

# Environment by design

SUDESHNA CHATTERJEE

THE design of school environments extensively relies on developmental theories that categorize childhood into predictable stages. Educators are familiar with the four stages of childhood development (sensorimotor, pre-operational, concrete operational, and formal operational) established through the work of Swiss philosopher and psychologist, Jean Piaget. Universal stage theories of child development, as these have come to be known, make it easy to predict age-specific typical behaviour. However, new sociological theories of childhood challenge the Piagetian notion of the naturally developing child where every child is believed to develop in predictable stages.

The sociological child, in contrast, is seen as a unique individual rooted in the family and cultural context, and possessing feelings and experiences that are different from every other child. Typically, designers use the Piagetian knowledge about age-specific motor skills, cognitive abilities and predictable behaviour of children to define spaces for educational settings. The new sociological perspective on childhood, however, allows for a different way of looking at the preschool environment.

Loris Malaguzzi, Italian educator and founder of the most celebrated preschools in the world today – Reggio Emilia Municipal Preschools in Italy – sincerely believes that since no two children or teacher in a preschool look alike or wear the same clothes, the environment of preschools should not be made to lose its personality and look like the next preschool. Each child and teacher brings a piece of his or her culture, history, family values and personal experience to the classroom everyday. These aid in the learning and teaching process despite what the curriculum prescribes.

This article is not a critique of rival educational philosophies. Rather, it is an attempt to review the design philosophy adopted by the two different educational traditions that have most commonly influenced design thinking about the preschool environment. I have broadly classified them as the universalist tradition after Piaget, and the child-centred tradition as reflected in the Reggio Emilia approach to early childhood education. Discussing the role of the environment in conjunction with these educational traditions is important as all of us deal with children and provide for them according to our own understanding and view of childhood. At the end, I leave it to the reader to decide which design ideas are more suitable for their particular philosophy of early childhood education.

**T**he belief that the physical environment influences children's behaviour has a long tradition in early childhood education. Froebel compared his kindergarden to a garden where children could bloom as naturally as flowers. The Montessori curriculum also emphasized the importance of an ordered environment to help children learn.

Carol Weinstein (1987), working within the Piagetian tradition of child development, strongly advocates viewing the built environment as a means of achieving desired outcomes. She notes several important outcomes, broadly categorized under socio-emotional and cognitive development, in designing the preschool classroom. Motor development also appears as an important category in her study of adequate preschool classrooms. The socio-emotional outcomes achievable through planning and design according to Weinstein include: (i) self-esteem, (ii) security and comfort, (iii) self-control,

(iv) peer interaction and pro-social behaviour, and (v) sex role identification. Cognitive development outcomes include (a) symbolic expression, (b) logical thought, (c) creativity and problem-solving ability, and (d) attention span and task involvement.

To give some credit to the view of naturally developing childhood, there is empirical evidence particularly from the field of brain development, to show some correlation between the development of the human brain and maturation of the child through chronological age. However, much of that research has focused on animal brains, adult human brains and brains of children at developmental risks (Bergen & Coscia 2000). So any generalization from such models are within margins of error.

There does seem to be consensus on some facts among brain researchers as recorded by Bergen and Coscia: (i) 25% of the brain development process is complete at birth; (ii) though there are some designated major sites in the brain for particular functions such as sight, hearing, language, the brain actually functions in a very integrative and interactive manner; (iii) as 75% of the brain develops after birth, childhood experiences profoundly affect the structure and performance of individual brains; (iv) the brain's intrinsic plasticity or resilience provides some protection against negative experiences and it is only in situations of extreme neglect, abuse, starvation, illness, or environmental toxins, that any long-term damage may be caused; and (v) because the brain continues to have plasticity, experiences throughout life continue to affect its structure and functions.

