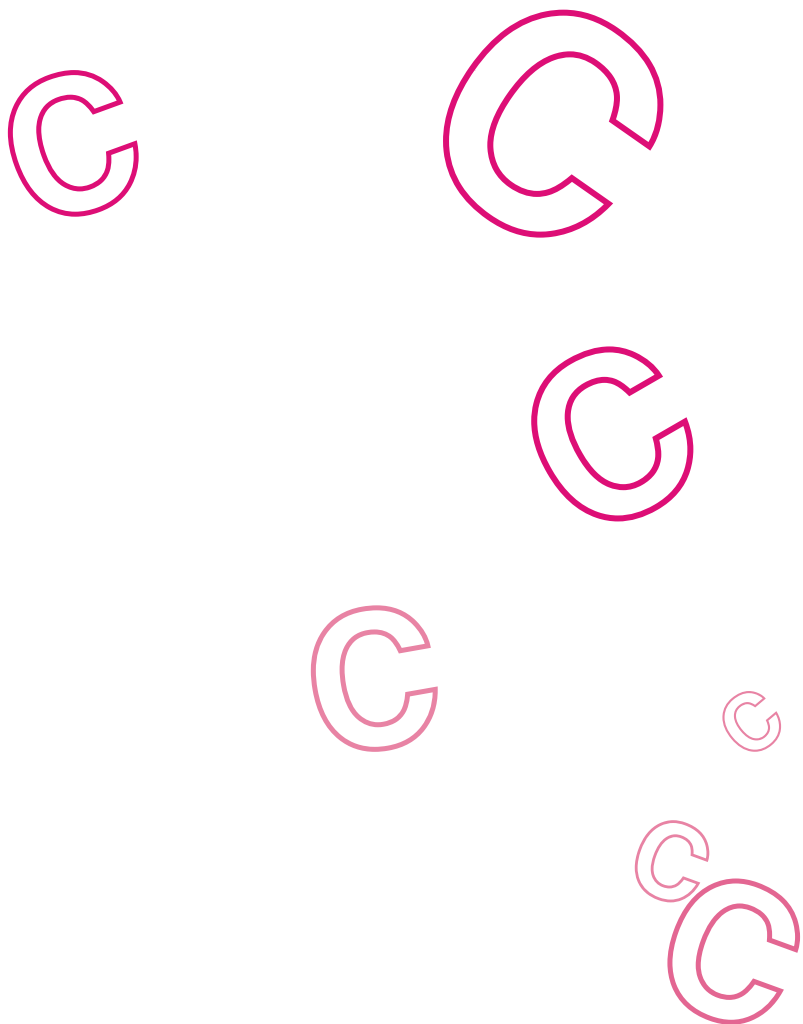




an informational guide to young children's outdoor play spaces



Outside Criteria

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Consortium for Health, Intervention, Learning and Development (CHILD)

Thank you to the sixteen participating child care centres and early childhood educators who have made this possible.

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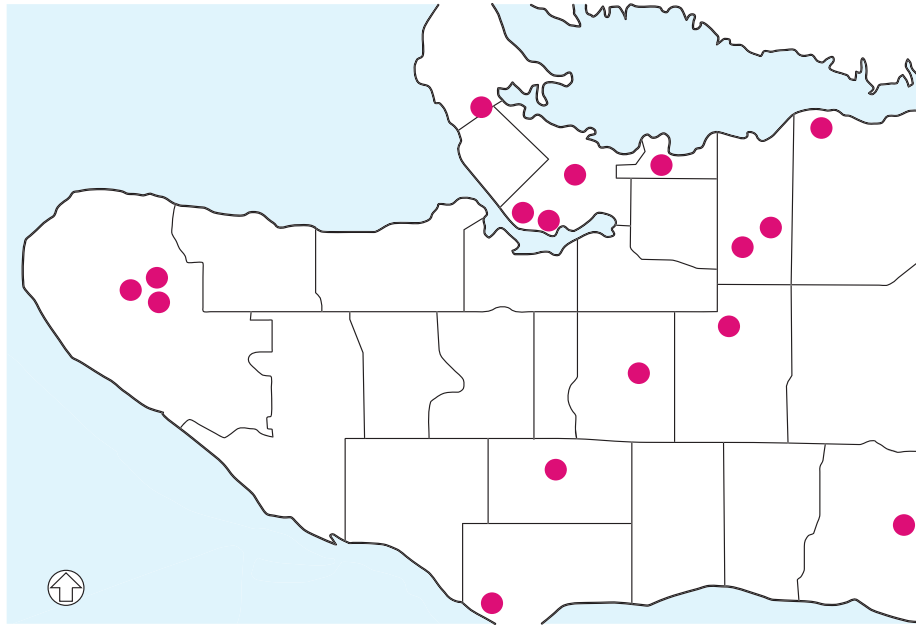
Seven Cs Findings : making outdoor play spaces *places*



what are seven cs?

Seven Cs is an informational guide for early childhood educators, designers, administrators, and parents.¹ The goal of Seven Cs is to help people design outdoor play spaces that support the development of young children and integrate the unique qualities of playing outdoors. The guide should be used in concert with existing codes, safety regulations, and design guidelines.

Seven Cs is based on findings identified from a five-year multidisciplinary study of outdoor play spaces at child care centres in Vancouver.² This study was funded through the Consortium for Health, Intervention, Learning, and Development (CHILD). It has involved academic researchers, early childhood educators, governmental agencies, and professionals.



01 left: Map of Vancouver locating the 16 child care centres in our study.

02 - 05 opposite page: Views of four different outdoor play spaces in our study.

01

our study at a glance

what centres did we study?

Our study compared sixteen outdoor play spaces at child care centres with children aged two to five. Centres were selected based on their socio-economic location throughout the city of Vancouver, their building's architectural type, and the centre's willingness to participate. Architectural types were identified as modern, organic, modular, and re-use.

why children aged 2 to 5?

Children aged two to five were observed because this age group makes up the largest population of children at most child care centres. Likewise, this is the age range when parents in British Columbia are most likely to enroll their children in child care.³ This reflects national trends too. Over half the children up to age 5 in Canada are enrolled in some form of child care.⁴

This age group is also important because they experience developmental milestones such as increased physical ability, curiosity, imagination, memory, language, imitative play and cooperative play.⁵ Previous studies and Seven Cs have shown that physical features in the child care environment can support the development of these milestones.⁶

why are the outdoor play spaces at child care centres important?

Children in care log in many hours at their centres and the outdoor play space can potentially offer valuable experiences outdoors. Outdoor play spaces can provide contact with living things like plants and animals, and environmental conditions that change with the seasons. This contact can enhance physical and cognitive development, encourage imaginative play, and stimulate empathy. The outdoor environment may also provide a restorative environment for children.⁷



02



03



04



05

The outdoor spaces at child care centres are ideal locations to express the character of a place. It is an environment where children can interact with the enchanting natural elements that are British Columbia's hallmark. The outdoor environment offers curriculum opportunities for early childhood educators and is unique in its ability to provide for large group activities that prove more difficult indoors.

Unfortunately, many play spaces in North America are dominated by pre-fabricated play equipment that does not express the unique qualities of playing outdoors. When the play spaces start to look the same, they fail to reflect the individuality of the various programs. Furthermore, early childhood educators and children are less likely to take ownership of the standardized play space.

According to our early childhood educators, outdoor play spaces are also commonly used by centres as places for childrens' gross motor play, free play, and spontaneous exploration. Outdoor play spaces that accommodate this type of use should be encouraged. This is an important use because recent studies in Canada, Europe, and the United States have found that vigorous gross motor movement was decreasing among young children, contributing to the increasing problems of obesity in school age children.⁸

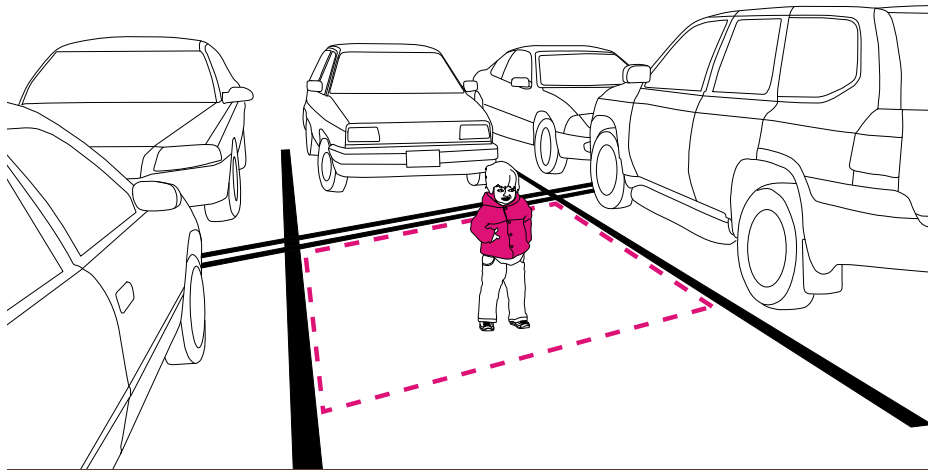
play: an active process without a product.

what did we ask in our study?

We asked which outdoor physical factors contribute to early childhood development and quality play at child cares centres, and to what degree do these factors currently exist at the centres under study? Specifically we studied:

1. Size of the outdoor play spaces and where children played in these spaces.

Outdoor play spaces are used by centres for gross motor play (for example, running). Yet, recent studies have found that gross motor movement is decreasing among young children, contributing to obesity in school children. Unfortunately, in both Canada and the U.S. the amount of outdoor space allocated for each child enrolled in full time care has stayed the same since the 1980s (75 f² / 7m²). At the same time, changes to safety regulations pertaining to play equipment has resulted in lower play structures with bigger no-encroachment zones (areas that must be kept free of objects and children not playing on the equipment). These regulations further decrease space for gross motor play.



14m² for your Lincoln Navigator
7m² for your Little Navigator

06 left: Child care licensing regulation in British Columbia requires a minimum of 7m² per child of outdoor play space only half of a vehicle parking space.

