

## RETHINKING SPACE TO RETHINK LEARNING: DESIGNING INCLUSIVE SCHOOLS FOR ALL

**Lorenza Orlandini, & Silvia Panzavolta**

*INDIRE - National Institute of Documentation, Innovation and Educational Research (Italy)*

### Abstract

Research increasingly shows that learning environments shape participation, engagement and well-being, and that inclusion requires more than removing architectural barriers. Building on this evidence, INDIRE has advanced a view of the school as an integrated and permeable learning environment, formalised in the 1+4 Manifesto "Spaces for a New Generation of School in Italy" and subsequent studies. Grounded in Universal Design for Learning and the WHO ICF bio-psycho-social model, the framework links spatial configurations to teaching strategies and to learners' diverse functioning profiles. To support teachers' reflective planning, INDIRE developed a digital application that helps identify environmental facilitators and barriers and align space, pedagogy and student needs. Pilots in professional development contexts show the tool supports self-evaluation and guides design choices that strengthen equity and participation

**Keywords:** *Inclusion, learning environments, equity, teaching-learning activities.*

---

### 1. Learning spaces and inclusive learning processes: An ICF-informed perspective

Educational research has increasingly converged on the understanding that physical learning spaces play a decisive role in shaping learners' functioning, understood as the dynamic interaction between individual characteristics, educational activities, and environmental conditions (Barrett, 2015; Scott-Webber, 2004; Higgins et al., 2005; Manninen et al., 2007; Brooks, 2011, 2012). From an ICF perspective (WHO, 2001), learning environments are not neutral backdrops for instruction, but environmental factors that directly influence students' levels of activity and participation, as well as their well-being, motivation, and engagement (D'Alonzo, 2019). In this sense, the organization, flexibility, material configuration, and symbolic meaning of space contribute to either facilitating or restricting educational participation, depending on how they interact with learners' diverse profiles of functioning (Gennari, 1988; Cleveland, 2009). Building on this conceptual framework, INDIRE's long-term research on Innovative Learning Environments (ILEs) has progressively reframed school space as a pedagogical, organizational, and cultural device that actively mediates learning processes (Infante, Moscato, & Panzavolta, 2023). In continuity with the Manifesto 1+4 Educational Spaces for the New Millennium (INDIRE), the school is conceived as a system of interconnected environments—formal and informal, individual and collective, exploratory and reflective—each associated with specific configurations of activity, interaction, and participation (Carro & Tosi, 2023). Within an ICF-informed approach, these environments are interpreted as potential facilitators or barriers, depending on the extent to which spatial layouts, furnishings, technologies, and learning situations support autonomy, interaction, accessibility, and meaningful engagement for all students (Vanacore & Gomez Paloma, 2020).

More recent developments in INDIRE's research explicitly foreground the inclusive value of learning spaces by moving beyond a narrow focus on accessibility or the mere removal of architectural barriers. Inclusion is conceptualized as a systemic property of educational contexts, emerging from the alignment between spatial design, didactic practices, and organizational choices (Castoldi, 2020). Empirical studies and professional development initiatives promoted by INDIRE show that inclusive ILEs are not designed for specific categories of learners but aim to create sufficiently enabling conditions for the widest possible range of functioning profiles, in line with the principles of UDL (Meyer, Rose, & Gordon, 2014). Flexibility, usability, clarity of spatial affordances, and the possibility of multiple configurations emerge as key environmental features that enhance participation, self-regulation, collaboration, and well-being (Brooks, 2012; Higgins et al., 2005). From this perspective, learning environments operate as active facilitators of functioning, contributing to a cultural shift in which diversity is recognized as an ordinary dimension of educational life and inclusion is embedded within everyday pedagogical practices rather than addressed through compensatory or exceptional interventions.

