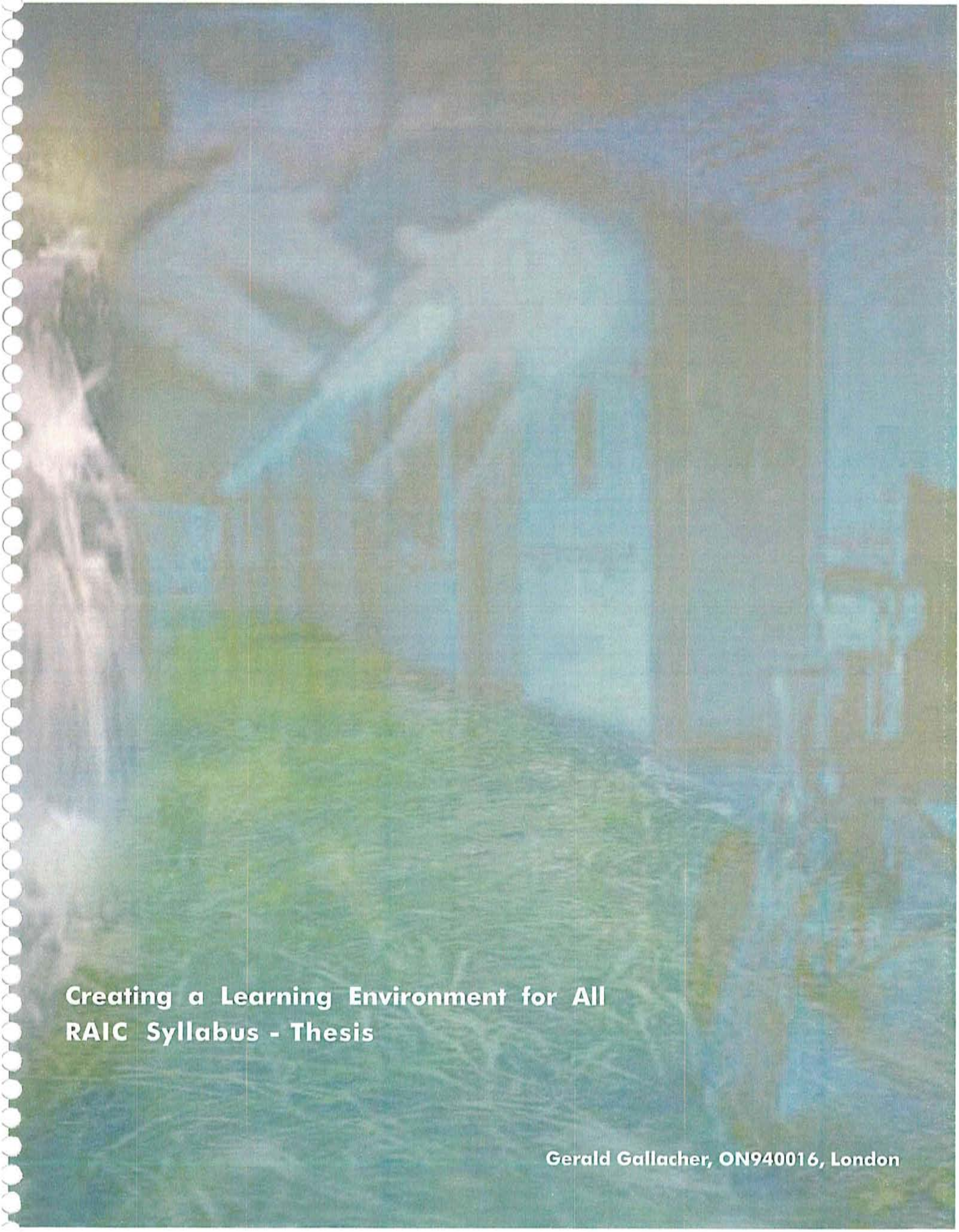

Creating a Learning Environment for All
RAIC Syllabus - Thesis

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Creating a Learning Environment for All

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Finally, Winston Churchill once said, "writing a long and substantial book is like having a friend and companion at your side, to whom you can always turn for comfort and amusement, and whose society becomes more attractive as a new and widening field of interest is lighted in the mind"

So to that end I would like to thank my family and especially my wife Nadine whose support, encouragement and most of all patience has been never ending through this entire process. In addition, I would like to thank Dawn Morrison and the entire London Chapter of students for all their help and support.

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ABSTRACT

Thesis Statement

The purpose of this thesis is to create a series of design principles to shape a new learning environment, which assists in the learning process, thereby enhancing the well-being of the child/student. The development of the design principles reconizes that children with special needs require unique consideration.

In order to generate the design principles, this thesis examines five areas of research;

- Understanding the Problem,
- Understanding Current Practise,
- Current Educational Theory,
- Environmental Perception,
- Precedent Studies.

The first area of research reviews the Ontario Ministry of Education's defined exceptionalities. The research provides an overall review of these complex issues, to develop a general understanding, of the difficulties experienced by these students.

The second area of research reviews the current practise for educating students with exceptionalities. Although these guidelines are not without flaw they do provide a basis for understanding the provisions necessary to create an enhnaced learning experience. From the study of these guidelines, it is clear that each case is unique and the solution provided is solely for that student. The current system of education delivery essentially occurs in three types of learning environments; the "regular" classroom in the student's home school, the special education classroom, or attendance at a special education school. The research concludes that these three learning environments provide adequate support to assist in the delivery of curriculum for exceptional. However, the design principles propose a new type of learning environment to match a new type of instruction for each of the current learning environments.

The third area of research examines current educational theories, which will benefit not only exceptional students, but all students. The studied

educational theories of Inclusion, Multiple Intelligences and Cooperative Learning will form the basis of design principles. These educational theories all promote positive development for children with disabilities. The creation of a positive learning environment for exceptional children will invariably benefit all children within the school community.

The first educational theory examined is Inclusion, which defines the ultimate goal for all children, regardless if they have an exceptionality, is to be included in the "regular" classroom. This is a shift from past theories of educating children with exceptionalities. In the past educators advocated separating the students and placing them in specialized classrooms or learning centres with intensive instruction dedicated to the individual needs of the student. To accept and include the student is an added benefit to all involved.

> *"The expectations of inclusive practices are that (a) the individual learning needs of all children will be met, (b) children with disabilities will develop the social skills that are necessary for successful peer relationships, and (c) meaningful social relationships with their typically developing peers will occur as familiarity increases (Lupart, 1998). Supporters of inclusion suggest accommodating to the needs of the child rather than forcing a child to "fit into" the classroom (Edmunds, 2000)"* [1]

As is demonstrated in the above quotation from Focus On.. a newsletter summarizing recent research as published by the Research Alliance for Children with Special Needs, it is in the best interest of the exceptional student to be educated in the "regular" classroom in the student's "home" school.

The second educational theory examines theories regarding intelligence and how individuals learn. This thesis investigates the recent research by Dr. Howard Gardner and the Project Zero Team at the Harvard Graduate School of Education. The Project Zero team has developed the theory of Multiple Intelligences, which suggests that people learn in different ways; there are nine defined types of intelligence.

- Linguistic, intelligence of the written or spoken word,
- Logical/Mathematical, intelligence of reasoning and numbers,
- Spatial, intelligence of images and pictures,

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[1] Specht, J., et al. Focus On, Volume 1 Issue 3.

- Musical, Intelligence of tone, rhythm, and timbre,
- Bodily/Kinaesthetic, intelligence of body and hands,
- Intrapersonal, intelligence of self-knowledge,
- Interpersonal, intelligence of social understanding,
- Naturalist, intelligence of the natural world, and
- Existential, intelligence of the supernatural.

The nine different intelligences will inform the development of design principles. The principles will define the environmental attributes to assist learning for each type of intelligence.

The third educational theory examined which provides a positive learning environment for children with exceptionalities is Cooperative Learning. This theory promotes learning in small groups and provides an origin for design principles to assist this method of learning.

In addition, to the educational theories an understanding of how exceptional children perceive the environment, both built form and the natural environment has shaped the development of the design principles in order to define a new positive learning environment. The research reviews noted environmental psychologists Thomas David and Carol Weinstien's design propositions and design function statements, which were developed in a belief that "*a systematic knowledge about children and their interaction with the built environment can be used to improve the design of children's settings.*" [2] These statements developed by David and Weinstien evoke optimistic feelings for the students assisted by the environment. In addition, the research reviews the natural environment and the positive effects of incorporating nature into the learning environment. The research reviews author Richard Louv's theory describing a need for children to interact with nature to promote positive development and good health as well as foster creativity.

The final area of research examined in this thesis is a review of precedents relevant to the proposed learning environments. The review included schools designed specifically for exceptional students or special education schools, resource classrooms for exceptional students, schools with

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[2] David, Thomas G. and Weinstien, Carol Simon (editors) Spaces for Children The Built Environment and Child Development, Plenum Press, New York, 1987. Pg. 7.

teaching based in Multiple Intelligences, and schools that incorporate nature in the design. The research reviews positive and negative aspects of the learning environments in order to assist in the development of the design principles.

This thesis proposes a series of design principles to be utilized for three different learning environments; the "regular" classroom, the special education classroom and the special education school. The design principles are to be applied equally to each of the different learning environments utilizing Kevin Lynch's theory of "legibility." The design principles will enable the learning environment to remain legible regardless of the expanding or contracting scale of the space. The focus of the design principles will be to provide a familiar learning environment for exceptional students through each level of educational support. This will ease the transition for the exceptional students and provide a comfort level through the different levels of special education support, culminating in the end goal including all students in a redefined type of learning environment.

Objectives

Develop a series of architectural design principles to create a new learning environment for elementery students (K-8). The principles are influenced by the educational theories of Inclusion, Multiple Intelligences and Cooperative Learning while being informed by an understanding of environmental perception (both built form and natural environment) for students with exceptionalities.