06

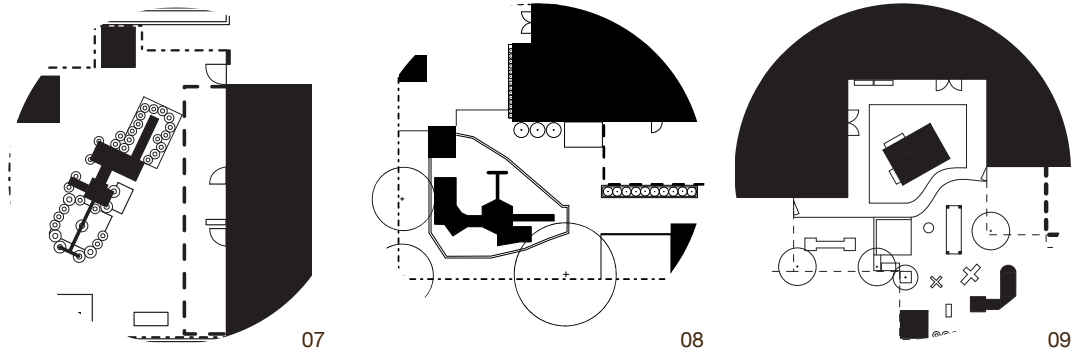
2. Types of play observed in different play environments. There are different ways that young children play. We studied the relationship between different outdoor play spaces and the way children played in these spaces. We observed social play: cooperative play, independent play, and aggressive play. Play direction: child-directed play versus staff-directed play, a combination, and play ‘themes’ designed for the play space. Play types: imaginative play, volitional play (manipulating the physical environment), communicative play (use of descriptive language), object play, exploratory play, and gross motor play. We also observed children’s play duration: fleeting (moves from one activity to the next without completion), moderate duration, and deep play (long durations of play exceeding the video clip).

3. What staff and children enjoy about their current outdoor play spaces. Children and adult perceptions about their outdoor play spaces capture time periods and events beyond the duration of the study. It is crucial to integrate this relationship into the research. It also helps to involve people using the play spaces in our research project.

4. Presence of living things in the outdoor play environment. Previous research in landscape architecture has shown that outdoor play spaces can provide contact with living things like plants that change with time. This contact can enhance physical, cognitive, and language development; encourage imaginative play; stimulate empathy; and provide restorative experiences for children.

07 - 09 below: Plan views of three centres in our study.

10 opposite page: Children's movements tracked over a 30 minute time period.



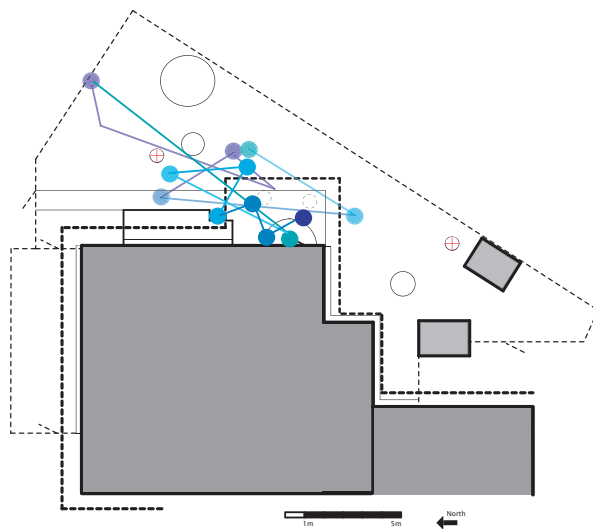
5. Amount of manipulable materials in the outdoor play environment. Incorporating manipulable materials like sand, dirt, gravel and water into a play space allows children to exert control over their play space and change their surroundings to suit their needs. Children want to play with responsive materials that can be carried, collected, damned, dug, floated, filled, scooped, sifted, spilled, sprinkled, and thrown

how was our study performed?

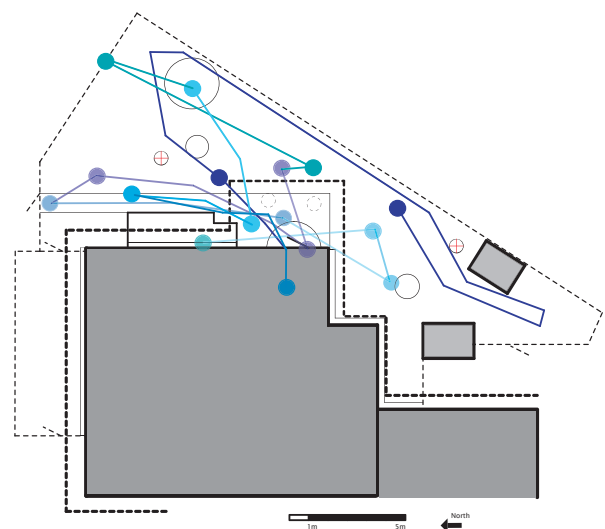
Our research is based on an Action Research model. Action Research involves collaboration between different groups of individuals for the purpose of bringing about changes in concrete situations.⁹ Drawing together five different types of perspectives and information, Action Research enabled participants in the research process to directly influence each other, to interpret research findings more tangibly, and to insure a greater validity within the child care community.

1. Other similar studies. To begin our study we compiled a list of the outdoor physical factors and characteristics that have been documented as encouraging or supporting development and play in children aged two to five years.¹⁰

play: it is intrinsically motivated.



14 month old child



32 month old child

10

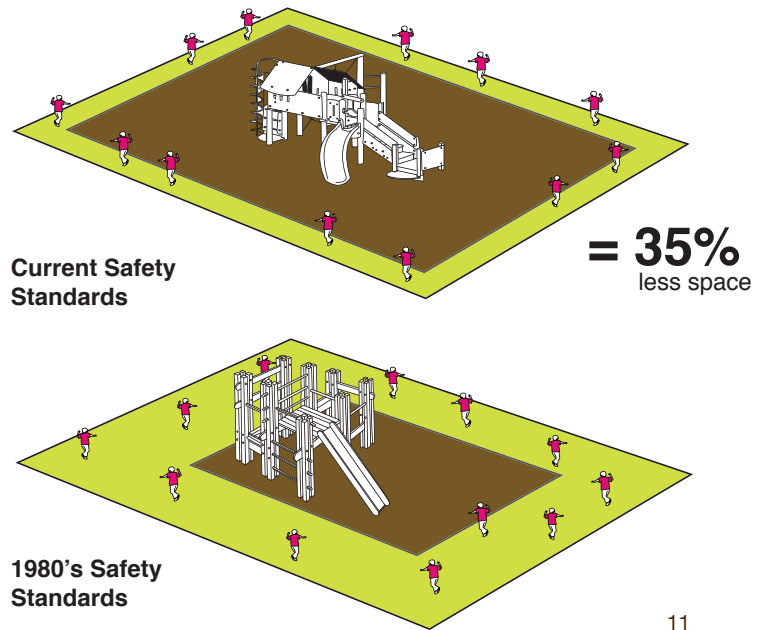
2. Documented field observations. For the field observations, the outdoor play spaces were documented with plan view drawings and a check-list was filled out on site. Photographs were taken at an adult's height and a child's height. We also inventoried materials used in the outdoor play space.

3. Focused interviews and workshops with early childhood educators and directors.

Interviews with early childhood educators at all participating child care centres were based on a set of questions that helped us gain further insight into how the spaces were being used by children, and what attributes of the play spaces were developmentally valuable. Centre-wide workshops allowed all people involved in the project to share what we were learning.

4. Observation of children. We documented children using the play spaces during different seasons with field notes and video recordings. Observations and video recordings occurred on two cold rainy days and two warm sunny days. They gave us further insight into how the spaces were being used and enabled us to code how children were playing and developing in each of the centres.

5. How policy effects the implementation of physical designs for outdoor play areas. We worked with policymakers to re-evaluate the way the outdoor play spaces are considered by public agencies. We studied the various regulations, guidelines, and standards that currently shape the design of outdoor play spaces for children in Canada.



11

what did we find?

We found that children had quality outdoor play experiences and enriched developmental opportunities in environments that had the following characteristics:

- they had elements for children to manipulate and make their own;
- they contained living things;
- they were sensitive to climate;
- they were designed to the scale of the child;
- they allowed the child's imagination to shape the play experience; and
- they provided areas for children to play alone or in groups.

Most importantly we found that quality outdoor play means more than play equipment. Our findings form the basis of the 7Cs criteria: character, context, connectivity, change, chance, clarity, and challenge. These findings should be used in concert with existing codes, safety regulations, and guides. However, here are some highlights:

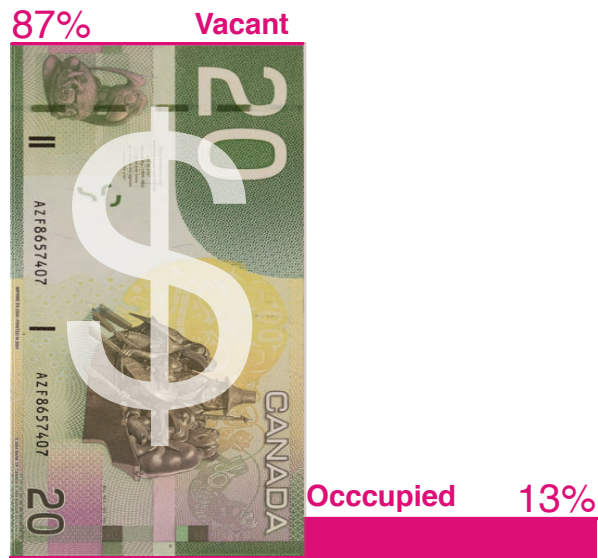
Children need more space!

Nine of the twelve child care centres studied conformed to the regulated “child to space ratio” and operated at maximum levels of density. We found that:

Child care centres exceeding their densities had more aggression.

While space requirements for equipment has increased, “space ratios per child” (the amount of outdoor space allocated for each child enrolled full time) have stayed the same since the 1980s. Changes to safety regulations pertaining to play equipment has resulted in lower play structures with bigger fall zones (areas that must be kept free of objects or other children). In turn, we found:

Centres with equipment purchased in the past six years have less space for non-equipment play.



12

11 opposite page: Child space ratios of 75^{ft} per child have stayed the same since 1980. By 2006 no-encroachment areas have increased reducing space for non-equipment play.

12 left: Play equipment is expensive and vacant 87% of the time. Other types of play spaces can cost less and be more engaging.

Who is all that expensive equipment for?

In a random sampling of video clips documenting children's use of their play space we found that:

The equipment was unoccupied 87% of the time.

Of the 13% of the time the equipment was occupied children:

- used loose parts together with the structure 5% of the time;
- played underneath 4% of the time;
- used it as intended 3% of the time; and
- used it for prospect 1% of the time.

Living things in the play environment

Previous studies and analyses of video clips from the Seven Cs study found that children were more likely to verbally interact with each other and their early childhood educators when their play engaged living things such as plants, animals, and insects.

Contact with living organisms increases developmental opportunities for children.



13



14

Maybe imagining should be left to the children?

Several centers have themed plays spaces - meaning adults assigned a motif to the play space, like circus show. In our review and coding of the video clips and interviews with early childhood educators, we found that:

There was no discernible relationship between themes created by the manufacturers or designers and children's imaginative play.

What do the children like best about their outdoor play space?

