornale italiano di educazione alla salute, sport e didattica inclusiva*, *8*(2), 1-21. https://doi.org/10.32043/gsd.v8i2.1092.

Giaconi C., Taddei A., Del Bianco N., Caldarelli A., D'Angelo I. (2020). Dalla "voce degli studenti" alla co-progettazione di percorsi inclusivi: uno studio di caso. *SIRD*, *2*, 186–193.

Goldsmith, S. (2007). *Universal design*. London: Routledge.

Hall, B. (1975). Participatory Research: An Approach for Change. *Convergence, 2*(3), 24–32.

Hunnicutt B. (2020). *The Age of Experiences*. Philadelphia: Temple University Press.

Iso-Ahola, S. E., & Baumeister, R. F. (2023). Leisure and meaning in life. *Frontiers in psychology*, *14*, 1074649. https://doi.org/10.3389/fpsyg.2023.1074649.

Iso-Ahola, S. E., & Park, C. J. (1996). Leisure-related social support and self-determination as buffers of stress-illness relationship. *Journal of Leisure research*, *28*(3), 169-187. https://doi.org/10.1080/00222216.1996.11949769.

Izzo, M. V. (2012). Universal Design for Learning: Enhancing Achievement of Students with Disabilities. *Procedia Computer Science*, *14*, 343-350. https://doi.org/10.1016/j.procs.2012.10.039.

Lansdown, G. (2022). "Article 31: The Rights to Rest, Play, Recreation, and Cultural and Artistic Activities." In Z. Vaghri, J. Zermatten, G. Lansdown & B. Ruggiero (Eds.), *Monitoring State Compliance with the UN Convention on the Rights of the Child. Children's Well-Being: Indicators and Research, vol 25* (pp. 271-280). Cham: Springer.

Lepri, C. (2011). *Viaggiatori inattesi: appunti sull'integrazione sociale delle persone disabili*. Milano: FrancoAngeli.

Liamputtong, P. (2011). *Focus group methodology: Principle and practice*. Thousand Oaks: Sage.

Macbeth, J. L. (2010). Reflecting on disability research in sport and leisure settings. *Leisure Studies*, *29*(4), 477–485. https://doi.org/10.1080/02614367.2010.523834.

Mace, R. (1985). Universal Design: Barrier-Free Environments for Everyone. *Designer's West*, 33(1), 147-152.

May, E. (2024). Critical pedagogy and disability in participatory research: a review. *Information and Learning Sciences*, *125*(7/8), 437-455. https://doi.org/10.1108/ILS-02-2023-0021.

Medeghini, R. (2018), Uscire dall'inclusione? L'inclusione scolastica tra problematizzazione, ambiguità e normalizzazione. In D. Goodley, S. D'Alessio, B. Ferri, F. Monceri, T. Titchkosky, G. Vadalà, E. Valtellina, V. Migliarini, F. Bocci, A. D. Marra, & R. Medeghini (Eds.), *Disability Studies e inclusione. Per una lettura critica delle politiche e delle pratiche educative* (pp. 205–230). Trento: Erickson.

Pinnelli, S., Fiorucci, A., Sorrentino, C., Baccassino, F., & Abbate, E. (2024). Gli indicatori dell'inclusione scolastica: dal talento alle opportunità. In Società Italiana di Pedagogia Speciale (SIPeS) (Ed.), *L'inclusione non si ferma. Cammina sempre. Volume in ricordo di Andrea Canevaro* (pp. 343–354). Trento: Erickson.

Purrington, A., & Hickerson, B. (2013). Leisure as a Cross-Cultural Concept. *World Leisure Journal,* 55, 125-137. https://doi.org/10.1080/04419057.2013.782564.

Quintero, J., Baldiris, S., Rubira, R., Cerón, J., & Velez, G. (2019). Augmented reality in educational inclusion. A systematic review on the last decade. *Frontiers in Psychology*, *10*, 1835. https://doi.org/10.3389/fpsyg.2019.01835.

Rose, D. H., Gravel, J. W., & Gordon D. (2014). Universal design for learning. In L. Florian (Ed.), SAGE handbook of special education, 2° ed (pp. 441-454). Thousand Oaks: Sage.

Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: universal design for learning*. VA: Association for Supervision and Curriculum Development.

Rossi M., Berardinetti V., Peconio G., & Simonetti C. (2024). Didattica Museale e Realtà Virtuale: quali prospettive educative?. *Nuova Secondaria*, (6), 381–391. http://digital.casalini.it/5748622.

Sarmiento-Pelayo, M. P. (2015). Co-design: A central approach to the inclusion of people with disabilities. *Revista de la Facultad de Medicina*, *63*, 149-154. https://doi.org/10.15446/revfacmed.v63n3sup.49345.

Savia, G. (2016). *Universal Design for Learning: La Progettazione Universale per l'Apprendimento per una didattica inclusiva*. Trento: Erickson.

Schalock, R. L., & Verdugo Alonso, M. Á. (2002). *Handbook of quality of life for human service practitioners*. Washington DC: American Association on Mental Retardation.

Schalock, R. L., & Verdugo Alonso, M. Á. (2006). *Manuale di Qualità di Vita. Modelli e pratiche di intervento* (trad. It). Brescia: Vannini.

Schreier M. (2012). *Qualitative content analysis in practice*. Thousand Oaks: Sage.

Sheehy, K., Garcia Carrizosa, H., Rix, J., Seale, J., & Hayhoe, S. (2019). Inclusive museums and augmented reality. Affordances, participation, ethics and fun. *The International Journal of the Inclusive Museum*, *12*(4), 67-85. https://doi.org/10.18848/1835-2014/CGP/v12i04/67-85.

Shogren, K. A., Caldarelli, A., Giaconi, C., D'Angelo, I., & Del Bianco, N. (2022). Co designing inclusive museum itineraries with people with disabilities: A case study

from self-determination. *Education Sciences & Society*, 2, 214-226. https://doi.org/10.3280/ess2-2022oa14611.

Steen, M. (2013). Co-design as a process of joint inquiry and imagination. *Design issues*, *29*(2), 16-28. https://www.jstor.org/stable/24266991.

Taddei, A. (2017). Università e Cooperazione Italiana in El Salvador. Un'indagine sui laboratori per la Scuola Inclusiva a Tempo Pieno. *L'INTEGRAZIONE SCOLASTICA E SOCIALE*, *16*(2), 132-143. https://rivistedigitali.erickson.it/integrazione-scolastica-sociale/it/visualizza/pdf/1420.

Titchkosky, T. (2011). *The Question of Access. Disability, Space, Meaning*. Toronto: University of Toronto Press.

Tokarski, W., & Zarotis, G. F. (2020). Definition, concepts and research about leisure time. *International Journal of Innovative Research and Knowledge*, *5*(2), 139 - 149. https://www.ijirk.com/issue-details/505.

United Nations (2006). Convention on the Rights of Persons with Disabilities. *Treaty Series*, *2515*, 3.

United Nations (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. https://sdgs.un.org/2030agenda.

Wellner, P., Mackay, W., & Gold, R. (1993). Special issue on computer augmented environments: back to the real world. *Communications of the ACM*, *36*(7), 24--26. https://doi.org/10.1145/159544.159555.

World Health Organization. WHOQOL Group. (1995). The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. *Social Science & Medicine*, *41*(10), 1403-1409. https://doi.org/10.1016/0277-9536(95)00112-k.

World Health Organization (2001). *International classification of functioning, disability and health: ICF.* World Health Organization.

World Leisure Organisation (2020). *Charter for Leisure*. https://www.worldleisure.org/wlo2019/wp-content/uploads/2021/07/Charter-for-Leisure_en.pdf.

Note dell'autore

Conflitto di interessi
Gli autori dichiarano di non avere alcun conflitto di interessi in merito alla presente pubblicazione.

Finanziamento
Questo studio non ha ricevuto finanziamenti da enti pubblici, commerciali o no-profit.

Approvazione etica
La raccolta dati è stata effettuata in forma anonima e volontaria, senza coinvolgimento diretto di strutture sanitarie o interventi clinici. Non è stata pertanto necessaria l'approvazione di un Comitato Etico.

Consenso informato
Tutti i partecipanti hanno fornito consenso informato prima di partecipare alla ricerca.

Data elaborato
20/09/2025