Test the established design principles to provide an architectural solution for established learning environments; the "regular" classroom in the student's home school, the special education room and a special education school designed to guide the student back to his/her home school. The application of the design principles will create similar learning environments, which will be familiar to the exceptional students as he/she transitions through the special education system.

Figure 1 - "Exceptional Student"

INTRODUCTION

I struggled with what focus this thesis should take and what I should do to best complete and culminate this long journey of knowledge and discovery. I was absorbed in the notion that a thesis must add to the architectural discourse and I felt determined to find a niche in need of filling. Through much discussion and deliberation with professionals within the public education system, I felt there was an ideal opportunity presenting itself, to incorporate the learned design skills to enhance the education of our children based on leading edge philosophies of education.

In listening to teachers describe the difficulties of special needs students it became apparent that there is a core group of children who are being failed by the traditional model of classroom design. Despite best efforts, without the necessary interventions in place, such individuals often leave the academic institution with very poor life functioning skills and high illiteracy rates. It was at this time a decision was made to design a school to encourage and support special needs students.

During the preliminary research, it became clear that some students with special needs within the Thames Valley District School Board (TVDSB) only attend an alternative intensive education program for one year. The first impression of this statement was to wonder why they would not allow more than one year at a time. This was also the subject of an article in the London Free Press (LFP) on September 03, 2003. The girl depicted in the article Abbey Kastelein, has Down syndrome. Her parents had been struggling to extend her stay at Madeline Hardy [3], however the "*1997 policy states children can only attend for one year.*" [4] At the time of this article the school served 40 children, the LFP article stated the local MPP Bob Wood wants expansion. Simple solution, more room means more spaces for children like Abby to extend their stay within special schools and advance their learning to a point where they can be a functioning member of society. This was the idea generator for this thesis, an expansion or replacement of the existing facility, would be better for all involved and children like Abby could find a regular placement and continue with their education. It was at this point

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[3] A special education school located at the Child and Parent Research Institute [CPRI] to provide intensive support for students with exceptionalities.

[4] Nelson, Marissa. Abbey not allowed into class, London Free Press, September 03, 2003.

that the research enlightened initial theories and acknowledged that the solution is not so simple. The research clarified that the policy is in place for the betterment of the student and is based on sound educational theories. The research has clarified that schools such as Madeline Hardy will still be necessary, and a new updated facility would better serve the students and staff. In addition, special education classrooms within community schools would be of great benefit to the students with special needs. However, the end goal, as was probably the case with Abby, is Inclusion into a regular classroom in the student's home school.

The direction of the research has taken many paths, and as a result, has lead to the development of a set of design principles. The design principles are founded in three current educational theories; Inclusion, Cooperative Learning and Multiple Intelligences in addition to an understanding of environmental perception. Throughout the research, the aforementioned educational theories were prevalent in the education of children with special needs, in addition to being a new direction for education across the TVDSB. The TVDSB is implementing a training program for staff to become a "Tribes Learning Community" teacher. This program trains the teacher to be a facilitator in the classroom, leading the group development process, creating a student centred education approach in which students relate to peers within the group in addition to the teacher. Author and educator Jeanne Gibbs describes "Tribes" as follows;

> *"It is a "process". It is based on a synthesis of studies on children's development, cooperative learning, cognition, systems theory, multiple intelligences, human resilience and the skills needed for the 21st century"* [5]

The Tribes program is currently expanding throughout North America and Australia, and provides relevant theories for children with special needs. In order to best provide design principles that create a positive environment for students with special needs, it is first necessary to understand which mental, intellectual and physical disabilities are characterized as Exceptionalities. In order to do this research examines all of the problems that are described as Exceptionalities by the Ministry of Education in the Province of Ontario.

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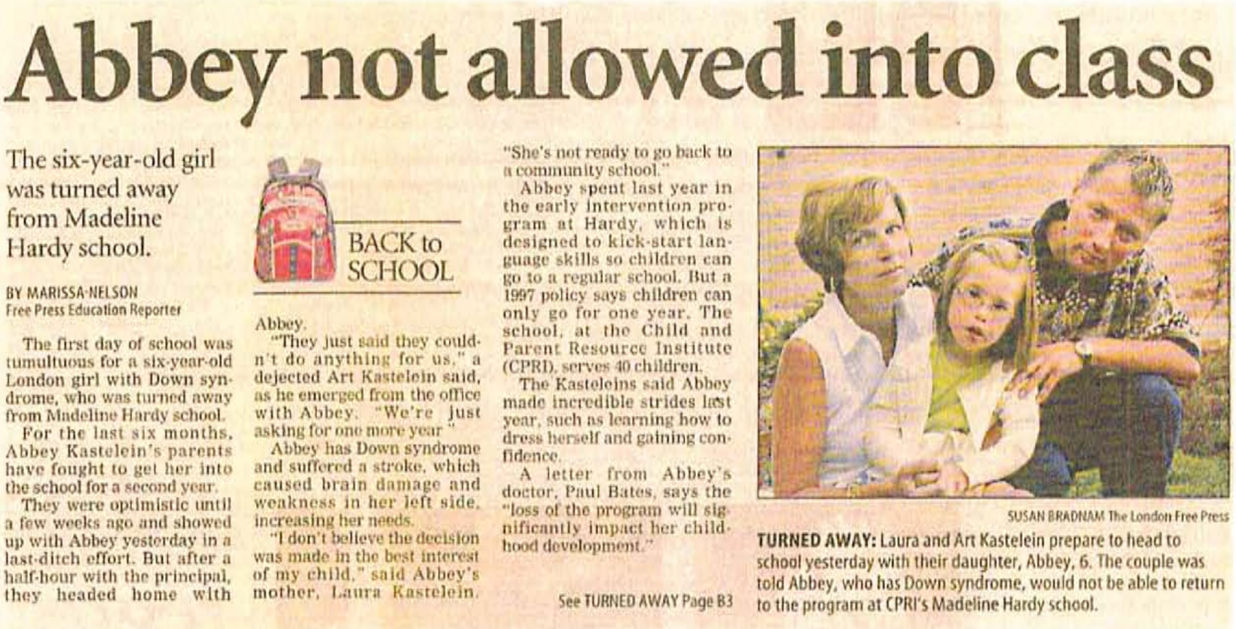
[5] Gibbs, Jeanne. (2001). TRIBES: A New Way of Learning and Being Together. Windsor, California. Center Source Systems Pg. 11.



Abbey not allowed into class

The six-year-old girl was turned away from Madeline Hardy school.

BACK to SCHOOL

BY MARISSA-NELSON
Free Press Education Reporter

The first day of school was tumultuous for a six-year-old London girl with Down syndrome, who was turned away from Madeline Hardy school.

For the last six months, Abbey Kastelein's parents have fought to get her into the school for a second year.

They were optimistic until a few weeks ago and showed up with Abbey yesterday in a last-ditch effort. But after a half-hour with the principal, they headed home with Abbey.

"They just said they couldn't do anything for us," a dejected Art Kastelein said, as he emerged from the office with Abbey. "We're just asking for one more year."

Abbey has Down syndrome and suffered a stroke, which caused brain damage and weakness in her left side, increasing her needs.

"I don't believe the decision was made in the best interest of my child," said Abbey's mother, Laura Kastelein. "She's not ready to go back to a community school."

Abbey spent last year in the early intervention program at Hardy, which is designed to kick-start language skills so children can go to a regular school. But a 1997 policy says children can only go for one year. The school, at the Child and Parent Resource Institute (CPRI), serves 40 children.

The Kasteleins said Abbey made incredible strides last year, such as learning how to dress herself and gaining confidence.

A letter from Abbey's doctor, Paul Bates, says the "loss of the program will significantly impact her childhood development."

See TURNED AWAY Page B3

SUSAN BRADNAM The London Free Press

TURNED AWAY: Laura and Art Kastelein prepare to head to school yesterday with their daughter, Abbey, 6. The couple was told Abbey, who has Down syndrome, would not be able to return to the program at CPRI's Madeline Hardy school.

Figure 2 - London Free Press Article "Abbey not allowed into class.

UNDERSTANDING THE PROBLEM

Introduction

> *"We owe it to our special needs children to create an environment where they learn that their limitations are only one small dimension of who they are. Ordinary schools do not provide such an environment. Extraordinary schools do. Unfortunately, we continually confront the reality of ordinary schools that place insurmountable obstacles in the path of special needs children even while claiming to serve those children's best interests."* [6]

This excerpt describes the plight of exceptional students in the school system. They are not the majority, but they are a growing minority, deserving of the same opportunities to learn, grow and develop as do all children in the education system. Dr. Forman goes on to further state;

> *"The Canadian Charter of Rights and Freedoms states that all people have a right to equal treatment. As well, the human rights code is intended to ensure that those with special needs are provided for."* [7]

We need to ensure that we are providing the best possible opportunity for the student with exceptionalities to learn, develop and become a contributing member of society. In order to do this it is not only the quality of specifically trained educators but also the environment in which the student with special needs are learning.

The first step to ensure that we are providing the equal opportunity for children with developmental disabilities or mental heath disorders is to provide early identification. The provincial government is well aware of the importance and benefits of early detection of mental health problems in children from birth to age six and has developed programs for detection and intervention. Children's Mental Health Ontario has published a guide for the health services available for children from zero to six. This guide describes the importance of early detection;

> *"Early childhood mental health services (which) consist of*

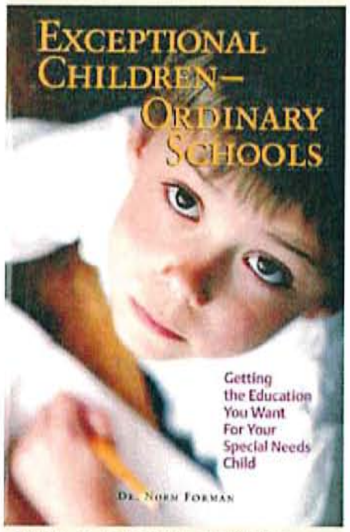

Exceptional Children–Ordinary Schools
Getting the Education You Want For Your Special Needs Child
Dr. Norm Forman

Figure 3 - Exceptional children, ordinary schools: getting the educaton you want for your special needs child.

