ON HIGHER GROUND: INFORMING LANDSCAPE ON A SCHOOL/PARK SITE IN THE COMMUNITY OF EAST CLAYTON

by

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This thesis examines ways in which educational and community-building opportunities can be enhanced on a school/park site located in the proposed sustainable community of East Clayton. It explores ways in which children construct knowledge of their world, through processes of direct interaction with, manipulation of, and reflection on their immediate environment. It proposes how the designed landscape of a schoolground can support these formative processes within the context of evolving attitudes and values concerning environmental education, community, and sustainability. A threefold framework, based on the concepts of contextuality, constructiveness, and relational space, was developed as a means of addressing the sensori-motor, cognitive, and social facets of learning.
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1.0 INTRODUCTION

In today's public schools, the most basic cultural messages are systematically presented and reinforced (Bower1995, 8). Formally and informally, the school and its environment serve as conduits for the processing of knowledge – a process informed by a child's relations with other children; with adults; and with the physical environment. Contemporary epistemologies and pedagogies recognize the primacy of the senses in the construction and processing knowledge and in the formation of individual and group identity (Frost 1989; Laura & Cotton 1999; Sauve 1998; Harvey 1993). Further, they recognize that direct contact with nature stimulates the perception of, and concern for, one's environment. It follows that learning environments that are both cognitively and sensorially stimulating enhance the receipt of knowledge and heighten one's perception of the world.

As new suburban communities are being re-envisioned to address rising awareness of ecological, social, and economic imbalances, the community school ground – one of the most ubiquitous physical features of the North American urban landscape – becomes an important facet in the redesign of more sustainable community landscapes. On the neighbourhood school ground, issues of ecology, education, and community intersect. Such an intersection provides a powerful point of departure for reconsidering how the 21st century school ground might support curricular expansion while also inspiring new ways of thinking about and experiencing landscape.

1.1 THESIS GOAL

The primary goal of this thesis is to examine how, and through what means, educational and community-building opportunities can be enhanced on a school/park site located in the proposed sustainable community of East Clayton. It explores ways in which children construct knowledge of their world by
directly interacting with, manipulation and reflecting on their immediate environment. It proposes how the designed landscape of a schoolground can support these formative processes within the context of evolving attitudes and values concerning environmental education, nature, and sustainability.

1.2 THESIS OBJECTIVES

The following summarize the objectives of this thesis:

- To explore the intersection between contemporary educational theories, changing epistemologies, and landscape architectural design.
- To provide a historical basis for ecologically-grounded education through an overview of 19th and early 20th century experiential educational theories.
- To explore the educational and developmental benefits of a natural environment and the implications for the design of school grounds and parks.
- To develop a framework for designing a school environment that is experientially rich, that accommodates contemporary learning needs, and that creates a civic and ecological heart for the surrounding community.

1.3 THESIS ORGANIZATION

This thesis is divided into five chapters. This first chapter outlines the central goal and objectives of the thesis and provides a basic rationale for this study, which includes a problem statement followed by a review of the educational benefits of natural learning environments. This is followed by a discussion of the general scope of the thesis, with a view to clarifying underlying assumptions of and key concepts covered in subsequent chapters. Chapter 2 examines the historical precedents of experiential learning theories as espoused by 19th and early 20th century educational philosophers and pedagogues such as
Rousseau, Froebel, Pestalozzi and later progressive educators such as John Dewey. This is supplemented by a discussion of more contemporary theories of child development and cognitive psychology, including social constructivism and those recognizing the primacy of experience and reflection in the formation of knowledge. Following from the literature reviews in Chapters 1 and 2, Chapter 3 outlines a Framework for Design -- a framework structured around the principles of Contextuality, Constructiveness, and Relational Space. Using these three broad principles, this chapter explores a number of contemporary precedents (including schoolyards, urban parks and reclamation projects) that exemplify these principles. Chapter 4 begins a detailed discussion of the site chosen for this thesis. It provides a description of attributes that are important to an ecological and cultural understanding of the site and concludes with a summary of issues and considerations. Chapter 5 begins with a discussion of the design goals and strategies, each of which reflects the principles discussed in chapters 3 and 4, and concludes with a detailed discussion of the design.

1.4 BACKGROUND AND RATIONALE

Elementary school-aged children spend upwards of 200 days per year at school, and up to two hours of each school day is spent in outdoor play grounds and/or fields, representing a total of 25% of a child's time being spent in the outdoors (Cunningham and Jones 1999, 57). Piaget's groundbreaking studies of infants engaging with their physical environment suggest that from a very early age, children begin to construct mental schema of their world based on active perception and engagement with their physical environment (Piaget in Furth 1969). More recent research in the fields of design, educational psychology, and environmental psychology suggest that direct contact with natural elements leads to an enriched experience of the landscape, supporting motor, cognitive, sensory and emotional development (Frost 1989; Kazanjian 1998; Harvey 1993, 100; Herrington 1997). In a 1994 study focusing on school ground naturalization, school grounds and their associated spaces are seen as communicators of "hidden
messages" – messages which affect children's learning experience and the formation of values and behaviours towards the environment (Titman 1994, 64). Considering the amount of time spent in the outdoor environment, school environments that provide few opportunities for motor-sensory, cognitive, and emotional stimulation, have great potential to adversely affect a child's experience of the landscape and, subsequently, the learning process.

The interface between the design of learning environments and educational curricula has historical roots in a number of educational theories. Historical precedents include the kindergarten gardens of Frederich Froebel, the symbolic architecture of Rudolf Steiner, and throughout the 20th century, several individual examples of educational architecture designed to convey meaning at a variety of different levels (Dudek 1996; see Appendix 1 for a discussion of meaning in school architecture and a study of various spatial typologies of school buildings). In addition, the rise of school ground naturalization over the past two decades has resulted in thousands of existing schoolyards being retrofitted with increased opportunities for more diverse, stimulating and creative learning environments (Harvey 1993). However, as the development and refinement of environmental educational programming and curriculum continues, the design of new school grounds still does little to reflect larger epistemological and curricular changes taking place (Gayford 1996; Harvey 1993, 100).

1.4.1 East Clayton Schools as a Sustainable Community Resource

The East Clayton community provides an ideal model for reconsidering the form and function of the 21st century school ground. Located on the eastern edge of the Surrey, British Columbia, one of the fastest growing municipalities in the Lower Mainland, East Clayton was designed to consider a number of key policy initiatives formulated to address the development of more sustainable communities at a region-wide scale (City of Surrey et al. 2000). Located on a high point above two significant watersheds, a
primary objective of the plan is to address the downstream consequences of development. The means for achieving this is through an integrated system of "ecological infrastructure", aimed primarily at managing, cleansing, and infiltrating stormwater naturally, and on the surface. At the heart of this system are two school grounds, of approximately 5 hectares each, which are intended to function, literally, as large sponges that absorb, store, and cleanse surface runoff. At the same time, these school sites are intended to be integral components of a larger social infrastructure that provide opportunities for meeting a variety of community needs (i.e., environmental education, recreation, habitat). The rooting of these sites -- ecologically and socially -- at the heart of this new community provides a strong cue for reconsidering the role of the schoolyard within the context of a more sustainable community pattern.

1.4.2 Benefits of Using Natural Elements on Schoolgrounds

Substantial literature reveals benefits that accrue to students, teachers, the school itself, and to the community as a result of using the landscape as an instructional and inspirational tool (Cunningham and Jones 1999; Maxey 1999). These benefits include greater ecological literacy, increased academic performance in a number of subject areas (Leiberman and Hoody 1998, 22), and more incommensurable improvements such as the formation of values and ethics related to negotiating social relationships with others, developing self-confidence and empathy, and understanding one's role in the world. The following outlines these benefits in more detail.

Enhanced Academic Performance

Empirical evidence regarding the benefits of natural landscapes on academic performance is still relatively sparse. Harvey notes an increased botanical knowledge as a result of direct interaction with natural systems, (Harvey 1993) while others find more tenuous links between increased sense of well-being with higher academic performance (Olds 1989, 32; Alexander 1995). One of the most conclusive
studies to document a correlation between a diverse outdoor environment and academic performance is
the recent State Education and Environment Roundtable, which explores the benefits of the outdoor
environment as an integrated context for learning (EIC). A total of 40 schools were studied, using
primarily observational and interview techniques. Most schools used the outdoor landscape as an
integrated component in all areas of the curriculum, including "general and disciplinary knowledge;
thinking and problem-solving skills; and basic life skills, such as cooperation and interpersonal
communications" (Lieberman and Hoody 1998, i). Findings showed that the overwhelming majority of
students of EIC programs (92%) outperformed those of non EIC programs in the areas of reading,
writing, mathematics, science and social studies. A weakness of the study, however, is that it fails to take
into account related factors, such as the socio-economic and cultural contexts in which the schools exist,
which may have an effect on access to and quality of outdoor areas. However, such findings do provide a
basis for suggesting how the outdoors can provide quantitative benefits to learning.

Enhanced Play and Development

Substantial research shows that playful interaction with the physical environment has considerable
developmental dimensions (Moore 1986; Piaget in Piers 1972, 27). Play fulfils myriad formative
functions, including: developing competency in a range of sensory-motor activities (Moore 1986, 15);
developing creativity and imagination (Chipeniuk 1994, 45); enhancing perceptual and intellectual
abilities; advancing independence and assisting in the formation of individual identity (Cheskey 1996;
Cobb 1977); and assisting in emotional healing (Moore 15; Kaplan and Kaplan 1999). Play is also a
means for negotiating social relationships, for collectively working through problems and discovering
solutions (Lecesse 1994, 72; Smith 1985). As the developmental dimensions of play are becoming more
widely understood and recognized, the design of environments that facilitate multiple facets of learning
becomes increasingly important. Traditional play environments have focused primarily on sensorimotor
development and physical fitness while other important aspects such as emotional, sensory and cognitive development are typically disregarded (Lecesse 1994, 72; Herrington 1997, 150). Herrington notes that "the design of play spaces for young children should incorporate the fine gradations of physical, cognitive, social, and emotional development into the design process" (Herrington 1997, 151).

The use of natural elements provides myriad opportunities for increasing the repertoire of play. Studies show that outdoor environments are preferred over indoor environments for play activities by school children between the ages of 7 and 12 (Moore 1986; Moore 1990). Descriptions and drawings done by school children in one study of play environments featured landscapes closest to the child's home or school, including back yards, streets, and neighbourhood parks, or nearby fields and farmland (Moore 1986, 277). Other research shows that play areas and school grounds that provide diversified opportunities for play, through the manipulation of natural elements and attention to the built environment, provide a qualitatively richer play experience and satisfy wider and finer-grained developmental requirements than do conventional play areas, which typically focus on motor-physical development (Moore 1989 208; Herrington 1999, 150).

Imagination, fantasy, and myth are characteristic ways in which play experiences are framed, especially during the early stages of development up to about the age of 8 (Cobb 1977, 27; Egan 1998, 21). According to Egan, it is during these years that children employ a "mythic" understanding of their environment, an understanding framed in large part by innate, somatic responses to the immediate physical surroundings (Egan, Ibid.). He contends that mythic thinking constitutes the poetic dimensions of thinking. As children develop language competency, the use of mythic structures such as fantasy, abstract thinking, metaphor, and narrative become ways of framing experience and in developing a cognitive vision of the world. It follows that the natural landscape, itself rich in expressive, symbolic, and
narrative qualities, serves to assist in generating the myths that inform a child's concept of her internal and external world.

Natural elements such as vegetation, water, and soil provide infinite possibilities for fostering creative, developmentally stimulating play. Used as structuring devices, plants can impart identity and spatial variety to a landscape, providing complexity in a spatially undefined, homogenous play area. Plants can be used to provide spatial variation in even very small spaces, and can serve as dramatic backdrops to facilitate creative and imaginative play. By forming landmarks and borders for pathways, plants and other natural elements such as stones and water can also structure the type and direction of movement and improve the legibility of a space. Plants' texture, fragrance and varied shapes invite touch, smell, and close examination, contributing to the refinement of fine-motor and cognitive skills while the varied organic and biological attributes of plant life supply important nutrients and shelter for myriad living organisms.

Restorative Aspects

Leading the research in the psychological benefits of nature are Rachel and Stephen Kaplan, who began their research looking into the benefits that gardening has on psychological well-being. Their most recent book attempts to provide a taxonomy of approaches for socially and ecologically rich spaces (Kaplan and Kaplan 1989; 1990; 1999). Olds cites nature as a primal source of healing and rejuvenation in children, benefits which are impossible to replace during later stages of life. She asserts that "failure to utilize this implicit knowledge of nature as a healer denies them resources for growth and perpetuates the chances that they too will suffer our ills" (Olds 1989, 32).
Safer, Healthier Environment

A number of researchers have linked the quality of the physical environment of school grounds with aggression and incidence of injury (Moore 1989, 197; Titman 1994, 33). Such research also indicates that the inflexibility of materials and components (i.e., asphalt, immovable play equipment) contributes to these problems. The use of natural elements, with their diversity of form, malleability, and textural variety, can serve as an antidote to aggression and violence (Cheskey 1994, 4; Harvey 1993, 130; Moore 1989). Diversified play areas can include vegetative rooms, buffers and landform, paintings on pavement, and moveable structures, and areas for private and individual play, all of which are considered by Coffey to have a "child-calming effect" (Coffey 1996, 8-9). The EIC study referenced above also found that students' attitudes towards one another improved after incorporating the natural environment into the overall curriculum (Lieberman and Hoody, 27). Others speculate that by fostering real connections between children and their environment -- by upholding an ethic of care -- self-esteem, confidence, and social responsibility are enhanced (Guy 1997, 128). In addition to these findings, other more anecdotal evidence suggests that greater use of natural elements such as large shade trees, reduces the risk of ultraviolet radiation, while also assisting in enhancing air and water quality (Coley et al., 1997). Finally, the use of natural means of irrigation, fertilization, and pest control has marked positive effects on physical health and well-being as well as assisting in teaching about more organic ways of cultivating and managing the natural environment (Titman 1996, 10).

Sense of Ownership and Empowerment

One consequence of many successful school ground naturalization projects is an increased level of participation among students. Being involved in the planning, organization, and manipulation of their school environment allows children to develop and participate in a child-initiated democratic process. Involvement and participatory decision-making is seen as critical element in creating more "sustainable"
play spaces, as such approaches curb a child's reliance on top-down structures toward personal and group empowerment and self-sufficiency (Maxey 1999, 18). Many projects undertaken in Sweden, Europe and Japan feature supervised activity spaces where children can build structures, plant gardens and tend to animals (Stine 1997). In a North American context, gardening, art, and recycling programs enrich the curriculum while also acting as catalysts for wider community involvement in environmental education and community development (Lecesse 1994; Birt et al, 1997).

In a recent design project, Herrington notes that the process of naming a particular aspect of the designed landscape (i.e., “princess palace”) became a key device for children to inscribe personal meaning and identity into their play landscape, and thereby assume a level of ownership (Herrington 1999).

**Empathy Toward and Awareness of Other Creatures’ Needs**

The biophilia hypothesis, which asserts that humans have an innate drive to care for nature, is cited as a basis for fostering an ecological ethic among children (Orr 1994, 142). Other research credits the diversity natural environments provide, and the kinds of experiential learning opportunities they furnish, with fostering ways to understand the cycles of growth, waste, and reuse, which, in some cases, can also manifest as a broader appreciation of cultural and ecological diversity (Coffey 1994, 11; Orr 1992). In addition, Harvey indicates that experiences with biological elements (including exposure to wildlife, a diversity of ecosystems, and close interaction with natural elements) during the childhood years contributes to the formation of an ecological ethic (Harvey 1993, 135). Childhood experiences of cultivating and harvesting food are also seen as significant elements in inculcating a respect for other living things (Alexander et al., 1995).
Creation of a Sense of Place

In her article, "Playgrounds as Community Landscapes" Susan Herrington proposes that play landscapes should be designed to link child's play experiences to the larger context of the environment and community (Herrington 1999, 25). Using the concepts of hermeneutics and interpretation as a design framework, her designs for two play spaces emphasize contextuality, space articulation, and circulation (Ibid.). The landscapes are designed to carefully reflect and reveal important processes and patterns related to their specific social, ecological and cultural contexts rather than simply responding to single-use programs and narrow pragmatic considerations.

Edith Cobb sees the child-environment relationship, as realized through outdoor play, as the quest for defining the genius loci. She sees play as "a sort of fingering over of the environment in sensory terms, a questioning of the power of materials as a preliminary to the creation of a higher organization of meaning" (Cobb as quoted in Moore 1986, 8). Through sensory exploration and continuous manipulation, this conceptual "mapping" process gives rise to an image of the world "that mobilizes and fuses the spatio-temporal experience of the perceiving nervous system into a form that has in turn become a symbolic abstraction, a condensation of level upon level of experience and information fused into symbol and code" (Ibid.). Thus, through successive modes of play experiences and interactions, and as new places are continuously discovered in depth, a layering of meaning accrues, one of affiliation with a place, which has been variously referred to in design theory as "topophilia" (Yi-Fu 1977), "rootedness" (Lynch 1972) and "placeness" (Relph 1974).

1.5 Scope and Definitions

A primary concern of this thesis is to examine how, and through what means, educational opportunities can be enhanced on a school/park site in ways that support the ecological function of a larger community landscape. Therefore, this thesis will focus on identifying ways in which children develop and will
explore how a designed landscape can enhance the experience and awareness of the environment, and in
doing so, enrich opportunities for learning. The site's role as a community park, together with its
important ecological roles (i.e., water retention and biofiltration) will require additional consideration.
The arguments presented in this thesis are derived primarily from the literature concerning environmental
education, educational theory, and theories of landscape architectural design. The following section
provides a brief overview of the key issues covered by this thesis.

1.5.1 Nature, Knowledge and the Environment

Throughout the fields of landscape architecture, ecology and education, there are several divergent views
of Nature. Much contemporary debate rages about whether Nature is a construct, a product of fluctuating
societal values, histories, and ideologies, or a benign force, existing outside the frame of cultural
invention. Is nature "out there", or do we create it? While it is not the purpose of this thesis to engage in
lengthy critical debate regarding the relative merits of each position, because this thesis touches on the
relationships between learning, knowledge and design, it is important to establish a general philosophical
stance regarding the concept of nature.

This thesis assumes the position that nature and culture are bound. This assertion is partly derived from a
broad spectrum of emerging contemporary theory which has resulted in recognition that both the mind
and body are important agents in understanding our relationship to the physical world. Elaborated by N.
Katherine Hales through the terms "positionality" and "interaction", this view suggests first, that we
know the world because we interact with it, and second, that our knowledge stems from the particular
cultural, historical and social position we inhabit in a given time and place (Hayle 1995, 48). Rather than
implying that nature is either purely constructed or purely given, this position acknowledges the various
cultural, social, and historical lenses that filter and ultimately help to form our ideas about nature. This
view runs counter to traditional, instrumentalist views of ecological science and ecological design, which typically ignore the cultural milieu from which values, attitudes and representations of nature are derived. Landscape theorist James Corner sees the "dynamic, representational, and 'erring' characteristics of culture" as a means through which notions of Nature, ecology, and ecological design can be enriched (Corner 1997, 85).