We asked early childhood educators what they and the children appreciated about their current outdoor play spaces.

70% of comments involved spatial qualities, such as yard shape and equipment location.

Children need to shape their environment.

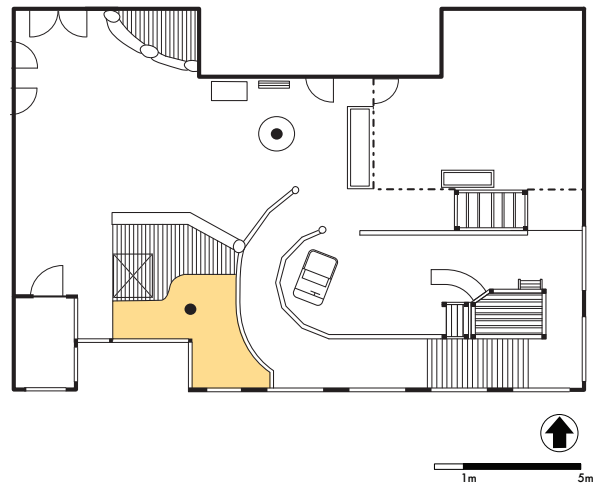
We found that outdoor play spaces that contain materials that children could manipulate - sand, water, pea gravel, mud, plants, pathways, and loose parts offered more developmental and play opportunities than spaces that did not contain these elements.

Aggression between the children increases when no manipulable material was provided in their outdoor play space.

13 opposite page: House imagined by children. This play space is commonly used by children who imagine it to be a house or a kitchen.

14 opposite page: House themed by adults. There is no documentation by video or staff interviews that children play house or other domestic games here.

15 right: Yellow indicates the amount of malleable surfacing in this play space. This centre is primarily covered with hard surfacing which has a negative impact on the sound quality of the play space.



15

The sound environment contributes to quality.

Materials of the play space influence sound. Centres that had primarily hard surfaces and exposure to street sound measured high in noise levels. The adults and children using these spaces also experienced higher level of stress than at quieter centres.

The physical materials of the play environment influence the sound landscape, which in turn influence stress levels.

What do the early childhood educators want to see in their play space?

43% would like additional sensory experiences

35% would like better organized space

22% would like better equipment, structures, seating

Children wanted more soft spaces in both their inside and outside spaces.

play: it exerts no external pressure to conform to rules, pressures, goals, tasks or definite action.

play: it is about possible alternative worlds, which involve 'supposing', and 'as if', which lift players to their highest levels of functioning. This involves being imaginative, creative, original and innovative.



seven cs

Seven Cs links physical conditions of outdoor play environments with what we know about the development of young children. It should be used to inform the design team responsible for designing the play space. The design team should not only involve professional designers, but early childhood educators, parents, and children. **The Seven Cs includes character, context, connectivity, change, chance, clarity, and challenge.** Each C builds upon another to define the key elements that should be considered by the design team. While our research primarily addresses children aged two to five years-old, we believe that many of these elements are relevant to play spaces for older children as well.

play: it is about participants wallowing in ideas, feelings, and relationships. It involves reflecting on and becoming aware of what we know, or 'metacognition'.

16 - 19 below: Examples of four different character types found in our study.



16



17



18



19

character

“Moving from the indoors outside, there is more room visually and physically. You feel like you can breathe outside. There is a different set of emotions outside. It feels calming to be outside and children are able to adjust to their emotional and social needs. For example, if children need to, they can hide away from the larger group. Inside it is more difficult for children to escape from the group. Less restrictions are placed on the children outside. They are able to move freely in different ways, they can scream when they are excited or make other loud noises. The outdoors is also a dynamic changing environment. The change is noticeable and enticing to the children.”¹¹

Shelly Esau, Early Childhood Educator

20 - 22 below: These three images show how play spaces can be designed to reflect the unique character of a place, contribute to the overall feeling of a play space and differentiate one play environment from another.



20



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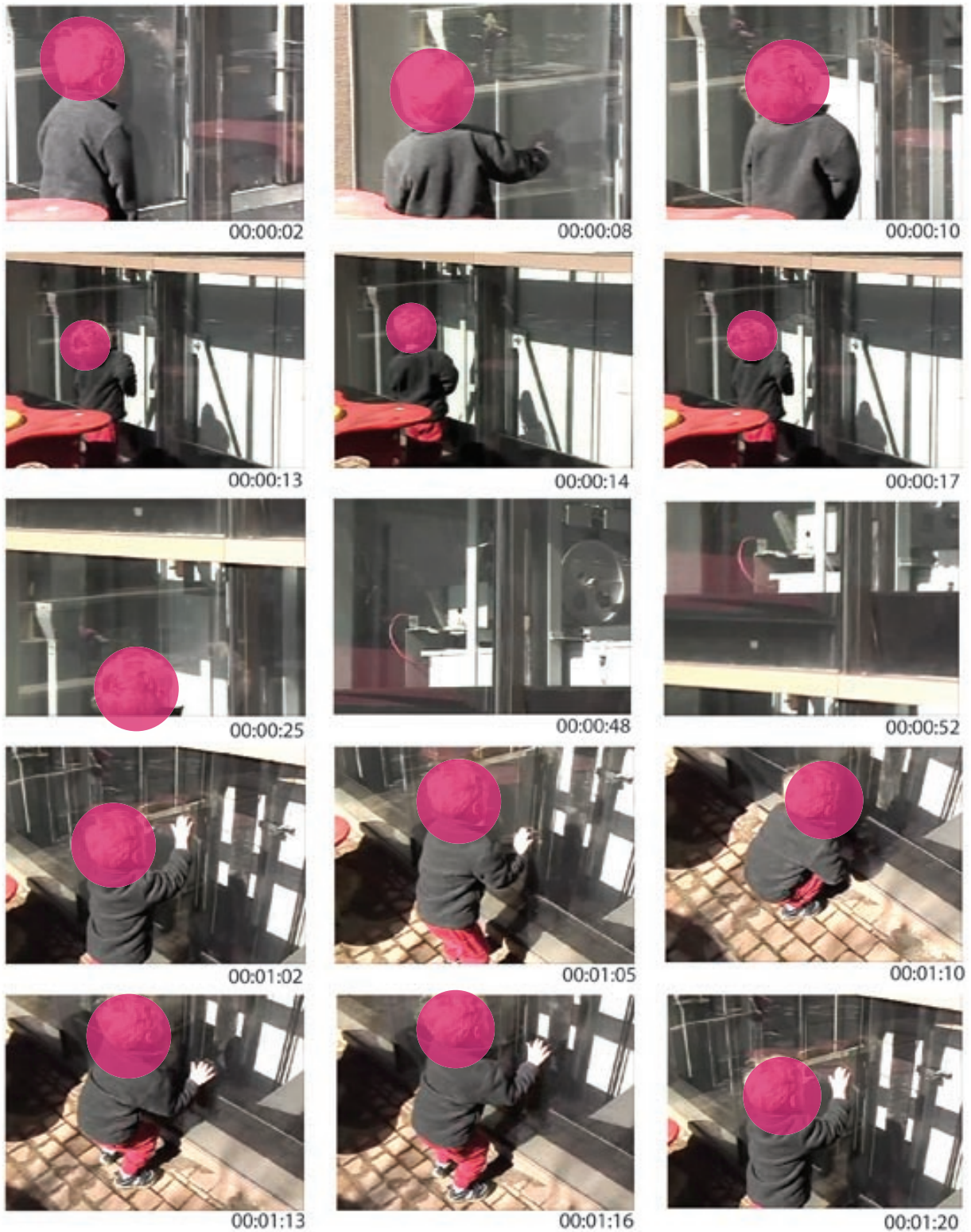


22

Character refers to the overall feel and design intent of your outdoor play space. We have identified four architectural character types currently existing in our study: modern, organic, modular, and re-use. These physical characteristics have been successfully used in European studies of child care environments and they provide an effective way to code for design type.

Character is also important to children's development. Young children are forming memories, learning classification skills, identifying concepts of scale, and using a language to describe these experiences; even humour.¹³ These are developmental milestones that can be directly supported by the physical environment.

Together, the design team should write a brief mission statement that defines the goals of the centre and how the character or "overall feel" of the outdoor play space will reflect and support these goals. Linking the mission statement to the physical character of the play space is paramount to the design process.¹² It helps guide the many decisions that the design team will face during the creation of the play space.



23 above: Modern character type means that the design highlights the infrastructure and mechanisms of the landscape and building.

23



24 above: Organic character type means that the design highlights the changing outdoor environment and includes materials children can manipulate.

24



00:23:16



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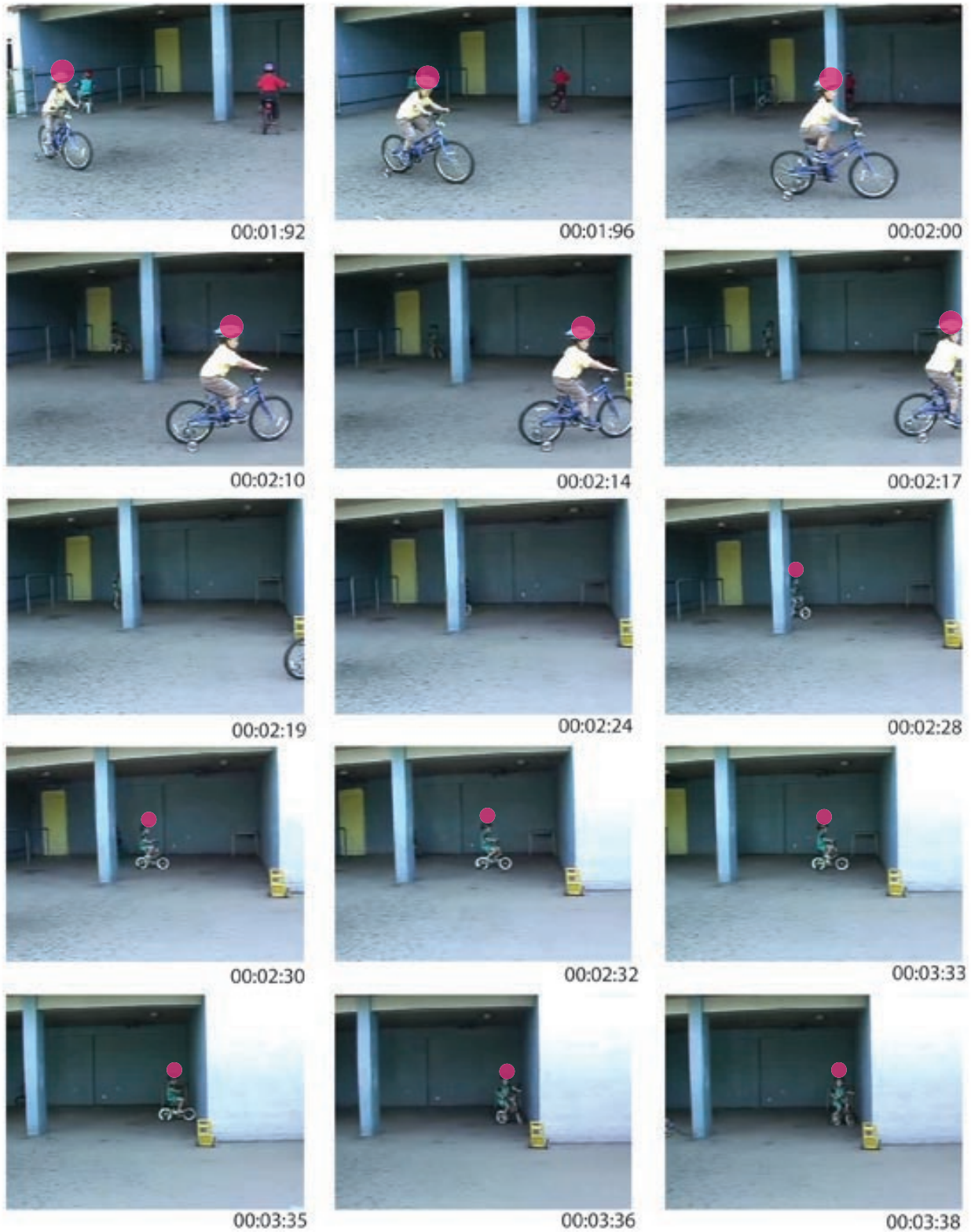
00:23:29