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[6] Forman, Norm (2005) Exceptional children, ordinary schools: getting the education you want for your special needs child, Fitzhenry & Whiteside, Markham, ON. Pg. xvii.

[7] Forman, Norm (2005) Pg. xviii.

> *multidisciplinary services provided to children from birth to six years of age to identify and treat existing or emerging mental health problems, enhance adaptive parenting and overall family functioning, strengthen competencies, minimize developmental delays, prevent functional deterioration, enhance the ability of other systems to address the needs of young children and their families, and promote child mental health and well-being."* [8]

As stated in the CMHO's guide, if the problem can be addressed and treatment programs implemented before the child reaches school age the possibilities of a positive outcome is increased. The CMHO's guide goes on further to state the advantage of early identification and treatment;

> *"Recent advances in biological and neuropsychological research demonstrate that all organisms adapt to their environment, and neither behaviour nor development potential is fixed by genetic factors or limited by strict critical periods. Advances in the understanding of the development of young children show the importance of the ecological context that begins with the family, then widens to include the child's immediate community, and then expands further to embrace the broader socio-cultural-economic environment. Research supports the notion that well-designed early interventions in mental health promotion/prevention activities can enhance the development and well-being of children from all social classes and cultural groups."* [9]

Once the identification of a problem has been completed and early intervention is implemented prior to the beginning of school the focus of the child's education can be clearly identified. The provincial education act outlines five categories of exceptional students.

- ***"Behaviour;***
- ***Communication;***
- ***Intellectual;***
- ***Physical**, and;*
- ***Multiple**.*

Three of these categories are further broken down into additional sub categories;

Communication

- *Autism;*

---

[8] Children's Mental Health Ontario, Children's Mental Health Services for Children Zero to Six: Review of the Literature and Practise Guide, CMHO, Toronto, ON March 31, 2002. Pg. i.

[9] CMHO (2002) Pg. ii.

- *Deaf and hard of hearing;*
- *Language impairment;*
- *Speech impairment; and*
- *Learning disability.*

Intellectual

- *giftedness;*
- *mild intellectual disability; and*
- *developmental disability*

Physical

- *Physical disability; and*
- *Blind and low vision."* [10]

The criteria and the guidelines for determining students with exceptionalities have been clearly defined by the province and the individual boards of education. These guidelines are developed by educational professionals, in conjunction with health care professionals who have a greater knowledge base and understanding of developmental disabilities and mental illness in children. To create design principles it is necessary to understand the five categories that identify special needs students and the disorders that place the student in the particular category. A general understanding of these disorders will provide a knowledge base to influence decisions as to the formulation of design elements within the built environment.

This research provides the descriptions as outlined in the TVDSB's Special Education Plan, with definitions from the publication as well as criteria for identification. In addition, the research will provide a brief synopsis of the defined disorder or disability from various other sources.

Figure 4 - "Exceptional student"

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[10] Thames Valley District School Board (TVDSB), (2005) Thames Valley District School Board Special Education Plan 2005-2006, London, ON. Pg. 48.

Behaviour

The first category listed in the TVDSB Special Education Plan is Behaviour, it is defined as follows;

> *"A learning disorder characterized by specific behaviour problems over such a period of time, and to such a marked degree, and of such a nature, as to adversely affect educational performance, and that may be accompanied by one or more of the following:*
>
> - *An inability to build or to maintain interpersonal relationships;*
> - *Excessive fears or anxieties;*
> - *A tendency to compulsive reaction; or*
> - *An inability to learn that cannot be traced to intellectual, sensory, or other health factors, or any combination thereof.*
>
> *Criteria for Identification:*
>
> - *The need for identification is based on longstanding difficulties.*
> - *Children who are candidates for formal identification have severe behavioural and social-emotional difficulties. In addition, behaviour concerns are of significant duration and the previous efforts of school-based and system-based personnel have been met with limited success.*
> - *Typically these children would meet DSM-IV diagnostic criteria as diagnosed by a member of the College of Psychologists or medical practitioner for one or more of the following:*
> - o *Oppositional-Defiant Disorder*
> - o *Conduct Disorder*
> - o *Mood Disorder e.g., Depression, Bi-Polar*
> - o *Anxiety Disorder*
>   - ☐ *selective mutism*
>   - ☐ *obsessive-compulsive disorder*
>   - ☐ *social phobia*
>   - ☐ *post traumatic stress disorder*
>   - ☐ *general anxiety disorder"* [11]

To gain a better understanding of the terms as defined in the TVDSB's Special Education Plan, it is essential to provide information detailing the classifications as listed. A clarification of the behaviours associated with

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[11] TVDSB (2005) Pg. 49.

the labels is best described in Eric Mash and David Wolfe's book Abnormal Child Psychology. They offer brief descriptions of Oppositional Defiant Disorder (ODD) and Conduct Disorder, as well as the defining features as set out in the psychological diagnostic criteria DSM-IV. In addition, a brief description of associated characteristics of Conduct Problems as well as causes and current treatment practises.

> *"Oppositional defiant disorder (ODD) is diagnosed in children who show age-inappropriate and persistent pattern of irritable, hostile, oppositional, and defiant behaviour. Conduct disorder (CD) describes children who display severe aggressive and antisocial acts involving inflicting pain on others or interfering with other's rights. Psychopathy refers to a pattern of deceitful, callous, manipulative and remorseless behaviour.*
>
> *Associated Characteristics of Conduct Problems*
> *Children with conduct problems have interpersonal difficulties with peers, although they may form friendships with other antisocial children. Families of children with conduct problems show high rates of conflict among family members relative to rates in non problem families, poor communication patterns, low support and disorganization. Children with conduct problems engage in behaviours that place them at high risk for health-related problems such as drug overdose and sexually transmitted diseases. Children with conduct problems usually have one or more other disorders, most typically ADHD, depression and anxiety.*
>
> *Causes of Conduct Problems*
> *Conduct problems in children are best accounted for by multiple causes, or risk and protective factors, operating in transactional fashion over time. Adoption and twin studies suggest the importance of genetic influences on antisocial behaviour in adults and adolescents, although findings for children are less clear. The structural characteristics of the community provide a backdrop for the emergence of conduct problems by giving rise to community conditions that interfere with the adoption of prevailing social norms and the development of productive social relations.*
>
> *Treatment*
> *Despite considerable efforts to help children and adolescents with conduct problems, there is an absence of clearly effective interventions. The focus of parent management training is on teaching parents to change their child's behaviour in the home. The underlying assumptions of cognitive problem solving skills training is that the child's antisocial responses are triggered by faulty perceptions and appraisals of interpersonal events. The focus is on*

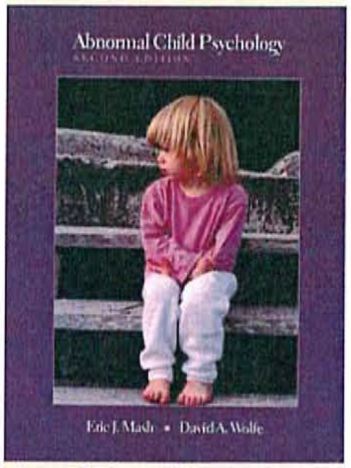

Figure 5 - Cover of Abnormal Child Psyc. 2nd Edition.

> *changing behaviour by changing the way the child thinks in social situations. Multisystematic treatment is an intensive approach that is carried out with all family members, school personnel, peers, juvenile justice staff, and other individuals in the child's life. Recent efforts have focused on preventing conduct problems through early intervention."* [12]

As is defined in the description of the conduct disorders these behaviours are often disturbing to the larger class as a whole. However, the treatment described requires the student to be attending school and focusing on building stronger positive peer relationships. These children would benefit from being educated in the inclusive classroom as well as a classroom practising Cooperative Learning, where peer support is at the core of the learning process.

A subsequent behaviour listed in the TVDSB's Special Education Plan is Mood Disorders. Mood disorders in children can generally be divided into two categories – depressive disorders, and bipolar disorders. It is a common misconception that children are affected by depression in the same way adults are affected. However, depression in children can be quite debilitating and can affect the child's mental development. Children with depression will experience cognitive and psychological problems including deficits in intellectual and academic performance, self-esteem, social problem solving and coping skills. Eric Mash and David Wolfe offer theories for the reasons which cause childhood depression;

> *"Many theories of depression have been proposed, including psychodynamic, attachment, behavioural, cognitive, self-control, interpersonal, neurobiological and socioenvironmental. Depression is likely a final common pathway for interacting influences that predispose a child to develop a disorder. These influences include genetic risk, neurobiological factors, family conditions, stressful life events, cognitive factors, and deficits in emotion regulation."* [13]

The initial treatment recommended for treating depression in children is Cognitive-Behaviour Therapy (CBT). In addition to CBT treatment, the TVDSB provides programs that promote prevention and awareness.

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[12] Mash, Eric J., Wolfe David A. (2002) Abnormal Child Psychology Second Edition, Wadsworth Publishing Company, Belmont CA. Pg 128.

[13] Mash, Eric J., Wolfe David A. (2002) Pg. 199.

The other mood disorder is bipolar disorder. Children with bipolar disorder experience irregular periods of high and low moods. Some symptoms that accompany bipolar disorder are inflated self-esteem, decreased need for sleep, distractibility and reckless behaviour. Bipolar disorder is less common than depression in children; however, it is usually accompanied by other disorders, such as Attention-Deficit Hyperactivity Disorder (ADHD), Conduct Disorders and Anxiety Disorders. Bipolar disorder is believed to be developed by a combination of factors including a genetic disposition and the correct environmental factors, such as a traumatic stressor or disturbances within the family unit. The treatment approach for bipolar disorder requires education of the child as well as the family with respect to the illness in addition to medication and psychotherapeutic interventions.