It is also important to distinguish between the term Nature as discussed above (i.e., the all encompassing embodiment of our physical world of which humans and cultural systems are a part) and the term "nature" as it refers to specific material content of the physical environment. As a point of clarity, when referring to the physical environment in which activities occur on the school ground, the terms "natural environment" and "natural elements" will be used to identify a range of material components including vegetation, water, soil, and all organisms that dwell within these elements.

The structure of the educational system within which the majority of western society currently operates has descended from systems of industrialization and techniques of standardization that arose during the late 18th and early 19th centuries. These traditional educational systems are criticized for their adherence to epistemological foundations that are considered by many to be incompatible with post-modern epistemologies and subsequent educational methods (Orr, 1994; Bowers 1995; Sauve 1999). Models of learning that acknowledge the lived experience of the everyday world, such as those proposed by the fields of phenomenography and constructivist epistemology, are being more widely researched and experimented with in school curricula as a means of enriching individual and collective learning about complex environmental problems (Roberston 1994; Larochelle and Bednarz 1998; Lord 1999).
This thesis uses the broad definition of "learning" proposed by Gowin, which sees learning as a "change in the meaning of human experience" (Gowin 1981). Others writing on contemporary cognitive theory see learning as a process of "conceptual change", where the term "conceptual" refers to an individual's "idiosyncratic" interpretation of a more universal concept (Roberston 1994, 26). This definition suggests a constant flow between the individual subject, a subject’s prior knowledge, the context in which learning takes place, and the object of thought. The implications that emerge from this view of knowledge suggest design strategies that influence the way children acquire, retain, and construct meaning through direct sensory and cognitive interaction with their environment. Given the premise of this thesis – that the designed environment conveys messages that are important in the formation of a child's attitudes and behaviours towards the environment -- this has to do with how cultural and natural processes are physically manifest and function on the site.

Post-modern, or "post-positivist" cognitive theories, such as those rooted in the constructivist theories of child development pioneer Jean Piaget, reject the notion of fixed intelligence, and uphold the essentially integrated nature of learning, wherein the learner gradually develops intellectual structures, dependent on specific biological stages in human development, but mediated through his or her own environment. Similar to the ways in which a phenomenological understanding of the physical environment is preceded by interaction, constructivist cognitive theories assert that the formation of knowledge is conditioned by the particular relations that exist between the student and the object of thought (Roberston 1994, 28). These relations are defined by the way in which knowledge is received and then elaborated on by the student, through the lenses of the particular social, cultural and environmental constructs in which the student exists.

1 Traditional knowledge systems, as implied here, are those that accept the Cartesian representation of the individual as a spectator of an already "constructed" reality. These systems are grounded on the premise of positivism, a position which asserts that genuine knowledge is founded
1.5.2 Environmental Education and Post-Modern Epistemology

In discussing the relationship between environmental education and the physical environment David Orr notes that all education is “environmental education” and is inextricably linked to the physical environment. Orr states that "the shape of the individual mind is affected by land as it is by genes" suggesting that the learning process is informed as much by the cognitive processes of the mind as by the physical and methodological settings in which education takes place (Orr 1994, 86). His second important premise is that education is a process and occurs when there is an active discourse between humans and their environment. Over the past decade environmental education programs have attempted to reflect these epistemological shifts by recognizing ethics, values, and cultural diversity in the development of an environmental consciousness. These new approaches emphasize holistic views, consider the interdependence of nature and culture, of social and environmental goals, of history and preservation and recognize the links between local, regional, national and global political and social systems (Sterling 1992). Bringing together the objectivity of empirical science with subjective reflection and "personal knowledge," new epistemologies recognize the role of the individual as a co-participant in the construction of knowledge (Orr 90; Robertson 1994, 21).

In 1976 the Belgrade Charter, established at the UNESCO-UNEP (International Environmental Workshop), emphasized a more holistic interpretation of environmental education, focusing on the formation of values and opinions towards the environment, in addition to the development of skills and understanding. More recently, environmental education goals have expanded to be more holistic and inclusive, recognizing that an understanding of complex environmental issues requires radical epistemological, institutional and systemic changes. Ongoing educational reforms in general, and specifically changes to environmental educational theory have resulted in the expansion of the goals of either on scientific "truths" or laws, or is verifiable through direct observation (Seamon 1982, 120; Corner, 91; Sauve 1999, 10).
environmental education across subject areas and disciplines. Consequently environmental issues are now addressed in subjects ranging from art and aesthetics (Birt et al. 1997), to politics, economics, cultural studies (Gayford 1996, 116), and mathematics (Roberston 1994).

Recently, more critical environmental education frameworks consist variously of the following general principals:

- the development of an environmental consciousness based on holistic views, considering the interdependence of nature and culture, of social and environmental goals, of history and preservation and links between local, regional, national and global political and social systems;
- a recognition of new ways of knowing and understanding, emphasizing critical thinking and problem solving in an interdisciplinary context, focusing on real problems from a range of sources and disciplines;
- fostering an environmental ethic through direct interaction within regenerative systems;
- development of social and political literacy, imparting action and positive individual and community outcomes; and
- the development of new teaching methods that are consistent with these aims. (from Fien 1993).

In British Columbia, the most formal articulation of these principles can be found in the document "Environmental Concepts in the Classroom – A guide for Teachers" (Province of British Columbia 1995). The document is organized around six broad areas of focus which include: Direct Experience, which supports the notion that direct experience facilitates deeper and more transformative learning; Responsible Action, which recognizes the links between environmental impacts and decisions at personal, local, national and global scales, and across cultural, social, and geographic boundaries; Complex Systems, which relates to the application of holistic and interdisciplinary approaches to the
study and understanding of social, cultural, and ecological systems, emphasizing interconnectedness, rather than separateness; Aesthetic Appreciation, which connects environmental care with developing a respect for nature's beauty and distinctness; and Environmental Ethics, which relates generally to the relationship between values and beliefs and particular individual and societal attitudes and actions toward the environment. These principles are intended to promote links between disciplines and subject areas in the classroom, pedagogical methods that emphasize real-world problem solving, and the consideration of environmental issues as an integrated component of all areas (Province of British Columbia 1995). However, as it has only been adopted as a set of guidelines, this document holds little value as an instrument for implementing any of its proposed principles (Courtenay-Hall et al. 1999, 83).

1.5.3 Ecological Design and Sustainability

In recent decades, considerable research and practice has focused on the cultural, aesthetic, and biophysical aspects of ecological design (Thayer 1994; Kaplan and Kaplan 1999; Spirn 1988; Corner 1999). No longer concerned with applying a set of "rules" (derived from ecological science) to the design of landscapes, contemporary approaches to ecological design are concerned with "creating the places to think about, appreciate, and advance environmental quality." (Galatowitsch 1998, 99). Ecological approaches to design are increasingly intertwined with aesthetic and cultural concerns, moving landscape architecture "beyond the simple amelioration of sites toward practices that also reactivate the cultural dimensions of sites (Girot 1999, 59). This design current is supported by the recently-coined term "Eco-revelatory Design", defined as design which not only addresses ecological recovery and/or conservation, but that also "reveals and interprets ecological phenomena, processes and relationships" (Galatowitsch, Ibid.). Drawing a historical parallel to the "epiphanic" experience sought from nature by 19th century artists, eco-revelatory design provides living proof of nature's processes, heightening one's awareness of
nature's complexities and seeks to communicate messages about the connection between all living things (Condon 1991, 4).

These new approaches are grounded in the theories of hermeneutics and phenomenology, both of which accept the key role of the subject in the formation of ideas and concepts about the environment. The theory of hermeneutics is a branch of philosophy that treats the understanding and analysis of texts, locating meaning within the particular historical and cultural contexts of their authors (Gallagher 1992; Corner 1991). Hermeneutics regards physical texts as a means for transmitting experience, beliefs, and values from one subject or society to another so that the "determination of specific meanings is a matter for judgment and common sense reasoning -- not for a priori theory and scientific proof" (Ibid., 1992).

Acting as texts, landscapes transmit meaning to those who experience them via the intentions of the particular designer and his or her cultural history and social relevance. Using the definitions of knowledge and nature adopted by this thesis, a reconsideration of school grounds and play spaces as text expands their potential uses. From mere stages for play and learning, through design, they can be repositioned as active participants in the construction of meaning and knowledge in the day to day life of the growing child.

Sustainability is defined here as landscape design and management that accommodates human systems in ways that also maintain and potentially enhance natural systems. Thayer uses the following definition to describe sustainable landscapes: "those landscapes which tend toward ideal conditions by conserving resources (i.e., soil, energy, water, air quality, wildlife diversity, etc.), as well as those which actually achieve a long-term regenerative capacity (Thayer 1989, 102). He further notes, "a critical purpose of the sustainable landscape is the demonstration and diffusion of environmentally and socially sustaining principles into common usage in the everyday world" (Thayer 1994, 232). When incorporated into the fabric of everyday reality, natural processes, and the forms they engender can be both didactic and
transformative. Marc Treib states that didactic landscapes "dictate that forms should tell us, in fact instruct us, about the natural workings or history of a place" (Treib 1995, 53). Didactic forms are often those that influence certain normative behavioral patterns through direct interaction with them. Such forms and processes are meaningful because they have direct relevance to human thought and action.\(^2\)

Seen in this light, this thesis supports the view that designed spaces that reveal and facilitate involvement with ecological processes have the potential to change how children and others view the world in new and lasting ways.

Notions of equity and participation are also central to the communication of sustainability and increasingly relevant to the design of spaces for play, learning and personal growth. Traditional play spaces and school grounds that have been designed and implemented by an institutional authority have few mechanisms for involving the users of the spaces in their planning and design. Such play spaces serve as discursive devices for maintaining divisions between adults and children and marginalizing children's needs (Maxey 1999, 18). Certainly, within the context of a "sustainable" school ground, issues such as participation, empowerment, diversity, and access among school children and the wider community must be considered.

In the specific context of East Clayton, the form and function of the two school/park sites are central to making East Clayton "work" as a sustainable community and to making the school sites perform as the ecological heart of the community. Contained in the plan are several performance thresholds and design guidelines which provide the framework for ensuring that the two school/park sites perform in ways that benefit the ecological and social health of the community. These thresholds address habitat retention and enhancement, urban forestry, infiltration, and water management, and will be used as a basis for

\(^2\) Didactic objects and instruments have been used in various pedagogical situations throughout the 19th and 20th century as both a means of pragmatic instruction and revelation. Objects from the everyday reality of the child would guide a child's cognitive, motor, and even spiritual development while teaching normative social skills (Branzi 1998; Dudek 1998).
developing a more comprehensive program for the chosen site. Reference to these thresholds, along with the expanded program, are outlined in Chapter 5.

1.6 THESIS LIMITATIONS

This thesis has two important limitations. First, as the future development of the East Clayton Community will likely take place over the next 20 years, it is impossible to address a number of issues which would typically inform school-ground and park design. These include but are not limited to: culture and demographic constitution of surrounding residents; interface with existing community institutions; initiatives and programs that might enrich curriculum opportunities; and program and curriculum implementation and participation in stewardship and community education activities. Rather, given the exploratory nature of this thesis, a number of assumptions have been made based on existing information or are dismissed as being beyond the scope of this thesis.

Second, as the primary goal of this thesis is to consider the landscape as an expressive educational medium, a detailed exploration of the most appropriate building for the site is outside the scope of the project. For the purposes of this thesis an existing school building was chosen which fulfilled a number of criteria outlined by the design framework. While a number of important principles regarding spatial integration, siting and orientation, and social quality of spaces has been considered, it is important to recognize that a more detailed consideration of the physical program and building/landscape interface is required.
CHAPTER 2 – EDUCATION AND NATURE: AN OVERVIEW

"...And in the gardens all the world grows wide."

— R.M. Rilke, "Childhood" from Book of Images

2.1 INTRODUCTION

This chapter provides an investigation of a number of early educational theories that originated within the context of 19th century European romanticism and focuses first on experiential education as found in the educational theories of Pestalozzi and Froebel and later, those of Dewey, Montessori and Steiner. Each of these theorists, to varying degrees, looked to the spiritual and sensual qualities of nature as a means of instructing children about their immediate environment and their place, socially and metaphysically, in the world. Second, this chapter explores contemporary cognitive theories that are compatible with these educational theories. An examination of these ideas illuminates how each is uniquely grounded in the interplay between experience and perception of the natural world and sheds light on their potential parallels to current thinking on environmental education and the design of educational landscapes. In addition, such a discussion illustrates how notions of nature and the environment have been persistently influenced by the epistemological foundations of a particular age.

2.2 THE PEDAGOGICAL THEORIES OF PESTALOZZI AND FROEBEL

2.2.1 Johann Heinrich Pestalozzi

The pedagogical theories developed by Johann Heinrich Pestalozzi and Frederich Froebel were some of the earliest (within a European context) regarding the relationship between children and nature. While
each used the outdoor environment extensively as an educational tool, each had very different ideological and pedagogical positions regarding the use and interpretation of nature. However, despite their differences in practical applications and underlying philosophical/moral aims, they were driven by a spirit of social reform and were equally influenced by the revolutionary ideas of the romantic naturalist Jean-Jacques Rousseau. Their theories can not be separated from the social and political context of their time and the dominant currents of intellectual thought that arose out of 18th century European Enlightenment, namely the waning influence of rationalism and the concomitant ascendancy of romanticism (Gutek, 8).

While in some ways ideologically opposed, both the rationalists and the romantics looked to nature as the basis for human knowledge. The rationalists considered direct observation of physical phenomena to be the basis of scientific truth. Observation of the physical world would reveal the laws of nature, which would, upon their abstraction into scientific theorems, explain universal systems. Through reason, humans could understand natural laws governing human existence and in "accordance with these universal laws he could ensure the progress of the human race." (Gutek, 9). Most clearly articulated in the texts of John Locke and Issac Newton, rationalism denied the existence of innate ideas and instead "asserted that the sources of man's ideas were in the experience of external sensible objects and the internal operations of the mind" (Ibid). In contrast to rationalism, romanticism operated on the view that "an understanding of life's most important phenomena is incomplete unless the role of the nonexpressible and invisible is acknowledged" (Condon 1991, 3). Thus, whereas the rationalists mediated the environment though the intellect, first through observation and then mathematical abstraction, the romantics sought a raw and unmediated interaction with nature directly through the senses (Johnson 1988; Zajonic 1998).
Rousseau's ideas regarding nature were manifest in his beliefs on educational and social reform. In Rousseau's estimation, man, in his natural state, was innately good and it was a wicked social and cultural environment that was the basis of a corrupt society. Thus, nature, in its un-corrupted state, became the only antidote to man's tendency towards corruption. To Rousseau, education through nature "would permit the child's natural goodness to develop in the midst of a pernicious social environment." (Gutek, 11). While Rousseau never realized his ideas on natural education in practice, his novel Emile, ou Triate de l'Education (1762), which translates his ideas through the story of a young boy's experiences with nature, provided significant inspiration for both Pestalozzi and Froebel.

The principles espoused by Rousseau diverged significantly from the traditional educational doctrines of the time, which stressed rote memorization of texts, songs, and scripture, and under which the child's nature (considered by traditionalists to be innately evil), was suppressed upon entry into formal schooling. Both Pestalozzi's and Froebel's methods were founded on the Rousseauian belief that nature was the best teacher; accordingly, it was through direct interaction with its phenomena that the child would learn the appropriate intellectual, moral, and practical skills for spiritual and social nourishment.

Pestalozzi's ideas were brought to fruition at the experimental farm at Neuhoff, schools in Stans and Beurgdorf, and culminated in the development of the Yverdon Institute (closed less than two decades after its opening in 1909). While none of these experiments survive, the essence of Pestalozzi's ideas on education and social advancement are contained in his two most seminal works: Leonard and Gertrude and How Gertrude Teaches her Children. These works describe Pestalozzi's educational method, at the core of which was the belief that nature provided the model for human development (Gutek, 111). Incorporating experiential and interactive exercises that taught language, aesthetics, geometry, natural science, mathematics, geography and history, his method attempted to bring the course of instruction "into complete harmony with the stages of development of human nature" (Heafford, 47). The basis of
this course of instruction was the concept of "sense-impression", which to Pestalozzi was the foundation of all knowledge, and would become the basis of all instruction. In *How Gertrude Teaches Her Children*, he articulates his aim of raising sense impression to an "art" as a means of teaching the three foundational divisions of knowledge: "form, number, and words" (Ibid.). Children would be introduced to these three elementary concepts through the faculties of sight, sound and touch, which would, through the first sense-impressions, "rouse a feeling in the children of their manifold relationship and similarities" (Anderson 1931, 68). The natural and physical environment was a rich source of sense impressions. The field trip, a walk through the woods, or a mountain climbing excursion, was an integral part of the program of instruction. Drawing was also an integral component to Pestalozzi's method. Using the basic geometric forms found in nature -- primarily the square, circle and triangle -- children would understand the elemental composition of natural organisms and through this knowledge, understand their relationship to one another (Dudek 1996).

His method reflected the romantic notion that the processes of nature were analogous to the learning patterns of the child. He used the metaphor of a tree to describe a child's development, in which the process of growth occurred continuously and gradually, and where each phase of growth required completion before the ensuing one was begun:

As the tree grows so does man. Already before the child is born there are to be found in it the germs of the capacities which will unfold throughout its later life. Just as all the separate parts of the tree cooperate, under the influence of the invisible vital force of its physical structure, in the production of its fruit, so all the fundamental powers of the human being cooperate under the influence of an unseen force in the human organism in the production of a man...
(Pestalozzi as quoted in Anderson 1931, 127).

The provision of a loving and nurturing environment in which children could freely develop individual cognitive skills and foster social relations, was another key aspect of Pestalozzi's method (Heafford, 109).
His development of a "child-centred" method, which would stimulate the formation of ideas from within the child (rather than impose ideas from an outside source), shows similarities to more current cognitive theories, which recognize that learning is an individual process involving an interplay between the cognitive mind, the body, and the environment in which learning takes place (Furth 1996, Sugarman 1987). Within Pestalozzi's "child-centred" system, "teachers...had to reject the conventional teaching methods and begin to analyze the mental processes of the child in order to discover how the concepts a child could comprehend depended on his age and his stage of development (Heafford, 51).

2.2.2 Frederich Froebel

Frederich Froebel also considered the natural environment a potent source for cognitive, social and spiritual enlightenment. The expression of Froebel's romantic ideology, coupled with an interest in metaphysics and social reform, culminated in the development of the kindergarten, the first of which was opened in 1839 in Bad Blankenburg, Germany.