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25 above: Modular character type means that equipment dominates the play area leaving inadequate room for other kinds of play.

25



26 above: Re-use character type means that the design is an adaptation of a space that was not originally intended for children.



27



28

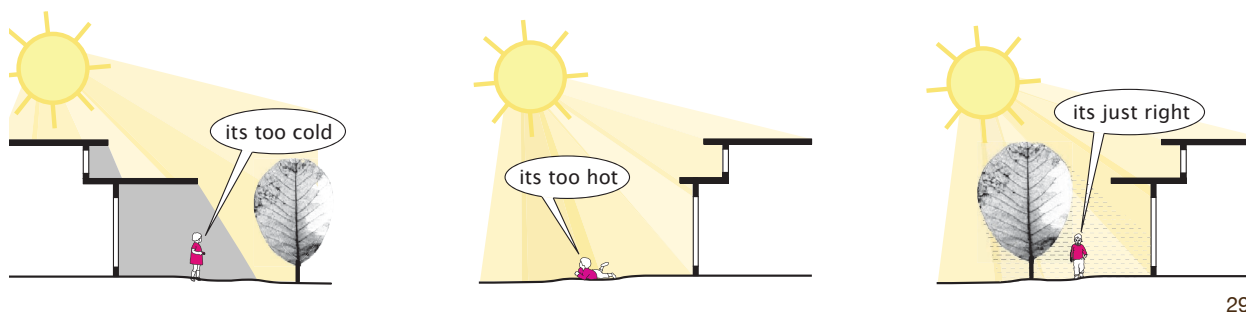
27 above left: In the summer months the sun often makes many places in the outdoor play space too hot for children to occupy. In this photo, the simple addition of a parachute over the play climber, provides enough shade for children to play safely in the sun.

28 above right: At this centre the play climber provides prospect points high enough for children to look out to the surrounding neighbourhood enabling them to see what's going on around their play space.

context

Context refers to the small world of the play space itself, the larger landscape that surrounds the centre, and how they interact with each other.¹⁴

The design team should assess their centre's context and ask - is the child care centre in an old neighborhood or in the central business district, or on a farm? Is there room to provide maximum space for the children? Are there views out from the play space to its surroundings? The micro-climatic conditions should also be assessed by the design team. What is the orientation of the site - south or is it shaded by a large building?



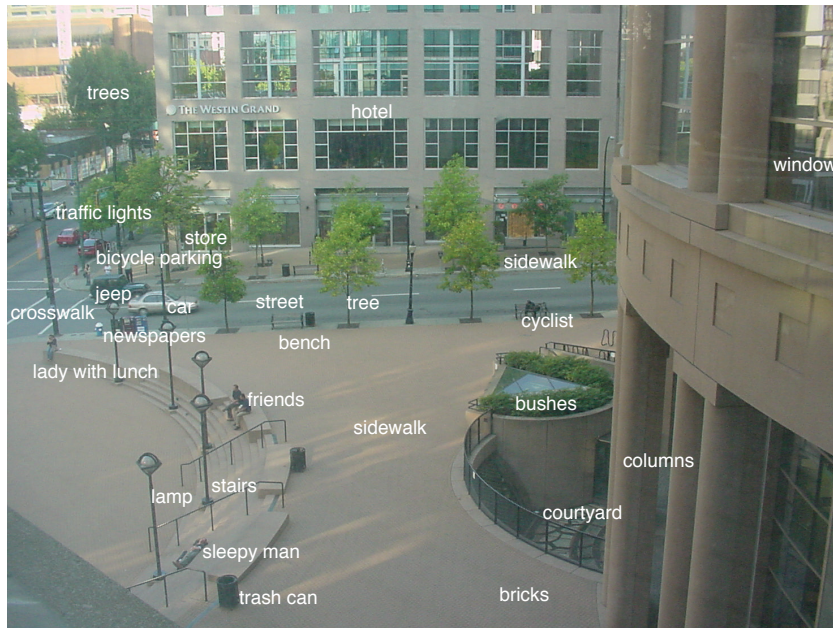
29

Thermal Delights. Micro-climatic conditions should also be considered in regards to the location of the play space relative to the ground plane, the degree of transparency between the space and its surroundings, and degrees of sun and shadow.¹⁷

We found that centres that overlooked thermal issues (too hot, or too cold, or too damp) created conditions that early childhood educators as well as children did not want to occupy for any length of time.

Space per child ratio. It's worth the fight.

The number of children the centre expects to enroll is an important piece of information when designing a child care centre.¹⁵ The number of full-time enrolled children determines the amount of space allocated both inside and outside. Child to space density impacts levels of aggression, the mood, and the types of play, and the amount of gross motor activity in outdoor play spaces.¹⁶ The City of Vancouver recommends an outdoor space ratio of 10.6 m²-14m² per child for ages three to five years enrolled in full time group child care. Based on our findings centers with 14m² per child ratios or slightly higher offered more flexible space for early childhood educators to improvise different play activities, and extra space also allowed for more gross motor activities like running.



29 opposite page: Different light conditions impact children's enjoyment of the outdoor play space.

30 left: A view to the surrounding 'busy town' context from one of our centres.

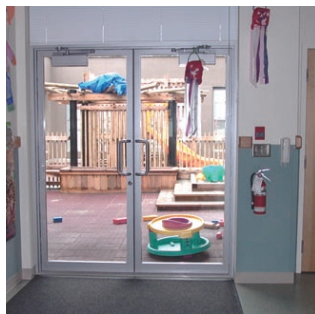
30

The design team should make every effort to claim as much space as possible for the children. This can be difficult when the child care centre is being built as part of a larger project in a dense urban situation, but every effort must be made to claim space for children against demands of parking, loading docks, and smoking areas for adults.

Busy Town. The design team should consider what the surrounding context has to offer to the play space. Children enjoy observing - especially adults. Children also appreciate views - such as a dumpster being unloaded - that adults do not. What are the views afforded by the location of the play space? A number of the roof top play spaces we studied accommodated views of the city which captivated children - inciting discussion among the children and their early childhood educators.

Who are your neighbours? We found that several centers in our study had created long term and valuable relationships with their neighbors. For example, at one centre the staff and children were allowed to visit their next door neighbour to pick pears. This helped to create a bond between the centre and its neighbourhood.

play: it actively uses previous firsthand experiences, including struggle, manipulation, exploration, discovery and practice.



31



32



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34

31: A transparent door visually connects the indoor and outdoor spaces.

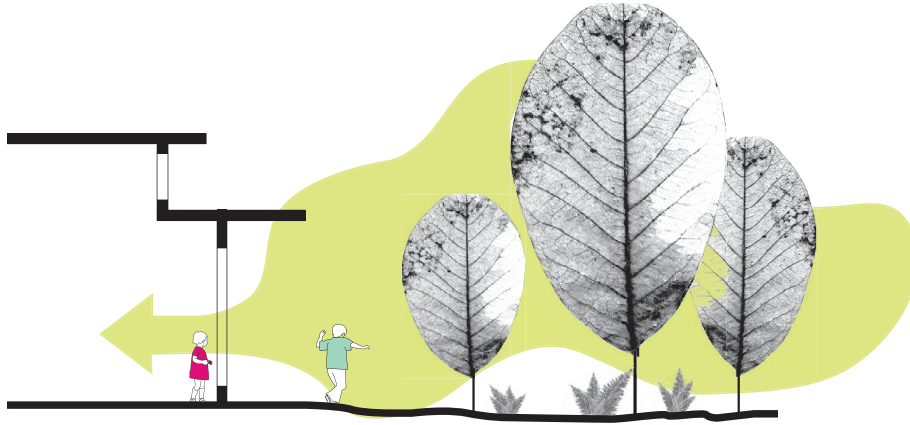
32: These two play houses are a creative way of connecting two childcare programs.

33: This fence connects the toddler and 3-5 play spaces. The spaces in the fence allow children to interact and observe each other.

34: These child scaled tunnels are a unique design solution to improve the connectivity of a play environment.

connectivity

This category indicates the physical, visual, and cognitive connectivity of the play space itself. Connectivity is physical, but it also activates cognitive development, such as the way a hierarchy of pathways can orchestrate movement in a play space and helps children understand that space. According to Leland Shaw “repeated observations with able and disabled children have shown that unifying the play yard unifies the play experience and increases significantly the time spent engaged with the physical structure of the place.”¹⁸



35 left: Designers should make every effort to link the outdoor play space with the inside play space.

35

Indoor / Outdoor. Every effort should be made to link the outdoor play space with the inside play space. Centres that had direct physical and visual connection to their outdoor play space from inside used the outdoors more frequently than those centres that lacked this connection. For example, one centre must take children in an elevator to reach their play space, making outdoor play an inconvenience. Outdoor play spaces that are visually connected to the inside also contribute to the interior atmosphere of the centre. Reggio Domus Academy Research Center states that this connectivity contributes a sense of place to the interior “from weather to seasonal changes, from the time of day to the rhythms of the town - precisely because it exists in a specific place and time.”²⁰

Pathways. The design team should determine the different pathways that will accommodate different forms of mobility. Our study and others have shown that looped paths and a hierarchy of paths with dominant paths for multi-purposes and subordinate paths extending from these main paths give children the opportunity to explore the space at different speeds and to make decisions.¹⁹ Pathways were important features in the play spaces we studied. We found that play was characterized by aggressive tricycle riding and “channel surfing” play at centres that had no defined pathways. In one example, asphalt constituted eighty percent of the ground plane, causing children without wheeled vehicles to retreat to the margins of the play space.



