

Children and their development as the starting point: A new way to think about the design of elementary schools

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Although the active role of the environment in education has been widely accepted, only few schools render this consideration into built spaces. This is mostly due to a lack of communication between educators and designers. This paper aims to begin to bridge the gap between pedagogy and architecture by exploring aspects of child development and implications for designing developmentally appropriate environments. Five aspects of child development are considered: physical; ego; cognitive; social; and ethical. What is known about child development in each of these areas has significant implications for designing schools in new and innovative ways to better foster student learning. This analysis of child development highlights common themes of how schools should be designed including a variety of scale, exposure to nature, and interactivity of spaces. This interdisciplinary approach to design has significant implications for the development of school buildings.

IMAGINE walking into a building where everything is above eye level. With your head tilted back to take in your surroundings, you travel down what feels like a cavernous, never-ending tunnel. Every door you pass looks the same, the contents beyond each door blurring together in your mind with no individuality and no personal character. Now imagine someone said this was the place where you will be nourished, cultivated, and where you will find out who you really are. Every message the environment gives is that personalisation, creativity, and excitement have no place inside this large and static building. This is the experience of many elementary school children who attend schools designed with no regard for their development.

The environment of a school plays an active role in children's development, including the way they learn. This position is held by many developmental psychologists. Piaget and Vygotsky both claimed that learning and development happen through the interaction of children with the environment and people (Hunt, 1969). Psychologist and educator, Loris Malaguzzi (1998), the founder of the Reggio Emilia pre-school system, suggested that the environment is

a 'third teacher', which has the power to speak to children and stimulate them.

The influence of the environment is widely recognised by architects and landscape architects, both in its physical components (space) and its relationship to socio-cultural meanings (place). In relation to schools, Nair and Fielding (2005) point out that the school building and grounds can be considered a three-dimensional textbook, offering curricular information, and helping children learn about social relations and norms (Sutton, 1996).

However, most school systems do not see space and place as actors in the learning process. Many school buildings across the world still reflect the traditional pattern of shoe-box classrooms along corridors. Architects can play a role and propose designs based on knowledge of child development, but the change must come from educators and communities (Hertzberger, 2008), the people who give meaning to schools. A deeper understanding and collaboration among school practitioners and designers is the key to going beyond traditional educational facilities.

This paper helps bridge the gap between educational psychology and architecture by

giving evidence for the need for a more developmentally appropriate design. Five main aspects of child development (physical, ego, cognitive, social, and ethical) and their implications for design are discussed. Common themes among the aspects are then highlighted and related to concepts of space and place. The goal of this paper is to introduce a new approach that integrates aspects of child development into design insights for elementary schools.

Knowledge about child development

Childhood is a time of rapid development. This development occurs in all aspects of a child's life. For the purposes of analysis, we discuss five aspects of development separately, despite the overlapping and integrated nature of actual development. Knowledge about development in the physical, ego, cognitive, social, and ethical realms each have implications for the design of elementary schools.

Physical development

Physical development refers to changes in the body and one's control over one's body. This involves muscular control, co-ordination, and an increase in strength. During elementary school years, children learn to co-ordinate their bodies in relation to other people and space. They also further develop a sense of balance. Children do this through exploration, movement, and adventure. There is a natural desire for children to test themselves physically, much to the chagrin of caretakers who nervously standby as children climb, swing, and engage in other risk-taking behaviours. These behaviours serve an important purpose for a child's physical development. In addition, good mastery of movement and co-ordination is suggested to be fundamental for intellectual development (Olds, 2001). When children take physical risks, they are working on developing physically.

Children in elementary school are many different shapes and sizes. This is because physical development is different for different

children. This is particularly true in the current educational environment, with a focus on including all children in general education classrooms, including those with physical disabilities. Elementary age children are learning how to control and manage their bodies as their bodies transform and grow.

Physical development has several implications for the design of the space and place where children spend more than 1000 hours each year. First, schools need to provide places for children to develop physical skills (Olds, 2001). Spatial elements should encourage different interpretative ways of getting around, from rolling and crawling to running and skipping. Large areas where children can jump, swing, climb, etc., are essential to overall child development, they are more than simply places for children to 'let off steam'. This includes playgrounds and gymnasiums, which are often subpar in today's schools (Malone & Tranter, 2003; Moore & Wong, 1997; McKendrick et al., 2000). Playgrounds are intended to encourage good health, allow free movement in a contained space, and provide opportunities to breathe fresh air (De Visscher & Bouverne-De Bie, 2008), all of which are important for development.