While the gardens of Froebel's kindergartens were intended to serve a practical purpose (i.e., for food production) they were also metaphors for the universe, representing the divine integration between man and nature (Herrington 1998, 326). Herrington notes that contact with nature, as realized in the kindergarten gardens and surrounding landscape, was a conduit through which the child gained a sense of herself, as an individual within larger society, and within the greater universe (Herrington 1999, 4). Like the American transcendentalists, the "naturephilosoplie" of Froebel was deeply grounded in the belief that "nature was the all embracing macrocosm as well as the finite microcosm, which was a small part of the universal being" (Gutek, 54). Froebel believed that "...the life of the individual as apart and at the same time as a whole is the most important thought; the sun, and planets are part of a whole; the elements -- earth, air, water, light, heat (are each separate and yet depend upon the whole of which each is a
part...in all Nature the individual tries to realize in itself the whole ..." (Ibid). This Divine Unity was physically expressed in the gardens themselves; their layouts served as "unworded texts of an idealized garden culture" and communicated the twin concepts of unity and individuality, expressed by having communal plots surround the individual children's garden plots so that "the gardening children felt embraced by the adult world, and at the same time separate but part of this world" (Herrington 1999, 4).

Like Rousseau's young student Emile, the education of children under Froebel's method was not physically bound by the school but, rather, took place in the woods and fields, which were considered part of the school itself. Froebel organized frequent excursions into the surrounding landscape during which children would explore and contemplate physical phenomena and their related processes in order to understand larger ecological and cultural relationships (Herrington 1999). Mistrustful of education based on rote learning Froebel felt these excursions would furnish direct and indirect contact with the physical world as a means of fostering "harmonious growth throughout the child's whole being" (Kauffmann 1981, 130), thereby "awakening...the great thought of inner, constant, living unity of all things and phenomenon in nature" (Froebel as quoted in Herrington 1999, 5). The spatial and temporal qualities inherent in natural elements provided a rich source for developing motor, cognitive, and expressive potentials of the young child while it fostered a deeper understanding of a child's position in relation to his or her cultural and geographic context. Many exercises emphasized the connection of the children to plant material, such as the fantasy games that allowed children to become elements of the garden, and exercises where children compared their height with that of a plant (Herrington 1998, 332). Observing changes in vegetation and wildlife revealed ideas about seasonal variation and larger cycles occurring in nature.

The emphasis on spatial and sensory experience was also manifest in the provisions of the indoor educational environment of the kindergarten. The "arrangement of rooms, light, temperature, suitable
chairs and tables" must be diverse enough to stimulate all the senses, in order to further encourage a continued interest in exploring and learning about the surrounding environment. Teachers "must not be indifferent as to the kind of materials to be used for play and work... care must also be taken in choosing suitable colors...[and] special care given to the organs of the five senses." (Heerwart 1897, 11-12).

To initiate and encourage this continued exploration, Froebel used a series of play objects, called "gifts", a series of basic geometric objects that included wood blocks, colored paper, and string. These were presented sequentially, in order of increasing complexity and corresponded to successive stages in a child's development. Like the gardens, the gifts were not only used for the purpose of mastering a number of sensory, motor and cognitive skills, but – as abstractions of simple geometries underlying the complex shapes in nature – were also mystic representations of the relationship between man and nature (Kaufmann 1981, 131). Many of them were everyday nursery objects (i.e., building blocks), and while analogous to something known by the child, they were imbued with symbolic as well as didactic meaning. As Reitzes states, their use had implications for Froebel's social agenda, as he believed that "learning the sacred language of geometry in youth would provide a common ground for all people, and advance each individual and society in general, into a realm of fundamental unity." (Reitzes 1998, 447).

The gifts represented Froebel's principle of the "graduated course" where in accordance with the underlying laws of nature, play tasks moved gradually from the elemental to the complex, in accordance with the stages of cognitive development (Heerwart, 10). Simple exercises with colored building blocks were replaced by elaborate weavings with colored paper that resulted in the formation of complex geometric designs. Many have argued that the these gifts and the method by which they were introduced influenced a radical rethinking of space, line, and form, which found its expression in modern art and architecture, most notably in the work of Vassily Kandinsky, Paul Klee and Frank Lloyd Wright (Kaufmann 1981; Brostermann 1996).
Predating modern behavioral and cognitive theories on child development, the activities undertaken in Froebel's kindergarten (including singing, dancing, gardening, storytelling, gifts and play) were intended to meet the basic cognitive, psychological, emotional, motor, and spiritual needs of the learning child (Brosterman, 32). Bertha von Marenholtz-Bulow, an early protégé of Froebel, listed the many needs of the child that the kindergarten method satisfied:

1. The need for physical movement, through gymnastic games that develop the limbs; 2. A child's need to occupy herself or himself in a plastic fashion, through exercises that produce manual dexterity and develop the senses; 3. A child's need to create through small tasks that develop one's artistic faculties; 4. A child's need to know, or natural curiosity, engaging in observing, examining, comparing (which is how intellectual development is brought about); 5. A child's tendency to cultivate and nurture through gardening and carrying out small tasks, which result in the development of the heart and conscience; 6. The need to sing through games and songs, which produce the development of feelings and esthetic taste; 7. The need to live in society, through life in the kindergarten community: this mode of existence produces social virtues; 8. The deepest need of the soul; to find the reason behind things, to find God (Brostermann, 30, 32).

2.3 20TH CENTURY EXPERIENTIAL EDUCATION

Throughout the late 19th and early 20th centuries, despite efforts to translate the methods of Froebel to North American schools, under the influence of industrialism most outdoor school environments became arenas for improving the physical fitness and, in the case of school gardens, the individual productivity of children (Herrington 1997, 150). The rise of urban populations, coupled with outdated building infrastructure and environmental concerns, meant that reforms were largely focused on increasing access to air and light, while facilitating the most effective conditions for social control (Stillman and Cleary, 1958). However, despite widespread modernization and sterilization of school environments, during the early years of the 20th century, the theories of John Dewey, Maria Montessori and Rudolf Steiner continued to foster the spirit of educational reform.
2.3.1 John Dewey and the Progressive Education Movement

John Dewey (1859-1952), one of the leading proponents of the Progressivist Education Movement in the United States, saw a direct connection between doing and knowing: "Life goes on in an environment; not merely in it but because of it, through interaction with it...The career and destiny of a living being are bound up with its interchanges with its environment" (Dewey 1934, 19). The dual concepts of praxis (doing) and pathos (being done to) are central to Dewey's theory of experiential knowledge. To Dewey, experience amounts to a transaction that takes place between an individual and whatever constitutes his or her environment at a given time. Learning takes place when there is continuity between reflection on an experience and future actions in response to a previous action (Garrison 1998, 65).

A further dimension of Dewey's educational view is that education must integrate with the lived situation of the individual learner if there is to be any benefit to the larger society. Such an integration requires coordination between the subject matter, a student's interests, needs, and capacities, and the environment in which learning takes place. "We never educate directly, but indirectly by means of the environment...We design environments" (Dewey 1934, 20). This suggests that it is not necessarily familiarity with the subject matter that facilitates teaching, but rather, that teaching is facilitated by environments designed to accommodate a student's needs (this included both the social and physical dimensions of the learning environment). In Dewey's estimation these needs included "thinking, inquiry, and reflection", all of which would stimulate one's ability to learn -- that is, to facilitate the continuous process of interaction and reflection with one's immediate environment (Garrison 71). Using the outdoor environment to develop language competency and gardening for social development, Dewey's methods have been critiqued for their focus on "pragmatic" ends (Herrington 2000). However they have been credited with laying the groundwork for educational and cognitive theories that focus on the socially "constructive" nature of knowledge and learning (Applebee 1996; Larochelle and Bednarz, 1998).
2.3.2 The Montessori Method

Aided by her training in medicine, psychology and anthropology, Dr. Maria Montessori (1870 - 1952) developed her philosophy of education based upon actual observations of mentally challenged children in Italy during the first decade of the 20th century. Influenced by the writings of Jean Itard (1775-1838) and Edouard Seguin (1812-1880), Montessori believed that a "special educational treatment" could enhance learning by improving the mental condition of these children, and further, that this theory could be applied to all children (De Jesus 1987, 6). The fundamental tenet of Montessori philosophy is that all children carry within themselves the person they will become. In order to develop physical, intellectual, social and emotional potential to the fullest, the child must have freedom: a freedom to be achieved through order and self-discipline (Montessori, 1964a). Montessori's notion of freedom was grounded in the belief that children learn through an innate curiosity and need only appropriate guidance. This parallels the Rousseauian principle (later taken up by Froebel) that fundamental learning occurs through "self activity", wherein learning originates "with the child itself, and expression became self-expression instead of recitation" (Brosterman, 32). Montessori recognized that the only valid learning impulse is the self-motivation of the child, who forms knowledge through informal and everyday activities within her environment. At the same time she recognized that for such learning to occur effectively, order and structure were required in the physical and social environment, thereby ensuring that exercises were suited to the particular developmental needs of each child (De Jesus 1987). Guiding the child's activity was the Montessori teacher, who ensured that the child's individual freedom was tempered by order – an order that was manifest through the "prepared environment".

Prepared environments are defined by six components: freedom; order; beauty and atmosphere; didactic materials; community life; and reality and nature (Montessori, 1972). Each component consists of a series of activities, taken in sequential order (according to a three-tiered developmental model) and taught to the child by the teacher. Once an activity is explained to the child, the child is free to use the
object or combination of objects over a duration determined by the child. The use of the natural environment within the Montessori school is particularly significant for this discussion.

Nature, the "botanical world", or "life garden" (Orem 1971) of the Montessori school consists of a completely enclosed garden with a fence, directly connected to the classroom, allowing children to move freely between the two. The school garden is an important element of the Montessori method, facilitating observation, contemplation, and direct manipulation through the planting of small, individual garden plots. Through the cultivation of his or her individual plot, the child learns responsibility and an ethic of care, in addition to developing a sense of "confident expectation" in connecting their actions to physical effects taking place in the gardens (Montessori 1964b). As a conduit to the metaphysical realm, the garden teaches the child a reverence for nature through which he or she cultivates notions of faith and a larger "philosophy of life" (Ibid). Thus the garden and its connection to the indoor space of the classroom, becomes a microcosm for understanding more universal relationships.

2.3.3 Rudolf Steiner and the Waldorf Method

Rudolf Steiner's educational ideas developed out of the climate of reform and rejection of Cartesian science and modernization that had driven reforms of the previous decades. While the educational theories of the romantic educational reformers discussed earlier can be seen as providing practical precedents for Steiner's educational method his theories also owe significant debt to the scientific and aesthetic theories evolving out of late 18th and early 19th German Enlightenment. A student of chemistry, mathematics and philosophy, Steiner formed his ideas concerning the union of nature and education early on, which developed even greater focus through his in-depth research into the scientific and philosophical work of Goethe and Schiller. Heavily influenced by Goethe's theory of "Perceptive
Judgement” and the philosophy of aesthetics espoused by F. Schiller, Steiner's educational method sought the intersection between art, science, and the spirit, as captured in the union between the material and ethereal realms of the natural world (Nobel 1996, 31). Steiner believed that truth and knowledge could only be realized through the union of the intellectual, artistic, and spiritual realms of consciousness -- a union that would "prepare the mind, enrich and ennoble the feelings, and bring forth the strength of commitment necessary to meet the self-chosen aims of life" (Sanoff 1994, 100).

Steiner considered nature the ideal after which humans could model individual moral behavior. Steiner sought to reawaken human behavior to its "natural" instincts, a reawakening that would be realized at different developmental stages through a heightened cognitive, bodily, and spiritual awareness of the material world. Steiner was influenced by Goethe's theories of metamorphosis and organic development, which were premised on the assumption that organic development could not be understood through pure empirical science but, rather, could only be understood in apprehending its processes, its transformations, and metamorphoses (Nobel, 113). Growth and human potential were formative and accumulative, rather than having a pre-determined outcome. Within the context of formative growth, the child is constituted as a threefold being that constructs understanding of his or her world through the body, the soul and the spirit. "Through his body he belongs to the world which he also perceives through his body; through his soul he constructs for himself his own world; through his spirit a world reveals itself to him which is exalted above both the others" (Childs 1996, 85).

In addition to the threefold nature of human existence, Steiner, like Maria Montessori, proposed that the development of the child occurred over three seven-year stages. Each of these stages would see the child

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3 The concept of "perceptive" or "intuitive judgement" as espoused by Goethe, refers to "a perceiving of the truth within the whole, while observing so as to reach the archetypal picture or Idea [or archetypal phenomenon], to which the phenomenon relates." (Adams and Whicher, as quoted in Herrington 1998, 327). Further, to Goethe, the "archetypal phenomenon [Urphanomen] is not to be considered as principle from which manifold consequences result; rather it is to be seen as a fundamental appearance within which the manifold is to be held" (Goethe as translated in Zajonc 1998).
undergo transformations in adapting to the physical environment. In the years between 0 and 7 years, the
child's "ego" or the "human element which experiences that which endures throughout our Earthly
existence" is entrenched in the physical world (Child 101). The external stimulus of the material world
provides the most potent and formative means through which the child learns. In this stage, motor,
sensory and social skills are developed. From the years between 7 and 14 the ego is entrenched in what
Steiner calls the "etheric" body. The etheric body is that component of consciousness that apprehends the
inner life-force of all organisms, the force that distinguishes living beings from inert material matter.
During this stage, children begin to realize themselves as belonging to a larger social and spiritual order
with the natural world becoming the primary means for apprehending one's etheric self. In this stage,
children begin to form simple concepts about their relationship to their surrounding environment. The
third stage, occurring between the years 14 and 21, the ego is entrenched in the "astral" body. Also called
the "sentient body", this stage is characterized by an awakening of the consciousness. The student now
apprehends the relationship between himself and the surrounding world through the formation of larger
order concepts and ideas.

During each of these stages, the role of art and aesthetics was central to the structuring of knowledge.
Primarily through music, eurhythmmy (a combination of choreographed dance and gymnastics), graphic
and plastic arts, the student formed the motor, sensory, and creative confidence for approaching all areas
of learning in a holistic way (Nobel, 170). Art and creativity were the means through which abstract ideas
and the physical world were unified. Further, the mental and expressive grounding for art was the basic
urge for creative play, or "spieltrieb" (Ibid. 100). Through free-play, Steiner believed that children
expressed this most basic urge for managing the struggle between the formal and the sensory.

The influence of the educational theorists outlined above has varied and/or been reinterpreted throughout
the 20th century and the degree to which their philosophies remains true to their original intent in current
applications, reflects the fluctuating epistemological current of contemporary society and changing attitudes about nature. Within North America, many of their applications occur predominantly in the context of "alternative" schooling while throughout Europe, Sweden, and Italy, such approaches have remained relevant and have become a cornerstone of educational systems. An example is the Reggio Emilia approach, founded in Italy following the World War II. Founded by Loris Malaguzzi in a small Italian village a few miles from the town of Reggio Emilia in the wake of World War II, the educational philosophy of Reggio Emilia followed on the heels of the progressivist philosophies of Froebel, Montessori, and Dewey. Emerging from the devastation of the second world war, and the rigidity of religious schooling throughout Italy, the approach was propelled by an urge to give dignified meaning to human existence through education focused on the cultivation of a child's intellectual, emotional, social, creative, and moral potential (Edwards et al. 1998, 57).

2.4 CONTEMPORARY COGNITIVE THEORY AND EXPERIENTIAL LEARNING

The above sections have sought to provide historical precedents for experientially-based education. In all of these examples, the natural environment was understood as both a model and a setting for an education that was to nurture the physical, spiritual, moral and intellectual needs of children. Significant literature emerging from the fields of educational psychology and environmental education suggests that curricular changes taking place consider "present and evolving realities" (Sauve 1999, 10). From an epistemological perspective, this has involved a reconsideration of the interrelationship between students, their cognitive processes, and the social and cultural contexts in which learning takes place.

During the 20th century, theories of knowledge evolved out of two divergent paths of educational psychology—the behavioural and cognitive sciences. Behaviourists hold that knowledge is that which has been proved or confirmed through observation and is evidenced by what can be seen. Learning and
instruction become a linear process characterized by a one-way transmission of information from object to the subject. To the behaviourist, the learning process is considered "a 'black box', or a product of "inputs and outputs" (Robertson 22). Moreover, an entirely behaviourist view of knowledge asserts that non-observable events are illegitimate sources of learning. These events range from psychological and cognitive phenomena such as self-reflection, to the more abstract operations of concept formation and conceptualization (Furth, 170; Robertson, 22).

A central tenet of behaviourist-based approaches to education holds that learning results in a specific outcome as a result of a stimulus. This "stimulus-response" approach is based on the premise that quantifiable products themselves are taken as evidence of a process (Gowin 1981). A behaviourist approach to environmental education would consider a learning experience an activity that achieves a set of pre-specified outcomes (for example through the identification of plant species). In this scenario, the greater one's ability to master the identification of the plant species, the greater the transference of knowledge. As a consequence, the instructor or teacher becomes the all-knowing master who places a premium on the development of skills and techniques of observation and analysis, without acknowledging the operations of the mind that actually precede or inform perception and analysis.

Unlike traditional behaviourists, cognitive theorists reject the notion of fixed intelligence, and uphold the essentially integrated nature of learning, in which the learner gradually develops intellectual structures highly dependent upon his own environmental interactions. Cognitive theories suggest that the subject and object engage in a circular process and argue that each contributes, in turn, to the successful coordination and clarification of thought and action. Ideas of nature are thus constructed, not in a vacuum, but through the combination of sensory perception and a cognitive feedback loop that is constantly "testing" one's perception against the knowledge that is already present in one's conceptual framework (Roberston 1994; Larochelle and Bednarz 1996).
One of the first theorists to investigate the dynamic nature of cognitive activity was Jean Piaget who sought to understand cognitive development by systematically discovering the conditions that coordinate human behaviour and the formation of knowledge. Through his hundreds of observations of children, he developed a method of categorizing the natural manifestations of human intelligence. The cognitive development of the child was seen to pass through four progressive stages: sensorimotor (between birth and approximately 2 years); preoperational (from approximately 2 years to approximately 7 years); concrete operational (from approximately 7 years approximately 10.5 years) and formal operational (from approximately 10.5 years to 15 years) (Piaget 1968). For the infant, knowing occurs primarily as a direct response to the immediate external environment. In this pre-oral/pre-linguistic phase, imagery, imitation and spatially conditioned responses are a strong means of communication and knowledge formation (Furth 51). Indeed, Piaget's research was particularly instrumental in identifying innate spatial facets of cognitive development in children (especially infants and toddlers) and their contribution to sensory-motor and social development (Piaget 1968). His "space schemata" were an attempt to categorize children's sensory perceptions and geometric operations into a commonly understood language of "space categories", which, it is suggested, support the "the existence of a shared language of space and form" (Condon 1988).