36



37

36 above left: The smaller spaces underneath climbers are important social and intimate spaces for children.

37 above right: Bamboo can be used to enclose activity areas. It allows children to pass through or hide in, but also can clearly define a play space boundary.

change

Change involves a range of differently sized spaces designed in the play area and how the whole play space changes over time. The design team should ensure that a range of spaces accommodate different amounts of children and that the materials of the spaces actually change themselves overtime.²¹

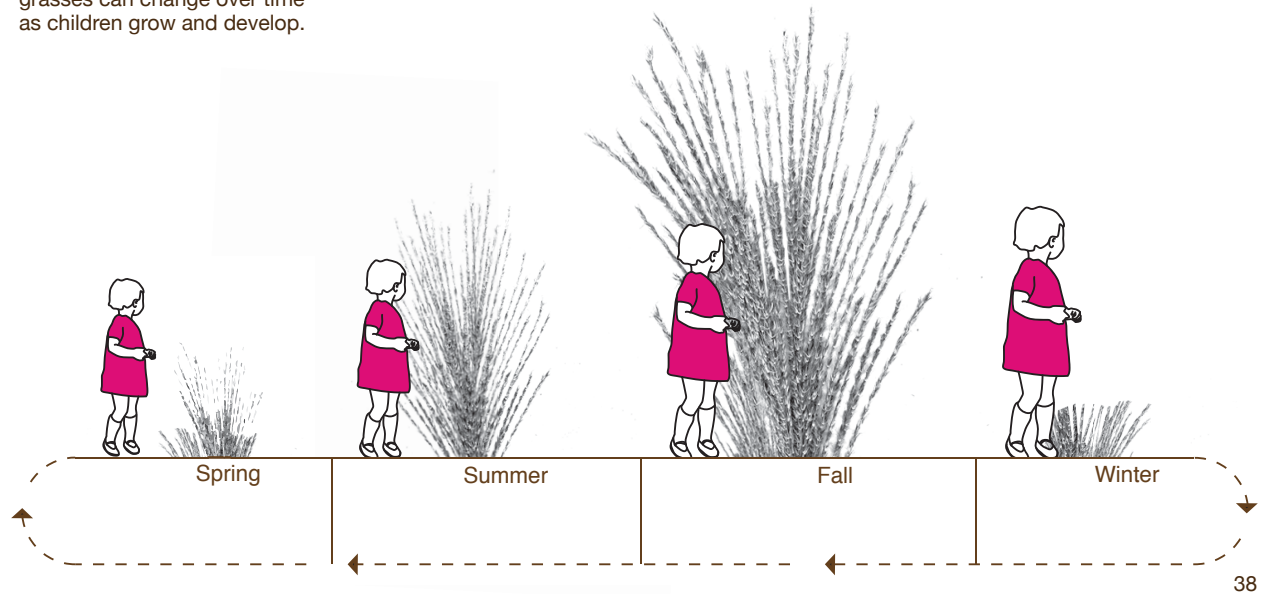
Differently sized sub-spaces. Many of the design guidelines for children's outdoor play spaces stress the importance of variable sized spaces to accommodate different numbers of children and different uses.²² Spaces that allow children to be alone are particularly important because children are often grouped together and they need spaces to get away, to be on their own, or in pairs. Anita Olds contends that private spaces are crucial to development because they allow retreat and enable children "to behave according to their mood and give shy children the opportunities to explore feelings and inner turmoil they prefer not to reveal to others."²³

play: it is sustained, and when in full flow, helps us to function in advance of what we can actually do in our real lives.

Only two of the centres studied intentionally designed private spaces for children. Many children in our study used the underneath spaces of the climbing structure as a private space; however, since safety standards have reduced the height of newer play structures, these important underneath spaces are vanishing. In outdoor play spaces that lacked any subspaces, we observed children huddling in corners or doorway threshold to talk or be by themselves.

Zones are areas in the play space that are designed to accommodate particular uses - such as sand play.²⁴ Zoning is an important concept for the design team to consider, yet they should consider how the zones relate to each other. Reggio Domus Academy Research Center notes that “space is not composed of functional zones... they must be flexible over time and manipulatable, open to modification by the children’s processes of self learning and in turn, interact with these processes and modify them.”²⁵

38 below: Inexpensive and hardy plants like ornamental grasses can change over time as children grow and develop.



Our study found that many play spaces had distinct zones; however, there was little attention given to how these zones related to each other or how they could potentially overlap.²⁶ This resulted in conflicts between children and their early childhood educators, particularly if children were prevented from moving loose parts between distinct zones. Physical elements that enclose zones and contribute to the fluidity among zones are objects like low walls or stumps, which can be climbed over, or plant material, which can allow children to pass through its walls.²⁷ A study of den spaces, which are typically created with plant material and created by children, notes that these spaces contribute to children's developing sense of self and control by engaging "an intricate process requiring some protection from unwelcome and uncontrolled external disturbances, so that the secret aspect of the den becomes especially important."²⁸

Changing materials. Young children are interested in how things grow and change, and they are beginning to understand the sequence of daily events.²⁹ Sand, mud, gravel, and vegetation (fallen or picked) are materials that can be shaped and are advocated by most of the literature concerning quality child care environments.³⁰ Our study found that children had shorter durations of play where change was limited. Play durations were shorter at centres where sand and water were tightly controlled (i.e. it could not be mixed or transported across the play space) compared with centres where mixing and transporting of this material was encouraged.

39 below: Fallen leaves are an example of plant generated open-ended play props for children.



39

Young children will often engage in careful watching and observing of their environment. Plants and animals index changes in the season and growth in general.³¹ We found that children who had the opportunity to interact with living organism - whether plants or worms - described what they were experiencing to each other and to their early childhood educators. This verbal venting is one of the first steps to literacy, and should not be overlooked when considering whether plants should be part of the play space.

Plants not only modify the climatic conditions and provide light shade, but the flowers, seeds, and leaves produced by this living material can provide open-ended play props for children. Robin Moore states that “vegetation supplies a wide variety of play resources that children can harvest for themselves. There is no substitute for plant generated play props. Leaves, flowers, fruits, nuts, seeds, and sticks stimulate an infinite variety of imaginative responses.”³² While staff interviews suggested that plants in the play spaces were not an alternative due to maintenance or the perceived fragility of plants, play spaces that incorporated vigorous low maintenance plants created sensory rich play spaces with numerous play props.

play: it can be solitary.

40 below: Messy zones like this one with sand, provide areas for children to dig, mold, shape, sift, and press.



40

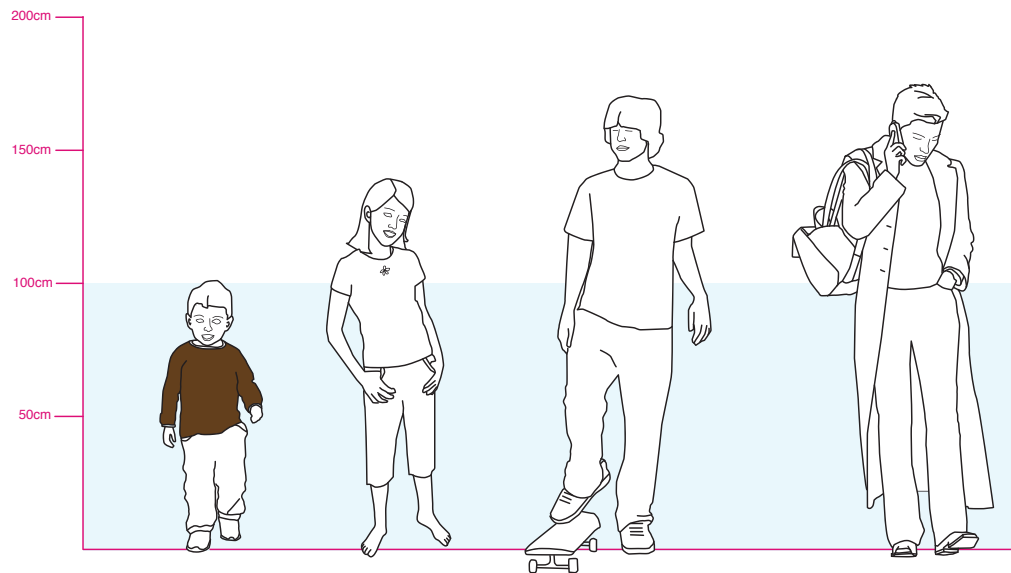
chance

“The children use these outdoor spaces at our centres day after day, and more thought needs to be given to how these spaces can change over time to sustain interest and enrich play.”

Sandra Menzer, Executive Director of Vancouver Society of Children’s Centres, 2003

Chance involves an occasion that allows something to be done; an opportunity for the child to create, manipulate, and leave an impression on the play space. Chance has sometimes been referred to as open-endedness or flexibility. This can be a difficult dimension for professional designers to understand because they typically design for permanence. However, chance is extremely important. In Simon Nicholson’s “How Not to Cheat Children: Theory of Loose Parts,” written to landscape architects, he states that “children should have the opportunity to play with space forming material in order that they may invent, construct, evaluate, and modify” on their own.³³ This is extremely important to young children

41 below: People of different heights have different perceptual fields.