**T**his new brain research indicates the relevance and adequacy of the environmental context for the development of the human brain to its full capacity. Cognitive development which is not brain development but which develops abstract representations about the world through direct and indirect experiences of a person, is by definition much more context-specific. In fact, cognitive development in human infants is strongly dependent on the proximal environment or the space immediately surrounding children including physical space, people and their different activities (Graven 2004). The time an infant spends in different surroundings plays a role in shaping memories. No wonder recent research has shown midlife benefits of preschooling for poor children. The findings suggest that with quality preschool it is possible to work wonders for the overall development of the child starting at age three (Kirp 2004).

**I**n a conference organized by the College of Public Health of the University of South Florida in January 2004, neuroscientists and architects came together to understand the processes involved in brain development in order to improve the proximal environment in child care settings. As an architect participant I learned that an infant starts with object memory followed by event memory, and then contextual memory. However, unlike Piaget's ideas of development of thought and bodily skills, the development of these three forms of memory does not take discernible long stages, but in fact develops in the first year of the infant's life.

From the perspective of environmental cognition in early childhood, the contextual memory allows the child to develop cues that permit or cause the recall of prior events and activities. Graven also made the distinction between contextual memory and source memory stating that 'contextual memory goes on for years before the child has developed source memory and is able to separate implicit feelings from conscious feelings that colour events and activities' (Graven 2004, p. 17). What this means is that sustained contact with living, playing and learning environments in childhood shape

the way we understand the world and develop our identities in the world.

**A**fter World War II strong local initiatives throughout Italy gave birth to parent-run schools, which was the beginning of the Italian tradition of strong municipally funded preschools. Though similar preschools started in other provinces, the preschools in the town of Reggio Emilia remain the most innovative and noteworthy. The municipality of Reggio Emilia currently supports 22 preschools and 13 infant/toddler centres. The ever-evolving educational philosophy of these preschools soon came to be known as the ‘Reggio Emilia approach’ and generated tremendous interest among early childhood educators worldwide, particularly in the last decade.

This child-centred approach to early childhood education considers the environment as the third teacher after the family and the school. The overarching philosophy guiding the Reggio approach is the harmonious development of the whole child in communicative, social and affective domains. Families and other citizens are invited to participate in the school, small class sizes with two teachers looking after a class of twenty children are encouraged, and special and careful attention is given to the physical settings of the schools. Every corner of every space of the typical Reggio preschool has an identity and a purpose, with rich potential to engage and communicate with the child, and is in turn valued and cared for by children and adults.

The difference in approach toward the environment between the universalist tradition of education and the more child-centred tradition is best reflected in the words of Malaguzzi, the driving force behind the Reggio schools: ‘There is a difference between the environment that you are able to build based on a preconceived image of the child and the environment that you can build that is based on the child that you see in front of you – the relationship you build with the child, the games you play. An environment that grows out of your relationship with the child is unique and fluid’ (Malaguzzi 1994, p. 52).

**O**ver the years the Reggio schools found that the physical environment becomes a valuable teacher if it is comfortable, pleasing, organized, clean, inviting and engaging. These characteristics of a learning environment are true for spaces of all scale whether big or small, open or furnished, public or private. Floor space, wall space and ceiling space are all subject to these rules (Caldwell 1997). The Reggio approach believes that the environment is best able to educate when it promotes complex, varied, sustained, and changing relationships between people, the world of first-hand experience, ideas and several different ways of expressing those ideas (Malaguzzi 1994).