In phases subsequent to the infant/toddler years, knowing becomes more internalized, developing in tandem with the child's emerging sense of self, and becomes gradually dissociated from sensory-motor content (Sugarman, 1987, 11). However, Piaget argued that even at very early stages, assimilation of information takes place and results in the formation of mental constructs or "schemes of action", which are cognitive attempts to organize information so that "every action vis-a-vis an object transforms this object in its properties and in its relations" (Piaget, trans. Furth, 56-58). Like Dewey's concept of the relationship between transaction and continuity, this theory emphasizes the dynamic interrelationship
between the object and existing cognitive schema, which, through continuous and circular processes of interaction, inform ever more developed cognitive schemes of the world, which in turn, influence subsequent behavioural patterns. The concepts of transaction and continuity are interchangeable with Piaget's framework which uses the terms assimilation and adaptation, where assimilation refers to learning that is incorporated into prior knowledge, and accommodation refers to learning that "fundamentally modifies prior knowledge" (Roberston 1994, 24).

Similarly, Pia Bjorklid's concept of "interactional" assumes that "the environment itself develops, and can be modified, changed and molded by the individual" (Bjorklid as quoted in Moore, 10). Bjorklid emphasizes the "reciprocal nature of the adaptation process whereby the individual is not only influenced by but also influences his environment, and has an inner need to do so" (Ibid.). This echoes Piaget's assertion that environment is not something fixed -- 'out there' -- but that "children should be able to do their own experimenting, their own research...in order for a child to understand something he must construct it for himself, he must reinvent it...if in the future individuals are to be formed who are capable of creativity and not simply repetition (Piaget as quoted in Moore, 27).

2.4.1 Social Constructivism as a Framework for Learning

Recent research critiques Piaget's theories of cognitive development for being too narrowly focused on a single, terminal state of intelligence (Gardner 1999; Egan 1997), while ignoring the dynamic social and cultural context in which learning takes place (Smith 1993, 129). However, he is considered one of the fathers of constructivist cognitive theory, which supports the view that the individual and his or her environment are co-actors in the construction of knowledge (Robertson 1996). The constructivist view of knowledge can be generally understood through the following two principles: 1) "Knowledge is not passively received but actively built up by the cognizing subject; and 2) the function of cognition is
adaptive and serves the organization of the experiential world" (Von Glaserfeld as quoted in Roberston 1994, 22). Constructivism introduces the observer/subject "within the description of his or her observations" (Larochelle and Bednarz 1998, 5).

Where Piaget's theoretical work hinged upon gaining an understanding of individual learning and development, more contemporary constructivist theories (i.e., social constructivism) place more emphasis on the conceptual frameworks of children's thinking. Where Piaget saw the end product as proof of the process, social constructivists focus on the various ways in which children form and reform conceptual ideas as a means of learning. To the social constructivist, learning involves the interaction of meaningful concepts within a student's conceptual framework, where "conceptual frameworks" are taken to mean the cluster of beliefs, values, emotions, and assumptions which students have developed in the process of understanding the world and which they bring to any learning process (Robertson, 25). Direct involvement in one's environment becomes a key means of integrating new ideas with pre-existing concepts, which themselves are derived from previous interactions with and perceptions of the immediate environment. The implications for design that arise from a constructivist epistemology revolve around how both teaching methodology and the physical environment assist in facilitating transformation, or a conceptual change. The art/skill in teaching consists in the skill with which messages are transmitted by the teaching environment while the art of learning is the ever-developing skill with which a receiver extracts the meaning of the message picked up by his or her senses. The teacher or transmitter (in this case, the physical landscape), becomes something that "serves to orient students efforts at construction." (Larochelle, 12).

Applebee articulates the social nature of knowledge formation as a "conversation" between the learner/subject and the various symbolic representations of the world that have evolved over time and that make up his or her environment (Applebee 1996). The role of the educational curriculum within this
context consists not of discreet skills to be imparted, but rather of elements, including the physical landscape, that "form a conversational domain within larger, culturally constituted and socially significant discourses...into which a community at a given point in time wants its students to be able to enter" (Brodkey 1992, 129).

2.4.2 Phenomenology and Phenomenography

Significant literature emerging from the fields of educational psychology and environmental education indicates a need to establish new relationships between the learner and their environment in order to facilitate constructive learning. Phenomenology, and its more recent cousin, phenomenography, are considered potential methodological frameworks for constructivist education (Roberston 1994).

Phenomenography is a branch of educational psychology that studies the differing ways in which people experience, perceive, apprehend, and conceptualize various phenomena in the world. Emerging out of educational studies during the 1970s in Sweden, phenomenography is an attempt to discover, qualitatively, how and why people know, and therefore learn, differently. Underpinning phenomenography is its philosophical predecessor – phenomenology – which is an attempt to understand qualitatively how and why people experience the world differently. Most closely associated with the philosophical work of Martin Heidegger, phenomenology examines the ontological nature of the person/world relationship – or how we exist in the world. In both phenomenography and phenomenology, the relationship between the object and subject is key to understanding both the nature of the phenomena that is being experienced, and to assimilating this phenomena into pre-existing conceptual frameworks in ways that are meaningful.
Phenomenology seeks an understanding of fundamental behavioural patterns in space and is therefore most relevant to design. "Through empathetic looking and seeing he or she strives to make genuine contact with dimensions of environmental behavior and experience and thereby secure accurate qualitative descriptions which will provide a base for authentic conceptual portrayals of the various dimensions of the person-environment relationship." (Seamon, 1982, 121).

In design, phenomenology becomes an important method for understanding and identifying qualities that give certain landscapes meaning. As social constructivists suggest, learning takes place through ordinary, everyday experiences within the physical environment. Individual cognition is constructed and reconstructed as a result of exchanges taking place between the person and the social and cultural environment itself. Beginning with the assertion that our existence is bound to the physical world, phenomenology seeks a description of the essential elements of this existence in space, "which, when understood, provide footholds around which to understand ourselves and others" (Seamon 1982, 137). Supporting both the phenomenological and constructivist positions is Mugerauer's notion of "environmental hermeneutics", which attempts to discover (through an emphasis on history, memory, interpretation and language), the essential or vernacular characteristics of a certain landscape, which "are concealed in the local language" (Mugerauer 1985, 67), where language refers to the forms, processes, artifacts, and environmental particularities of a given locale. As a socially and culturally constituted artifact, the landscape (embedded with the traces of past histories) serves as the matrix of present actions while communicating the "tacit, socially constituted conventions that give shape and structure to the larger realms of discourse" (Applebee, 1996).
2.5 CONCLUSION

The above discussion has sought to establish a broad historical and psychological basis for considering the quality of the environment in facilitating the learning and development process in children. This discussion, along with the benefits associated with naturalized school-grounds outlined in Chapter 1, highlights a number of common principles that have implications for the design of outdoor learning environments. These broad principles include Contextuality, Constructiveness, and Relational Space. Chapter 3 presents a brief discussion of each of these principles, with an emphasis on exploring how each reinforces the particular concepts of knowledge and learning outlined in Chapter 1 and 2. (For a general overview of developmental milestones experienced in elementary school-aged children, see Appendix 2b).
CHAPTER 3 – DEVELOPING A FRAMEWORK FOR DESIGN

3.1 INTRODUCTION

The following section presents a brief discussion of each of the principles introduced in the previous chapter – those of Contextuality, Constructiveness, and Relational Space – with an emphasis on exploring how each reinforces the particular concepts of knowledge and learning outlined in Chapter 1 and 2. This framework is then expanded by a discussion of precedents drawn from both landscape architecture and architecture. These precedents will explore a wide range of site typologies, from educational buildings and learning landscapes, to gardens and public parks. It is recognized that many of the projects discussed in each category share a number of similar characteristics, however, the categorization provides a useful focus for specific attributes which are considered important and which a more general discussion might not adequately address. This framework and accompanying images is shown on Drawings D3 through D5 (see Appendix 1).

3.2 CONTEXTUALITY

Contextuality refers to design that is sensitive to the physical, social, historical and cultural setting of a site. Contextual design exposes site-specific qualities of a landscape, uncovering its "potential" from "what already exists in situ" (Girot 1999, 61). The search for a site's potential is rooted in a phenomenological consideration of the landscape and its genius loci (see Norberg-Schulz 1980). Central to this theory is the concept of place. Relph describes places experientially as "fusions of human and natural order...and the significant centres of our immediate experiences of the world" (Relph as quoted in Seamon 1982, 132). The essence of an experience of place is the concept of insideness, or "the degree to which people belong to and identify themselves with place" (Ibid, 133).
Contextual approaches look for a direct connection between experience and the landscape. If we accept that sensory engagement with natural phenomena heightens perception and thereby stimulates the acquisition of knowledge, the most effective designs will be those that emphasize the phenomenal qualities of a given site in addition to celebrating both the position and condition of the body on that site. Within the context of a school environment, contextual design can provide evidence of certain inherent characteristics of a site's history (i.e., geological weathering, flooding, settlement patterns); it can also highlight a site's ephemeral aspects (such as wind patterns, diurnal and seasonal variations, auditory qualities and patterns). Contextuality celebrates the idiosyncratic environmental and cultural languages of local and regional landscapes, and when applied to the landscape of the community school, can forge real connections between students, the larger community, and their environment. Within the sphere of evolving attitudes, behaviours, and interpretations of nature and the environment, contextual design demonstrates "how the particulars of the site or region provide a collective connection point for community education, dialogue, and identity" (Herrington 1996, 26).

The following three examples exemplify the concept of contextuality as described above.

3.2.1 Strawberry Vale School

This primary school, designed in 1994 by the firm Patkau Architects, with landscape architect, Moura Quayle and Lanarc Consultants, serves a semi-rural community on the edge of Victoria, British Columbia. The 3300m² building is located south of an existing school and beside a garry oak woodland which forms the edge of a small park. The form of the school and its grounds are derived from environmental forces. Materially and tectonically, the building expresses a harmony with both the physical and ephemeral conditions of the site. Pods of classrooms are arranged along a single corridor.
and terraced foundations follow closely the contours of the rocky site. This approach minimizes the earthwork needed to accommodate the building and allows the particularities of the site's topography and geology to be manifest in physical form (MacDonald 1997, 16). Classrooms are oriented to the park and woods to the south and are located at-grade to allow individual access to the outdoors. Daylight is optimized through controlled placement of windows, clerestories and skylights. Building materials are chosen to minimize embodied energy and toxicity and the primary construction of wood, steel and concrete is exposed, both to reveal the method of construction and to reduce the use of synthetic finishes.

The siting and building program were intended from the beginning to integrate the hydrology and biodiversity of the site into the teaching curriculum. Rainwater from the new building's surfaces is collected and directed along a watercourse into a constructed marsh for natural filtering. Circulation within the site is organized around the landmark rock outcrops, a feature which enhances the legibility of the site. The site also features a Garry Oak nursery (a gesture towards the original forest growth on the site), a wildflower field, and several natural planted areas, which provide spatial definition for various activity areas. The design also maintains links to the site's recent past. While necessitating the demolition of a 1950s school, the new design maintained vestiges of its foundation, which are now used to demarcate play areas. The school's sensitive siting, materiality, site-specific programming, and circulation program work to forge a unique identity for the school while also contributing to its instructional role within the larger community.

3.2.2 Iowa State University Childcare Centre

The Iowa State University Child Care Centre was designed in 1996 as a prototype for child care centres on the Iowa State campus (Herrington 1999, 27). As a prototype, the design was developed by architects, landscape architects, students in these disciplines, artists, children, child development specialists and
university administrators. The 8000 sq. ft site accommodates 86 children comprised of three age groups: (infant/toddler; pre-school and kindergarten; and elementary school age). The design process, which elicits reflections of childhood memories and experiences of growing up in the Midwest and in suburban communities, has resulted in spaces that emphasize the vernacular qualities of the regional landscape, rather than relying on the placement of play structures.

One of the key features of the design was the recovery of a drainage channel that ran through the site prior to the construction of the child Care Centre. This reified channel forms a unifying element for the three spaces within the site, and during different seasons, provides a means for understanding changing hydrological cycles. In addition, the placement of field stones (recovered from local farms, where they had emerged at the surface as a result of heaving during the spring thaw) provides evidence of the area's agricultural heritage. These stones are dispersed throughout the site and provide places for sitting and for creative play. The gently sloping topography of the site reflects the larger Iowa landscape and is foregrounded in the design through the placement of play structures directly onto or into the landforms themselves. In this way, children can experience the undulating contours of the site as well as more subtle changes in topography while also possibly registering a more sub-conscious connection to the larger regional landscape. Finally, the vegetation on the site reflects its suburban context by using low evergreen shrubs typically found in backyard landscapes.

3.2.3 Infant Garden

The Infant Garden was designed by landscape architect Susan Herrington in 1994 for ten infants enrolled in the Child and Family Study Centre at the University of California, Davis. Its primary goal was "to create an outdoor play landscape that would support the sensorimotor and socio-emotional development of infants as it occurred in spontaneous exploration" (Herrington 1999, 27). The design meets this goal in
a way that reflects an acute sensitivity to the California regional landscape and the various biotic and abiotic communities inhabiting the site. The design is comprised of three central elements – the raised grass ring, the pine circle and the plant maze. The lack of identity and legibility characterizing the existing site design compelled designers to create a centre, which became the grass ring. Comprised of a circle of mounded earth, the grass ring automatically rooted the site, evoking a sense of "community or locus mundi." In addition, the design also addresses the provision of shelter in a way that celebrates the ephemeral qualities of wind and light. The shade structure, consisting of a triangular parachute awning in vivid color, can be suspended from the circle and during periods of sunshine, casts colored shade onto the ground plane. Variations in height can be manipulated according to wind and light levels.

To one side of the grass mound is a circular grove of pines and to the other is the shrub maze. The plantings in each of these areas are meant to reflect the domestic environment familiar to the child by using vegetation common in the surrounding suburban landscape. The plant types are chosen for their ability to encourage touch and smell while the rows of the shrub maze echo the linear patterns of the agricultural fields.

3.2.4 Duisburg-Nord Landscape Park

Begun in the early 1990s, The Duisburg Nord Landscape Park is designed by landscape architectural firm, Peter Latz + Partners. Located on the former site of an iron and steel plant in Duisburg-Meiderich, Duisberg-Nord was designed as "the park of the 21st Century" and as a counter-response to the 19th century landscape park (Weilacher 1999, 121). The impetus for its design was the industrial decline of the 1970s and 1980s, which had rendered the buildings obsolete. The master plan was conceived as one facet in a larger open space scheme to reanimate the region. Rather than removing the abandoned vestiges of its industrial past, the master plan, based on a four-fold layering of architectural, ecological,
circulatory, and spatial elements, celebrates its industrial heritage and in the process, sets up a compelling dialogue between nature, technology, and humans.

Particularly relevant to this discussion is Latz's consideration of the roles of ecology and design. The Duisberg-Nord site has not been altered to re-present nature in an Arcadian sense, but rather, nature has been let back in and allowed to thrive within human-made conditions. The way in which the gardens have been reinterpreted and used through the parks forms the backbone of both the ecological and spatial structure. Designed in abandoned shells of buildings, in concrete tanks, or incorporated into pieces of relic machinery, each garden features communities of vegetation that have, over time, grown accustomed to the particular substrate and ecological condition of the industrial site. Latz describes the gardens as organizing features that link the site, "harmonizing to form a whole and possibly clarifying it...to prepare and present the many unknown species of vegetation and for drawing attention to the labyrinth-like maze of cavities that exists below ground" (Latz 1995, 97). As such each garden is a living laboratory for contemplating and experiencing the juxtaposition between human control and ecology. Rather than designating certain aspects of the industrial site "off limits" the gardens allow visitors to experience the site as a totality and to witness its constant evolution. The industrial infrastructure provides infinite opportunities for play and exploration. Children and adults alike are invited to clamber up and down the thick masonry walls, to explore the various topographical levels of the circulation system, and to touch, smell and observe the various processes and changes that have occurred and continue to occur to both the built and natural landscape.

Another key aspect of the design is the way in which water is used as a restorative device. The Emsher canal, which runs through the site, was previously fenced off due to its contaminated water quality. In the new design, this canal is envisioned as a public resource, containing clean water, providing habitat for water-fowl and serving as a place for people to walk. This is to be achieved by creating an artificial
wetland environment at the mouth of the canal, which utilizes rushes and other riparian vegetation in addition to a wind pump, in order to ensure continuous oxygenation and filtration of the water (Latz 93).

### 3.3 CONSTRUCTIVENESS

The concept of constructiveness refers to design that consciously discloses the intersection between "organisms and their environment (Sugarman 1988, 230)." Revealing the conversation between culture and nature is central to constructive learning and to a constructivist view of space as it allows children to recognize that they are part of, and producers of their environment. This view recognizes that within a cultural context "ecological design" involves the manipulation of natural systems. Constructive spaces allow students to think about, interact with, and manipulate the environment (Edwards 1998, 76). Such spaces serve to provide evidence of one's existence in the world, supplying a means for "understand[ing] the path of [one's] learning and the organization of their experience, knowledge, and the meaning of [one's] relationship with others" (Rinaldi, 188). The techniques of narrative and metaphor are often used to describe such spaces, and are used consistently in "constructive spaces" (see Edwards et al. 1998). The use of narrative is one way in which children establish a collective link to events, memories, and experiences, and thereby construct a frame for understanding their world in a given time and place.

Rather than presenting a fixed version of reality, narratives expressed through landscape become a means for a child to negotiate the "ongoing processes of encounter, interaction, and construction of a constantly changing nature that exceeds human attempts to understand and represent it" (Potteiger and Purinton 1998, 31).

The concepts described above are demonstrated in the following three examples.
3.3.1 Extension for the Ecole Maternelle Kindergarten

In this project, designed by architects Edouard Francois et Dundan the dialectic between nature and culture is explored in a design for a four room kindergarten in a suburban neighbourhood. Responding to the placement of the existing building and its relationship to the surrounding trees on the site, the extension intersects with the branches of the trees in a manner that reflects the shapes of the branches while also recalling the form of a tree house. The walls are transparent, allowing visual penetration into the surrounding school yard while the structural supports (comprised of intertwined PVC) provide drainage from the roof and echo the natural forms of the surrounding trees. Hanging from the floor of the extension are swings and bird feeders. The form, orientation, and material expression of the kindergarten is a playful metaphor for a tree itself.