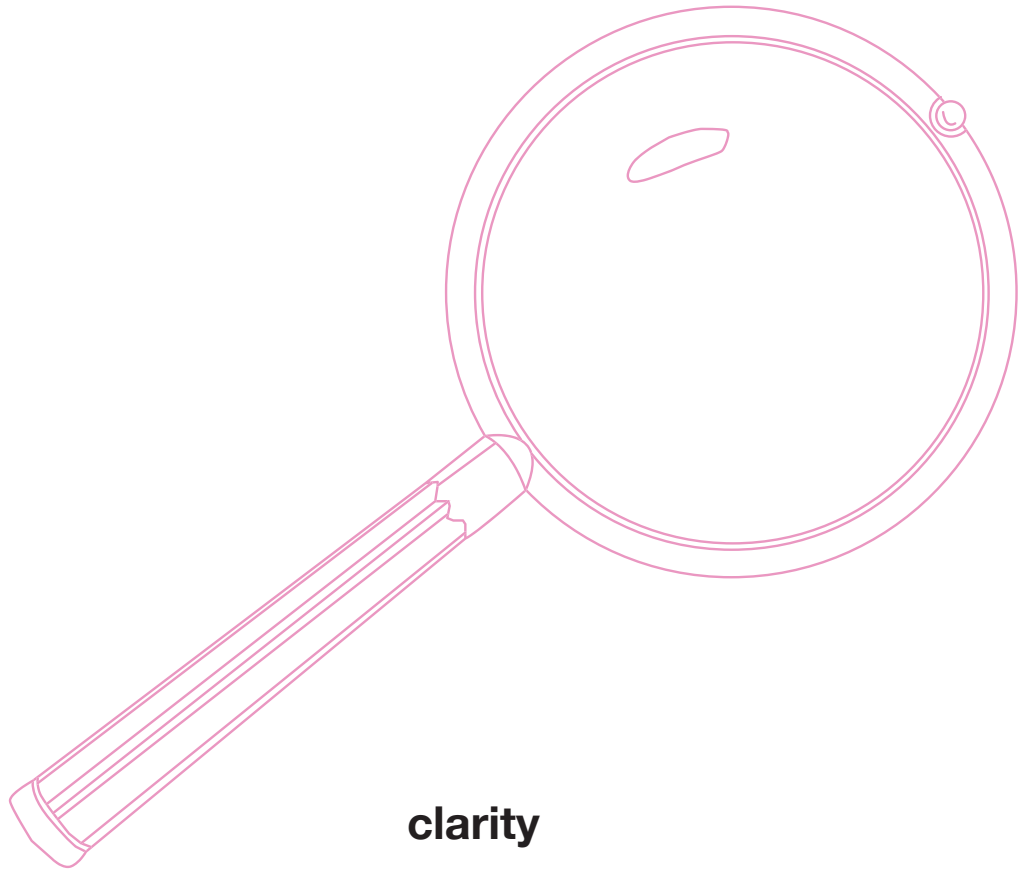
41

who are mastering fine motor skills, have increased mobility, and are capable of inventing games, other worlds, and even people.³⁴

Messy zones. The design team should consider how the play space can be designed to allow for chance. A good example of chance opportunities in outdoor play spaces are what Jim Greenman refers to as “messy zones; places to dig, watery places and sand areas where loose parts provide tools for children’s imagination and their increased ability to mold, shape, shift, press, and drizzle.”³⁵ These are not areas “themed” by the designer, but spaces that have enough malleable material that allow the children to design themselves.

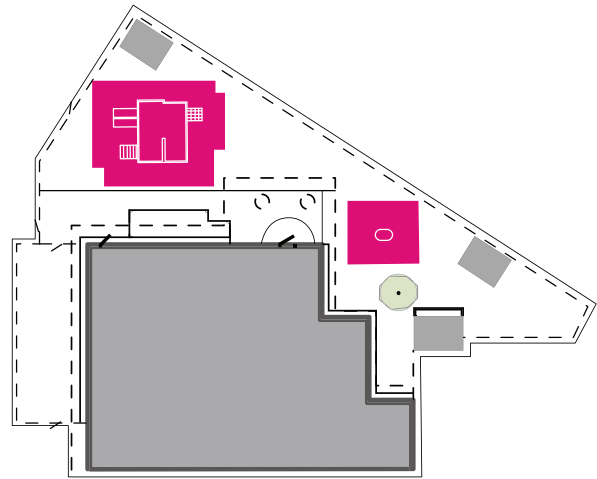
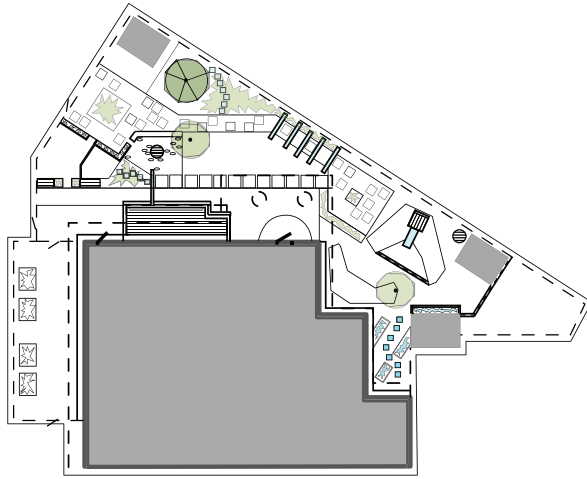
Mystery. Chance also involves stimulating spontaneous exploration - children exploring on their own. Spontaneous exploration links physical movement with the mind, and it is an equally important contribution of the outdoor play space to child development. Spontaneous exploration can “enhance perceptual motor functioning - gross motor, fine motor, spatial awareness activities, directional awareness, balance, integration (hitting a moving ball), expressive activities.”³⁶ It also expands the children’s cognitive understanding of their play space.

The design team can encourage spontaneous exploration activities in the play space by creating areas that encourage children to investigate. This can be achieved by considering the physical height of children - what can they see from their height? How can a sense of mystery be created with plant material, low walls, or terrain? Stepping stones and plant material in strategic parts can also encourage movement and understanding of the play space.³⁷ This leads to the next C - clarity.



clarity

Clarity combines physical legibility and perceptual imageability. Our study found that spaces where a large play structure occupied the geographical center of the play space (a common location for these structures), children had a difficult time maintaining play involving movements like tag or imitative play because the play structure divided the play into disconnected peripheral spaces. Early childhood educators noted that this type of configuration interrupted their view of the entire play space. The design team should ensure that clear entry and exit spaces are provided to the outdoor plays space to prevent accidents.³⁸

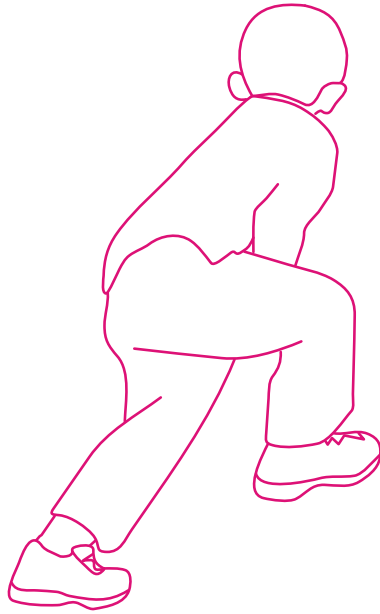


42

The soundscape of the outdoor play space should also be considered by the design team.³⁹ We found that outdoor play spaces that were comprised of primarily hard surfaces and little vegetation and close proximity to a busy street were significantly louder than play spaces with soft material, plants, and distance from traffic noise. The noisier outdoor play spaces created a general atmosphere of confusion, and stress was noted in both early childhood educators and the children.

42 above: The plan on the right may look clearer to the design team in plan view. However the plan on the left is a clearer design scheme because it's related to the scale and movement of children.

play: during free flow play, we use technical prowess, mastery and competence we have previously developed, and so can be in control.



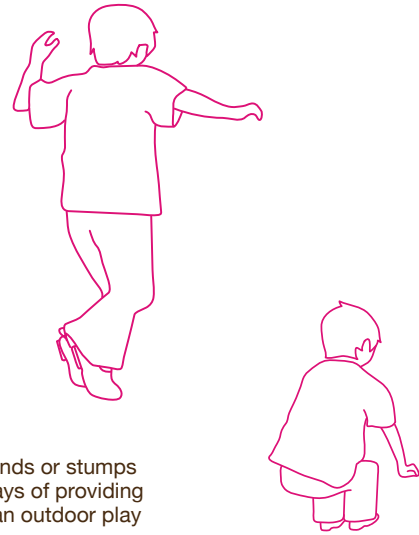
challenge

Challenge refers to the physical and cognitive encounters that a play space provides. The design team must determine the types of challenge that the play space provides. Our study and others found that a lack of challenging things to do in a play space has been the primary reason for increases in bullying. According to Play for All Guidelines, “without taking risks, children cannot learn to their full potential. Settings must challenge them to take risks without being hazardous. The difference between “hazard” and “challenge” must be understood when creating play settings. Children will use equipment and parts of the environment in all possible ways, regardless of design intentions. Since the idea of play is to explore and maximize the potential of any play setting, children will test its use to the limits of their abilities.”⁴⁰



43

43 left: Log ends or stumps are simple ways of providing challenge in an outdoor play space.



The design team should consider graduated challenges that involve the presentation of “several levels of difficulty for each activity” and “enables each child to find an optimal level of challenge.”⁴¹ The good news is that we found that challenge can be easily accommodated in an outdoor play space. An important finding of our study revealed how simple design elements served as catalysts for challenge. Varying heights of a retaining wall (ramps intended for wheelchairs) created opportunities for balance, tunnels designed to be crawled through were eventually walked upon, and a sandbox containing driftwood could be adjusted to varying heights by the children themselves allowing them to test a multitude of skills. The following describes specific developmental benchmarks of children and correlates these with simple design elements:

perceptual motor activity and supporting physical conditions

Three years 83-109 cm height	Body locomotion	Grassy slopes to roll down Tunnels to crawl through Stairs of graduate levels Connect play zones with stairs Walls high and wide enough to step onto
	Ball throwing Kicking	Area with some vertical enclosure Elements to aim for
	Hops on one foot Jumps in place Tip toe walk	Stepping stones, stumps, or patterned paths Hard ground plane
	Pedals tricycle	Looping circulation for tricycle
	Climbs up and down	Range of heights and in/outs to climb through and up
	Imitating	Small group activity area Intimate places for 2 or 3 children Circular spaces to follow and mimic each other
	Tripod grasp (first two fingers and thumb)	Opportunities to practice fine motor skills, sand, plants to pick, areas to draw and paint
	Can build towers of eight or more blocks	Storage for loose parts

play: it can be in partnerships, or groups of adults and/or children who will be sensitive to each other.