Schools should support development with ways for children to challenge themselves physically. The school environment should provide opportunities to develop physical prowess through such activities as walking on small objects, climbing trees, swinging high or cycling fast; additionally, schools should provide elements that challenge balance, such as tree trunks or low walls (Day, 2007). Research shows that although schools provide an area for physical activity, the design of most of these areas leave children bored and uninterested in engaging in anything other than a break from academics (Moore & Wong, 1997). Children are not, in fact, challenging themselves and enhancing their development, due to the few affordances provided to them.

In addition, spaces for physical activity must offer numerous and varied opportuni-

ties. Chawla (2006) writes about the importance of thinking about the relationship between the environment and the organisms interacting with that environment, often referred to as affordances. For children to meaningfully interact with their environment there must be affordances. However, affordances lie not in a particular object, but in the relationship between the object and person interacting with it. Based on the knowledge that children develop at different rates, what is an affordance for one child on a particular day may be meaningless to that same child on a different day or to another child. In order to provide all children within a school opportunity for further development, there must be many different objects, all of which will offer different affordances at different moments in time.

Finally, the knowledge that children are different sizes from each other (and from adults) implies that space should be designed from a lower point of view. Several scholars (Hertzberger, 2009; Lippmann, 2004; Nair & Fielding, 2005) suggest that children like smaller places, more fit to their dimensions. Schools designed with child development as their starting point would include nooks and crannies of different shapes and sizes appropriate for children of different shapes and sizes.

Spaces for children must allow for physical exploration, risk taking, and personal challenges in various ways, but must also be safe. Norris and Smith (2008) list safety as the most important consideration when designing spaces and products for children. Safety is a challenge for designers, considering that children's behaviour is unpredictable, due to a natural creativity that leads children to interpret the environment in multiple ways (Day, 2007). This involves paying attention to details and designing spaces that allow for errors. For example, furniture in schools must not only allow for children of different shapes and sizes but must also take into consideration safety issues related to children at various levels of motor co-ordination negotiating their way

around the space. In addition, soft materials, such as rubber or wood chips in exterior settings, reduce the chance of injury due to falling. Trees and other play structures should not be too tall (five to eight feet) for the same reason (Day, 2007). While a certain degree of risk is always present (Hart, 2002), especially when dealing with activities related to physical exploration, the design of both indoor and outdoor objects can play an important role in reducing those risks, thus allowing for the variety of adventures necessary for physical development.

Children develop physically, at different rates, during elementary school. Thus, schools must be designed with varied spaces where children can challenge themselves in safe ways.

Ego development

During the years a child is in elementary school, that child is developing his/her sense of self. It is the time of life where children begin to understand and speak about the world outside of themselves, in relationship to themselves (Piaget, 1932). Montessori (1967) claims that children absorb all the characteristics of the environment, which influences who they will become.

In addition to developing a sense of self, children at this age are developing imagination. Common is the image of a young child immersed in an imaginary world that does not reflect reality. Fantasy becomes a bridge between the real world and the development inside the child. Nair and Fielding (2005) claim the importance of both imagination and creativity in today's and tomorrow's world. Nurturing the development of imagination and creativity is an important aspect of schooling for elementary children.

Related to this development of self is the need to feel safe in order to learn (Salzberger-Wittenberg et al., 1983; Watt, 1994). Research shows that children who feel anxious or unsafe are less motivated to learn (Entwistle, 1987). Three major aspects of design influence the perception of safety: the

feeling of crowding, the opportunity to know one's location, and physical anchoring. When children perceive crowding, they behave in a more aggressive and less interactive manner (Moore & Lackney, 1994), thus making it difficult for them to effectively learn in a classroom full of other students. It has been found that disorientation brings about a lack of security in people (Hall, 1976). Building on this, one can see how spatial clarity would bring a sense of reassurance to children. If they know where they are and can find their way, they feel more secure and at ease, and are more likely to focus on academic learning. Finally, a secure and solid physical anchor, enhancing the feeling of 'refuge', helps foster a feeling of security in children (Alexander et al., 1977; Day, 2007).