## 2. Inclusive learning spaces

Since the early 2010s, INDIRE has progressively developed a coherent line of inquiry on learning environments, framing space as a key driver of pedagogical innovation and of flexible, personalised teaching practices (Tosi, 2019). Central to this perspective is the idea that learning cannot be confined to the traditional classroom alone: educational processes unfold across a variety of settings that should be intentionally designed to respond to evolving learners and to the complexity of contemporary society. This approach challenges the spatial model inherited from early twentieth-century mass schooling, largely based on standardised classrooms and transmissive pedagogies. INDIRE's research highlights the role of space in shaping how learning occurs and in creating the conditions for learning to be meaningful (Atkin, 2011), deep (Fullan, Quinn, & McEachen, 2018) and student-centred (Crumly, Dietz, & D'Angelo, 2014). The configuration of spaces—together with furniture, materials and technologies—functions as a set of affordances (Gibson, 1979) that influences the meanings students construct through learning experiences (Young, Cleveland, & Imms, 2020). Learning environments designed around functional and symbolic values (INDIRE, 2016) support diverse learning styles and enable teachers to plan activities that balance individual, collaborative, informal, exploratory and community-oriented experiences. Beyond safety requirements, spatial quality affects well-being, behaviour and learning: poorly lit, overcrowded, noisy or thermally uncomfortable environments can increase stress and reduce attention, often disproportionately affecting learners who require additional support.

This conceptual shift is synthesised in the Manifesto “1+4 Learning Spaces for a New Generation of School in Italy”, which proposes a school articulated into five interconnected environments. Each space is conceived in relation to specific pedagogical intentions, phases of learning, class organisation and students' diverse profiles, including interests, abilities and vulnerabilities. At the core lies the group learning space, which reinterprets and expands the traditional classroom. Rather than a fixed and uniform setting, it is designed to support collaborative practices and multiple forms of interaction, overcoming the rigid layout of desks in rows that historically reinforced teacher-centred instruction.

Over time, INDIRE's research has further strengthened the link between learning environments and inclusive education, drawing on the bio-psycho-social model of the WHO ICF framework (WHO, 2007; Caprino et al., 2022). Within this lens, space is understood as a contextual factor that can enable or hinder participation. Consequently, the Manifesto has been progressively elaborated to include concrete guidelines and design principles aimed at fostering inclusion through spatial organisation and use (Infante et al., 2023). In this perspective, the group learning space must ensure physical comfort—appropriate lighting, ventilation, thermal regulation, acoustic quality and clear signage—while allowing flexible configurations that support cooperative work and broad participation. Adaptability and spatial legibility are key features that help students engage meaningfully according to individual needs.

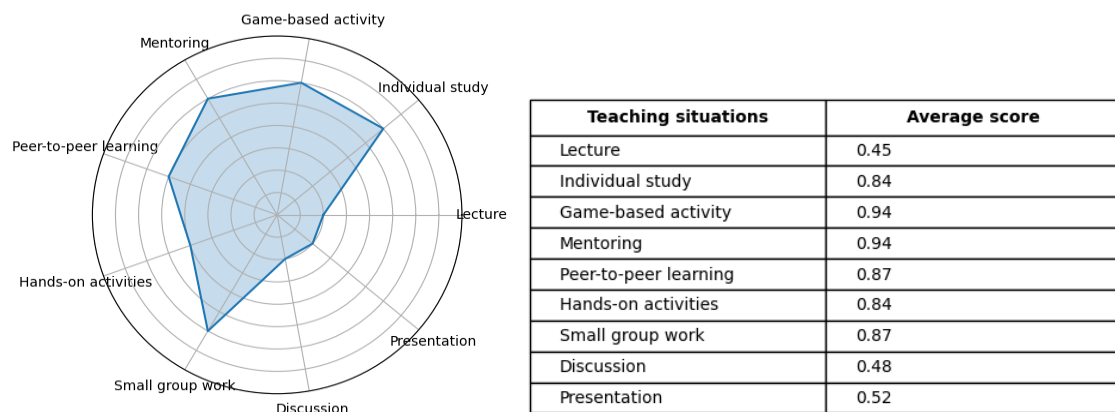
Alongside this, the individual space is designed to support autonomy, concentration and self-regulation. By limiting sensory overload and offering protected, calm settings, it responds to learners who benefit from quieter environments for reflection and focused activity, contributing to overall mental well-being. The Agora embodies the school's openness to the wider community: as a shared and representative space, it supports communication, collective identity and social belonging, and requires accessibility and effective wayfinding so that all users can navigate independently and feel recognised within it. Informal spaces play a complementary role by supporting spontaneous interaction, peer exchange and informal learning; their inclusiveness relies on being easily identifiable and usable, enriched by graphic, tactile, digital and analog supports that facilitate expression and communication without mediation. Finally, the exploration lab is dedicated to hands-on, experiential learning. Equipped with tools, materials and technologies—including digital and immersive resources - it enables differentiated and personalised approaches and encourages students to move autonomously, explore phenomena and develop talents in line with UDL principles (CAST, 2011).