Four years 94-117 cm height	Rhythm and temporal awareness	Running on bumpy surfaces Surfaces that make noise
	Body and space perception	Mirrors Sand areas for making sand angels
	Walks straight line and gaining balance	Ledges, walls, stump rounds, wooden beams, and stones
	Pedals and steers a wheeled toys with confidence, turns corners, avoids obstacles	Complex circulation pathways
	Climbs ladders, trees, playground equipment	Multiple places to climb, access climber (ropes, on all fours, rope ladder)
	Jumps over 12 cm high and lands with both feet together	Hurdles - plantings or other objects to jump over
	Runs starts, stops, and moves around obstacles with ease	Meandering paths to follow
	Continues one activity for ten to fifteen minutes	Storage so that staff can introduce varying loose parts to the landscape
	Moods change rapidly and unpredictably	Places for retreat Soft comfortable areas Range of spatial qualities to suit mood Easy and clear access into areas
	Cooperates with others in group activities	Spaces for large and mid sized groups
	Enjoys role playing and make believe play	Storage for a range of loose parts Incorporate materials like sand, water, plant props

Five years 99-122 cm height	Airborne and pivoting movement	Swings, bars to hang from Low benches to suspend over
	Walks backward heel to toe	Differentiated circulation surfaces Mirrors
	Learns to skip using alternating feet	Meandering pedestrian circulation
	Catches ball thrown from 3 feet away	Larger open spaces
	Rides tricycle or wheeled toy with speed and skill	Complex tricycle circulation Opportunities to vary or alter the course
	Jumps over low objects	Low objects such as log rounds that can be piled up
	Eager to learn new things	The outdoors has elements of change and chance
	Empathy for others	Plants material Animals and insect habitats
	Collects things	Plant material with droppings Children's storage outside to store objects
	Sometimes needs to be alone	Dens, niches Quiet places
	Enjoys friendship has one or two special playmates	Varying sizes of play spaces
	Elaborate symbolic play	Subspaces that can become other space (space ships, kitchens, bird's nests)

Descriptions of developmental stages adapted from Jambor 1990, Oestreich 1993, Allen & Marotz 2000.

play: it is an integrating mechanism, which brings together everything we learn, know, feel and understand.

conclusions

Our findings indicate that the design of outdoor play spaces - their design type, size, configuration, age of equipment, and materials - contributes to children's play and development. Findings also link economic conditions with quality outdoor play spaces. While safety has occupied much of the media regarding children's play equipment, we found that safety changes to equipment and no-encroachment zones impact the quality of the entire play space and its use. Our findings on living elements reaffirm other studies regarding the importance of plants in children's play spaces. We were struck by the fact that the child care staff were primarily concerned with the environmental qualities of their play spaces. Given that children were only using the play structures 13% of the time also suggests that more attention should be paid to the whole

environment of the play space. This finding is particularly applicable to landscape architects because they are specifically trained to design outdoor environments for people. For example, landscape architects have pioneered the application of plants on rooftops without compromising the building envelope. Rooftop play spaces are one of the fastest growing play space types in the city and in our study they tended to be some of the noisiest and hottest play spaces. New studies need to be performed to include aspects of weather that are not present in Vancouver, like heavy snow loads and extreme heat conditions. Lastly, further research must be performed on the space ratio per child.

notes

1. Seven Cs emerged as a way for the researchers to organize and remember the criteria. Seven Cs as a phrase has a long history dating back to ancient usage, and has referred to a number of different seas and oceans since this time. The authors thank their partners from the Consortium for Health, Intervention, Learning and Development and the Social Science and Humanities Research Council of Canada for their support.
2. Portions of the Seven Cs research were first published in S. Herrington and C. Lesmeister (2006) "The design of landscapes at child-care centres: seven cs," *Landscape Research*, 31 (1), 63-82.
3. M. Friendly, J. Beach, and M. Turiano, M. (2002) *Early Childhood Education and Care Canada*, 2001 5th edition (Toronto, Ontario: University of Toronto Childcare Resource and Research Unit).
4. Statistics Canada - <http://www.statcan.ca/Daily/English/050207/d050207b.htm>).
5. J. L. Frost and B.L. Klein, *Children's Play and Playgrounds* (Boston: Allyn and Bacon), 1979, pp.16-18. A.D Pellegrini and P.K. Smith, "The Development of Play During Childhood: Forms and Possible Functions." *Child Psychology & Psychiatry*, 3 (2), 1998, pp. 52-3.
6. R.C. Moore (1986) *Childhood's Domain: Play and Place in Child Development*. (London: Dover, NH: Croom Helm). R.C. Moore, S.M. Goltsman, and D.S. Iacofano, D.S. (1992) *Play for All Guidelines: Planning, Designing, and Management of Outdoor Play Settings for All Children* 2nd ed. (Berkley, CA: MIG Communications). R.C. Moore (1993) *Plants for Play: A Plant Selection Guide for Children's Outdoor Environments* (Berkeley, California: MIG Communications). M.S. Rivkin (1995) *The Great Outdoors Restoring Children's Right to Play Outside* (Washington, D.C.: National Association for the Education of Young Children). S. Herrington and M.K. Studtmann (1998) From yard to garden: new directions in the design of children's outdoor play environments, *Landscape and Urban Planning*, 42, pp.191-205. S. Herrington (1999) Playgrounds as community landscapes, *Built Environment: Playgrounds in the Built Environment*, 25(1), pp. 25-34. S. Herrington (1997) The received view of play and the subculture of infants, *Landscape Journal: Design, Planning, and Management of the Land*, 16(2), pp.149-60. A. R. Olds (2000) *Child Care Design Guide*. (New York: McGraw-Hill). M. Kylin (2003) Children's dens, *Children, Youth, and Environments Journal*. 13(1) pp.1-25.
7. A.R. Olds (1989) Psychological and physiological harmony in child care center design, *Children's Environment Quarterly*, 6(4), pp.8-16. R. C. Moore and D. Young, D. (1978) Childhood Outdoors: Towards a social ecology of the landscape: Altman & J.F. Wohlwill (Eds.) *Children and the Environment*, pp.83-130.

8. A 2003 study in Yorkhill hospital in Scotland found that children aged three to five spent about twenty minutes a day in vigorous activities (Reilly and Dorosty 2004), less than half the time prescribed by the Canadian Health Guidelines. See J.J. Reilly and A.R. Dorosty (2004) Epidemic Obesity in UK children, *The Lancet* 354 (9193), p. 1874). Likewise, over half of Canada's children are not active enough for optimal growth and development. The *New Physical Activity Guidelines for Children and Youth* state that in order for children to increase their activity to a healthy level each day they should engage in ninety minutes of physical activity and decrease by ninety minutes the amount of time engaged in sedentary activities like watching videos (Health Canada, 2002). According to the Canadian Institute of Child Health, children in 36% of studied child care centres spent less than 10% of their time engaged in outdoor play. Lack of space was the main reason for not going outdoors (Mauffette et al., 1999, p.8).
9. N.O. Houser (1990) Teacher-Researcher: The synthesis of roles for teacher empowerment, *Action in Teacher Education*, 12 (2), pp. 55-60.
10. T.D. Wachs (1979) "Proximal experience and early cognitive-intellectual development: The physical environment," *Merrill Palmer Quarterly*, 25, pp. 3-41 found six items that have a significant impact on development: Adequate, degree of personal space, schedule, levels of noise confusion, physically responsive environments, degree of exploration based on physical set-up, and organization of the environment.

Regarding the outdoor environment: J. Isenburg and E. Jacob (1985) Playful literacy activities and learning: preliminary observations in J.L. Frost and S. Sunderlin (eds) *When Children Play; Proceedings of the International Conference on Play and Environment*, pp. 17-21 (Wharton, MD: Association for Childhood Education International) found that playing outdoors contributes to literacy development. H. Russell, (1973) *A Teacher's Guide: Ten-Minute Field Trips Using School Grounds for Environmental Studies*. Chicago J.G. Ferguson., J. Finlay, J. (1988) Sharing and Caring, *Nature Study*, 42(1&2), p.28, M. Harvey (1989) Children's experiences with vegetation. *Children's Environments Quarterly* 6 (1):36-43, and J. Dighe (1993) Children and the earth, *Young Children*, 48(3), pp.58-63, found that children playing in natural environments develop empathy for other living organisms. A. R. Olds (2000, 1989) and S. Kaplan & C. Peterson (1993) found the outdoor environment can be a restorative environment for children. R. C. Moore and D. Young, D. (1978) found that the outdoor environment provides volitional learning opportunities that allow children to manipulate elements of the outdoor setting.

11. Interview by Chandra Lesmeister, 2005, Vancouver.
12. E.K. Allen and L.R. Marotz, (2000) *By the Ages: Behaviour and Development of Children Pre-Birth Through Eight* (Canada, Delmar Thomson Learning).
13. Adapted from M.Dudek (2000) *Kindergarten Architecture* (England: Spon Press).

14. L.G. Shaw (1987) Designing playgrounds for able and disabled children, in: Weinstein, C.S. & Thomas, G.D (Ed.), *Spaces for Children: The Built Environment and Child Development* (New York: Plenum) p. 190.
15. M.Dudek (2000) p. 71-2.
16. A reduced density in child care landscapes was often due to the fact that some children without guardian consent forms were not in the play space during video sessions.
17. R. C. Moore and H. (1997) *Natural Learning: Rediscovering Nature's Way of Teaching*. (Berkeley California: MIG Communications)., P. K.Smith and K .J. Connolly (1980) *The Ecology of Preschool Behavior* (Cambridge, England: Cambridge University Press).
18. L.G. Shaw (1987) p. 191.
19. S. Herrington (1999).
20. A. Branzi, C. Rinaldi, V. Vecchi, A. Petrillo, J. Bruner, P. Icaro, A. Sarti, and A. Veca, (1998) *Children, Spaces, Relations: Metaproject for an Environment for Young Children*, Ceppi, G., & Zini, M. (ed.) (Modena, Italy: Grafiche Rebecchi Ceccarelli s.r.l), p.41.
21. E.K. Allen and L.R. Marotz, (2000).
22. J.L. Frost and B.L. Klein (1979) *Children's Play and Playgrounds* (Boston: Allyn and Bacon); J. Greenman, (1992) Places for childhood, *Exchange*, 7, pp. 21-23; L. G. Shaw (1987); R.C. Moore et al. (1992); S. Herrington, (1999); A.G. Maufette, L. Frechette, and D. Robertson (1999) *Revisiting Children Outdoor Environments: A Focus on Design, Play, and Safety* (Hull, Quebec: Gauvin Presses); M. Dudek (2001) *Building for Young Children* (London, England: The National EarlyYears Network).
23. A.R. Olds (1989) p. 12.
24. A. Erikson (1995) *Playground Design: Outdoor Environments for Learning and Development*. New York: Van Nostrand Reinhold; J. Greenman, J. (1988) *Caring Spaces, Learning Places: Children's Environments that Work* (Redman Washington: Exchange Press Inc.); M.S. Rivkin (1995).
25. A. Branzi et al. (1998) p.3.
26. A. Branzi et al. (1998) p.10.
27. S. Herrington and M.K. Studtmann (1998).
28. M. Kylin (2003) pp 20-1.