In order to support ego development and nurture a sense of self, schools must be designed with this knowledge. For example, the environment should avoid 'telling' too much or expressing a too clear symbolic meaning through mediums such as large murals with explicit subjects (Pairman & Terreni, 2001) or stereotypical images, for children can appreciate more complex signs representing nuances of real life objects (Tarr, 2001). With less overt messages children are able to build meanings and develop stories (Gable, 2000). For instance, artwork does not need to be simplified for children, for with guidance, children will make meaning of any piece of art. These opportunities turn the environment into a teacher, involving creativity and active thinking.

The design of schools should allow for creativity in other ways. Besides the obvious spaces for creative activities such as craftwork and art (Ceppi & Zini, 1998), there can also be other forms of sensory stimulation built into the school's design, such as different forms light and a variety of materials. The school environment can activate a series of sensory activities, particularly through the

use of natural elements, helping children develop their personalities in relation to the environment.

The circulation space¹ can also be designed with child development in mind. Long hallways may be frightening to many young children because they are not able to see the endpoint of where they are going (Alexander et al., 1977). For this reason, some points of control along hallways, like narrowing or turning points, would be appropriate (Barret & Zhang, 2009). Also, Alexander et al. (1977) claim that circulation spaces should look more like a room than a corridor: independent zones with three or four classrooms help children identify the location, distinguish their room (Nair & Fielding, 2005), thus make them feel safer.

Other ways to enhance the sense of safety is to create space scaled to children's dimensions, like 'baskets' or niches (Dudek, 2000), or create a 'homelike' environment (Hertzberger, 2008). Those intimate settings, identified as 'home bases' with personalised meanings, can be present even in larger schools (Hertzberger, 2008).

The development of self, coupled with the importance of imagination and creativity means that children need schools that provide opportunities for them to determine the meaning of the environment and to learn through the creative use of materials, while feeling safe and secure.

Cognitive development

Cognitive development deals with an individual's construction of knowledge. While there are many theories about the construction of knowledge, it is generally accepted that children need opportunities to explore, reflect upon, and talk about new ideas. Children need to explore the world around them in order to learn. As John Dewey (1916) stated, 'The development within the young...takes place through the inter-

¹ Areas dedicated to the movement among classes, like hallways or atria, which can also be used for complementary learning activities.

mediary of the environment' (p.22). However, experiences alone are not enough to learn (Adams, 1991), for children need to reflect upon the stimuli coming from experiences and compare them to each other (Bruner, 1973, as cited in Adams, 1991). Cognitive development requires making connections between and among experiences (Adams, 1991). The repetition of experiences can help children conceptualise meanings through reflection (Adams, 1991). In addition to exploration and reflection, children need opportunities to talk about ideas with others. Learning is an inherently social phenomenon (Vygotsky, 1978; Wenger, 1998). The cognitive process includes a variety of steps, including experience, followed by reflection, conceptualisation, and social interaction; however, this is not a linear progression.

One theory in cognitive development is the concept of multiple intelligences (Gardner, 1983). Gardner suggests there are many different ways individuals can be 'smart' and each way is found to varying degrees within an individual. There is not one continuum of intelligence. This theory has had significant effects on education (Bransford et al., 2000). Using Gardner's (1983) premise, Nair and Fielding (2005), suggest that children learn in different ways, in different times, in different places, and from different people or places. Increasing the number of learning modalities addressed in a classroom has been found to significantly improve learning outcomes (Baumgartner et al., 2003; Ku & Sullivan, 2002). Gardner's theory furthers the idea that learning is complex and should be differentiated.

Hence, the designed environment should provide spaces for hands-on experiences, reflection, and social learning while providing teachers access to support each of the ways in which students may be intelligent. Schools should be designed to accommodate the variety of intelligences and individual needs of students (Barrett & Zhang, 2009; Nair & Fielding, 2005). Facili-

ties built in the traditional way, with rectangular classrooms and corridors, do not do so. Changing the spatial features of classrooms and extending the learning settings beyond basic cells are two effective strategies to support all learners. For example, L-shaped classrooms allow various activities to take place at the same time (Lippmann, 2004). There must be space for both collaborative work and quiet individual study (Baglione, 2006). Spaces out of the classrooms, if designed with certain features (wideness, variety and natural lighting), can become 'learning streets' (Nair, 2005) where interactions with other people are positive events.