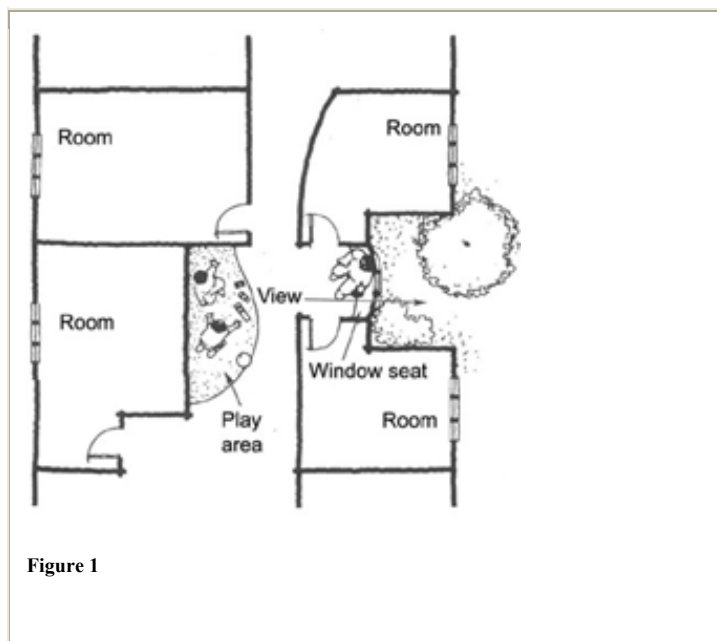
The school is considered as a living organism and part of a shared world. Children feel connected to everything that goes on in the world by being in school. They are also encouraged to observe, reflect and create their own impressions of everything that goes on. Visitors to the Reggio schools are struck by the high quality and intelligence of the artwork produced by children. The stunning study of shadows and reflections by the Reggio children show how deeply they observe the everyday environment. The reflections of children in a pool of water were not connected at the feet but the shadows were. The Reggio schools embrace each child’s creations, collective projects of teachers and students, and the ongoing research, experimentation and documentation of the pedagogical teams to construct unique identities of the preschool environments.

Despite differences in their approach to early childhood education, many common design ideas are promoted by different camps to enrich childcare settings.

Lobby and reception area: On entering a building we ask ourselves, ‘What kind of a place is this?’ In a preschool the entrance lobby has the added responsibility of assuring the child that this place is fun, interesting and will take care of him/her. On visiting two organizationally similar but physically very different preschools in the Research Triangle in North Carolina, I realized the difference a good lobby and reception area make to a centre. One of these schools had a reception tucked away in a corner and a long corridor, emanating from the entrance, abruptly ended in a windowless wall.

In the other, the reception formed a wide node connecting two wings of the school. As soon as one entered, one could see the receptionist right in front, and get glimpses of a play yard with lots of trees through the large French windows behind the reception. Light streamed in through large windows, skylights and created a warm ambience for the scattered comfortable sitting areas in the lobby. Addition of plants, an aquarium, upholstered couches, made the lobby a home-like place and an easy transition area from home to school for the young child. I came to the conclusion, and later found evidence to support my ideas (Olds 2001), that real things like comfortable seating, toys, plants, fish and birds all reflect the ‘aliveness’ of a centre and are much more convincing than a few scattered over-sized stuffed toys.

Indoor circulation: Honouring local safety codes, width of corridors can be varied especially in new constructions to generate activity nodes and areas of social contact. These areas can be adorned with children’s works, suitable furniture, plants, and indoor play structures to create distinct zones within the school. To vary the width of corridors in existing buildings, a few classroom walls can project out and create semi-private niches in the corridor (see figure 1). Seating and book shelves along well-lit corridors also cheer up the space. Try opening a few windows along the length of the corridor to bring in light and to establish contact with the outdoors.



**Internal corridors**

Adapted from Olds, *Childcare Design Guide*, 2001, p. 99.

**C**lassrooms: Working within the universalist tradition, Weinstein advises creating a classroom that reflects the presence of the child. In other words, designing walls and bulletin boards that provide different opportunities for personalizing with artwork, photographs, projects, stories, height and weight charts, and birthday lists (see figure 2). This is not very different from the Reggio approach where ample spaces and surfaces are provided to incorporate the ongoing work of children. The classrooms with glass windows opening outside as well as in the centrally located, naturally top-lit covered piazza bring in ample light. Plenty of healthy plants add colour and life to the spaces everywhere. Collages and weavings of children on glass doors and windows take on a transparent quality as light shines through them.