The remaining recognized behaviour listed in the TVDSB Special Education Plan is Anxiety Disorders; this is the most common mental health problem among children, which often goes untreated and undiagnosed. An anxiety Disorder as defined by Mash and Wolfe is as follows;

> *"Anxiety is an adaptive emotion that prepares youngsters for coping with potentially threatening people, objects, or events. It is characterized by strong negative emotions and bodily symptoms of tension, in which a youngster apprehensively anticipates future danger or misfortune. The symptoms of anxiety are expressed through three interrelated response systems; the physical system, the cognitive system, and the behavioural system. Fears, anxieties, worries, and rituals in children are common, change with age, and follow a predictable development pattern."* [14]

Anxiety disorders, as listed in the diagnostic criteria DSM-IV, are divided into nine categories that closely define the child's reaction to a specific fear as well as the avoidance of that fear. The five listed in the TVDSB's Special Education Plan are the most common affecting school aged children.

Selective Mutism is attributed to the child's fear of being the centre of attention and/or scrutiny or doing something or saying something that will be intensely humiliating. In order to avoid attention the child chooses not to communicate verbally. The second anxiety disorder listed in the TVDSB's Special Education Plan is Obsessive Compulsive Disorder (OCD). OCD is an unwanted thought or obsession that causes anxiety. In order to relieve

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[14] Mash, Eric J., Wolfe David A. (2002) Pg. 162.

the anxiety, the child will often have a ritualized or compulsive behaviour. A common example of an OCD is a fear of germs, which causes a continual need to wash one's hands. The third anxiety disorder is Social Phobia. This phobia is similar to Selective Mutism, in that the child has a fear of being singled out and being humiliated in front of one's peers, however the response is not manifested in the child's choice not to communicate verbally. A child with Social Phobia will be withdrawn and may be viewed as socially maladjusted by others. The fourth anxiety disorder listed in the TVDSB Special Education Plan is Post Traumatic Stress Disorder (PSTD). Children with PSTD have experienced an intensely negative experience. The child keeps reliving frightening thoughts or memories of the event that can be debilitating for the child. The final anxiety disorder listed is General Anxiety Disorder (GAD), children with GAD experience chronic or exaggerated worry and tension. Children with anxiety disorders are often socially withdrawn and usually have other disorders or depression. Mash and Wolfe offer the following theories as to the causes of anxiety disorders;

> *"Theories have viewed anxiety as a defence against unconscious conflicts, a learned response, or an adaptive mechanism needed for survival. No single theory can explain the many different forms of anxiety disorders in children. Family and twin studies suggest a biological vulnerability for the development of anxiety disorders. Anxiety is associated with specific brain circuits and neurobiological processes. The potential underlying vulnerability of children at risk for anxiety is most likely localized to brain circuits involving the brain stem, the limbic system, and the frontal cortex. A parenting style characterized by over control and rigid beliefs is the one most often associated with anxiety disorders in children."* [15]

The treatment for an anxiety disorder is Cognitive Behaviour Therapy, sometimes combined with medication. The understanding of anxiety disorders and its current research is integral to developing appropriate and effective design intentions. The result of this understanding is a well-designed and functional classroom that creates an emotionally safe, calming and inviting space that is conducive to education for all.

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[15] Mash, Eric J., Wolfe David A. (1999) Pg. 163.

Communication

The second category of exceptionalities listed in the TVDSB's Special Education Plan is Communication. The Ministry of Education has divided this category into additional sub-categories; Autism, Deaf and Hard of Hearing, Language Impairment, Speech Impairment and Learning Disability.

The first sub-category is Deaf and Hard of Hearing. Deaf and Hard of Hearing is an impairment, which has caused deficits in the development of speech and language. This disability will require modifications to the classroom and school environment to allow for the development of students. The intent is to educate the student in their "home" school, however, if this is not possible, provincial schools specifically designed for the deaf and hard of hearing are available (e.g. John P Robarts, School for the Deaf and Hard of Hearing).

Language and Speech Impairment are usually as a result of poor development during infancy; the environmental opportunities to learn and express the important sounds that form language are usually deficient. These disorders are usually overcome when the child reaches school age and begins attending school regularly; however, these impairments are often found at the root of other learning disabilities.
Learning disabilities are described by Mash and Wolfe as a;

> *"general term that encompasses communication and learning problems that occur in the absence of other obvious conditions, such as, mental retardation or brain damage. Children and adults with learning disabilities show specific deficits in using spoken or written language."* [16]

Of the sub-categories, Autism is classed as a biological disorder. Since this disorder is so complex, the research discusses this sub-category in detail.

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[16] Mash, Eric J., Wolfe David A. (2002) Pg. 292.

Autism and Pervasive Development Disorders

Autism Disorder and Aspergers Syndrome are Pervasive Development Disorders (PDD), which are characterized by impairments in social interaction, communication difficulties, and stereotyped pattern behaviours. Both disorders are now recognized as life long biological impairments. Mash and Wolfe offer the following synopsis of Autism;

> *"Children with Autism experience profound difficulties in relating to other people, including deficits in orientating to social stimuli, imitating others, sharing a focus of attention with others, and noticing and understanding other people's feelings.*
>
> *Children with Autism display serious abnormalities in communication and language, including deficits in the use of preverbal vocalizations and gestures, language oddities such as pronoun reversal and echolalia, and difficulties with the appropriate use of language in social contexts.*
>
> *Children with Autism display stereotyped and repetitive patterns of behaviours, interests and activities that include obsessive routines and rituals abnormal preoccupation, insistence on sameness, or stereotyped body movements. About 80% of children with Autism also have mental retardation; approximately 60% have IQs less than 50, and 20% have IQs between 50 and 70. About 20% of children with Autism have average intelligence or above, with IQ's higher than 70.*
>
> *Sensory-perceptual abnormalities and deficits are common in children with Autism. These may include oversensitivities or undersensitivities to certain stimuli, overselective, and impaired shifting of attention to sensory input, and impairments in mixing across sensory modalities.*
>
> *Children with Autism display a deficit in theory of mind (ToM) – the ability to understand other people's and one's own mental states, including beliefs, intentions, feelings and desires.*
>
> *Children with Autism display a general deficit in higher order planning and regulatory behaviours."* [17]

Autism is a disorder, which has recently received a lot of media coverage, from various newspaper articles to an in-depth news feature on Canadian Broadcasting Corporation (CBC) Newsworld and News Online. The article

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[17] Mash, Eric J., Wolfe David A. (2002) Pg. 257.

in CBC News Online was generated by the reaction to recent Canadian Supreme Court rulings with regards to Ontario's and British Columbia's stance on the payment of treatment for children with Autism. The treatment in question is Applied Behaviour Analysis (ABA), this is described as a;

> *"specific therapy for children with Autism, which leads the child through multiple repetitions of a wide variety of actions appropriate for children of their age."* [18]

ABA was developed in the early 1980's by Norwegian doctor Ivar Lovaas, as an early intervention therapy, and was initially named Lovaas therapy. The payment is in question because some consider the service an essential medical treatment, which under the Canada Health Act would be covered. However, the position portrayed by the CBC's coverage is that the provincial governments are disagreeing partly due to the large cost of the treatment and the rise of the occurrences of children with Autism. The cost ranges from $30,000 to $80,000 a year per child, which the Ontario Government pays for up until the age of six, this is currently being challenged in the courts. A group of parents have combined to bring forward legal action to obtain payment for the treatment past the age of six. In contrast, the British Columbia government does not feel it is necessary to pay for any part of the treatment. The Supreme Court of Canada will decide the matter of payment as a ruling based on the Charter of Human Rights.

Asperger syndrome is similar to Autism in that it is a disorder, which affects social development. However, children with Aspergers are often quite intelligent in other areas, as outlined in the CBC News Online in-depth report.

> *"For years, autistic people with sparkling artistic, mathematical or technical ability were referred to as "idiot savants," though the prefix has now been dropped. Ten per cent of people with autism are clearly gifted and it has been argued that there is a relationship between autism and genius."* [19]

Due to the complexity of Autism and Aspergers students with these exceptionalities present challenges concerning the educational environment. Autistic children experience sensory stimuli much differently than the non-

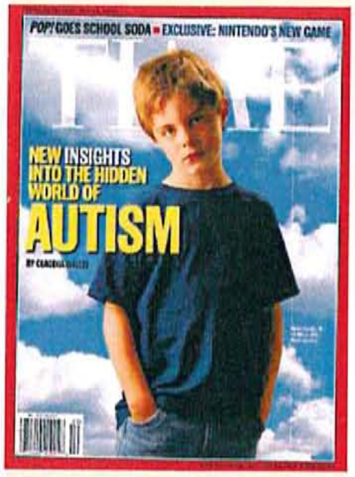
POP! GOES SCHOOL SODA ■ EXCLUSIVE: NINTENDO'S NEW GAME
TIME
NEW INSIGHTS INTO THE HIDDEN WORLD OF
AUTISM

Figure 6 - Cover of Time Magazine May 2006

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[18] http://www.cbc.ca/story/canada/national/2005/04/04/autism-ruling050404.html

[19] Krantz,Lani CBC News Online | October 10, 2003 http://www.cbc.ca/news/background/autism/history.html

autistic child. Careful consideration will be given to the sensory information bestowed upon these children.

Deaf and hard of hearing

This sub-category of exceptionality is part of the Communication heading although the cause is usually physical impairment. The TVDSB Special Education plan defines this exceptionality as follows:

> *"An impairment characterized by deficits in language and speech development because of diminished or non-existent auditory response to sound.*
>
> *Criteria for Identification:*
>
> *A permanent hearing loss, sustained by an audiological assessment (within the previous 12 months) by a registered audiologist, which results in a need for accommodations and/or modifications to the classroom environment and/or program."* [20]

Students who are hard of hearing are sometimes accommodated in a provincial school, specifically for students who are deaf and hard of hearing. However, the trend is moving towards accommodating students with this exceptionality in the student's home school with assistive listening and language devices including specialized support from the TVDSB office.