3.3.2 Sweet Farm

Sweet Farm is a 33 hectare estate near Sutton in the Eastern Townships of Quebec. Described as a "narrative composition" its formal organization was accomplished by first understanding the different landscape types that characterized the site. This approach was chosen in part to retain, as much as possible, the intrinsic landscape qualities of the site (i.e., meadow, forest, marsh, gorge, lawn and dell) while providing a means through which these elements could be further revealed and connected (Deene 1998, 20). The paths meander along lines of least resistance and maximize access to significant views. Intersecting these picturesque, so-called "natural" paths is a single, "lazer cut" path that connects a viewing tower with the estate. Strengthening the dialectic between the natural and artifice is the 'ellipse', a large gully cut into the earth that creates a series of linear openings in the forest. The experience along the path is articulated by a series of interventions, constructed of materials and artifacts from the site, that either reveal past uses of the site, or respond to the site's more ephemeral qualities.
Interventions include a garden comprised of stacked mink cages (vestiges of the farm's checkered past), placed in a small birch clearing. The cages form a small, tranquil spot for picnics under the thick forest canopy. Other elements include the belvedere – a cantilevered pier that hovers over the gorge; a boardwalk consisting of logs laid either vertical or split horizontal that provides passage over the marsh and slough; and woven walls, which consist of branches that are to be laced through vertical branches mounted into the ground. The wall is considered to be work in progress, to be constructed by passers-by. The woven branches are intended to close off views into the forest and thereby emphasize the relationship between sky and earth while also increasing the dramatic experience of the gorge on the opposite side of the path. On the one hand, the interventions exemplify a "contextual" approach – the materials used and methods of construction are sensitive to the existing context – while at another level, they provide a means for interpreting the various layers of meaning held by the site, allowing the visitor a means to construct a variety of experiences and narratives for herself.

3.3.3 Guadalupe River Park

The third example is Guadalupe River Park, San Jose, California, George Hargreaves Landscape Architect. The philosophy of Hargreaves and Associates is rooted in a desire to communicate the relationship between humans and their environment through design that mediates the flux between pure ecological design, and more culturally-based design. Hargreaves writes, "with increasing frequency our work deals with land which has been made and re-made (Hargreaves and Associates, 1999). Reflecting this philosophy, this project deals with ameliorating the effects of flooding within an urban river basin in a way that discloses the relationship between humans, nature and technology. Designed to express the unfolding narrative of the Guadalupe River, the park features a large flood-control channel, major recreation park and forested area that provide a rich habitat. The River Park consists of the grading plan for the flood-control channel itself and provides the underlying structural spine for the design of the
River Park. Undulating terraced banks and landforms suggest the obviously manmade and river-influenced backbone for the riverbank landscape and respond to natural processes (such as flow, erosion and deposition) related to the hydrology of the site.

3.4 RELATIONAL SPACE

The concept of relational space refers to design that accommodates the social dimensions of the school environment. The school should be instructive, both to the community it surrounds, and to the students who attend it. This notion relates to both the quality of individual spaces and their relationship to the whole.

Spaces for children should "read" in their dimensions, scale, complexity and order, as though they are for children. From the quality of both the indoor and outdoor spaces, and the links between the two "we can learn more about the value and meaning of the relationship among the children and adults who spend time there" (Edwards et al. 1998, 162). Schools and their environments should serve as cultural filters for contemporary values and relations, acting as the "essence and distillation of the society" (Branzi 1998). Within the context of a "sustainable" community such as East Clayton, the implications of this revolve around how the buildings and their associated outdoor learning spaces address the civic realm of the street, while also communicating (through material form and expression, processing of energy and waste and orientation, program, etc.) their instructional and sustainable function, allowing students and residents to cultivate what David Orr calls a "connectedness, implicatedness, and ecological citizenship" (Orr 1992, 103).

Similar to the idea of constructive space, relational spaces can facilitate constant exploration, discovery and exchange among people and create many networks of connections among people and things.
This requires a variety of environments, of different scales and spatial qualities both to accommodate different age groups and developmental stages, but also to furnish a variety of learning activities (Moore 1986, 22). From larger common spaces, enclosed courtyards, and piazzas for gathering, to more secluded spaces for smaller group collaboration or individual activity, spaces must be diversified, stimulating and welcoming and allow for spontaneous and planned activities as well as for privacy and pause from the general rhythms of the school.

This category also has to do with the ability of the physical environment to accommodate multiple curricular activities. Relational spaces are those that offer a rich diversity of programming opportunities in a multitude of subject areas. The school ground is seen as an extension of the interior spaces and should provide a wide variety of learning opportunities and extend, where appropriate, into the community itself (Sanoff 1994, 16). School environments need to address both the health and the well-being of the students who attend them. Air quality, lighting and acoustic quality are also important to both energy efficiency and social/physical well-being within the school building, and relate to its siting and configuration within the landscape (Province of British Columbia 1995).

The following two schools demonstrate the concept of relational space as described above.

3.4.1 Reggio Emilia — the Diana School

Founded by Loris Malaguzzi in a small Italian village a few miles from the town of Reggio Emilia in the wake of World War II, the educational philosophy of Reggio Emilia followed on the heels of the progressive educational philosophies of Frobel, Montessori, and Dewey. The design of the school ensures that the child's intellectual, emotional, social, and moral potential are carefully cultivated and guided. (Edwards et al. xvi). Developed for infants and children up to the age of 8 years, Reggio Emilia
philosophy sees the development of young children as a part of a community responsibility, and as a result, schools are integrally located to focus the interaction of all people connected with the school (Sanoff 15). The belief that the quality of the children's environment is directly related to all aspects of learning and to the health and well-being of the whole child is central to the Reggio Emilia philosophy.

The Diana school’s central placement within the commune di Reggio Emilia reflects a commitment to facilitate interaction and continuous dialogue between the community and school. Designed in partnership between architects, interior designers, teachers, educational advisors, and parents, the school was designed on the premise that thoughtfully designed spaces have significant benefits on learning and child development. The importance of the physical environment of a Reggio Emilia school is described by its founder, Loris Malaguzzi in the following way:

“We value space because of its power to organize, promote pleasant relationships between people of different ages, create a handsome environment, provide changes, promote choices and activity, and its potential for sparking all kinds of social, effective, and cognitive learning. All of this contributes to a sense of well-being and security in children. We also think that the space has to be a sort of aquarium which mirrors the ideas, values, attitudes, and cultures of the people who live within it” (Katz 1990, 11).

The spaces in which learning takes place are considered the “third teacher” along with the team of two teachers per class (Edwards et al. 1998, 68). As cognitive development is intrinsically linked to social development, the school is designed to facilitate maximum social exchanges among children, teachers and parents. The primary central space, “the piazza” facilitates such interaction. The piazza, an integrating space, is located in the centre of the school, with most spaces opening onto it. Another important feature of the school is the design of ateliers, or studios, which are shared by a group of classrooms. Staffed by an instructor trained in the visual and creative arts, the ateliers facilitate creative exploration of projects associated with activities planned in the classroom. Light and air quality is considered in the use of extensive glazing, atrium space, and light reflecting materials, which connect indoor and outdoor spaces and provide light to indoor spaces. The indoor garden in the central space is a
central gathering place for children, while individual rooms open onto their own outdoor classroom space, providing differentiated activity areas as well as enriching opportunities for interacting with the outdoors.

3.4.2 Seven Hills School

The Seven Hills School of Cincinnati is comprised of elementary and middle-school aged children. It was founded in 1916 according to an educational philosophy that linked learning to active exploration, interaction, and discovery. It is a school where “education extends beyond the classroom to the laboratory, the library, out-of-doors, studio, and stage, as well as in service to the community” (Sanoff 127).

Additions to the school responded to a fire which had demolished a wing of the original structure. The reconstruction provided opportunities for merging previously separated age groups and curriculum areas, resulting in the creation of a “middle school”, which would provide a transition between grade 6 through 8. These years are considered by many to be a crucial development stage when there should be “as much consideration for who the student is and becomes – his and her self-concept, self-responsibility, attitudes toward school, and personal happiness – as for how much and what he or she know” (Sanoff 128). The design of the new portion of the school reflects a child-centred philosophy of teaching, with a strong focus on interdisciplinary teaching curricula rather than on the teaching of single-subjects. Classrooms are large in order to facilitate group discussion and individual work. They are separated by detractable walls, and open onto outdoor spaces. The library was conceived as the “heart of the school” with all classrooms leading to this centre. The following principles emerged from a workshop to develop a design program for the additions:
• Air-light-space
• Large library for holding school gatherings
• Direct access to outdoors from each classroom
• Display areas for student work
• Areas in classroom for quiet work and messy projects
• Sinks and water fountains in each room and accessible to outside areas (Sanoff 129)

The result, commented one teacher, is an atmosphere that is “warm, bright, energizing and welcoming. The spaces work for different teaching styles including contemporary hands-on and collaborative” (Ibid.).

3.4.3 Central Park

Completed in 1868, the 843 acre Central Park was designed as a social antidote to the surrounding urban fabric, providing a “relief for workers hemmed in by the city.” The appearance of a wilderness style belies the underlying ecological and social agendas of the park, which necessitated a high degree of construction, manipulation and control of the existing landscape. The park’s order is derived from the ecological functions it fulfils (forest production and protection, water for reclamation, and fields for drainage); at the same time these ecological functions provide for a rich and specialized program of activities, all of which combine to create a highly democratic and socializing environment. Thus the park was conceived both as a refuge from urban chaos and as a closely connected organism of the surrounding city fabric -- just another of the city's multiple productive operations. Within a contemporary context, Central Park provides a relevant precedent of how a constructed landscape can serves as a powerful mediator for complex social relations occurring within an urban environment and for managing the ongoing dialogue between humans and their environment.
CHAPTER 4 – THE SITE

4.1 EAST CLAYTON COMMUNITY CONTEXT

The site chosen for this project is located in the community of East Clayton. East Clayton is an approximately 250-hectare (620 acre) area located on the south-eastern edge of the larger Clayton district, an approximately 909 hectare (2,000 acre) area on the Surrey/Langely border. East Clayton is positioned on a highland area defined by three distinct edge conditions – comprised variously of water, road, and vegetation corridors – each of which contribute to a diverse landscape structure. To its southeast and west respectively lie the river basins of the Nickomekle and Serpentine Rivers. To its west and north is the Agricultural Land Reserve (ALR), on its south is Fraser Highway, and on its east is the Langley border (196 Street). Land subdivision during the early part of the century into 160-acre parcels resulted in the existing agricultural grid, which has defined, in large part, the existing pattern of human settlement.

The site is one of two school/park sites proposed for the East Clayton community. Both sites are located along the central east-west spine of 70th Avenue. The primary land-use surrounding the sites is currently low density residential with some hobby farms. Most recent development since the 1950s has occurred in small increments and subdivision conforms to the historical agricultural grid. With low net densities, narrow curbless rural roads, and expansive views to the surrounding agricultural lowlands, the area is distinctly rural in character. For a summary of site conditions and graphic analysis, please refer to Drawing D2 in Appendix 1.
4.1.1 Planning Context

The two school/park sites are to develop within the context of the East Clayton Neighbourhood Concept Plan (NCP) (City of Surrey et al. 2000), a plan developed in conformance with a number of key policy initiatives formulated to address the development of more sustainable communities at a region-wide scale. The NCP provides the framework for planning for the development of a new community of a population of up to 13,000 people over the next 20 years (Ibid). The NCP is guided by seven principles for building sustainable communities as endorsed by Surrey City Council in Dec. 1998.

The seven principles of Sustainable Development for East Clayton are as follows:

**Principle No. 1**
Increase density and conserve energy by designing compact walkable neighbourhoods. This will encourage pedestrian activities where basic services (e.g., schools, parks, transit, shops, etc.) are within a five- to six-minute walk of their homes.

**Principle No. 2**
Provide different dwelling types (a mix of housing types, including a broad range of densities from single-family homes to apartment buildings) in the same neighbourhood and even on the same street.

**Principle No. 3**
Communities are designed for people; therefore, all dwellings should present a friendly face to the street in order to promote social interaction.

**Principle No. 4**
Ensure that car storage and services are handled at the rear of dwellings.

**Principle No. 5**
Provide an interconnected street network, in a grid or modified grid pattern, to ensure a variety of itineraries and to disperse traffic congestion; and provide public transit to connect East Clayton with the surrounding region.
Principle No. 6

Provide narrow streets shaded by rows of trees in order to save costs and to provide a greener, friendlier environment.

Principle No. 7

Preserve the natural environment and promote natural drainage systems (in which storm water is held on the surface and permitted to seep naturally into the ground).

4.1.2 Historic Settlement Pattern and Local History

The landscape structure of the East Clayton site is distinguished by the low-lying floodplains of the Serpentine and Nicomekle River systems, which are contained on three sides by a ridge/hill/upland terrain. This structure influenced the placement of a trail system, diagonally along the ridges, and through the valley floor, thereby connecting New Westminster and Vancouver eastwards to the BC interior and southwards to Washington State. The Semiahmoo Trail (1872), Yale Road (1875), and McLellan Road (1874-5), (later to become King George Highway, Fraser Highway, and No. 10 Highway respectively), connected the uplands to the lowlands and stimulated early organic development along the ridges and dryer portions of the lowlands. Early district lot subdivision parcelled the land into 160-acre units, creating the loose agricultural grid pattern still visible today.

Formerly called Serpentine Flats or Serpentine Valley, the area of Clayton was named in 1889 by the postmaster, John George, for his native Clayton, Ohio. Begun in 1871, Yale Road (now the Fraser Highway), was for many years the lifeline to New Westminster and Vancouver. The construction of the Fraser River Bridge in 1904 and the gravelling and extension of the Semiahmoo Trail (King George Highway) as far as the US border by 1913, established Clayton's role as a major Surrey transportation hub. This was further enhanced in 1923 by the paving of the Pacific Highway (176 Street as of 1957).
The first Crown land grant was granted to John Wesley Pickard in 1883. By 1891, the area had a population of about 300, two churches, at least one paid school teacher, and train service to New Westminster (Treleaven 1969, 32).

During the late 19th Century, the main industry in the area was farming and prior to the first World War, most of this was carried out on the Serpentine Flats to the west of Clayton Hill. Veterans returning to Clayton could only purchase pieces of land on a much smaller scale than those acquired by the pioneers forty years earlier. These new settlers generally set up on higher ground, in the area of East Clayton and to its north, and practiced poultry farming, as it required less capital investment and land. Dairy farmers and the growers of feed crops prospered on the flats below.

4.1.3 Surrounding Land-use

Residential

Currently, the East Clayton area contains 191 individual parcels most of which are low-density residential parcels. The size of parcels ranges from \( \frac{3}{4} \) of an acre to 60 acres with the average being 10 acres. Most new development in the area has occurred in small increments and subdivision conforms to the historic agricultural grid with the exception of Aloha Estates, a subdivision of one acre parcels located directly to the north of the site.

A central objective of the East Clayton NCP is to provide a mix of densities and housing types in order to achieve an average total net density (excluding parks and roads) of approximately 8 to 10 dwelling units per acre. As per City of Surrey policy for the siting of neighbourhood schools, the site is located and sized to serve a surrounding residential catchment that does not exceed 1500 residential units (City of Surrey School District No. 36...).
**Parks and Greenways**

As mentioned, the two East Clayton school/park sites are conceived of as social and ecological "hearts" of East Clayton. The NCP proposes 70th Avenue as a major Collector Greenway that will connect, almost seamlessly, the eastern edge of the site (196th Street) with its west edge (188th Street). The 70th Avenue corridor is considered to be an integral connective component between the two sites. This Greenway will accommodate multiple users (cars, bikes, pedestrians) within a 17m right-of-way and include extensive tree cover, natural features and traffic calming measures. The 70th Avenue Greenway will also connect to a north-south greenway at the eastern edge, with interstitial patches and corridors of natural areas to its north and south, as well as to adjacent areas of open space, such as the recently completed Clayton High School, located on 188th just north of 70th Avenue. An additional Greenway connection occurs along the southeast edge of the site.

There are currently three schools in the vicinity of the sites: East Clayton Elementary on 70th Avenue west of 188th Street; Clayton Secondary School, on 188th Street south of 70th Avenue; and Clayton Elementary, on 188th Street, just north of 70th Avenue.

4.2 **Detailed Context – The School Site**

This site is situated in the eastern half of the community of East Clayton, directly south of Aloha Estates, a subdivision of one acre single family lots developed during the 1980s. Traversing the site's northwest corner is a BC Gas utility right-of-way, used currently as a public linear recreation area. This diagonal swath connects westward to a north-south linear strip of forested area (proposed greenway). Along its north edge is 70th Avenue (proposed Collector Greenway), which consists of a 23 metre right-of-way.
with an 11.3 metre paved roadway. Along its east and south edge are residential collector streets consisting of a 22 metre right of way with an 11.3 metre paved roadway.

The site’s distinct panhandle shape is primarily the result of existing subdivision and road configuration, as well as its southeasterly slope. The north portion of the site is generally flat, with a slight slope of between 0.5% and 1% while the lower portion has a slope of approximately 6% to 8% oriented in a southwesterly direction, which makes it naturally prone to collecting surface water. Due to relatively impervious soil conditions, the NCP proposes that this southeast corner of the site include a wetland/retention of 2658 m$^2$ in surface area, with an additional 3895 m$^2$ of area required to retain the 100 year storm.

Three structures currently exist on the site: two single-family dwellings (ca. 1970s) and a single-storey barn structure on the eastern-most parcel. Vegetation adjacent to these structures is relatively young shrubs and collections of deciduous shade trees (i.e., maple, birch, cottonwood) with some older conifers interspersed.

4.2.1 Vegetation

East Clayton is comprised primarily of fields and relatively young stands of mixed forest. Historically, vegetation conformed to that found in the Coastal Western Hemlock (CWH) biogeoclimatic zone which covers much of the Lower Mainland region, and consisted of Western hemlock, Douglas fir, and Western red cedar. However, logging and farming activity occurring between 1912 and 1930, together with more recent clearing and suburban development, has resulted in the formation of younger forest blocks dominated by red alder, paper birch, black cottonwood and big leaf maple, with conifers occurring as
individuals or in small clusters. The site’s vegetation consists primarily of clusters of pioneer forest, thimbleberry, hardhack and red osier dogwood commonly interspersed among field grass.

It is important to note that according to a recent environmental report the forest in the southern portion of the site is considered an area of “high natural value”. This assessment is based on a number of criteria, which include, but are not limited to: supporting or potentially supporting significant wildlife, plant or fish species; providing nesting, roosting and/or foraging habitats for various raptors; and facilitating groundwater recharge and discharge important or potentially important to downstream aquatic systems.  

4.2.2 Topography

Slopes range from 0% to 2% on the flat hilltop area and 6% to 9% in the south-east portion. The site drains in a south-westerly direction towards McClellan Creek and then to the Nikcomekl basin. This lower portion has a slope of approximately 8-10% oriented in a southwesterly direction, which make it naturally prone to collecting surface water. Accordingly, the NCP proposes that this southeast corner of the site include a wetland/retention pond. The site has a gently sloping topography characteristic of upland areas. Micro-topographical elements include roadside swales and ditches, as well as natural drainage channels and ravines (occurring through wooded areas).