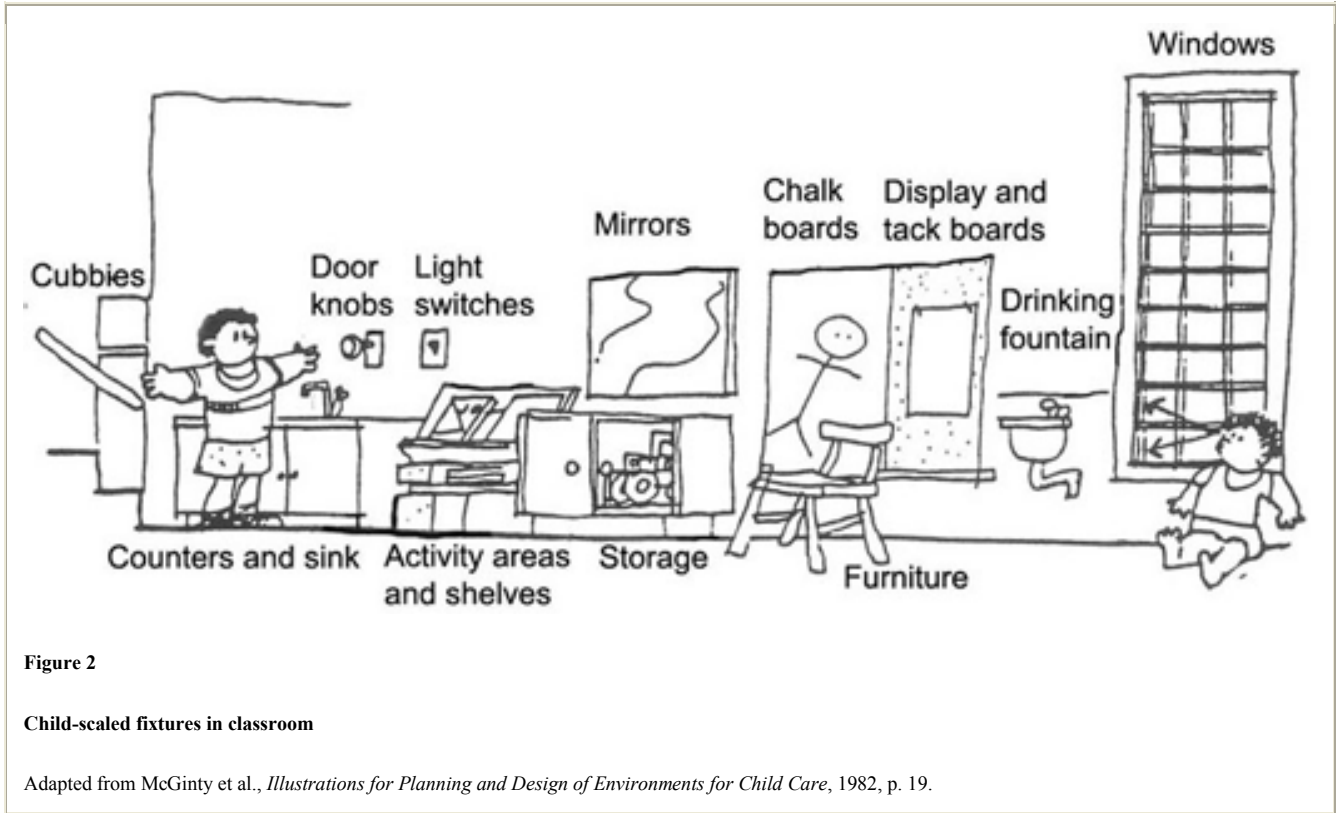


Figure 2

**Child-scaled fixtures in classroom**

Adapted from McGinty et al., *Illustrations for Planning and Design of Environments for Child Care*, 1982, p. 19.