Language impairment

Language impairment is a sub-category of the Communication category of exceptionalities. The TVDSB Special Education plan defines this exceptionality as follows:

> *"A learning disorder characterized by an impairment in comprehension and/or use of verbal communication or the written or other symbol system of communication, which may be associated with neurological, psychological, physical, or sensory factors, and which may: involve one or more of the form, content, and function of language in communication; and include one or more of the following:*
>
> - *language delay;*
> - *dysfluency;*
> - *voice and articulation development which may or may not be organically or functionally based.*

Making Sense of the Confusing World of Autism

Figure 7 - CBC News In Depth Report - Autism

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[20] TVDSB (2005) Pg. 49.

> *Criteria for Identification:*
> - *A language impairment that, based on an assessment by a qualified speech and language pathologist or a diagnosis of a language disorder by a member of the College of Psychologists which results in a need for accommodations and/or modifications to the classroom environment and/or program."* [21]

This exceptionality often requires specialist assistance from professional services working in conjunction with the education system. Specialist services are provided by specialized language support staff from the TVDSB offices in conjunction with support from outside of the school setting, and require the student to leave the school for extended periods during the school day.

Speech impairment

Speech impairment is a sub-category of the Communication category of exceptionalities. The TVDSB Special Education plan defines this exceptionality as follows:

> *"A disorder in language formulation that may be associated with neurological, psychological, physical, or sensory factors; that involves perceptual motor aspects of transmitting oral messages; and that may be characterized by impairment in articulation, rhythm, and stress.*
>
> *Criteria for Identification:*
> - *An impairment or disorder in articulation, voice or fluency that significantly interferes with communication, social interaction and academic progress to the extent that, based on an assessment by a qualified speech/language pathologist, an augmentative/alternative communication system may be required.*
>
> *Examples:*
> *a) A student with apraxia (motor planning) who is so unintelligible that picture communication symbols are necessary to supplement oral communication.*
> *b) A student whose stuttering is so severe during oral presentations in the classroom that written communication becomes more effective.*
> *c) A student with a cleft palate whose speech is so unintelligible due to hyper nasality that a digivox is programmed with routine*

---

[21] TVDSB (2005) Pg. 50.

> *classroom requests."* [22]

Similar to Language impairment this exceptionality often requires specialist assistance from professional services working in conjunction with the education system. Specialist services are provided by specialized speech support staff from the TVDSB offices in conjunction with support from outside of the school setting, and in some cases require the student to leave the school for extended periods during the school day.

Learning disability

A learning disability is a sub-category of the Communication category of exceptionalities. The TVDSB Special Education plan defines this exceptionality as follows:

> *"A learning disorder evident in both academic and social situations that involves*
> *one or more of the processes necessary for the proper use of spoken language*
> *or the symbols of communication, and that is characterized by a condition that*
> *is not primarily the result of:*
>
> - *impairment of vision;* • *developmental disability;*
> - *impairment of hearing;* • *primary emotional disturbance;*
> - *physical disability;* • *cultural difference; and*
>
> *results in a significant discrepancy between academic achievement and assessed intellectual ability, with deficits in one or more of the following:*
>
> - *receptive language (listening, reading);*
> - *expressive language (talking, spelling, writing);*
> - *language processing (thinking, conceptualizing, integrating);*
> - *mathematical computations;*
>
> *may be associated with one or more conditions diagnosed as:*
>
> - *a perceptual handicap;* • *dyslexia;*
> - *a brain injury;* • *developmental aphasia.*
> - *minimal brain dysfunction;*
>
> *Criteria for Identification:*
>
> - *Results may range from Low Average to Very Superior,*

---

[22] TVDSB (2005) Pg. 50.

although typically they would fall within the Average IQ range, on a standardized, individually administered measure of general intellectual ability (e.g., WISC-III, SB:FE).

- *A significant discrepancy between assessed intellectual potential (IQ) and current standardized assessments of academic achievement (e.g., WJIII, WIAT II) in at least one of the following: word recognition/decoding, reading comprehension, written language, mathematics is evident.*
- *The discrepancy is related to processing deficits, (e.g., attention, memory, sequencing, organization, problem-solving, phonological processing, language processing, visual spatial processing, processing speed, perceptual motor processing).*
- *Related difficulties may be apparent in social skills, emotional maturation, and classroom behaviour.*
- *Deficits are not related to physical, environmental, or cultural factors and are not better described under another exceptionality.*[23]

Essentially children with a learning disability have the ability to succeed in school, as measured by standardized IQ test, but they are not achieving at a level equal to their measured potential. It is essential that Learning Disabilities be identified at the earliest possible stage, to avoid negative development and promote sensory and language stimulation.

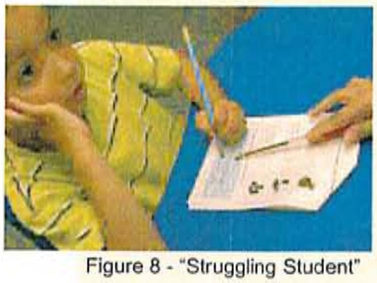

Figure 8 - "Struggling Student"

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[23] TVDSB (2005) Pg. 51.

Intellectual

The third category of exceptionalities listed by the province and TVDSB is Intellectual. There are two sub-categories of Intellectual Exceptionalities, Mild Intellectual Disabilities and Developmental Disabilities.

Mild intellectual disability

A mild intellectual disability is a sub-category of the Intellectual category of exceptionalities. The TVDSB Special Education plan defines this exceptionality as follows:

- *"an ability to profit educationally within a regular class with the aid of considerable curriculum modification and supportive service;*
- *an inability to profit educationally within a regular class because of slow intellectual development;*
- *a potential for academic learning, independent social adjustment, and economic self-support.*

Criteria for Identification:

- *Assessed overall intellectual function in the Borderline range which results in well below average academic achievement in all areas and the need for extensive curriculum modifications and/or alternate specialized programming."* [24]

It is essential that the mild intellectual disability be identified as early as possible. The goal is to provide academic support for children with this exceptionality, in order that they continue to attend the student's home school. The support is part of a multi-disciplinary team, with the goal of attendance in the home school with the final goal being graduation, with classmates.

Developmental Disabilities

Developmental Disabilities are defined as a severe learning disorder characterized by;

- *"an inability to profit from a Special Education program for students with mild intellectual disabilities because of a slow intellectual development;*
- *an ability to profit from a Special Education program that is designed to accommodate slow intellectual development;*

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[24] TVDSB (2005). Pg. 51.

- *a limited potential for academic learning, independent social adjustment, and economic self-support."* [25]

In addition to the three characterizations, the student usually has severe adaptive behaviour deficits. The education of children with severe developmental disabilities is just one component of a multi-disciplinary team including medical professionals, speech and language pathologists, physiotherapists, psychologists and social workers. In some cases these children will be placed in full-time residential care, this approach usually leads to the optimal education for the child. The goal for children who are admitted to the Residential Education Program is to advance to an academic and social level that would enable the student to return to his/her home school and eventually the "regular" classroom.

Physical

The fourth exceptionality listed in the TVDSB's Special Education Plan is Physical Disability, and is defined as follows;

> *"A condition of such severe physical limitation or deficiency as to require special assistance in learning situations to provide the opportunity for educational achievement equivalent to that of students without exceptionalities who are of the same age or developmental level."* [26]

The physical disability is an ongoing condition that requires accommodations to the learning environment and/or educational program. This includes students who are blind or have low vision, who will require special modifications to the learning environment or educational program. Typically, students who are blind or have low vision are accommodated in a Provincial school for the blind, which is solely accommodates visually impaired students to prepare the students for continuing education or skilled trades.

Figure 9 - "Student with Physical Disabilities"

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[25] TVDSB (2005) Pg. 51.
[26] TVDSB (2005) Pg. 53.

Multiple

The final exceptionality listed in the TVDSB's Special Education Plan is Multiple Exceptionalities, which are defined as;

> *"A combination of learning or other disorders, impairments, or physical disabilities, that is of such nature as to require, for educational achievement, the services of one or more teachers holding qualifications in Special Education and the provision of support services appropriate for such disorders, impairments, or disabilities."* [27]

Children with multiple disabilities are accommodated by a multi-disciplinary team approach, composed of educators and medical practitioners providing expertise in small areas to assist in the greater whole.

Summary

As previously described, the five categories of exceptionalities encapsulate a wide range of disabilities. These include most conceivable situations for students within the education system. It is the intent of this thesis to create a learning environment for all and to include children with exceptionalities, whether physical or mental, within the regular classroom in the student's "home" school. A general understanding of the various disabilities will inform the development of design principles to create a positive response to the learning environment. The understanding that the disability is just one aspect of the whole student, and that it is only part of what makes an individual unique, is essential to the essence of the design principles. Each disability requires consideration when developing design principles. As an example, students with behaviour problems will require a calming and soothing environment in which they feel safe and secure to minimize behaviour escalations. Another example would be the consideration of tactile surfaces. Different textures that affect the child's stimulation will require careful consideration to avoid over stimulation or negative stimulation. Finally, the ability to promote maximum mobility and accessibility for students with physical disabilities is of the utmost importance.

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[27] TVDSB (2005) Pg. 53.

UNDERSTANDING CURRENT PRACTISE

Introduction

> *"Children's Mental Health – Many of our families are having difficulty supporting children who are suffering from illness related to mental health. As services in other sectors are reduced, these children will require highly modified program interventions if they are to experience success in our school system. This approach would require initiatives that extend well beyond the boundaries of what would normally be considered the mandate of an education system."* [28]

As stated in the excerpt from the TVDSB Special Education Plan, it is clear that cuts to services in other public sectors are having a direct impact on the education system. The education system is now becoming the focal point of treatment for children with issues related to mental health. The province and local school boards are struggling to keep up, not only with an increased demand for Special Education but new delivery methods as well.