One of Gardner's (1983) intelligences most relevant to this discussion is spatial intelligence. Spatial intelligence deals with the ability to visualise space, understand how it is organised, and find one's way. Regardless of a child's natural intelligence in this regard, all children are developing their spatial competence during elementary school years.

Four spatial features can help children find their way in school buildings: landmarks, spatial sequences, functions and colours. Research shows that children use special points, considered landmarks, to organise their mental map and make decisions about their routes (Biel, 1982; Golledge et al., 1992), and that such devices are easier to memorise when they are placed at nodes (Golledge et al., 1992). Second, children tend to organise their usual routes in different parts, creating a sort of sequence to remember the location of settings along the path (Allen, 1981). Third, children tend to use the function of the destination as a way to orientate themselves (Christensen, 2003; Heft & Wohlwill, 1987). Finally, Olds (1987) suggests that colour is the most effective way to visually recognise space. For example, colour and other markers used to differentiate the various areas of the school, highlighting the functions or pointing out the presence of landmarks. The combination of these elements can be an effective way to facilitate way finding in school facilities.

Providing multi-sensory stimuli, opportunities for hands-on experiences, and spatial variations are important for creating schools where all students can develop cognitively, regardless of individual differences.

Social development

Social development involves learning to effectively interact with other people and positively contribute to a group. In elementary school, children leave their protected home environment and enter a world of peers with whom they must learn to socialise, sometimes for the first time. In addition to learning how to socialise with peers, elementary age children also learn how to get along with their community at large.

Social development is important not only to develop effective social skills, but is also essential to support the learning process. Learning is an inherently social process (Wenger, 1998), thus the ability to interact with others is both a skill and a means to an end.

Although space does not lead to automatic interaction (Gieryn, 2000), the design of schools can encourage socialisation. There are spatial devices that encourage some behaviours and discourage others (Moleski & Lang, 1986). First, the scale of spaces is important, because in small environments encounters are more likely to happen naturally (Pasalar, 2003). Second, social interactions are influenced by the boundaries and connections allowed, including transparency (Biner et al., 1991), as well as proximity (Gieryn, 2000). Third, children need places where they can stop by and start a conversation (Day, 2007), especially in public areas of the school. Therefore, flow patterns should be considered, and circulation spaces should be tangential to rest places, without interfering too much, but allowing social exchanges (Olds, 2001). Finally, the public flavour of places fosters interactions among people (Gieryn, 2000).

In schools, the private and public realms represent individual and collective identities. The patterns of socialisation among individ-

uals are shaped by the environmental relationships between private and public space (Markus & Cameron, 2002). Hertz-berger (2008) suggests enhancing 'spatial cohesion', avoiding fragmentation in the school layout, through the use of public places. For example, he recommends providing a main entrance and 'town square', avoiding separate access points and enhancing a 'sense of togetherness' (Hertzberger, 2008).

Related to learning how to socialise with the community at large, Hertzberger (2009) uses the metaphor of 'playgrounds as streets'. He states that schools are usually fenced-in, for safety reasons, but fear is having a disruptive effect on socialisation. The built environment has a strong impact on this phenomenon; in fact, walls and fences speak very clearly to people. There are many ways to encourage connection with the community, through the use of school gardens (Desmond et al., 2004), shared facilities with community-based organisations (Cooper & Vincent 2008; Sullivan, 2002), and community involvement in the design process and customisation of the school (Sutton, 1992). Community connectedness can enhance the sense of belonging, which has positive consequences on the school climate and learning (Uline et al., 2009).

The physical environment can play a role in preventing social problems in schools (Day, 2007; Malone & Tranter, 2003). The space should provide enough room to not feel crowded (Malone & Tranter, 2003), but should remain scaled enough to allow children to feel some control over it. Avoiding large monotonous areas and providing settings for different play activities is a way to reduce dullness and prevent negative behaviours (Lambert, 1999, as cited in Malone & Tranter, 2003). Buildings and school grounds should have a gentle feel, through the use of green elements and texture as well as grid patterns of appropriate size. Thus, schools should have a warm, welcoming feel to their design.