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4.2.3 Views

Views to the east include Mount Baker, the Nicomekl River basin and Langley City centre. The steeper slopes at the southern end of the site afford views of the agricultural lowlands. To the site’s north, the Coast Mountain range is visible.

4.2.4 Soils

The subsurface geology in the uplands of east Surrey consist largely of Capilano Sediments, which are composed of deposits ranging from moderately coarse-textured glacial till to moderately fine textured glaciomarine sediments. The primary soil unit is Bose, a soil typically found on the upland areas of the Sunshine Coast, Delta, and Surrey municipalities. Bose is characterized by a sandy loam or gravelly, loamy sand surface texture of up to 10 cm thick underlain with a deeper, coarser gravelly sand or sandy subsurface. Immediately below this is a more impervious layer, approximately 50 cm thick, of glacial till or glaciomarine deposits, which is composed of either red cemented sand or silty clay loam. Undisturbed and uncompacted, the clayey soils of the substrata can normally absorb up to 0.5 to 1.0 mm of water per hour during winter conditions and approximately 1.0 to 2.0 mm per hour during summer conditions.

4.2.5 Hydrology and Drainage

There are several natural stream channels occurring within the Clayton context, many of which have had their source of flow altered due to increased development and conventional stormwater systems.

The Dillon report found that the network of roadside ditches and swales running adjacent to roadways and property lines provides for the conveyance of nutrients to more valuable fish habitats downstream during periods of intermittent flow. It also provides habitat areas for terrestrial and avian wildlife. While
there are no significant watercourses running through the site, it is close to two watercourses of note. The first is North Cloverdale Stream, located on the southern boundary of East Clayton and draining into the Nickomekle basin. This is the most significant stream course in the area and the primary catchment for drainage from the southeastern portion of the community. The second is Homer Creek, with its headwaters at 194th Street (to the east of the site). This is of a lower classification and does not currently support young fish, although does supply significant food/nutrient value to downstream fish populations.

The riparian zones associated with these watercourses are essential components of a healthy aquatic environment, providing food, cover, shade, bank stability, and erosion control. Many of these areas are also important habitat areas for wildlife due to their relatively mature and diverse vegetation, and proximity to water.

A chief indicator of sustainability in any watershed, and specifically, in the proposal for East Clayton is the level of impervious surface area throughout the site. As imperviousness in a development increases (as a result of roads, driveways, parking lots, patios, etc.), so too does the amount of stormwater runoff. This increase in surface runoff has a number of negative effects on both adjacent natural systems and downstream fish populations (Scheuler, 1994). Maintaining these fragile systems requires both reductions in the amount of impervious surface area throughout any given development, together with the application of soil enhancement/conservation Best Management Practices in order to maximize the permeability of the ground surface.

Once covered by forests, peat bogs, and marsh lands, the East Clayton area functioned as a sponge, absorbing a large percentage of runoff and controlling discharge to sensitive aquatic systems. With recent suburbanization and forest clearing along the ridges and high areas, the integrity of these aquatic systems
has been altered and is increasingly threatened, resulting in ever lower base flows in upland
watercourses, and flooding, erosion, and land wasting along the slopes and in the lower floodplain areas.

4.3 SUMMARY

The primary purpose of this analysis has been to reveal potential cues that will inform the design of the
school ground in ways that meet the needs of all users of the proposed community of East Clayton and
that also conform to the sustainable policy framework provided by the East Clayton NCP. The site is
endowed with unique cultural, geographic and ecological features that can be used to strengthen its
anticipated role as the educational and ecological heart of this sustainable community.

The following provides a brief summary of the issues highlighted by this analysis.

- The presence of significant deciduous forest on the site illuminates opportunities for enhancing
  bio-diversity and in furnishing connective corridors to adjacent areas that would also support
  significant habitat.
- Cultural features such as the agricultural grid, the historic regional trail system, and large-lot
  subdivision pattern and their drainage channels, provide strong physical order to the site, and,
  significantly, inform the proposed social and ecological framework for East Clayton.
- While soil percolation capacity is relatively limited, deep-well infiltration systems that will store
  water until it can naturally seep into the soil, and the proposed wetland, provide a starting point
  for developing a surface water management strategy that is also supportive of educational and
  social objectives for the sites.
- Prominent views are accessible from the site along the northeastern edge (most significantly of
  Mount Baker and the Nicomekle river basin)
• Access alo to the proposed north-south greenway that runs the length of the community (via 70th Avenue and along a green swath that connects at mid-point along the eastern edge of the site).
• The siting of the schools on the proposed 70th Avenue greenway creates a unifying thread between the two school sites and between the surrounding community.

While a number of issues with respect to access, and location of infiltration devices are determined by the East Clayton NCP, there are extensive issues that remain unanswered. These include, building siting, public and natural area linkages, programming and detailed design of retention pond/wetland, programming and design of recreation/learning grounds, indoor-outdoor linkages, location and engineering of additional infiltration devices, delineating tree preservation areas, and identifying opportunities for habitat restoration and management. In addition, as mentioned in the introduction, issues of demographics and cultural characteristics are outside the scope of this analysis.

The following chapter presents the Design Brief. The Goal and objectives presented in the Brief are derived from a consideration of site characteristics together with the literature review presented in Chapter 2 and the Design Framework discussed in Chapter 3. The brief provides more specific direction for the development of a design strategy and program for the site.
CHAPTER 5 - DESIGN STRATEGIES AND PROGRAM

5.1 DESIGN GOAL

The primary goal of this design is to examine how, and through what means, educational and community-building opportunities can be enhanced on a school/park site located in the proposed sustainable community of East Clayton. It explores ways in which children construct knowledge of their world, through processes of direct interaction with, manipulation of, and reflection on their immediate environment. It proposes how the designed landscape of a schoolground can support these formative processes within the context of evolving attitudes and values concerning environmental education, community, and sustainability. A threefold framework based on the concepts of contextuality, constructiveness, and relational space addresses the sensori-motor, cognitive, and social facets of learning.

5.2 DESIGN STRATEGIES

The following section outlines the primary objectives and strategies proposed by the design within the threefold framework of Contextuality, Relational Space, and Constructiveness. Where appropriate, relevant school board or Provincial policy and/or literature will be cited to support the proposed strategies.
5.2.1 Contextuality

Primary Objective:

Buildings, their siting, and the landscape should express the innate qualities and natural phenomena contingent to the local and regional landscape.

Strategies:

1. Reflect Clayton’s rural settlement and agricultural history through an appropriate site design, program, and building configuration while responding (as much as possible) to proposed cultural changes.

The building chosen for the site is situated along the proposed 70th Avenue Greenway, facing the existing low density subdivision. Its siting and orientation respond to existing conditions (primarily the presence of the open field landscape on the upper west quadrant) and takes advantage of the slight slope and view eastwards by having the projecting classroom wings oriented in this direction. The floor plan allows maximum sunlight to penetrate all classrooms throughout the day with its projecting “wings” following the path of the sun. Its roof form and massing reflect a farm/rural vocabulary consistent with the existing character of the site and the historical context of the Clayton area. The building is clad in corrugated metal, wood beams and wood siding. The treatment of fenestration is intended to allow as much light as possible into interior common areas and to classrooms. The central entry and library spaces are transformed into an atrium space by glazing the centre roof form. Additional interior light is provided through clerestoreys and generous floor to ceiling windows on all classrooms.

Gardens, fields, and the forest comprise key aspects of the site program, all of which reflect the historical and cultural context of the site and surrounding community.
2. *Use the ecological and cultural artifacts of the site (i.e., surface drainage regime, forest blocks, property boundaries, movement patterns, materials) as a means of informing the site structure and program.*

The existing drainage system is maintained as a means of informing the site structure, as a tool for enriching curriculum, and as a way to convey runoff to the wetland at the south end of the site. The upper "cattail wetland" consists of a 5 meter wide linear wetland consisting of a 2 metre wide wet swale. Along the school frontage, this channel is lined with PVC material in order to ensure continuous moisture. Wetland vegetation typical of upland marsh and wetland areas (i.e., "cattails", "yellow water iris" *iris pseudacorus*, and "fox sedge" *Carex vulpioida*) serve as biofilters of runoff from the adjacent street system. As a component of the school ground and educational programming, this area provides opportunities for teaching about biological characteristics of wetlands and hydrological cycles.

The drainage channel runs along the east edge of the site and down its centre. This provides a natural edge to the rear play area of the school ground and serves as a reminder of the channel system which delineates the majority of properties and roadways throughout the area.

3. *Consider the most appropriate scale, materials, and forms for buildings and landscape, especially as they relate to adjacent residential areas.*

The material and massing of buildings throughout the site attempts to reflect those of existing residential area to the site's north (Aloha Estates) as well as those anticipated for the new community. The main school building, lower wetland classroom, forest studio, and park welcoming centre are constructed of materials from or of the site, are human in scale and, where appropriate, enrich the public realm of the street or park.
4. Maximize connections within the site and to the surrounding street and greenway system and thereby reinforce the site as an ecological and social heart within the community.

The site’s two primary entry points (to the school, and to the park) are oriented towards the 70th Avenue greenway and the east-west green link along the southeast edge of the site respectively. Along the north edge of the site, the 70th Avenue greenway connects eastward to a north-south linear park along the community’s east edge, as well as linking the site to Langley. The primary park entry connects to the east-west green swath located in the south half of the site, which also connects to the north-south linear park to the site’s east. The diagonal line of the greenway continues through the site and links to the street system on the opposite side of the park. The directness of the path, together with its strong diagonal are
informed in part by the cultural patterns of movement and trail development characteristic of the larger landscape structure.

5. Enhance the perception of natural phenomena that are contingent to the site (i.e., wind, light, vegetation) as a means of enriching experience and learning.

An emphasis on the relationship between forest, field, and water, is a primary feature of the site’s organization. The gently sloping upper field area contrasts with the skyward reaching forest blocks, a contrast that is heightened by the slice created by the drainage ditches and the placement of pathways along the site’s edges. The experience of these characteristics are emphasized by aligning pathways along the forest edge as well as through its centre. A gravel pathway traverses the forest edge, with the grand channel on one side, and the forest on the other. In addition, paths extend toward key vantage points from which the Nicomekle river basin (to the east and south) and Mount Baker and Cascade Mountains (to the east) can be viewed. The large knoll at the south-east edge of the school ground serves as both a vantage point and a play space for children.

A 1.5m berm frames the lower portion of the site. This elevated walkway serves to elevate pedestrians above the adjacent 68th Avenue roadway and, together with the linear wetland boardwalk, provides a means to circumnavigate around the periphery of the wetland. The berm is also reminiscent of the dykes
that are characteristic features of the agricultural lowlands and floodplains.

5.2.2 Constructiveness

Primary Objective:

Spaces should invite exploration, interaction, reflection and manipulation in order to facilitate constructive learning.

Strategies:

1. Use the site’s ecological infrastructure (i.e., water and forest) to organize the site, to support and enhance ecological relationships, and to provide a narrative frame for experiencing the site.

At one level, the general site structure represents a narrative of the surrounding regional landscape structure, with the dryer upland region dispersing and conveying water, and the lower region collecting and storing water. Varying types wetlands and aquatic environments are used to express the changing hydrological conditions throughout the site: from cattail wetland, to riparian forest meadow and vegetated swale (through the middle of the site), and finally to the lower channel and wetland. Each of these gradations attempt to communicate the changing ecological characteristics inherent to the larger landscape structure and to

The “grand channel” (looking south).

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provide enriching opportunities for learning about hydrology and riparian systems at a variety of different scales. At a more site specific level, spaces such as the pine mound and forest classroom serve as reminders of the original forest character of the area and to the cultural legacy of forestry throughout the lower mainland region.

2. **Design spaces that allow for creative interaction and manipulation of the environment.**

Fundamental to contemporary views of environmental education and constructivist educational theory is the concept of direct action and experience. It is believed that conditions that allow direct involvement and manipulation to take place foster an awareness of one’s actions upon and within a larger context. When built into a curriculum that integrates the entire environment, learning takes place through a series of positive feedback loops wherein one’s actions lead to positive consequences, which subsequently feed into further actions.

The school ground includes several features that support such a learning program. These include:

The **construction zone**, located to the southwest of the school building and accessed via the intermediate play area off the gymnasium. This area is partially enclosed by a berm and woody groundcover, which both delineate the access path leading along the school’s south edge. A small shed, gravel surface area, area for wood storage and a kiln provide a location for creative manipulation of materials. Projects built by students could be displayed inside or throughout the exterior schoolyard and park. Indeed, built elements such as the tree house (located on the great knoll at the southeast corner of the schoolyard) and elements such as the bird screen, and willow wiers, could be constructed by students and could change incrementally throughout the life of the school.
The gardening areas (located off the southeast wing adjacent to the solar aquatics facility, and along the north edge of the school property line) are areas where children can tend to their own plots. The area adjacent to the solar aquatics facility could accommodate teaching plots, with a focus on sedges, grasses and other vegetation used for biofiltration. This area could also serve as a final treatment area for the solar aquatics process. Here, beds of crushed gravel, brick and stone would be arranged among beds of wetland grasses and sedges and provide a final phase of filtration before cleansed water is released into the central channel on its way to the lower wetland area.

The temporal garden is an area located at the north east of the site, where the utility right-of-way cuts across the east edge of the site. As a means of providing an area for community interaction and communication with the school, this corner would furnish an area for the display of projects done by the students themselves, as well as public art and gardening projects by members of the community. Rather than portraying a fixed representation of the community or school, this corner would become a dynamic and constantly changing expression of those inhabiting the school and surrounding community.

3. Emphasize the temporal aspects of the site (i.e., seasonal change, diurnal variation, water cycle and flow, deposition and accumulation).

Vegetation is chosen to emphasize the local landscape qualities and to heighten changes throughout the year. An example of this is found at the primary entrance to the school. Here, existing maple trees line the entry path, which has a border of seasonal grasses and evergreen ground cover. Throughout the season, the colors of the vegetation maintain the existing palette of greens, greys and oranges.

The grand channel which defines the previous property line down the centre of the site, is proposed as a location where children can see the processes of change and stream morphology over time. With an
average slope of 3.5%, the straight channel is designed with a series of weirs (constructed of willow branches taken from the site and bound with chicken wire), in order to provide areas of settling and oxygenation, and to reduce bank erosion. Over time, it is anticipated that these weirs would also collect debris and sediment on their north sides, a process that would result in a gradual build-up of land. Gradually, the willow weirs would decompose and become part of this debris/sedimentation process. Ultimately, the change in landform brought about by the accumulation of sediment would result in a natural change in the morphology of the channel, from a predominantly straight course to one that is more natural and “stream like.”

4. Preserve significant aspects of the site (i.e., forest, building foundations) as a means of enriching programming opportunities, to provide tangible reminders of the site’s evolving history, and to reinforce its instructional role within the community.

A primary feature of the educational landscape is the forest block in the northeastern quadrant of the site. This area provides a rich and diverse habitat for mammals, birds, and insects, and is recognized as meeting both ecological and educational goals. In order to maximize its value, however, certain areas would be selectively cleared, in order to allow the pioneer forest to flourish and to provide the requisite light and air to understory species (such as young conifers).

As a way of balancing use and preservation, four small interventions are planned to take place along the forest edge and are accessed via a 1.5 m gravel path. Conceived as events that could take place as individual moments within a child’s exploration of the forest during recess or after school, or as part of the planned curriculum, these spaces articulate certain aspects of the forest character (e.g., canopy, transparency, depth, and enclosure). These events include:
a. The **Forest Studio**. Located to the southeast of the school building, this 75 m² (800 sq. ft.) one-room studio is intended to provide break-away space for classroom instruction in all areas of the curriculum. Comprised of a wooden slab floor with glass-paneled "awning walls" (that open outwards), a storage this space would be ideal for teaching art, music, movement, or primary grade physical education (which might require less floor space than intermediate grades). The glass walls are covered with a protective web of PVC tubing which also provide a visual reference to the branches of surrounding trees.

![Forest Studio](image)

b. The **Clearing**. Here, an enclosed sand pit is situated in a clearing to the north of the forest block. While separated by the channel to its north, the clearing is still visible through the young forest, thereby allowing surveillance during school hours. The pit is furnished with large boulders, found beneath the first layers of soil during excavation, as well as an area of PVC drainage pipes. These two interventions – the pipes and the boulders – provide myriad opportunities for exploratory play and would furnish sensory-motor, social, and cognitive development. For example, the varying sizes of the boulders could challenge a variety of ages during a game of tag. While too large to move for an individual, the rocks could be manipulated and moved among a group of children,
depending upon the degree of social organization. Finally, a child could monitor his/her height using the height of the vertical pipes as a gauge.

The Clearing

The Soil Lab. Located in the thickest part of the forest, the soil lab is an small interactive space where children can study the properties of soil directly through physical manipulation and observation. Articulating entry into this space is a soil wall, constructed of two panes of Plexiglas, separated by 5 inches in which the various soil profiles found in situ are layered. The wall could be emptied and filled with different soil...
profiles characteristic of different regional landscapes. As, the transparent wall allows one to experience the qualities of soil directly through observation and interaction, using water and air as simple modifiers. Adjacent to the wall is the soil pit, a hole dug approximately 1m deep into the earth. Here, students are able to study – first hand – the physical and organic properties of soil. The materials remaining from the selective clearing of the forest (i.e., raw logs) are used to support the pit and to provide areas of seating for small classroom instruction.

d. **The Tower:** At the far southwest edge of the forest is the tower. This 12m high structure is sited to take advantage of the increasing slope along this edge and is oriented towards the view shed along 194th Avenue (which affords spectacular views to the agricultural lowlands). The platform of the tower would be fit with wind direction and velocity gauges, in addition to precipitation and humidity measuring devices so that students of the school and park users alike could explore ways of understanding the weather patterns of the site and surrounding region.
5. Reveal the method of craft and construction in buildings and spaces as a means of reinforcing connections between people and their environment.

Other structures placed in the landscape include the bird screen and wetland classroom (located on the north and south sides of the lower wetland/pond respectively). These would be constructed with wood remaining from the clearing of this portion of the site. The bird screen is constructed to fit seamlessly into the surrounding landscape. Trunks from cleared birch and alder trees are arranged in a half-circle, which would enclose a 6m$^2$ space. Openings of various sizes allow viewing from a variety of positions/heights to various points around the screens periphery. Bird houses project from the screen’s sides, mimick the branches upon which birds once perched and emphasize the “constructedness” of the screen.

The wetland classroom is an approximately 50m$^2$ (530 sq. ft.) structure that is intended to accommodate classroom activity and passive use by both school and park users. Consisting of a covered area featuring a layered overhead plane, and exterior platform, the structure and material of the classroom suggests the tectonics of a tree. Storage boxes, bird houses, and a variety of seating and observation areas allow for a
diversity of learning and experiential moments to occur here. The wetland itself is comprised of a pond of approximately 2000m$^2$ with a centre depth of approximately 1.5m and a shelf width of 6m (at a depth of .5 - .75m). Vegetation is chosen to be suitable to permanently wet conditions and to provide appropriate screening and surveillance around the shelf areas.