To understand the current practice for serving students with special education needs, this thesis will provide excerpts from the Thames Valley District School Board Special Education Plan 2005-2006. The provincial Ministry of Education mandates in the Education Act that each school board must provide Special Education Services for students whom have been defined as an "exceptional pupil". The guidelines for this provision are mandated in provincial Regulation 181/98. The province clearly defines how school boards are to provide special education services and mandates the creation of a Special Education Advisory Committee (SEAC). The SEAC is comprised of nominated and elected members from educator groups such as principals, teachers and educational assistants as well as members from support professionals such as medical practitioners, psychologists and social workers. The purpose of the SEAC is to provide recommendations to the school board on all matters affecting the establishment, development, and delivery of special education programs and services for exceptional pupils of the board. The following is the philosophy of programs and services for Special Education with in the TVDSB.

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[28] TVDSB (2005) Pg. 5.

> *"The Thames Valley District School Board believes that most exceptional children can and should have their needs met, using a variety of strategies, techniques and resource support, in regular classes in their home schools. The application of appropriate programs, services, and placements (which may include regular class, resource assistance, self-contained class, or attendance at a provincial school) are determined through the Program Development Team (PDT) and/or the Identification, Placement, and Review Committee (IPRC) processes, in consultation with parent(s)/legal guardian(s)."*[29]

It is clear that the preferential response to Special Education is to deliver the requirements to the student in their "home" school in a regular classroom as opposed to a self-contained classroom or provincial school. With in the framework of this philosophy, the TVDSB defines the goals for the delivery Special Education services to exceptional pupils;

- *"The general goals of education apply equally to Special Education. For the exceptional student, however, special teaching strategies, additional support, facilities and/or equipment may be required.*
- *Programs shall be designed to assist exceptional students to develop toward the maximum of their potentials in the affective, (social/emotional/behavioural), cognitive and psychomotor domains of learning and shall satisfy the mission and belief statements of the Thames Valley District School Board.*
- *Early and ongoing procedures for the identification of the learning needs, learning styles and abilities off the students shall be provided. School Program Development Teams, with input from the parent(s)/legal guardian(s), health agencies and/or social agencies will initiate program accommodations and/or modifications to support the integration of students in their home school settings, where appropriate.*
- *Placement in an appropriate Special Education program shall be determined after a complete educational assessment and careful consideration of the needs of the student by an identification, Placement and Review Committee. The principal or parent(s)/legal guardian(s) will request a Review as required.*
- *An IEP is developed for a student who requires a program which is modified from the grade level expectations or who requires an alternative program, or who requires accommodations in order to access the curriculum. In compliance with Reg. 181, all identified students will have*

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[29] TVDSB (2005) Pg. 54.

an IEP developed within 30 days of the IPRC.
- *The board shall provide Special Education personnel, as deemed appropriate, to support staff in meeting the needs of exceptional students in Special Education programs.*
- *The board shall facilitate staff development to enable staff to assist in the provision of appropriate programs and placements for exceptional students.*
- *The responsibility for each individual's education is shared by the student, parent(s)/legal guardian(S), educators and trustees."* [30]

In addition to the eight points defining the methods to be used to accomplish the philosophies of Special Education with TVDSB, they have developed five main guiding principles to Special Education. These principles are a culmination of input from staff, students, parents and medical support personnel. The guiding principles are the basis for the development and implementation of Special Education services;

- *"Support the Thames Valley District School Board's Mission of "Improving Student Learning" by maximizing and supporting student learning opportunities.*
- *All students should begin their educational career in their home school in the regular classroom.*
- *Maintain the philosophy of Spectrum of Services.*
- *Parents, students, staff and public input is a valued process designed to optimize the development, establishment and implementation of programs and support services.*
- *Ongoing communication with students, parents, staff, SEAC and other stakeholders is an important strategy in maintaining linkages with the broader community sector."* [31]

These guiding principles are focused on improving student learning and utilizing the input of all the stakeholders involved. The TVDSB has developed a three-tiered approach to special education as demonstrated in the figure from the Special Education Plan, showing the rings of support services provided to the exceptional pupil.

Figure 10 - Child receiving individual instruction.

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[30] TVDSB (2005) Pg. 11.

[31] TVDSB (2005) Pg. 11.

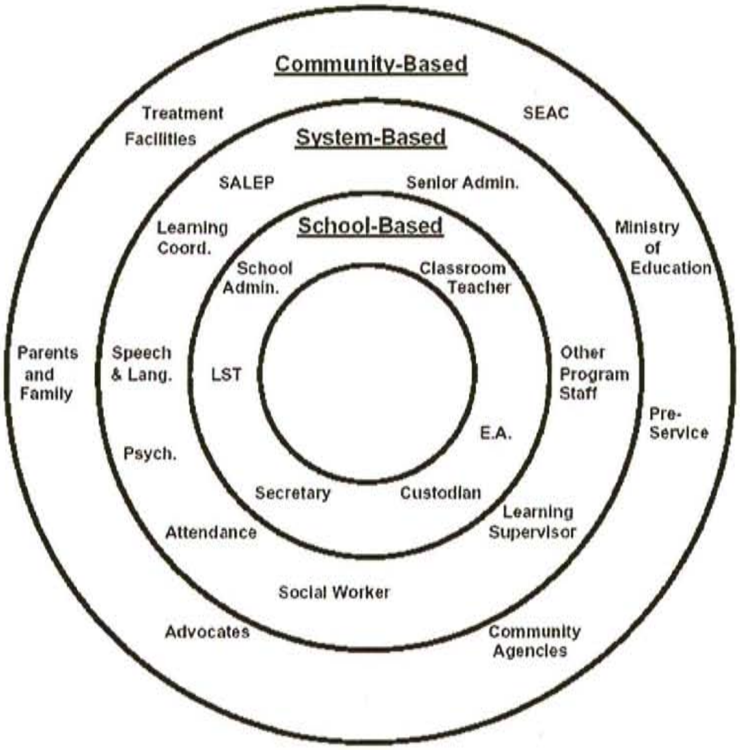

Figure 11 Three-tiered support for Special Education Services –TVDSB.

The diagram represents all levels of staff within the school participating in the exceptional child's education on an equal level, spreading out school board staff allocated to assist with special education, to the final level of community support which places the Special Education Advisory Committee on the same level as the Ministry of Education.

The first step, once it has been determined the student is an exceptional pupil, is the development of an Individualized Education Plan (IEP). It is mandated in Regulation 181 that the IEP be developed for the student within 30 days as stated earlier in the TVDSB's eight steps defining the delivery system for Special Education.

Individual Education Plan (IEP)

The Special Education Plan clearly outlines the procedures and criteria for defining a student as an "exceptional pupil". Once the procedural steps have been fulfilled by the Program Development Team (PDT) and the Identification, Placement, and Review Committee (IPRC) the proper course of action for the student is determined by a unanimous decision. There are essentially four levels of placement for the exceptional pupil; regular classroom, regular classroom with resource assistance, self-contained class or attendance at a provincial school. As outlined in the TVDSB's Special Education plan, the most common corrective measure for the exceptional pupil is placement in the regular classroom with modifications to the curriculum specifically tailored to the student's needs.

> *"The vast majority of students identified as exceptional are placed in regular classrooms on Individual Education Plans. Students being considered for self-contained special education class placements typically have a history of interventions by the school in response to their unique needs."* [32]

The intent of the TVDSB is to keep the student with his or her peer group in their "home" school. By providing an Individual Education Plan (IEP) the student is able to grow and develop on a social level equal to that of his or her peers. Some students with behaviour problems that pose a risk to their fellow students would be subject to further support. This is not a definite formula for special needs students, but a guideline to provide a path through the many services provided to special needs students. An IEP is defined in the TVDSB Special Education Plan as the follows;

> *"An IEP is a written plan. It is a working document which describes the areas of strengths and needs of the individual student. It is not, however, a description of everything that will be taught to the student. The IEP provides an opportunity for all those involved with the student to work together to provide a program that will foster student achievement and success."* [33]

The IEP only defines the strengths and weaknesses of the student; it does not provide a curriculum. Within the Special Education Plan, there are three levels of curriculum amendment; Accommodation, Modification and Alternative, these are defined as follows;

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[32] TVDSB (2005) Pg. 54.
[33] TVDSB (2005) Pg. 73.

> ***"Accommodation***
> *An accommodation is a change in the way a program or course is delivered to a student so that he/she can gain better access to the program. Accommodations may include changing the length of time needed to complete an assignment/test, using assistive technology, altering the instructions to match a student's style of learning, or photocopying notes. Most students receiving accommodations are working on grade level expectations of the Ontario Curriculum.*
>
> *Modification*
> *A modification refers to a change in the curriculum expectations because the grade level curriculum is inappropriate to the level of the student's abilities: for example, a student whose language program (reading, writing) is significantly lower than that expected for the grade level will have modifications made to his/her program.*
>
> *Alternative*
> *Alternative expectations are expectations that are not derived from a provincial*
> *curriculum policy document or that are modified so extensively that the Ontario*
> *Curriculum expectations no longer form the basis of the student's educational program. Alternative expectations in the areas of life skills, behaviour, enrichment, or orientation and mobility training for the visually impaired are examples of alternative expectations."* [34]

Each exceptional pupil has a specific IEP tailored to his/her strengths and weaknesses with an amended curriculum as required developed by the Learning Support Teacher (LST) and the classroom teacher. An IEP is created for every exceptional student regardless of the exceptionality; as well an IEP is also required for students in a self-contained classroom or students who attend a provincial school.

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[34] TVDSB (2005) Pg. 54.