As children learn how to interact with others during elementary school, the school

can support this development through a variety of spatial devices, attention to the relationship between public and private spaces, and supporting connections between the school and the community. Doing so may have an added benefit in reducing common social problems among young children.

Ethical development

Ethical development, as defined in this paper, deals with one's behaviour and disposition towards other people and the environment. Developing responsibility and sense of citizenship, a generally accepted goal of schooling, requires the development of care and concern for other living things. This includes a development of right versus wrong, respect for the natural environment, and respect for human diversity.

According to Piaget (1932), young children tend to accept the laws imposed by their guiding adults but as children interact with those outside of their immediate family, in places such as school, they start developing independent definitions of what should and should not be done. In addition, Kohlbert (1971) suggests that the rules shared by a group of people shape behavioural patterns. Children tend to regulate their actions on the basis of expected behaviours within their group of people (Jensen-Campbell & Graziano, 2005). Therefore, positive interpersonal contacts can enhance children's ethical development.

Although it is difficult to teach a sense of right and wrong through designed environments, places can convey values. For example, space can communicate responsibility and care when it is well kept and maintained (Uline et al., 2009), encouraging children to learn to care themselves and get involved. In addition, when areas are accessible to everyone, including those with disabilities, values of inclusion are promoted, in contrast to having separate places for separate people. The built environment can play a role in children's ethical development of right versus wrong.

In addition to developing a sense of right and wrong, elementary school children also learn how to care for the environment. Most scholars claim that children are born with an innate form of empathy towards nature, involving affinity, attraction and a sense of wonder (Carson, 1956; Cobb, 1977; Kellert, 1993; Orr, 2000; Sobel, 1996). This strong emotional connectedness to nature is a value that has to be cultivated; otherwise it risks being overshadowed by the commodity-oriented culture of our society (Kellert, 1993; Orr, 2000). Chawla (1998) suggests that direct experience of nature during childhood is the most significant factor in building a sensibility toward the environment.

Research shows that the way spaces (especially the outdoors) are designed can make a difference for the development of ecological literacy (Moore & Cosco, 2007; Moore & Wong, 1997; Murphy, 2003; Wechsler et al., 2003; Zask et al., 2001). The school grounds and buildings can provide meaningful experiences of natural elements and phenomena such as the water cycle and food cycle. For example, there can be systems for water collection such as cisterns (Keep, 2002; Wilks & Hes, 2008). In addition, the creation of small ecosystems such as woods and ponds can provide valuable experiences because children can have everyday contacts with the plants and animals (Titman, 1994). Moreover, a sustainable building can work as a learning tool, showing its functioning as a complex machine (Wilks & Hes, 2008). Greenhouses can help demonstrate the issue of heat transmission (Moore & Cooper Marcus, 2008; Wilks & Hes, 2008) while windmills (Keep, 2002) and solar or photovoltaic panels (Heitor, 2009) can show how to use the wind and the sun to produce energy. Finally, environments that afford manipulability, such as gardens, encourage children to take control of their physical setting, enhancing their sense of responsibility (Desmond et al., 2004). Combined, these devices can become effective three-dimensional textbooks if they are easy to use and appropriate to children's development (Blyth, 2009).

In addition to developing respect for the environment, it is important that elementary school children develop respect for human diversity. Social identity, which is mostly built through interpersonal relationships (Kohlberg, 1971) and the experience of place (Sutton, 1992), plays an important role in developing respect for diversity. As children grow and develop, they come into contact with peers and adults belonging to the category of 'other', including ethnicity, social class, physical and cognitive abilities. When dealing with diversity, fear and disinterest can derive from a lack of knowledge: for example, children living in gated communities are more likely to perceive racial and class diversity as threatening (Low, 2001).