To support teachers in translating these principles into everyday practice, INDIRE has developed an online application designed to guide the design and arrangement of inclusive and innovative learning environments. Grounded in the ICF bio-psycho-social model, the tool helps teachers reflect on how environmental factors can act as facilitators or barriers to learning and participation. It enables teachers to identify and configure teaching-learning settings in relation to the educational needs of individual students and the class group as a whole. By connecting pedagogical intentions, activity types and learners' functional profiles, the application supports informed decisions about spatial organisation and promotes a proactive, non-categorical approach to inclusion—encouraging flexible environments responsive to diversity rather than solutions tailored to specific diagnoses. Overall, the application acts as a practical bridge between research and practice, empowering teachers to use space as a pedagogical resource and to create learning environments that foster participation, autonomy and well-being for all learners.

### 3. The INDIRE ICF-based questionnaire

The INDIRE ICF-based questionnaire is a digital and methodological tool designed to support schools in the systematic analysis, documentation, and redesign of teaching practices and learning environments from an inclusive and ecological perspective. Structurally, the questionnaire is organized into six sections aligned with key ICF domains that are particularly relevant to the school context: learning and applying knowledge, general tasks and demands, communication, mobility, self-care, and interpersonal interactions and relationships. This structure allows teachers to explore how didactic activities, spatial configurations, organizational arrangements, and relational dynamics interact with students' functioning, participation, and well-being within everyday school life. The main objective of the questionnaire is not summative evaluation, but professional guidance and transformation. It is conceived as a reflective device that helps teachers identify whether specific activities and spaces function as facilitators or barriers to inclusion. Once completed, the questionnaire generates a radar chart that highlights teaching activities that are more or less suited to the student's needs, both to better enhance their abilities and to minimize their effort and difficulties. Interpreting the results is crucial: a score between 0 and 1 indicates an appropriate activity, whereas a score between 0 and -6 signals a potentially harmful activity that may lead to student isolation. As shown below (Figure 1), the INDIRE ICF-based questionnaire suggests the most appropriate tasks to personalize learning (i.e., peer-to-peer activities, game-based learning, small-group tasks etc.) while showing that other ones are less adequate (i.e., lecturing, discussion, etc.).

Figure 1. Rendering of the INDIRE ICF-based questionnaire.



By making these dynamics visible through structured observation, the questionnaire supports a process of informed redesign of both teaching strategies and learning environments. The underlying logic is cyclical and action-oriented: data collection leads to interpretation, which in turn informs the rethinking of activities, methods, and spatial use. One of the key strengths of the INDIRE questionnaire lies in its flexibility and scalability. It can be administered for individual students, small groups, or entire classes, making it suitable not only for students with certified special educational needs, but also for fragile learners and high-achieving students. This broad applicability reinforces a universal approach to inclusion, moving beyond compensatory logics toward proactive design for all. Moreover, the tool encourages collaboration among teachers, acting as a shared reference point between subject teachers and support teachers and fostering a common professional language grounded in the ICF framework.

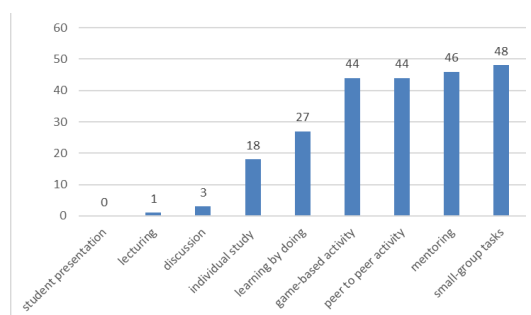
The questionnaire automatically generates visual and numerical outputs, such as radar charts, which offer immediate and intuitive feedback on the inclusiveness of proposed activities. These visualizations help teachers quickly identify areas of strength and critical issues, supporting clearer decision-making and deeper pedagogical reflection. An additional advantage is the possibility to export results in PDF format, allowing their integration into official school documentation such as Individualized Education Plans (PEI) and Personalized Learning Plans (PDP). In this sense, the questionnaire also functions as a concrete support tool for observation, documentation, and justification of instructional choices. Overall, the INDIRE questionnaire represents a bridge between theory and practice, observation and action. By embedding the ICF framework into everyday teaching and spatial planning, it promotes a pedagogy in which learning environments are no longer neutral settings, but active agents in inclusion and learning. Through its structured yet flexible design, the tool empowers teaching teams to move toward more intentional, collaborative, and inclusive educational practices.