Behaviour

The TVDSB's policy on support for children with behaviour exceptionalities, as with all of the listed exceptionalities, is to first provide a placement in a regular classroom with an IEP. The subsequent step would include in-classroom assistance with an Educational Assistant (EA) to fulfill the curriculum requirements. The third level of support would be in-school resource withdrawal. This is a period of time during the school day where the student would leave the regular classroom, during instructional time, to receive individualized instruction in the school's resource room. A further level of support would require the student to receive assistance from the STEPS for Success Program, and the Behaviour Itinerant Resource Teacher. All of these solutions are provided within the framework of the regular classroom; meaning the student attends his/her home school on a daily basis. These students have moderate behaviour challenges. Students with difficult behaviour challenges are referred to the STEPS for Success Program, for a temporary full-time placement, which is every other day or the Mental Health STEPS. The STEPS program is a self-contained classroom that may or may not be in the student's home school. There are several STEPS classrooms throughout the TVDSB. A Behaviour Itinerant Resource Teacher, together with support staff, staffs the STEPS classroom. The purpose of this program as defined in the TVDSB Special Education Plan is as follows;

> *"...assist students to develop skills/strategies to cope with and address their social, emotional and educational needs successfully in the school setting.*
>
> *This level of intervention and support is short term--not normally exceeding a five-month placement. Students remain on their home school register and continue to attend some classes at their home school while in this placement. This program requires parent consent and support for the student to be admitted to the program. Regular reviews are conducted as to the student's progress within the program. Home school involvement during the transition to, during the student's stay within the program and the transition back to the home school is imperative."* [35]

Students who display behaviour challenges who qualify for the STEPS program, are defined in the TVDSB Special Education Plan as students who;

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[35] TVDSB (2005) Pg. 55.

- *"requires a high degree of structured monitoring, consistency, goal setting, individual attention, social skills training, conflict resolution and problem-solving skills;*
- *displays severe psychopathology or those with limited cognitive ability to understand the consequences of their actions are **not** likely to be appropriate candidates."* [36]

The STEPS program is a transitional placement for students with extreme behaviour problems as either entrance into a provincial school or another mental health facility, or as a return to the "home" school from other intensive services. The transition of placement into the 'home" school on a part time basis enables both the student and staff to accomplish a smooth transition by slowly introducing the student to the new environment, and providing support from qualified professionals.

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[36] TVDSB (2005) Pg. 55.

Communication

The exceptionality of Communication is again divided into the recognized sub-categories; Autism, Deaf and Hard of Hearing, Speech and Language Impairment, and Learning Disabilities. This thesis addresses the current guidelines for providing educational services to pupils diagnosed with these exceptionalities, in each sub category individually, as each of these categories present different challenges to education. Although all are, communication related the responses are quite varied depending on the exceptionality.

Autism and Pervasive Development Disorders

As previously stated the initial protocol for support is an IEP, implemented in the "home" school, followed by an IEP with in-class assistance, subsequently followed by an in-school resource withdrawal. Students with a diagnosed communication disorder would receive support from the Itinerant PDD/ASD Resource Team and Speech-Language Services. The role of these teams is defined in the TVDSB Special Education Plans as follows;

> *"The purpose of this program is to address the needs of students diagnosed with Autism Spectrum Disorder/Pervasive Development Disorder with deficits in information-processing and/or environmental confusion to such a high degree of stress that the student is unable to function in a regular class. The program modifies the environment and provides methods of instruction that are compatible with the student's learning style thereby enabling the student to achieve grade level expectations."* [37]

The resource team is dedicated to guiding students with communication problems towards the completion of curriculum requirements. These students are greatly affected by the instructional environment. The modifications to environment may include a change from standard fluorescent lighting to incandescent lighting; studies have shown bright lights or flickering lights or the vibration of the ballast in fluorescent lighting can have an adverse affect on students with Autism. It is essential that the environmental factors that affect each student are assessed by the Program Development Team, and responded to on an individual basis, as environmental factors affect students with PDD or ASD differently. This will help to determine the level of support required for each student, and direct the placement, whether in a

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[37] TVDSB (2005) Pg. 56.

regular classroom with support or a self-contained ASD/PDD classroom.

Hearing Impairment

An individual IEP is developed with support from an Itinerant Hearing Resource Teacher and access to audiological services with the initial goal of keeping the student in the regular classroom. As defined in the TVDSB Special Education Plan the Hearing Resource Teacher may provide consultative service to the classroom teacher by way of classroom visitation and demonstration, assistance with program modifications and accommodations as well as equipment needs and demonstration. If further support is required the student may attend a self-contained classroom with a specialist teacher. The purpose of this classroom is to;

- *"provide support from a specialist teacher to students with hearing impairments;*
- *help students develop speech and language skills;*
- *foster self-esteem and independence;*
- *provide development of auditory-verbal skills;*
- *develop skills in use and management of amplification equipment;*
- *provide strategies for students to return to a regular classroom"* [38]

The final level of support for deaf students is attendance at a Provincial School for the Deaf. The TVDSB is served by three Provincial Schools for the Deaf;

- *"Robarts School for the Deaf in London - a day school serving western Ontario (some children stay during the week and return home on weekends) ;*
- *Ernest C. Drury School for the Deaf in Milton - a residential school serving central and northern Ontario;*
- *Centre Jules-Léger in Ottawa - a residential school serving francophone students and families throughout Ontario.*

- *These schools provide elementary and secondary school programs for deaf students from pre-school level to high school graduation. These programs:*
  - *provide rich and supportive bilingual/bi-cultural educational environments which facilitate students' language acquisition, learning, and social development through American Sign*

Figure 12 - "Children learning sign language".

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[38] TVDSB (2005) Pg. 57.

Language (ASL) and English;
- *are delivered by specially trained teachers;*
- *follow the Ontario curriculum developed for all students in the province."* [39]

The Provincial Schools for the deaf provide an intensive learning support for Deaf students and prepare the student for post secondary education in some cases or vocational training for those students who do not wish to further their academic studies and prefer to enter the work force.

Speech/Language Impairment

Students with speech and language impairments such as fluency, voice, articulation or language disorders would have an IEP developed in order that the student remain in the regular classroom with in the students "home" school. If further support is required specialized Speech Support Staff from the board office would assist the student either in the classroom or via a resource withdrawal to the resource classroom within the "home" school. In certain cases, the student is referred to the Community Care Access Centre, which would be upon the recommendation of the PDT and a medical evaluation, with the final approval resting with the Ministry of Health.

Learning Disability

The TVDSB Special Education plan describes the support offered to student's with Learning Disabilities as follows:

> *"a) in a regular class on an Individual Education Plan (IEP).*
> *Supports may include:*
> - *in-classroom assistance;*
> - *in-school resource withdrawal;*
> - *consultation with an Itinerant Intensive Support Teacher.*
>
> *b) in an self-contained Intensive Support Class.*
> *Placement in a self-contained class may be recommended at the late Primary/Junior or Intermediate (Grade 7/8) level, through the system IPRC process.*
>
> *The purpose of this class is to:*
> - *provide, for a period of 2 years, intensive support to students who are experiencing severe academic difficulties, primarily in the areas of reading, writing and language;*
> - *help students develop compensatory strategies for their*

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[39] TVDSB (2005) Pg. 82.

learning problems;
- *foster self-esteem and independence;*
- *provide technological support to compensate for severe reading, writing and language deficits;*
- *provide strategies for students to return to a regular classroom.*

Support for transition planning is available through the services of an Intensive Support Itinerant Teacher and Learning Coordinator: Special Education.

Criteria for placement in an Intensive Support Classes:
A student who:
- *is identified as a student with a Mild Intellectual Disability or a student who is learning disabled;*
- *exhibits increasing gaps between expected levels of academic achievement and current functioning levels;*
- *may exhibit low self-esteem, poor motivation, and/or emotional fragility which make it unlikely for the student to be successful in a regular classroom;*
- *has received interventions (which have been documented) in a regular classroom placement which have not been successful;*
- *has demonstrated strengths in learning skills which can be used to compensate for learning difficulties;*
- *does not exhibit behaviours that would negatively affect the learning of others in the program (ex. aggressive or oppositional behaviour);*
- *will respond to intensive levels of support."*[40]

As described by the guidelines for providing services to children with learning disabilities, the goal is for the student to attend his/her home school in the "regular" classroom with additional support as required. This may include instruction in a resource classroom or placement in the Intensive Support Class for a period to enable the student to return to the "regular" classroom.

Figure 13 - Students receiving individual instruction.

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[40] TVDSB (2005) Pg. 58.

Intellectual

Mild Intellectual Disability

Students with a Mild Intellectual Disability will receive five escalating levels of support. The first level as with all exceptionalities is an IEP while attending the regular classroom in the student's "home" school. If further support is required, the amount of individual attention paid to the student increases, such as in-classroom assistance, followed by in-school resource withdrawal or consultation with an Itinerant Intensive Support Teacher. The fifth level of support would be placement in a self-contained Intensive Support Class, the purpose of this class is as defined by the Special Education Plan as follows;

- *"provide, for a period of 2 years, intensive support to students who are experiencing severe academic difficulties, primarily in the areas of reading, writing and language;*
- *help students develop compensatory strategies for their learning problems;*
- *foster self-esteem and independence;*
- *provide technological support to compensate for severe reading, writing and language deficits;*
- *provide strategies for students to return to a regular classroom."* [41]

Students who qualify for this level of support are described as follows in the TVDSB Special Education Plan as a student who;

- *"is identified as a student with a Mild Intellectual Disability or a student who is learning disabled;*
- *exhibits increasing gaps between expected levels of academic achievement and current functioning levels;*
- *may exhibit low self-esteem, poor motivation, and/or emotional fragility which make it unlikely for the student to be successful in a regular classroom;*
- *has received interventions (which have been documented) in a regular classroom placement which have not been successful;*
- *has demonstrated strengths in learning skills which can be used to compensate for learning difficulties;*
- *does not exhibit behaviours that would negatively affect the learning of others in the program (ex. aggressive or oppositional behaviour);*
- *will respond to intensive levels of support."* [42]

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[41] TVDSB (2005) Pg. 58.

[42] TVDSB (2005) Pg. 58.

Developmental Disability

Students with Developmental Disabilities would receive support on the same escalating levels as the other exceptionalities. The first level of support is in the regular classroom with an IEP, supplemented if necessary with in-class assistance or in-school resource withdrawal. In addition to the standard support levels, there may be a requirement for consultation with a Learning Coordinator specializing in Special Education. The TVDSB Special Education Plan stresses the importance of keeping the student in the regular classroom, and that the education is individually tailored to the student. In addition, the use of community resources is a valuable asset to develop and create an IEP to best serve the student.