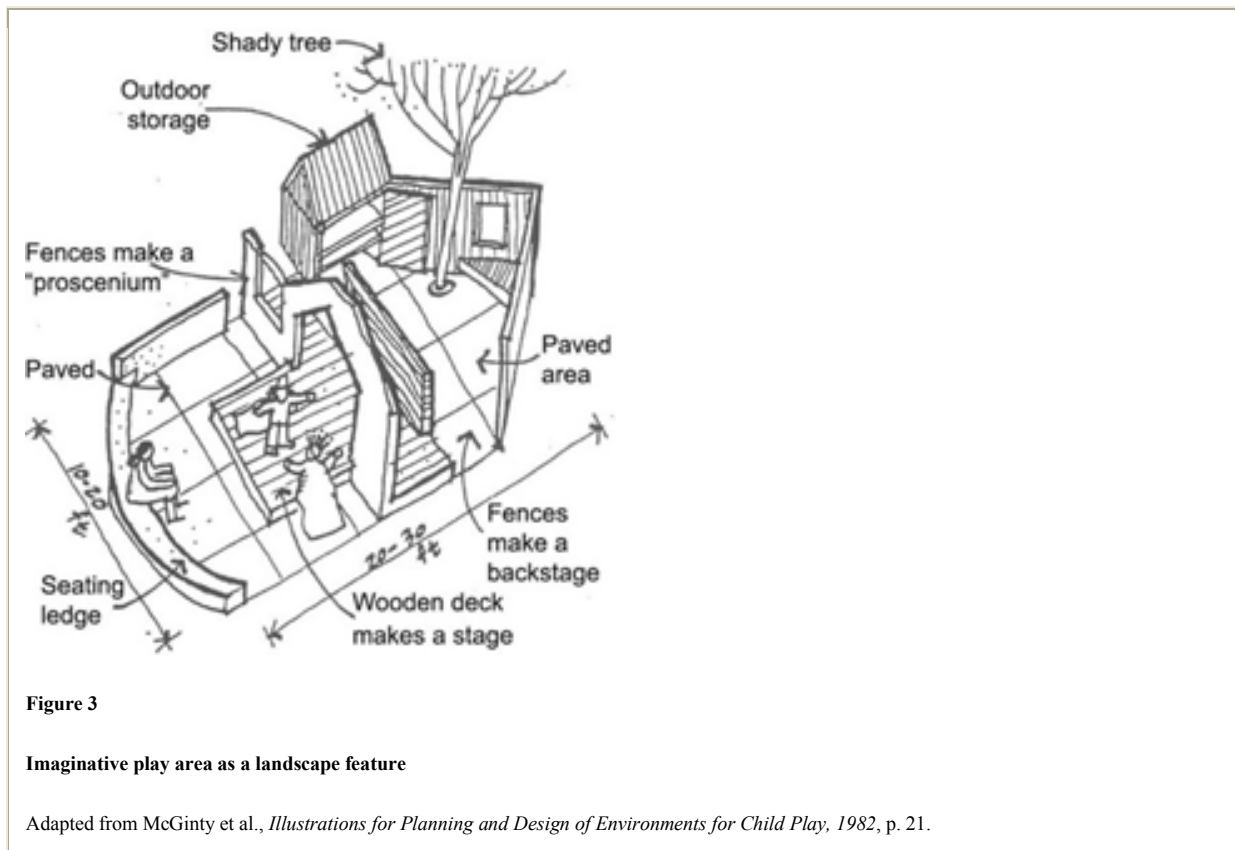
Reggio schools do not believe in expensive furnishings or furniture. Rather the colour of walls, specially shaped furniture and the clever display of simplest of objects on shelves delights the visitor of the Reggio schools. For example, shelves have mirrors lining their backs to amplify the patterns of simple objects like found shells that children pick up on their walks outdoor. Art is to be found everywhere including storage areas and bathrooms.

Child-scaled fixtures can be designed for toilets, water fountains, doorknobs, lighting fixtures, to send the message that ‘I can handle myself and the environment with competence.’ The logical organization of items in a classroom enhances the child’s understanding of space. Even very young children are able to comprehend the rationale of logical planning as this four-year-old did in his classroom (Nash 1981): ‘Over here we make lots of things, and here, we find things out. This is where we pretend, and build, and be as grown-up as anything. And this is a nice quiet place where the puzzles and books are – you can’t ride a trike or play balls or bring sand in here. This is a good place to be’ (p. 155).