### 4. Preliminary results

The questionnaire was tested in two online professional development contexts aimed at supporting reflection on the relationship between pedagogy, architecture, and inclusion, as well as at providing

operational guidance to participating teachers. Data collection began in 2022 within a training course on inclusive learning spaces jointly organized by the Regional School Office and INDIRE. The results allowed teachers, working individually or in small groups, to gain an initial overview of facilitating and hindering teaching situations in relation to different learning contexts and individual needs. The outcomes of each compilation (Fig. 1) subsequently guided participants, in the following phases of the course, in the design of inclusive teaching situations and learning settings, challenging the notion of the support classroom as the primary space for individualized interventions. The analysis of the 50 completed design projects shows that the most frequently proposed teaching situations are also those considered the most inclusive: small-group tasks, mentoring and peer-to-peer activities, together with game-based learning, in line with the findings reported by Mitchell (2014).

Figure 2. The most common teaching situations.



In 2025, the questionnaire was used within a training course for prospective support teachers at the lower secondary school level. During the training activities, participants were invited to use the application (on a voluntary basis) to initiate reflection on the relationship between the configuration of learning environments and teaching situations connected to the needs identified through completion of the tool. A total of 43 complete questionnaires were collected, from which several elements emerged, highlighting how the questionnaire can serve as a starting point for a broader reflection on the relationship between learning environments, spatial arrangements, and the selection of teaching situations best suited to increasing class participation and supporting teachers in reflecting on spatial configurations aligned with specific types of activities. The application's ability to maintain a holistic view of the learner - considering strengths and areas of difficulty - enables the identification of functional and contextual educational needs that cut across cognitive, relational, and behavioural dimensions. Rather than focusing on individual diagnoses, the tool promotes an interpretation of needs at both the individual and class-group levels, reinforcing the role of learning environments as key facilitators of participation. The recurring attention to dimensions such as attention regulation, interaction, and communication confirms the relevance of spatial and organizational settings in inclusive design, positioning the application as an effective bridge between the ICF framework and everyday pedagogical practice. With regard to the collected data, the compilations show that domains related to learning and relationships are frequently described as areas requiring support, even when reported difficulties are mild or moderate. In the domain *Learning and Applying Knowledge*, approximately 30% of the compilations indicate no significant difficulty, while a further 30% report mild (16.4%) or moderate (13.7%) levels of difficulty. This distribution suggests that many needs are situational rather than severe, reinforcing the importance of interventions targeting environmental and organizational factors rather than exclusively individual or remedial actions.

Even more indicative are the results related to the domain *Interactions and Interpersonal Relationships*. In this area, over one third of the compilations report mild (19.2%) or moderate (15.1%) difficulties, while only a smaller proportion indicates more severe challenges. These findings highlight the centrality of relational, behavioural, and regulatory aspects in everyday classroom dynamics, confirming that inclusive processes are strongly linked to how learning environments support interaction, participation, and social engagement. Overall, the prevalence of mild and moderate profiles across domains supports the pedagogical value of the application's approach: rather than addressing isolated or exceptional cases, the tool helps teachers interpret diffuse and emerging needs at both individual and class-group levels.

## 5. Conclusions, limits and perspectives

The results show that the application effectively supports teachers in identifying functional and contextual educational needs that extend across cognitive, relational, and behavioural domains. The prevalence of mild and moderate difficulties highlights the situational nature of many needs, emphasizing the role of learning environments as key facilitators of participation rather than focusing on individual remediation. Data related to interaction, communication, and attention regulation confirm the centrality of

spatial and organizational settings in inclusive design. The findings suggest that the tool promotes a shift from individualized support spaces toward flexible and shared learning settings. Overall, the application emerges as a valuable bridge between the ICF framework and everyday pedagogical practice, with potential for broader implementation