Learning to accept other people and cultures may start from sharing space with them. Schools that, through their layout and atmosphere, facilitate interactions can teach students to respect diversity. Hertzberger (2008) suggests that the public space of the school is the place where children go and meet others. For example, Reggio Emilia schools are designed with a piazza – a place for unexpected meetings and the creation of a social identity (Ceppi & Zini, 1998). Classrooms are arranged around the piazza, on the same level; hence there is no hierarchy between them, all the groups have the same importance, and all of them converge into the central public space (Ceppi & Zini, 1998).

School facilities should be a 'built' way to express ties to the local community (Nair & Fielding, 2005), and should find a way to include all the different group identities, making them feel 'at home'. This requires designers to study the communities in which they are building schools, and ideally, to engage communities in the process of design. Doing so can create schools that foster an appreciation for the diversity of human life.

As children's behaviours and dispositions towards other people and the environment are developing, the physical environment can foster the caring, respect, and interactions desired by a community.

Discussion

The discussion of five aspects of child development that are pertinent to elementary school-age children highlights three themes: variety of scale, exposure to nature and the interactivity of spaces. Each deserves special attention when designing learning environments for children.

Variety of scale

Scale refers to the size, real or perceived, with which spaces are designed. Schools must be designed from a child's vantage point, allowing children to perceive the space as somewhere they belong. This also helps create a sense of safety that leads to positive ego development and social interactions.

Schools must involve a variety of scales, including large areas for physical development, small areas for reflection, and public areas for socialisation. A balance must be found between small and large, for reduced dimensions can give the impression of overcrowding (Martin, 2006), while too large ones diminish the sense of control (Alexander et al., 1977). Likewise, large buildings make orientation and wayfinding difficult for children (Golledge et al., 1992), but buildings that are too small do not allow for the variety necessary.

Hertzberger (2008) suggests that the city can be a metaphor for a good large/small balance in schools. With the phrase 'the school as a city', he points out that in the overall layout the building should provide a hierarchy of spaces. He suggests a finger-plan layout, which encompasses areas of different sizes.

Variety in scale can also provide access to children of all different shapes, sizes, and abilities, leading to both ownership and an implicit message about the value of all individuals. A diverse human environment, such as a school, requires spaces of different scales, for individuals, sub-groups, and the whole community.

The way people interact is influenced by scale, and issues such as bullying can be

reduced via carefully designed spaces. The traditional model of schools as large, box-like buildings does not afford the variety of scale necessary to support development. Scale must be considered if one desires a school designed with child development in mind.

Exposure to nature

Connection to the natural world is important for child development. Exposure to nature teaches ecological literacy and helps nurture children's innate affinity towards the natural world (Chawla, 1998).

In addition to enhancing environmental awareness, the natural world offers a large range of affordances and gradual physical challenges (Chawla, 2006) which are important considering children develop at different rates. For example, a tree in a playground invites children of different sizes and physical abilities to find ways to climb and challenge themselves. The tree is not reserved for 'big kids' or 'sporty kids' the way a piece of playground equipment might be perceived. Something about the naturalness of the tree encourages inclusion. This is true of the natural world in general.

This natural inclusion creates environments that promote ethical social interactions, if coupled with appropriate human actions. Nature is an informal setting, encouraging children to socialise (Moore, 1986). It has also been shown to reduce social conflict (Malone & Tranter, 2003). Immersing children in the natural world can assist those hoping to teach children how to treat others with respect and dignity. Nature offers things to talk about and interact around, while promoting values of diversity.

Another advantage of exposing children to the natural world is the imagination that typically accompanies this exposure. Natural settings are the strongest source of inspiration for children's stories and play (Moore & Wong, 1997). A tree can be a spaceship, a house, a many armed monster, or anything else a child imagines. Nature encourages creativity in a manner that is good for child development.

Finally, naturalistic intelligence (Gardner, 1983) is one way an individual can be smart. With nature throughout a school environment, those children inclined toward such intelligence may excel in ways traditionally reserved only for those linguistically intelligent. At the same time, all children will cultivate this intelligence for future use.

The natural world offers diversity, opportunities for interaction, starting points for imagination, and provides support for those teaching children how to effectively and ethically interact with others. Therefore, designers should maximise the presence of nature within the school building – through in-between spaces like greenhouses – and in the grounds, including small ecosystems like ponds and woods when possible.