The classroom from the entrance should be inviting, familiar and friendly. It is important to assure children that good things happen in the room by giving them glimpses of interesting activity areas. Mixing a variety of spaces such as by varying floor texture, ceiling and boundary heights and types of lighting can enhance the sense of comfort. Different kinds of spaces – bright as well as dim, small and cozy as well as large and open, noisy as well as quiet – need to be available to children for sensory stimulation (Weinstein 1987). Environments that are soft and responsive to touch – such as containing elements like beanbags, stuffed couches, carpeting, sand, dirt, furry animals, sling swings, clay, paint and water – are considered by many to be comfortable and less stressful (Jones & Prescott

1978).

**I**maginative play areas: The years from two to five according to Piaget are characterized by increase in representational thought particularly as children engage in pretend play and language acquisition. Evans, Shub and Weinstein (1971), suggest that preschools incorporate a special dramatic play area possibly containing a kitchen and a bedroom as these are the two areas of the house that are most familiar to children. However, others like McGinty have included dramatic play areas in the landscaped school-yards (see figure 3). To facilitate language acquisition and development in children, the natural environment plays a very important role. Designing natural schoolyards has been seen as a way to introduce nature in children's lives.

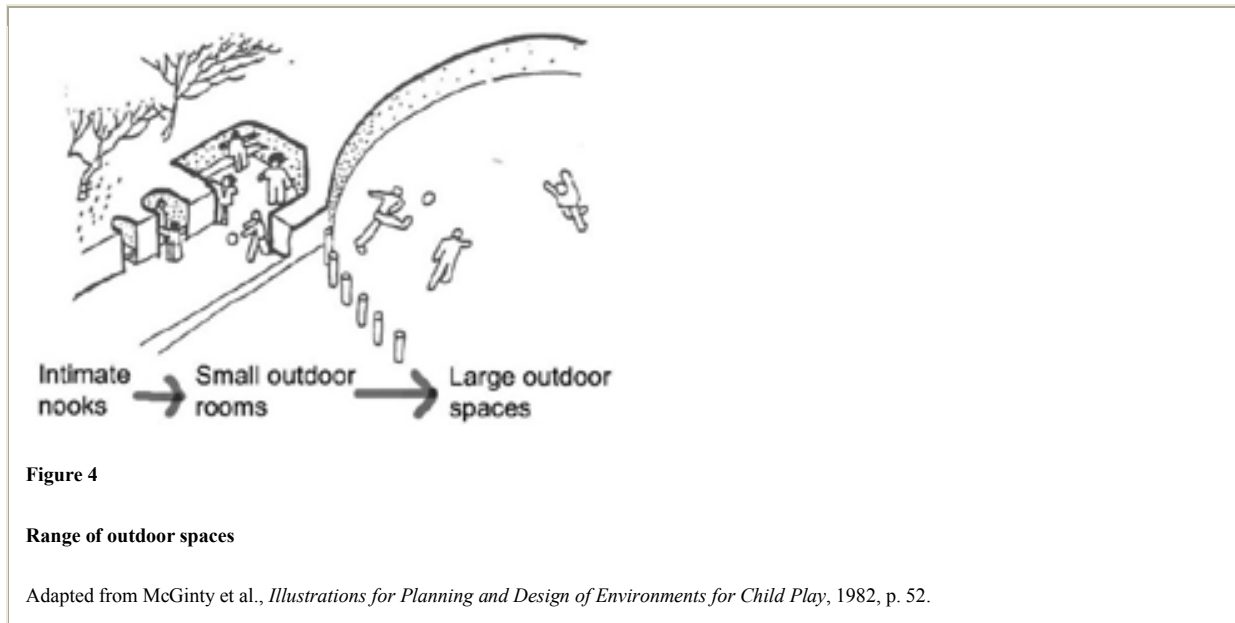


**C**ourtyards and gardens: Children love to run in and out, to see firsthand the first burst of rain, the first flower of the season. Scandinavian countries have mandatory year-round outdoor curriculum. In many other places such as the United States, 50 per cent of the programme occurs outside. In order for outdoor learning to happen in a delightful manner, and budget permitting, preschools should invest in creation of courtyards and gardens as an integral part of the physical environment.