6. *Reduce energy and reveal the cycles of waste and reuse through the use of recycled materials and sustainable technologies; this will allow children and adults to consider the consequences of their actions and to reveal their relationship to a larger context.*

The placement of a solar aquatics facility within the structure of the school building provides a demonstration of innovative waste reuse technology, which might influence future larger-scale applications throughout the community.

5.2.3 *Relational Space*

**Primary Objective:**

*Support the vision of East Clayton by designing civic and educational spaces that invigorate the public realm, that foster education and stewardship throughout the community, and that enhance social wellbeing.*

**Strategies:**

1. *Propose a school building type appropriate for a community for between 350 and 500 students that:*
   - reflects contemporary attitudes towards learning by linking program areas, age groups and inside/outside arrangement of spaces in appropriate ways;
• provides maximum opportunities for direct access to the outdoors, especially for younger ages;
• minimizes its ecological impact through reductions in energy inputs and outputs through the use of sensitive materials, passive solar gain, water retention and reuse, etc.; and
• invigorates the public realm, provides identity and communicates its important civic and instructional role to the surrounding community.

The school building chosen for the site is a modified plan of H.V. Humphries school, designed by Graham Matheson Architects (1992) for a site in Kaslo, British Columbia. For the purposes of this project, the plan, designed to accommodate 650 elementary and junior high students has been modified to fit the programming needs of 350 elementary school children. Additional space for community use was also considered in the modifications.

The chart below provides a summary of the spatial program of the school building.

<table>
<thead>
<tr>
<th>EAST CLAYTON SCHOOL PHYSICAL PROGRAM</th>
<th>metres²</th>
<th>square ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching spaces</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindergarten</td>
<td>92.9</td>
<td>1,000</td>
</tr>
<tr>
<td>Classrooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>primary (7) @ 75m² (525 sq. ft.)</td>
<td>525</td>
<td>5,651</td>
</tr>
<tr>
<td>intermediate (10) @ 75m² (800 sq. ft.)</td>
<td>743</td>
<td>8,000</td>
</tr>
<tr>
<td><strong>Special Functions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-purpose</td>
<td>116</td>
<td>1,250</td>
</tr>
<tr>
<td>Stage</td>
<td>139.55</td>
<td>1,500</td>
</tr>
<tr>
<td>Library/Resource Centre</td>
<td>139.55</td>
<td>1,500</td>
</tr>
<tr>
<td>Computer Room</td>
<td>40.87</td>
<td>440</td>
</tr>
<tr>
<td>Special Education</td>
<td>40.87</td>
<td>440</td>
</tr>
<tr>
<td>Graphic Arts</td>
<td>40.87</td>
<td>440</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>641</td>
<td>4,500</td>
</tr>
<tr>
<td>Greenhouse</td>
<td>92.9</td>
<td>1,000</td>
</tr>
<tr>
<td>Solar Aquatics</td>
<td>78</td>
<td>800</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General office</td>
<td>52.5</td>
<td>560</td>
</tr>
<tr>
<td>principle's office</td>
<td>17.6</td>
<td>190</td>
</tr>
<tr>
<td>teachers' lounge</td>
<td>32.5</td>
<td>350</td>
</tr>
<tr>
<td>staff washrooms</td>
<td>22.3</td>
<td>240</td>
</tr>
<tr>
<td><strong>Services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cafeteria/Lunch room</td>
<td>255.4</td>
<td>2,750</td>
</tr>
<tr>
<td>Kitchen &amp; receiving</td>
<td>66.7</td>
<td>750</td>
</tr>
<tr>
<td>Gym storage</td>
<td>72.5</td>
<td>780</td>
</tr>
<tr>
<td>Changing rooms/showers/lockers</td>
<td>111.4</td>
<td>1,200</td>
</tr>
<tr>
<td>Washrooms</td>
<td>111.4</td>
<td>1,200</td>
</tr>
<tr>
<td>Storage</td>
<td>92.9</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>TOTAL AREA</strong></td>
<td>3,303.07</td>
<td>35,541</td>
</tr>
</tbody>
</table>

Gravel Parking area 20 spaces
Consider the outdoor landscape an extension of indoor classrooms and provide learning opportunities in a wide variety of curricular areas and for the entire community; make the traces of learning evident everywhere and in ways that support the ecological and social function of the site and surrounding landscape; integrate teaching spaces into the fabric of the park and provide for shared use during non-school hours and thereby increase visual surveillance, safety and security.

Matheson's design for the school building provided considerable access to the outdoors through common egress off interior corridors. This proposal added individual access points off classrooms from the front and east wing of the school in order to create outdoor teaching areas. For example, the outdoor classroom areas along the north side of the school consist of approximately 12m² gravel areas that are accessed directly from the classrooms. These areas can accommodate small outdoor group activities and their adjacency to the cattail wetland allows for integration with classroom activities. Here, children can measure their height in comparison with the growing cattails; seasonal changes can be studied; and First Nations cultures and practices can be understood through the harvesting and use of natural materials.
The chart below summarizes the outdoor program of the school ground.

<table>
<thead>
<tr>
<th>EAST CLAYTON SCHOOL OUTDOOR PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>wetland classroom</td>
</tr>
<tr>
<td>covered play areas</td>
</tr>
<tr>
<td>intermediate play area</td>
</tr>
<tr>
<td>primary play area</td>
</tr>
<tr>
<td>pine mound</td>
</tr>
<tr>
<td>construction zone</td>
</tr>
<tr>
<td>outdoor stage</td>
</tr>
<tr>
<td>outdoor classrooms</td>
</tr>
<tr>
<td>experimental garden</td>
</tr>
<tr>
<td>children's vegetable garden</td>
</tr>
<tr>
<td>meadow</td>
</tr>
<tr>
<td>sensory circle</td>
</tr>
<tr>
<td>learning forest with interventions</td>
</tr>
<tr>
<td>forest classroom/studio</td>
</tr>
<tr>
<td>soccer field</td>
</tr>
<tr>
<td>basketball/hockey court</td>
</tr>
<tr>
<td>perimeter and interior circulation paths</td>
</tr>
</tbody>
</table>

The enterprises of teaching and learning are not isolated to the school ground. Rather, the entire school/park landscape is considered grounds for learning. The outdoor classroom situated at the south edge of the wetland is a place for learning about constructed and natural biological systems; the forest becomes the location for learning about soil, habitat, foraging, and nesting, and becomes a living backdrop for contemplating the beauty in its form and its manifold organisms.

3. Layer ecological, recreational and social uses as a means of communicating the multiple functions of the site, of building efficiency, and creating enriching areas for activity and learning.

Existing soil conditions on and surrounding the site require an approximate are of 2650m² be used for retention/wetland area on the site. Assuming that the need for this area will be lessened by the upper wetland area and channel system, the lower wetland area has been reduced marginally by 600m² (the total area of upper wetland area and channel system), leaving an area of approximately 2000m². The maximum centre depth of the wetland is 1.5m (comprising a total of 1/3 the total area) with shallow peripheral shelves that are planted with dense sedges, grasses and willows, which serve as a barrier.
In addition to the wetland, the ball diamond to its north doubles as a retention basin for the 100 year storm. It is anticipated that this area is infrequently flooded; therefore as much as possible, existing vegetation (i.e., older conifers, deciduous trees) is maintained around the field’s edge and supplemented by vegetation that is tolerant of such conditions.

The chart below summarizes the park program.

<table>
<thead>
<tr>
<th>EAST CLAYTON PARK PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseball diamond (65m X 65m)</td>
</tr>
<tr>
<td>wetland area of 2658m² with an average depth of 1.5 metre and an additional 3895m² for the 100 year storm</td>
</tr>
<tr>
<td>park maintenance building/ information / washrooms building</td>
</tr>
<tr>
<td>parking (20 spaces, permeable paving)</td>
</tr>
<tr>
<td>1.5 perimeter paths (including wooden boardwalks over wetland)</td>
</tr>
<tr>
<td>3.5 metre multi-user path for service vehicles, bicycles, pedestrians</td>
</tr>
<tr>
<td>remote classroom/wetland</td>
</tr>
<tr>
<td>tennis courts (2)</td>
</tr>
<tr>
<td>great lawn/frisbee field</td>
</tr>
<tr>
<td>bicycle racks</td>
</tr>
<tr>
<td>tot lot</td>
</tr>
</tbody>
</table>

4. Use the edges of the site to reinforce and enliven the street while welcoming users. At the same time, allow interior spaces to be soft, embracing and facilitate a variety of movement and activity patterns throughout the site.

The edges of the site are considered integral features of the design; they distill the site’s program and structure to the surrounding community, and serve as a critical link between the private domain of surrounding residences and the community public realm. As mentioned earlier, the school’s primary orientation along the 70th Avenue Greenway reinforces this street as a central, integrating feature of the community. The primary park entry along 194th Avenue is announced by a raised crosswalk, which connects to the east side of the street and to a green pedestrian corridor eastwards. For this entry, a monumental expression is denied in favor of a 4.5m wide gravel pathway, lined with vertical wood posts, which narrows to a 3.5m walkway that extends diagonally through the park. This pathway intersects the
2m gravel path (aligned north-south), which connects the forest to the wetland. The pathway, partially covered by forest canopy, is also articulated with 3m galvanized steel arbors, which are aligned to direct views to various vantage points (i.e., wetland, great lawn, view to lowlands). A grass berm (1.5m X 12m) surrounds the south edge of the wetland, which accommodates a 1.5m gravel path from which to view the park and street. The gravel pathway is defined by the canopy of ash trees, which are planted along its edges.

Axonometric of primary park entry (194th Ave.)


City of Surrey School District No. 36. "Site Layout and Design Guidelines for the Planning of School/Neighbourhood Park Sites Jointly Operated by the City of Surrey and School District No. 36." City of Surrey.


Province of British Columbia Ministry of Education (b). "Grades K to 3 – Curriculum Handbook for Parents; Grades 4 to 7 – Curriculum Handbook for Parents."


## APPENDIX 1: DRAWINGS AND GRAPHICS

| D1  | DESIGN CONCEPT                  |
| D2  | SITE ANALYSIS                   |
| D3  | DESIGN FRAMEWORK: CONSTRUCTIVENESS |
| D4  | DESIGN FRAMEWORK: CONTEXTUALITY |
| D5  | DESIGN FRAMEWORK: RELATIONAL SPACE |
| D6  | MASTER PLAN                     |
| D7  | SITE SECTIONS                    |
| D8  | UPPER WETLAND DETAILS           |
| D9  | SPATIAL RELATIONS                |
| D10 | LOWER WETLAND DETAIL            |
| D11 | SITE SKETCHES                   |
This thesis examines how, and through what means, educational and community-building opportunities can be enhanced on a school/park site located in the proposed sustainable community of East Clayton. It explores ways in which children construct knowledge of their world, through processes of direct interaction with, manipulation of, and reflection on their immediate environment. It proposes how the designed landscape of a schoolground can support these formative processes within the context of evolving attitudes and values concerning environmental education, community, and sustainability.

A threefold framework based on the concepts of contextuality, constructiveness, and relational space addresses the sensorimotor, cognitive, and social facets of learning.
the site

The site's position on higher ground is critical to the ways in which it functions, ecologically, in relation to the lower lying landscape. This design distills three primary features of the site: the patterns of cultural use over time—primarily that of movement, forestry, and agriculture; the relationship of water to the larger local regional landscape; and its future vision as a cultural and ecological nexus for the newly planned community of East Clayton.

trails, forestry and rural settlement

East Clayton is positioned on a highland area defined by three distinct edge conditions—primarily various uses of water, road, and vegetation corridors—each of which contribute to a diverse landscape structure. Influenced by the hill/marshy/ridge landscape, original settlement was influenced by the placement of a trail system, diagonally along the ridges, and through the valley floor, thereby connecting New Westminster and Vancouver to the east.

The site has experienced varying levels of deforestation over time (shown at left). The resulting relationship between human settlement and the ecological underlay is a primary feature of the landscape. Vegetation on the site consists primarily of clusters of pioneer forest dominated by red alder, paper birch, black cottonwood and big leaf maple, with conifers occurring as individuals or in small clusters. Thimbleberry, huckleberry and net over dogwood are commonly intermixed among field grasses. Gently-sloping upper hills contrast with the steeply climbing forested ridges, a contrast heightened by the linear size of the drainage ditches, fences and pathways along the site's edges.

ecological infrastructure

The relationship of high to low ground together with the physical structure of the soil on the site, necessitates careful consideration of the site's organization and hydrological function. The site is located on a southeasterly direction towards the Logan Creek Headwaters, and, due to a relatively dense substrate, water will not infiltrate directly to the aquifer, but rather, will be stored in surface water management facilities that will store water until it can naturally seep into the soil. While soil percolation capacity is relatively limited, deep well infiltration systems that will store water until it can naturally seep into the soil, and the proposed wetland, provide a starting point for developing a functional and social framework for the site.

summary

1. The presence of significant deciduous forest on the site illuminates opportunities for enhancing bio-diversity and in furnishing connective corridors to adjacent areas that would also support significant habitat.
2. Cultural features such as the agricultural grid, the historic regional trail system, and large lot subdivision pattern and their drainage channels, provide strong physical order to the site, and, significantly, inform the proposed social and ecological framework for East Clayton.
3. Prominent views are accessible from the site along the north-south greenway at the eastern edge, providing strong physical order to the site, and, significantly, inform the proposed social and ecological framework for East Clayton.
4. Access to the proposed north-south greenway that runs the length of the community and along the 70th Avenue greenway will also connect, almost seamlessly, to a north-south corridor of natural areas to its north and south, as well as to adjacent natural and riparian areas.
**Definition**

The dual concepts of praxis (doing) and paths (being done to) are central to a constructivist view of knowledge. Rooted in the experiential education of John Dewey and the educational psychology of Jean Piaget, constructivists believe in the relationship between direct experience and knowing. Direct experience amounts to a transaction that takes place between an individual and whatever constitutes his or her environment at a given time. Learning takes place when there is continuity between reflection on an experience and future actions in response to a previous action. To the social constructivist, learning involves the interaction of meaningful concepts within a student's conceptual framework, where conceptual frameworks are taken to mean the cluster of beliefs, values, emotions, and assumptions which students have developed in the process of understanding the world and which they bring to any learning process. The implications of this process result from a constructivist epistemology revolve around how both individual and societal methods and the physical environment assist in facilitating transformation, or a conceptual change.

**Precedents**

Constructive spaces allow students to think about, interact with, and manipulate the environment (Edwards 1998, 76). Constructive spaces serve to provide evidence of one's existence in the world, supplying a means for understanding the path of one's learning and the organization of their experience, knowledge, and the meaning of one's relationship with others (Rinaldi, 1988). The techniques of narrative and metaphor are often used to describe such spaces as narratives are one way in which children establish a collective link to events, memories, and experiences, and thereby construct a frame for understanding their world in a given time and place. Constructive spaces are designed to provide a context for a child to negotiate the ongoing processes of encounter, interaction, and consequences of a constantly changing natural environment that reflects human attempts to understand and represent it (Pratt and Kavaler 1998, 7).

**Reflection**

Sweet Farm, a private estate in rural Quebec, is a narrative composition consisting of site-sensitive interventions designed to reflect the different landscape types that characterized the site. The interventions provide a means to interpret the various layers of meaning held by the site, allowing the visitor a means to construct a variety of experiences and narratives for herself. Shown above are the woven walls, which consist of branches that are to be fixed horizontally through posts mounted vertically in the ground. The wall is in progress, to be constructed by passersby. The woven branches are intended to close off views into the forest and thereby emphasize the relationship between sky and earth while also increasing the dramatic experience thereby. The woven walls are intended to enhance exploration of the site and which they bring to any learning process. The implications of this process result from a constructivist epistemology revolve around how both individual and societal methods and the physical environment assist in facilitating transformation, or a conceptual change.

**Goal**

Spaces should invite exploration, interaction, reflection, and manipulation in order to facilitate constructive learning.

**Strategies**

1. Use the ecological infrastructure (i.e., water and forest) to organize the site in order to support and enhance ecological relationships and to provide a narrative frame for experiencing the site.
2. Design spaces that allow for creative interaction and manipulation of the environment.
3. Emphasize the temporal aspects of the site (i.e., seasonal change, diurnal variation, water cycle and flow, deposition and accretion).
4. Preserve significant aspects of the site (i.e., forest, building foundations.) as a means of engraving programming remnants of the site's evolving history, and to reinforce its instructional role within the community.
5. Reveal the method of craft and construction in buildings and spaces as a means of reinforcing connections between people and their environment.
6. Reduce energy and reveal the cycles of waste and reuse through the use of recycled materials and sustainable technologies; this will allow children and adults to consider the consequences of their actions and to reveal their relationship ship to a larger context.
Contextuality

definition
Contextuality refers to design that is sensitive to the physical, social, historical and cultural setting of a site. Contextual design exposes site-specific qualities of a landscape, uncovering its "potential" from "what already exists in situ" (Girod 1999: 81).

The child-environment relationship, as realized through outdoor play, can be seen as the quest for defining the genius loci. Through successive modes of play experiences and interactions, and as new places are continuously discovered in depth, a layering of meaning accrues, one of affiliation with a place, an affiliation variously referred to as "topophilia" (Yi-Fu 1977), "rootedness" (Lynch 1972) and "placelessness" (Relph 1974). Contextuality celebrates the idiosyncratic environmental and cultural languages of local and regional landscapes, and when applied to the landscape of the community school, can forge real connections between students, the larger community, and their environment.

precedents
Contextual approaches look for a direct connection between experience and the landscape. Within the context of a school environment, contextual design can provide evidence of certain inherent characteristics of a site's history (i.e., geological weathering, flooding, settlement patterns); it can also highlight a site's ephemeral aspects (such as wind patterns, diurnal and seasonal variations, auditory qualities and patterns).

The 3300 sq. ft Strawberryvale school is located south of an existing school and beside a gary oak woodland which forms the edge of a small park. The school's sensitive siting, materiality, site-specific programming, and circulation program work to forge a unique identity for the school while also contributing to an instructional role within the larger community. Pods of classrooms are interlinked along a single corridor and building foundations follow closely the contours of the rocky site. The sitting bowl of the program were intended from the beginning to integrate the hydrology and biodiversity of the site into the teaching curriculum. Rainwater from the new building's surfaces is collected and directed along a watertable into a constructed marsh for natural filtering.