## References

- Atkin, J. (2011). Transforming Places for Learning. *OECD, Designing for Education: Compendium of Exemplary Educational Facilities*. Paris: OECD Publishing.
- Barrett, P. Davies, F. Zhang, Y. Barrett, L. (2015). The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis. *Building and Environment*, 89, 118-133, <https://doi.org/10.1016/j.buildenv.2015.02.013>
- Booth, A., & Ainscow, M. (2014). *Nuovo index per l'inclusione: percorsi di apprendimento e partecipazione a scuola*. Roma: Carocci.
- Brooks, D. C. (2011). Space matters: The impact of formal learning environments on student learning. *British Journal of Educational Technology*, 42(5), 719-726.
- Brooks, D. C. (2012). Space and consequences: The impact of different formal learning spaces on instructor and student behavior. *Journal of Learning Spaces*, 1(2).
- Caprino, F., Chipa, S., Galletti, A., Moscato, P., Orlandini, L., Panzavolta, S. (2022). Quando lo spazio include. Progettare ambienti di apprendimento inclusivi. *L'integrazione scolastica e sociale*, 21(1), 31-53.
- Carro, R., & Tosi, L. (2023). *Lo spazio della scuola*. Roma: Carocci.
- CAST. (2011). *Universal Design for Learning (UDL): Guidelines version 2.0*. Center for Excellence in Universal Design (2012). Building for Everyone: A Universal Design Approach.
- Castoldi, M. (2020). *Ambienti di apprendimento. Ripensare il modello organizzativo della scuola*. Roma: Carocci Editore.
- Cleveland, B. (2009). *Engaging spaces: Innovative learning environments, pedagogies and student engagement*. Melbourne: Department of Education and Early Childhood Development.
- Crumly, C., Dietz, P., & D'Angelo, S. (2014). *Pedagogies for Student-Centered Learning: Online and On-Ground*. Minneapolis, MN, 1517 Media.
- D'Alonzo, L. (2019). *Dizionario di pedagogia speciale*. Brescia: Editrice Morcelliana.
- Fullan, M., Quinn, J., & McEachen, J. (2018). *Deep learning: Engage the world, change the world*. Thousand Oaks, CA: Corwin.
- Gennari, M. (1988). *Pedagogia degli ambienti educativi*. Roma: Armando Editore
- Higgins, S., Hall, E., Wall, K., Woolner, P., & McCaughy, C. (2005). *The impact of school environments: A literature review*. London: Design Council.
- Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston, Houghton-Mifflin.
- INDIRE. (2016). *1+4 Manifesto: Spaces for a New Generation of School in Italy* <https://architetturescolastiche.indire.it/en/progetti/the-14-manifesto-for-educational-spaces/>
- Infante, P., Moscato, G., & Panzavolta, S. (Eds.). (2023). *Pensare gli spazi di apprendimento per l'inclusione: Esperienze per una progettazione innovativa nelle scuole della Toscana*. Roma: Carocci Editore.
- Manninen, J., Burman, A., Koivunen, A., Kuittinen, E., Luukannel, S., Passi, S., & Särkkä, H. (2007). *Environments supporting learning: Introduction to learning environments thinking*. Helsinki: Finnish National Board of Education.
- Meyer, A., Rose, D. H., & Gordon, D. (2014). *Universal Design for Learning: Theory and practice*. Wakefield, MA: CAST.
- Mitchell, D. (2014). *What really works in special and inclusive education. Using evidence-based teaching strategies* (2nd ed.). New York, NY: Routledge.
- Scott-Webber, L. (2004). *In sync: Environment, behavior, and the design of learning spaces*. Ann Arbor, MI: Society for College and University Planning.
- Tosi, L. (Ed.) (2019). *Fare didattica in spazi flessibili. Progettare, allestire e utilizzare ambienti di apprendimento*. Firenze: Giunti.
- Vanacore, R., & Gomez Paloma, F. (2020). *Progettare gli spazi educativi: Un approccio interdisciplinare tra architettura e pedagogia*. Roma: Editoriale Anicia.
- World Health Organization. (WHO) (2001). *International Classification of Functioning, Disability and Health (ICF)*. Geneva: World Health Organization.
- World Health Organization. (WHO) (2007). *International Classification of Functioning, Disability and Health: Children and Youth Version (ICF-CY)*. Geneva: World Health Organization.
- Young, F., Cleveland, B., & Imms, W. (2020). The affordances of innovative learning environments for deep learning: Educators' and architects' perceptions. *The Australian Educational Researcher*, 47, 721-739.