Interactivity of space

The final theme that surfaced in the investigation of developmental factors and their implications for the design of schools is the need for an interactive environment. This refers to children and the community needing to be part of the on-going design of a school's space. Spaces that can be manipulated are valued positively by children (Titman, 1994; Malone & Tranter, 2003) and provide a series of benefits for their development.

When space is interactive, children have opportunities for hands-on experiences that support personal and interpersonal development. The environment plays a role in the definition of a child's sense of self (Proshansky et al., 1983) through the opportunity to create a place perceived as fitting to one's identity (Korpela, 1989). For example, design could provide only a few framing elements that constitute the 'hardware' of the setting in places such as hallways and allow children to create the rest of the design.

In addition, an interactive environment allows creativity and imagination to flow, as children determine what they want their space to look like. When schools are designed to be interactive, socialisation with

all children is supported, as children have something to talk to others about. Gardens are just one example of something both interactive and natural which provide these opportunities.

As children learn, grow, and develop they need to feel a sense of control in order to explore, interact, and feel safe. Interactive designs create ways for children to have some control over their built environment. For example, if children can manipulate their physical setting, they can adapt the setting to be appropriately challenging for personal development.

The community should also be involved in the design of a school, as community involvement supports social and ethical development. Schools designed with input from the community communicate the values and diversity found amongst those living there, rather than those of the designers.

Sustainable buildings can be an example of an interactive environment because they can be designed to engage people in the running of the building. In such a case, users adopt behaviours such as opening or closing certain windows during a given time of the day. This not only involves children in a hands-on manner, but also teaches about care for the environment in a way that has real consequence, such as being too warm or cold if proper care is not taken.

When schools are designed in ways that allow children opportunities to explore and control over their environment, overall development is supported.

Conclusion

This paper provides insights into the design of learning environments for elementary schools based on an analysis of five aspects of child development. This multidisciplinary approach is an attempt to ground architectural design in scholarship about child development, making the design more objective and less dependent on personal interpretation of the designers than has traditionally been done. People are brought to the centre of the discussion, as space is shaped according to the way children develop. This discussion can be used as a starting point for a more effective dialogue between education and architecture, in which shared decisions can bring about real change. Such schools can offer rich environments that foster personalisation, creativity, and excitement as children learn and develop.

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Completing elementary school, children are already free to change the time of the story to be presented. They come up with stories on given topics, based on the proposed plan and the available grammatical structures. Interiorization helps the development of the speech of children, which largely affects the change in their thinking and understanding. So, when entering a school, a child has only a vividly-effective and elementary-figurative perception of the world. In the future, his thinking grows to verbal-logical and concrete conceptual. This is facilitated by the active learning and use of speech. It is one of the means of thinking and contributes to solving a wide variety of tasks. Why do children behave in certain ways? Is their behavior related to their age, family relationships, or individual temperaments? Developmental psychologists strive to answer such questions as well as to understand, explain, and predict behaviors that occur throughout the lifespan. At each stage, children and adults face a developmental crisis that serves as a major turning point. Successfully managing the challenges of each stage leads to the emergence of a lifelong psychological virtue. Erikson's Stages of Psychosocial Development. Behavioral Child Development Theories. During the first half of the twentieth century, a new school of thought known as behaviorism rose to become a dominant force within psychology. Critical thinking helps students apply knowledge in new ways. Here are 7 easy ways to encourage this crucial life skill in elementary education. Critical thinking skills are an increasingly important element of elementary education, but teaching them can often be a challenge for elementary school teachers. From what critical thinking is to how to incorporate it into everyday lessons, we examine the essentials of this fundamental intellectual skill below. What is critical thinking? It also allows them to problem-solve and think on their feet, and boosts self-esteem by providing an opportunity for students to express themselves in front of their peers. Children start to learn some new subjects, such as Chemistry, Biology and History. The more classes they have, the more homework they need to do after school. Obviously, they would spend a little time on a foreign language. Therefore, children should learn a foreign language at primary school, instead of secondary school. In conclusion, in order to learn a foreign language, it is better to start it at the primary school rather than the secondary school for children. [by - Wang Zhe, Veta] To begin with, scholars believe that understanding a foreign language in elementary school may contribute a more incredible communication skill of pupil in the future regarding their ability to catch up insight is incredibly fascinating during this period.