Courtyards should be easily accessible from the building, and sheltered by the building while looking out into larger space. Courtyards can be of different scales; small niches in the external profile of buildings can be built up as storytelling courtyards. More central courtyards off several rooms work well for organized outdoor activities. Courtyards at the entrance of buildings need to be organized into

different activity settings and seating areas.

Play yards need to cater to a range of activities and group sizes. More fine-grained yards with several different types of vegetation, species of trees, clearly defined pathways, different imaginative play settings, settings for sand and water play, private nooks that can be owned by a single child, places for small groups of 1-4, places for large muscle activities involving many children such as during ball play, places for organized games and sports, and plenty of free space for spontaneous play (see figure 4).



In the Reggio schools, the garden is a special place for children. It is a place for observing natural processes – germination of seeds, to maturation into plants, exploring the lives of creatures that live under the soil, and on the plants. The garden is also a place to seek refuge under leafy trees in the heat of summer, gather berries from vines and squeeze them for colour. Edith Cobb (1977) in her seminal work, *The Ecology of Imagination in Childhood*, posits that the innate connection with nature in childhood and the poetic voice within us provides the basis of our creativity as adults. Natural materials such as sand, twigs, and stones according to Cobb help children in understanding the world through their construction play efforts.

Later, Caldwell (1997), extending Cobb’s hypothesis, suggests that children’s need to develop a relationship with nature can happen through playing with natural materials and constructing imaginative structures. The long tradition of building dens, bush houses and forts out of found objects and naturally occurring features, show that children strive to make and shape their own worlds when opportunities present themselves.

**T**he compatibility of the building and a well-designed landscape can help communicate the message ‘this is a place for children’ without adding superficial touches such as wall murals with Disney characters or giant stuffed toys. Olds (2001) in talking about settings for childcare wrote: ‘A greater sense of place and invitation exist where the childcare building is compatible with the natural terrain

and the architecture of the surrounding neighborhood. Ideally, the building will be positioned to take maximum advantage of the existing site resources and amenities to create favourable microclimates for outdoor play' (p. 84).

Olds further suggests placing the building in the least desirable part of the site to leave the more interesting areas for pathways, play yards, and settings to experience nature. A residential scale is desirable in the building of the preschool. The size and length of approach path, the size and height of roofs, front door, windows and the amount of uninterrupted wall surface needs to be carefully considered to make a centre recognizable as a place for children. All this needs to be achieved in a professional and competent manner without making the school clumsy and non-functional.

**M**aterials such as bricks, wood, glass that can be laid by hand, lend a human scale. Such materials are also easy to grasp, reach, walk around and embrace than expansive sheets of metal or huge blocks of concrete. Exterior surfaces should display warm materials like bricks, stucco, adobe, wood, and rammed earth, as it is easier to connect children to the sources of these materials. Interior surfaces also should have warm, soft materials rather than metal and concrete to avoid an institutional image and bad acoustics. Needless to mention, easy to clean, non-abrasive materials are preferable over toxic, flammable or otherwise hazardous ones (Olds 2001).

'Of course, many things that happen in school can be seen ahead and planned beforehand. But many things that happen cannot be known ahead of time...Schools can never be always predictable. We need to be open to what takes place and be able to change our plans and go with what might grow at that very moment both inside the child and inside ourselves' (Malaguzzi 1994, p. 53).

The physical environment of schools similarly cannot be too predictable. The settings need to be diverse and flexible, easy to maintain, safe and friendly for the child. We have to keep in mind that diversity and richness of environmental settings for children have a direct influence on the rhythm of play and child-environment exchange. A large-scale physical environment with hard finishes and few large plastic play equipment produces a rougher rhythm of play and aggression as compared to fine-grained, more comfortable home-like preschool settings that celebrate each child.

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