The 8000 sq. ft site accommodates multidisciplinary mixing of three age groups (infant/toddler, preschool, and kindergarten; and elementary school age). One of the key features of the design is a reified channel, which forms a unifying element for the three spaces within the site, and during different seasons, provides a means for understanding changing hydrological cycles. The placement of field stones provides evidence of the area's agricultural heritage and provide places for sitting and for creative play. The gently sloping topography of the site reflects the larger Iowa landscape and is foregrounded in the design through the placement of play structures directly onto or into the landforms themselves. In this way, children can experience the undulating contours of the site as well as more subtle changes in topography while also positively registering a more sub-conscious connection to the larger regional landscape.

Located on the former site of an iron and steel plant in Duisburg-Meiderich, Duisburg-Nord was designed as "the park of the 21st Century" and as a counter-response to the 19th century landscape park. The master plan was conceived as one facet in a larger open space scheme to reanimate the region in the wake of the industrial decline of the 1960s and 70s. Rather than removing the abandoned vestiges of its industrial past, the master plan (based on a four-fold layering of architectural, ecological, circulatory, and spatial elements) celebrates its industrial heritage. Latz's contextual approach is rooted in his consideration of the site's ecology. A series of gardens and open spaces are conceived for contemplating and engaging between human and natural aspects of the site's past and evolution.

The Iowa State University Childcare Centre

The 8000 sq. ft site accommodates 56 children divided into three age groups: (infant/toddler, preschool, and kindergarten; and elementary school age). One of the key features of the design is a reified channel, which forms a unifying element for the three spaces within the site, and during different seasons, provides a means for understanding changing hydrological cycles. The placement of field stones provides evidence of the area's agricultural heritage and provide places for sitting and for creative play. The gently sloping topography of the site reflects the larger Iowa landscape and is foregrounded in the design through the placement of play structures directly onto or into the landforms themselves. In this way, children can experience the undulating contours of the site as well as more subtle changes in topography while also positively registering a more sub-conscious connection to the larger regional landscape.

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Strategy

1. Reflect Clayton's rural settlement and agricultural history through an appropriate site design, program, and building configuration while responding (as much as possible) to proposed cultural changes.

2. Use the ecological and cultural artifacts of the site (i.e., surface drainage regime, forest blocks, property boundaries, movement patterns, materiality) as a means of informing the site structure and program.

3. Consider the most appropriate scale, materials, and forms for buildings and landscape, especially as they relate to adjacent residential areas.

4. Maximize connections within the site and to the surrounding street and greenway system and thereby reinforce the site as an ecological and social heart within the community.

5. Enhance the perception of natural phenomena that are contingent to the site (i.e., wind, light, vegetation) as a means of enriching experience and learning.

6. Recognize the position of the site in relation to the surrounding regional landscape.

"...the dream of cities rooted in their landscapes, cities where you and the shape of a hill; where the landscape feeds the identity of nature, beyond the line of water and the cycle of the seasons..."

—Cleaveland 1989

"Strawberryvale school, saanich
public architecture

Iowa State University Childcare Centre

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definition

The concept of relational space refers to design that accommodates the social dimensions of the environment. Both the school and park should be instructive, both to the community it surrounds, and to the students at citizens who use it. This notion relates to both the quality of individual spaces and their relationship to the whole.

Spaces for children should "read" in their dimensions, scale, complexity and order, as though they are for children. From the quality of both the indoor and outdoor spaces, and the links between the two "we can learn more about the value and meaning of the relationship among the children and adults who spend time there" (Edwards et al. 1998, 162). Schools and their environments should serve "as cultural filters for contemporary values and relations, acting as the "essence and distillation of the society" (Branzi 1998). Similar to the idea of constructive space, relational spaces can facilitate constant exploration, discovery and exchange among people and create many networks of connections among people and things (Edwards et al. 1983). This requires a variety of environments of different scales and spatial qualities both to accommodate different age groups and developmental stages, but also to furnish a variety of learning activities.

precedents

School spaces: From larger common spaces, enclosed courtyards, and piazzas for gathering, to more secluded spaces for smaller group collaboration or individual activity, spaces must be diversified, stimulating and welcoming and allow for spontaneous and planned activities as well as for privacy and pause from the general rhythms of the school.

Civic space: The outdoor environment must also enrich the health and the well-being of its users. This relates to the quality of the environment (i.e., lighting, air, water, acoustics), and to the ability of the environment to accommodate a rich diversity of human activity, and thereby facilitate the types of social and civic exchanges that are considered important to the formation of individual and group identity.

The Infant Garden (above) was designed by landscape architect Susan Herrington in 1994 for ten infants enrolled in the Child and Family Study Centre at the University of California, Davis. Reflecting an acute sensitivity to the California regional landscape and the various biotic and abiotic communities inhabiting the site, the design is comprised of three central elements - the raised grass ring, the pine circle and the plant maze. Each of the spaces is unique in identity and provides a variety of opportunities for group and individual learning and spontaneous exploration; together, they read as a unified whole and connect in form and function to the interior spaces of the classroom that surround them.

goal

Support the vision of East Clayton by designing civic and educational spaces that invigorate the public realm, foster education and stewardship throughout the community, and enhance social wellbeing.

strategies

1. Propose a school building type appropriate for a community for between 350 and 500 students that:
   - reflects contemporary attitudes towards learning by linking program areas, age groups and inside/outside arrangement of spaces in appropriate ways;
   - provides maximum opportunities for direct access to the outdoors, especially for younger ages;
   - minimizes its ecological impact through reductions in energy inputs and outputs through the use of sensitive materials, passive solar gain, water retention and reuse, etc. and
   - incorporates the public realm, provides identity and communicates its important civic and social role to the surrounding community.

2. Consider the outdoor landscape an extension of indoor classrooms and provide learning opportunities in a wide variety of curricular areas and for the entire community; make the traces of learning evident everywhere and in ways that support the ecological and social function of the site and surrounding landscape; integrate learning spaces into the fabric of the park and provide for shared use during non-school hours and thereby increase visual surveillance, safety and security.

3. Layer ecological, recreational and social uses in a manner that provides maximum opportunities for group and individual learning and spontaneous exploration; together, they read as a unified whole and connect in form and function to the interior spaces of the classroom that surround them.

4. Use the edges of the site to reinforce and enliven the street while welcoming users. At the same time, allow interior spaces to be soft, embracing and facilitate a variety of movement and activity patterns throughout the site.

5. Use the landscape structure to create engaging spaces for civic use at a variety of scales and that reveal the dialogue between culture and nature.
A school building 3525 m²
B upper wetland
C parking (20 spaces)
D primary play
E woodland meadow
F vegetable garden
G temporal garden
H learning forest
I central channel
J lower wetland
K main park entry
L parking (22 spaces)
APPENDIX 2A: SPATIAL TYPOLOGY OF SCHOOL BUILDINGS

INTRODUCTION

This thesis has focussed primarily on the qualitative aspects of learning environments, with a focus on linking ecologically-grounded design to various ways in which children learn. The primary aim has been to illuminate ways to unite the design of school grounds with the learning needs of children in ways that also enhance ecological health.

It is recognized that a significant degree of formal learning occurs in the classroom and within the built fabric of the school. For this reason, the siting of the building, its internal arrangement of spaces and how these internal spaces relate to the outside fabric are of considerable importance. While it is beyond the scope of this thesis to provide a detailed exploration into the spatial, ecological, and symbolic aspects of school architecture, it is important to provide a framework of design languages and spatial typologies of school architecture in order to select the most appropriate building type for the two sites.

The formal language of school architecture has evolved concurrent to fluctuating social attitudes regarding education together with changes in pedagogical methods. By the end of the 19th century, the traditional one-room school house was no longer feasible to accommodate increased numbers of children. The early 20th century school consisted of a larger, more coherent plan, with bilateral symmetry and over-scaled entrances and monumental masses to anchor the building (Weisser 1992). However, during the 1930s and early 40s, early modernist architects began to challenge the emphasis on classical imagery and hierarchical forms, with Richard Neutra, in 1935, calling the “basic unit of education – the individual classroom” (Ibid). Within this new model, the classroom became an activity room, with clusters of classrooms serving as the basic organizing device. Desks were detached from the floor, teachers were removed from their platform and seated closer to students. Windows reached the floor and single-story rooms opened to outdoor spaces.

The 1960s and 70s witnessed the next most prevalent shift in school building design: the “open space” concept. Developed around the concept of “team teaching”, the open classroom offered space to be divided and subdivided as need demanded. While hailed as a revolution that would transform teaching methodology, the realities of maintaining classroom discipline, dealing with complex learning dynamics, and minimizing distractions, caused the open concept, in its purest form, to decline from use (Miller, 1992). Since the 1970s, a revaluation of school architecture resulted, in some cases, to a return to more traditional building types and in others, to a hybridization of spatial strategies.

The following provides a non-exhaustive list of basic formal types used for elementary and secondary schools used throughout North America. Its purpose is to illuminate the strengths and weaknesses of a particular type over another and to assist in choosing the most appropriate form type for each of the sites.

1. **The Corridor**

In this spatial type, classroom, administrative, common spaces are arranged along a central corridor. An essentially linear configuration, this type is clearly understood spatially and easily controllable. Classrooms can be lit easily with natural light and, since they can all have an outside wall, can have easy access to outdoor space.
Challenges include differentiating program elements, providing for a variety of spatial experiences, and accommodating change over the life of the building (Weisser, 11).

2. **The Cluster**

- One of the most flexible spatial types (derived from the open space concept). Classrooms are arranged in groups, or clusters, around a common area. This approach frequently incorporates open classrooms, where operable partitions allow the teachers to change the size and arrangement of teaching areas. The creation of common spaces together with classroom clusters gives the school a more intimate spatial quality and because each student affiliates with a group of classrooms, workrooms and/or common area they have the potential to gain a greater sense of identity.

- Economical due to the fact that multiple programming opportunities allow for shared resources and energy use, the density of classrooms can result in confusion. Therefore, circulation can be difficult for this type. More effective hybrids clusters form repeating modules and are accessed off a central corridor.

3. **Double Corridor**

- Provides economy and flexibility with an emphasis on interior space. Made up of continuous, enclosed areas, this type can be built quickly and can accommodate a variety of organizations.
- Typically, two parallel corridors give access to two program zones: 1) classrooms, library, administration; and 2) gymnasium, cafeteria, assembly, kitchen, lockers and kindergarten. Often the arrangement of classrooms is suggested by the linear corridor, wherein classrooms line the perimeter and parallel corridors create a central band for common and administrative uses.
- Often, cluster arrangement incorporate double corridor design to give formal order to the open space concept.
- Best used for harsh climates due to the interior focus of the building.
- Generally stand isolated from the landscape and do not include extensive outdoor spaces that relate to the interior of the building.
• Bulky massing and large scale make them difficult to integrate well into residential neighbourhoods and the depth of the structure make small scale fenestration and detailing difficult to achieve.
• Lighting of interior spaces also difficult but is often achieved with skylights, atrium spaces, and clerestory windows.

4. The Courtyard

• Based on more traditional building typology: related to the academic quadrant. Provides a central space, controlled play area, variety of color and light for adjacent corridors and classrooms. Particularly good in mild climates where circulation outside is possible throughout the year. Courtyard defined by the building that surrounds it, allows multiple programming and shielding from winds.
• Difficult to fit with central heating.

5. The Urban Block

• Usually built in response to constrained site and density found in urban areas. Often concentrates on the creation of exterior space, however, in the case of courtyards, are often not as landscaped as lower density courtyard buildings due to higher traffic and more constrained spaces.
Throughout this century, several distinct stylistic approaches to children’s architecture have evolved, each of which embody a range of theoretical attitudes about education and child development. These range from designing the “ideal children’s environment” as espoused by Rousseau, through the use of highly expressive and organic forms, or to those that are highly metaphoric and seek to instill fascination and fantasy in the physical environment. These approaches are countered by a less sentimentalized and romanticized view of childhood – a view that manifests in more overtly modernist forms.

In his discussion of kindergarten architecture, Mark Dudek identifies three basic theoretical attitudes: metaphorical, organic, and late modernist/neutral. While each of these relates to the above spatial typologies, in so far as each may use one or a combination of one of the above spatial types, this categorization focuses more on the expressive qualities of the architecture and how it’s subsequent formal organization communicates meaning to its inhabitants (Dudek, 1997: 69).

1. **Metaphor**

Metaphoric architecture uses analogy, expressive formal imagery, and narrative as a means of proposing the school as a microcosm of its larger surround. In doing so, this approach proposes a more mythic understanding of space relations, communicating the relationship of the individual child to the larger society of which he or she is part. The Frankfurt ‘Kita’ daycare, by architect Christoph Mackler, illustrates this principle, which is designed according to the metaphor of the school as a small town. This design consists of a series of gabled masses, representing individual houses, which are connected to the community square via a central corridor. Through the use of urban typologies, including street, square, alley, the design conveys the cosmic social order of the daycare as a microcosm of the larger community in which it is situated.

![Image of Sossenheim ‘Kita’ by Christoph Mackler](image)

**Sossenheim ‘Kita’, Christoph Mackler, Architect.**

2. **Organic**

In more radical concepts, the metaphor appeals to a child’s penchant for fantasy and anthropomorphism. The plan for a nursery school in Berlin, by architect Christoph Langhof, shows similarities to the ideas of Rudolf Steiner and his theories of anthroposophy. The curved form of the exterior wall is intended to create an “island for the children” (quoted in Dudek, 73), and opposes the rigid orthogonal grid of the city. At points where orthogonal forms break out of the curving forms, these suggest how the world of the child should not be separated from the exterior world (Ibid). Similarly, a number of projects of German architect, Peter Hubner, explore organic shapes (such as the spiral) as a means of providing
greater flexibility of programming as well as to relate more expressively to the earth upon which it is situated.

Critiques of purely metaphorically derived forms stem from their tendency to present a single, and often idealized, reading of childhood experience. Thus, buildings and spaces that are overtly expressive and fantasticistical can potentially limit the creative potential of their inhabitants to structure and manipulate space and environment in ways that foster greater cognitive, social and experiential learning. Additionally, as highly metaphoric architecture generally places nature in a highly reverent position, supporting the romantic vision of preserving the inherent “goodness” of a child by way of presenting an idealized, often anti-urban, version of reality (Dudek 76, 86).

School at Stuttgart-Stammheim, Peter Hubner, Architect.

3. Late Modernist/Contextual

In contrast to the above two categories, late modernism (also referred to as “neutral”) derives much of its form from the particularities of the site and to programmatic considerations, creating an architecture that is both “coherent and largely functional” (Dudek, 84). It is important to note that the term “neutral” is slightly misleading as any architecture will influence, to some way, one’s behaviour and one’s relationship to his/her environment. This is particularly true in environments designed for children, who are especially susceptible to the sensual and physical aspects of spaces. However, this approach – which can also be aligned with contemporary architecture that exemplifies a “critical regionalist” stance – more often detaches itself from overt metaphorical associations, opting instead to derive its formal and material expression from existing site qualities. Its spatial organization is developed through an understanding of the various localized events possible within the structural frame of the building.

Examples of this type (shown below) include the Lutzowstrasse Kinderagesstatte, Berlin, by architect Klaus Zilich and Jasper Halmann; Strawberry Vale School in Victoria, BC, by Patkau Architects Ltd. (see also Chapter 3, section 3.2 “Contextuality”); and Rogers Avenue School in Victoria, BC, by Roger Hughes Architects. In each of the examples, the buildings respond to the physical exigencies of the site as well as the more ephemeral and sensual aspects of each site (i.e., light, color, transparency). As a result the structures attain a unique identity within their suburban settings while also expressing the innate qualities of their situations (Dudek 176, MacDonald 1997, 32).
(1) Lutzowstrasse Kindertagesstätte, Berlin.

(2) Strawberry Vale School, Victoria, BC.

(3) Rogers Avenue School, Victoria, BC.
## APPENDIX 3: DEVELOPMENTAL MILESTONES – STAGES OF PHYSICAL/EMOTIONAL/COGNITIVE DEVELOPMENT

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| **PHYSICAL** | • Learns to skip;  
• Throws ball over head;  
• Catches bouncing ball;  
• Rides a tricycle skillfully, may show interest in riding a bicycle with training wheels;  
• Uses a fork a knife well cuts on a line with scissors  
• Hand domination is established. | • Skilled at using scissors and small tools;  
• Good sense of balance;  
• Ties shoelaces;  
• Enjoys copying designs and shapes, letters and numbers;  
• May have gawky awkward appearance from long arms and legs. | • Have increased body strength and hand dexterity;  
• Show improved coordination and reaction time;  
• May begin to grow rapidly at the end of this age period. |
| **Mental** | • Knows basic colors (red, yellow, orange, blue, green);  
• Able to memorize simple number sequences (address and phone number);  
• Understands that stories have a beginning, middle, and end; enjoys telling his own stories; understands that books are read from left to right, top to bottom;  
• Enjoys riddles and jokes.  
• Counts up to 10 objects;  
• Draws pictures that represent animals, people, and objects; sorts objects by size;  
• Is project minded – plans buildings, play scenarios, and drawings; interested in cause and effect. | • Enjoys planning and building;  
• May show a stronger interest in reading;  
• Increases problem-solving ability;  
• Has longer attention span;  
• Enjoys creating elaborate collections;  
• Shows ability to learn difference between left and right;  
• Can begin to understand time and the days of the week. | • Shows interest in reading fictional stories, magazines, and how-to project books;  
• May develop special interest in collection or hobbies;  
• Fantasizes and daydreams about the future;  
• Enjoys planning and organizing tasks;  
• Becomes more product and goal oriented;  
• Has great ideas and intentions, but has difficulty following through;  
• Enjoys games with more complex rules. |
| **Social/Emotional** | • Invents games with simple rules;  
• Organizes other children and toys for pretend play;  
• Sometimes confuses fantasy with reality;  
• Can be very bossy sometimes;  
• Likes to try new things and take risks;  
• Notices when another child is angry or sad – more sensitive to feelings of others;  
• Basic understanding of right and wrong;  
• Understands and respects rules – often asks permission;  
• Understands and enjoys both giving and receiving;  
• Enjoys collecting things;  
• Sometimes needs to get away and be alone. | • Being with friends becomes increasingly important;  
• Shows interest in rules and rituals;  
• Wants to play more with friends of same gender;  
• May have a “best friend and enemy;  
• Shows strong desire to perform well, do things right.  
• Beings to see things from another child’s point of view, but still very self-centred  
• Finds criticism or failure difficult to handle  
• Sees things as binary opposites (black/white; wrong/right/wonderful/terrible with very little middle ground).  
• Seeks a sense of security in groups, organized play and clubs. | • Begins to develop a sense of empathy for others’ weaknesses;  
• Often likes rituals, rules, secret codes, and made-up languages  
• Enjoys being a member of a club;  
• His increased interest in competitive sports;  
• May be little or defy adult authority;  
• Shows interest in opposite sex by teasing, joking, showing off;  
• Prefers spending more time with friends than with parents;  
• Tends to see things as right or wrong, with no room for difference of opinion. |