29. E.K. Allen and L.R. Marotz, (2000).
30. E.K. Allen and L.R. Marotz, (2000).
31. R.C. Moore et al. (1992); R.C. Moore (1993); J. Greenman, (1992); Herrington (1997) (1999); S. Herrington and M.K. Studtmann (1998); A.G. Maufette et al. (1999).
32. R.C. Moore (1993) p.6.
33. Nicholson, S. (1971) *How not to cheat children: the theory of loose parts*, Landscape Architecture, 62(1) p.31.
34. E.K. Allen and L.R. Marotz (2000).
35. J. Greenman (1992) p. 184-5.
36. J.L. Frost and B.L. Klein (1979) p. 40.
37. S. Herrington and M.K. Studtmann (1998).
38. J. Greenman (1992) p.190.
39. P. Blatchford (1989) *Playtime in the primary school: problems and improvements*. (Windsor: NFER-Nelson).
40. R.C. Moore et al. (1992) p. XII.
41. J.E. Johnson, J.F. Christie and T.D. Yawkey (1987) *Play and Early Childhood Development* (Glenview, IL: Scott, Foresman) p. 204.
42. All play quotes through out text are from T. Bruce (1991) *Time to Play in Early Childhood Education*. Sevenoaks: Hodder and Stoughton.

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plants for children

The following list describes plant play props. This list is only a fraction of the different types of plant play props that could be installed. The specific site conditions such as thermal plant hardiness zone, sun exposure, and soil conditions; as well as the specific conditions of the children, such as allergies to pollen and bees, should be checked.

Acer campestre (Hedge Maple) especially good for splitting winged seeds and adhering to the nose,

Acer rubrum (Red Maple) for red winged seeds and twigs,

Bambusa oldhamii (Clumping Giant Timber Bamboo) for stalks that can be used to paint with,

Calamagrostis acutiflora 'Stricta' (Feather Reed) for flamboyant plume,

Cercis canadensis (Eastern Redbud) for long flat pods that persist through winter,

Cycas revoluta (Sago Palm) for a tough infant sized palm-like tree (its actually a primitive cone-bearing plant related to conifers),

Dietes vegeta (Fortnight Lily) for a tough flowering plant that blooms at two week intervals,

Euonymus alata (Winged Euonymus) for their twigs that have corky ridges and brilliant red leaves,

Feijoa sellowiana (Pineapple Guava) for edible petals put in salads in the late 1980s, and soft silvery backed leaves,

Festuca ovina glauca (Blue Fescue) for silvery –blue foliage and texture and grows like tufts of hair,

Forsythia intermedia (Forsythia) for the fact that they are often the first shrub to bloom in spring,

Fraxinus pennsylvanica (Green Ash) for winged seeds that grow in a pom-pom formation,

Gardenia jasminoides (Gardenia) for the intensely smelling flowers,

Helianthus annuus (Common Sunflower) for use as playhouse and general observation,

Hibiscus syriacus (Rose of Sharon) for their uncanny flower that stinks,

Imperata cylindrica 'Rubra' (Japanese Blood Grass) for the bright red tips of the grass blades,

Koelreuteria paniculata (Goldenrain Tree) for the papery clusters of fruit that look like tiny latterns,

Liquidambar styraciflua (American Sweet Gum) for the fruit balls that resemble tiny medieval weaponry (can be prickly),

Lunaria annua (Money Plant) for their silvery translucent coins,

Magnolia grandiflora (Southern Magnolia) for their outrageously large and fragrant flowers,

Mahonia aquifolium (Oregon Grape) for berries which make great fake blood and jelly,

Pennisetum setaceum (Fountain Grass) for its flamboyant plumes,

Phoenix canariensis (Canary Island Date Palm) for the lower drooping fronds,

Picea orientalis (Narrow Orientalis) for long cones in imaginary play,

Picea glauca (White Spruce) for the cones that can be thrown at each other with little harm,

Pinus strobus (Eastern White Pine) for cones for imaginary play,

Pinus sylvestris (Scotch Pine) for cones and the habit of growth on older trees make them good for climbing,

Platanus occidentalis (American Sycamore) for the brown seed balls,

Salix babylonica (Weeping Willow) for the long branchlets and use as a fort,

Salix discolor (Pussy Willow) for the soft catkins,

Sophora japonica (Japanese Pagoda Tree) for the long pods that stay until late fall,

Sempervivum tectorum (Hens and Chickens) for their spongy texture and the surprising place they can grow,

Stachys byzantina (Lamb's Ears) for the extremely soft leaves,

Symphoricarpos albus (Common Snowberry) for the white fruit that when stomped upon makes a snapping noise,

Trachelosperum jasminoides (Star Jasmine) for the fragrant vine or groundcover.

Source: R. C. Moore (1993) / S. Herrington (2002).

plants NOT for children

The following lists toxic plants (toxic in either a portion of the plant or the entire plant) that should be avoided in landscapes designed for children's use. The list provided below should not be considered a complete list, rather a start of a toxic plant list that should be updated regularly.

Toxic Plants .

Abrus precatorius - Rosemay Pea
Acokanthera species – Poison bush, Wintersweet
Aconitum spp. Monkshood)
Actaea spp. - Baneberry, Dolls Eyes
Aesculus spp. - Horse Chesnut
Agrostemma githago - Corn Cockle
Aleurites fordii - Tong Oil Tree
Alocasia macrorrhiza - Taro
Allium spp. - Onion
Amanita spp. - Deaf Angel Mushroom
A. muscaria - Fly Agaric Mushroom
A. pantherina - Panther Mushroom
A. verna - Destroying Angels Mushroom
Amaranthus spp. - pigweed
Amsinckia intermedia - Fiddleneck
Apocynum spp. - Dogbane
Argemone mexicana - Prickly Poppy or Mexican Poppy
Arisaema spp. - Jack in the Pulpit
Asclepias spp. - Milkweed
Astragalus and Oxytropis spp. – Locoweed
Atropa belladonna - Belladonna or Deadly Nightshade
Brassica spp. - Rape, Cabbage, Turnips, Broccoli, Mustard
Buxus species - Boxwood
Caltha palustris - Marsh Marigold or Cowslip
Cannabis sativa - Marijuana
Centaurea solstitialis - Yellow Star Thistle
Chelidonium majus - Celandine
Chenopodium album - Lamb's Quarters
Cicuta spp. - Water Hemlock or Cowbane
Claviceps spp. - Ergot
Conium maculatum - Poison Hemlock
Coronilla varia - Crown Vetch
Convallaria majalis - Lily of the Valley
Daphne spp. - Daphne
Datura spp. - Jimsonweed, Downy Thornapple, Devil's Trumpet, Angel's Trumpet
Delphinium spp. - Delphiniums and Larkspurs
Dicentra spp. - Bleeding Heart, Squirrel Corn, Dutchman's Breeches
Dieffenbachia species – Dumb Cane
Digitalis purpurea - Foxglove

Duranta repens – Golden-dewdrop
Equisetum arvense - Horsetail
Eupatorium rugosum - White Snakeroot
Euphorbia spp. - Poinsettia, Spurges
Fagopyrum esculentum - Buckwheat
Festuca arundinacea - Tall Fescue
Gelsemium sempervirens - Jessamine
Glechoma spp. - Ground Ivy, Creeping Charlie, and Gill over the Ground
Gloriosa Family – Clory Lily, Climbing Lily
Halogeton glomeratus - Halogeton
Helleborus niger - Christmas Rose
Hyoscyamus niger - Henbane
Hypericum perforatum - St. Johns Wort, Klamath Weed
Ilex species - Holly
Iris spp. - Irises
Jatropha species - Coral Plant
Kalmia species – Laurels
Laburnum anagyroides - Golden Chain or Laburnum
Lantana camara - Lantana, Red Sage, Yellow Sage, or West Indian Lantana
Lathyrus spp. - Sweet Pea, Tangier Pea, Everlasting Pea, Caley Pea and Singletary Pea
Leucothoe axillaris and Leucothoe davisiae - Drooping Leucothoe and Sierra Laurel
Ligustrum japonicum- Wax-leaved Privet
Linum usitatissimum - Flax
Lobelia spp. - Great Lobelia, Cardinal Flower, and Indian Tobacco
Lotus corniculatus - Birdsfoot Trefoil
Lupinus spp. - Lupine
Malus species – Apple (leaves and seeds in large amounts)
Medicago sativa - Alfalfa or Lucerne
Melia azedarach – Bead Tree, Chinaberry
Melilotus alba and Melilotus officinalis - White and Yellow Sweetclover
Menispermum canadense - Moonseed
Narcissus - daffodil
Nerium oleander - Oleander
Nicotiana spp. - Tobacco and Tree Tobacco
Onoclea sensibilis - Sensitive Fern
Ornithogalum umbellatum - Star of Bethlehem
Papaver spp. - Various Poppies including Opium Poppy
Phytolacca americana - Pokeweed
Pieris japonica and other spp. - Japanese Pieris, Mountain Fetterbrush
Pinus ponderosa - Ponderosa Pine
Podophyllum peltatum - Mayapple and Mandrake
Prunus spp. - Wild Cherries, Black Cherry, Bitter Cherry, Choke Cherry, Pin Cherry
Pteridium aquilinum - Bracken Fern
Quercus spp. - Oak Trees

Ranunculus spp. - Buttercups or Crowfoot
Rheum rhaponticum - Rhubarb
Rhododendron species – Rhododendron, Azaleas
Ricinus communis - Castor Bean
Robinia pseudoacacia - Black Locust
Rumex spp. - Dock
Sambucus canadensis – Elderberry
Sanquinaria canadensis - Bloodroot
Saponaria spp. - Bouncing Bet and Cow Cockle
Senecio spp. - Senecio, Groundsels, and Ragworts
Solanum spp. - Common Nightshade, Black Nightshade, Horse Nettle, Buffalo Bur, Jerusalem Cherry, Potato, White Potato
Sorghum spp. - Sorghum or Milo, Sudan Grass, and Johnson Grass
Symplocarpus foetidus - Eastern Skunk Cabbage
Taxus cuspidata - Yew
Tetradymia spp. - Horsebrush
Thevetia peruviana – Yellow Oleander
Toxicodendron diversiloba - Poison oak
Toxicodendron radicans - Poison ivy
Toxicodendron vernix - Poison Sumac
Tabernaemontana divaricata - Crape jasmine
Trifolium spp. - Alsike Clover, Red Clover, White Clover
Triglochin maritima - Arrowgrass
Urtica spp. - Stinging Nettle
Vicia spp. - Common Vetch, Hairy Vetch, Narrow leaved Vetch, Purple Vetch and Broad Beans
Veratrum californicum - Corn Lily, False Hellbore
Wisteria spp. - Wisteria
Xanthium strumarium - Cocklebur
Zantedeschia aethiopica – Calla Lily
Zigadenus spp. - Death Camas Apocynum spp.

This plant information was compiled from R. C. Moore 1992 / J. I. Alber and D. M. Alber, and the Cornell University Poisonous Plant Informational Database - HYPERLINK www.ansci.cornell.edu/plants/comlist.html