> *"Learning experiences for students with developmental disabilities must correspond with the student's needs, abilities and interests, but may differ in content, process, product and evaluation from grade level curriculum expectations. Agencies such as CPRI, Thames Valley Children's Centre and the Community Care Access Centres may provide consultative services."* [43]

The next level of support, is placement in a self-contained Developmental Class, should the IPRC process recommend this placement. Students who would be recommended for placement in the Developmental Class are students who, have an identified developmental disability and would benefit from extensive levels of support and specialized programs, or have significant adaptive deficits in two or more areas of functioning. The purpose of the Developmental Class is identified as follows in the TVDSB Special Education Plan;

> *"provide a program that reflects the individual student's level of development and, in the process, his/her learning needs. Program focus includes areas of communication and language development, cognitive development, physical development, social and emotional development and community living skills. Activities may focus on communication skills, life skills, self-care, social skills, and/or specialized physical activities and recreation. Integration into school and regular classroom programs, as well as extra-curricular activities are encouraged. When a student with developmental disabilities has severe or multiple disabilities, he/she may be transported to a self-contained class located in a school or facility which has appropriate plant modifications and/or specialized equipment and facilities."* [44]

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[43] TVDSB (2005) Pg. 61.

[44] TVDSB (2005) Pg. 61.

Physical Disability

Students with a Physical Disability would receive support in the form of an IEP in the regular classroom, and may include in-class assistance and consultation with a Learning Coordinator. In addition to the TVDSB services, community support services such as the Thames Valley Children's Centre and/or Community Care Access Centre may supplement these services. The TVDSB Special Education Plan recognizes the fact that the existing buildings are often inadequate facilities with respect to barrier free accessibility throughout the board; and has allowed for these instances within the plan.

> *"A student in a regular class with physical and/or multiple disabilities may be transported to a school or facility other than their home school, if the home school does not have the appropriate plant modifications and/or specialized equipment and facilities to meet the student's needs."* [45]

Visual Impairment

Students with a Visual Impairment would receive support in the form of an IEP in the regular classroom, and may include in-class assistance. As well students with a Visual Impairment, may receive support from a transcriber, intervenor, orientation and mobility trainer, in addition to support from the Itinerant Vision Resource Teacher. If the needs of the student cannot be attained in the student's "home" school, the student may be referred to a Provincial School for the blind. The TVDSB can recommend acceptance of students to W. Ross Macdonald School: School for the Blind and Deaf-Blind located in Brantford, Ontario. The programs are tailored to the needs of the individual student and are described as follows;

- *"are designed to help these students learn to live independently in a nonsheltered environment;*
- *are delivered by specially trained teachers;*
- *follow the Ontario curriculum developed for all students in the province;*
- *offer a full range of courses at the secondary level;*
- *offer courses in special subject areas such as music, broad-based technology,*
- *family studies, physical education, and mobility training;*
- *are individualized, to offer a comprehensive "life skills" program;*

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[45] TVDSB (2005) Pg. 62.

- *provide a home-visiting program for parents and families of preschool deaf-blind*
- *children to assist in preparing these children for future education."* [46]

Additional Programs and Services

The TVDSB lists additional services to encompass all the support provided to exceptional students, these include; Psychological Services, Speech and Language Services and Section 20 Programs. In addition, the TVDSB works with community facilities to provide a continuing educational structure while students are receiving medical care; these include Madame Vanier Children's Services, and the Children's Hospital of Western Ontario. The thesis has provided brief descriptions of the additional services in order to provide a better understanding; of the educational journey a student takes while recovering from mental illness, or other traumatic experiences. In addition to these community programs, the thesis has provided a description of services provided by the Provincial Demonstration School serving the TVDSB. These additional programs and services demonstrate the full range of services provided to exceptional pupils.

Figure 14 - Student with a physical disability receiving physiotherapy

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[46] TVDSB (2005) Pg. 83.

Psychological Services

The TVDSB offers a variety of Psychological Services to support exceptional students with the two most relevant services being Assessment and Consultation.

Students are assessed to understand their intellectual/cognitive functioning, as well as social/emotional and behavioural functioning. The assessment will also establish a baseline for classroom functioning, focusing on the student's academic, social skill and behaviour within the classroom setting. The psychological assessment of exceptional students is used to create educational programs, which will incorporate information about the student's intellectual, social/emotional strengths and difficulties.

Psychological Consultation is provided as an ongoing support service to teachers, learning coordinators, and parents for referred students on matters involving school issues. The support may include interpretation of the psychological assessment and assistance with the classroom implementation of these results. Additionally, assistance will be provided in developing programs for students with learning, social, emotional, behavioural, or intellectual needs, such as further psychological assessments or referrals for treatment.

Section 20 Programs

The Section 20 Program is based in the W.D. Sutton School to provide an "umbrella" program for educational services to various community care treatment and correctional facilities throughout the district. There are currently twenty facilities which provide educational services under the W.D. Sutton School which support students with emotional and behavioural needs. The community facilities are;

- *"CAS Receiving Home*
- *Children's Hospital of Western Ontario*
- *Anago Girls' Home (Parkhill)*
- *Pittock Sutton School at Victory Memorial P.S.*
- *Genest Detention Centre for Youth*
- *King St. Detention Centre*
- *Regional Mental Health Care*
- *Raoul Wallenberg Centre*
- *Salvation Army Bethesda Centre*
- *Community Homes - Adelaide & Sylvan*
- *Madame Vanier Children's Services (871 Trafalgar Street)*
- *Princess Elizabeth (London) P.S.,*

> - *Colborne Street P.S. (Strathroy),*
> - *Springfield P.S.(Partnership with Child and Family Counselling Centre of Elgin)*
> - *Craigwood Youth Services: London& Ailsa Craig*
> - *Western Area Youth Services (WAYS): Maitland Street & Belton House,*
> - *Hardy Geddes House"*[47]

Madame Vanier Children's Services

The following is an excerpt from the TVDSB Special Education Plan. It is a description of services provided by Madame Vanier Children's Services;

> *"Madame Vanier Children's Services is a Children's Mental Health Centre serving London and the surrounding area, offering treatment services to children with behavioural, social and emotional difficulties and their families. Madame Vanier Children's Services' multi-disciplinary staff offer services which include family therapy, child management training, psychiatric and psychological consultation, and special issue groups. These represent a continuum of service ranging from Prevention Outreach, Community Service, Crisis Response, Day Treatment, Residential Placement and Intensive Family Services. Treatment Services are provided through the following clinical teams: Crisis Intervention Team, Family School Team, Early Years Team, Hand-In-Hand Program Team, TLC Program Team, and the Middlesex Team.*
>
> *Most children in the Intensive Treatment Program attend W.D. Sutton School. The Early Intervention Program, along with the Primary, Junior and Intermediate classes of 6-8 students each are located on the main campus. Two primary classes are at Princess Elizabeth P.S. in London, and one class is at Colborne Street P.S. in Strathroy. The educational programs offered are consistent with the Ministry's Grades 1-8 curriculum guidelines. These programs focus on the development of age-appropriate social and cognitive skills, the promotion of self-confidence, the motivation to learn, and improved family functioning. Continued involvement by the child's home school is necessary and support during integration is offered."* [48]

Children's Hospital of Western Ontario

The following is an excerpt from the TVDSB Special Education Plan. It is a description of services provided by Children's Hospital of Western

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[47] TVDSB (2005) Pg. 68.

[48] TVDSB (2005) Pg. 69.

Ontatro;

> *"Children's Hospital of Western Ontario is the Paediatric Division of London Health Sciences Centre located at Westminster Campus. It treats children and young adolescents with medical and with acute psychiatric needs. The school program contributes to normalizing hospitalization and reducing stress which the child might experience when returning to the home school. On-site bedside instruction is provided for those students unable to attend the classroom."* [49]

Provincial Demonstration Schools

The Provincial Demonstration School is a separate facility and is operated by the province. The local board of education has the ability to refer to students to these facilities, and final acceptance to the school is based upon the approval of the Ministry of Education. The Provincial Demonstration School provides intensive training programs designed to prepare students for attendance of their "home" school. The programs are designed to be one year in length, in order that the student is able to return with his/her peer group at the home school. As was the case with Abby Kastelein, whose attendance to Madeline Hardy School at the Child and Parent Resource Institute (CPRI) was documented in the London Free Press article. The TVDSB Special Education Plan describes the intent and purpose of the Provincial Demonstration School as follows;

> *"Provincial Demonstration schools provide residential programs for students with severe learning disabilities. In addition, these schools have special programs for students with severe learning disabilities in association with attention deficit / hyperactivity disorder (ADD/ADHD). These are highly intensive, one-year programs.*
>
> *The Trillium School also operates Learning for Emotional and Academic Development (LEAD), a program for students with severe learning disabilities who require an additional level of social / emotional support.*
>
> *Application for admission to a provincial Demonstration School is made on behalf of students by the school board, with parental consent. The Provincial Committee on Learning Disabilities (PCLD) determines whether a student is eligible for admission.*
>
> > *The following Demonstration Schools offer services for Thames Valley District School Board students:*

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[49] TVDSB (2005) Pg. 69.

- *Amethyst School in London - LD and LD/ADHD Programs serving western and north-western Ontario;*
- *Trillium School - with the LEAD Program serving central and mid-northern Ontario;*
- *Centre Jules-Léger in Ottawa - a residential school serving francophone students and families throughout Ontario.*

  These schools provide special residential education programs for students between the ages of 5 and 21 years. These programs:
- *•enhance the development of each student's academic and social skills;*
- *develop the abilities of the students enrolled to a level that will enable them to return to programs operated by TVDSB within two years;*
- *provide, upon referral from schools, specialized consultative assistance for Individual students;*
- *provide in-service and teacher education programs designed to share*
- *methodologies and materials with TVDSB staff."* [50]

The Provincial Demonstration Schools work with the "home" school with the goal to return the student, whether directly to the regular classroom or a transitional self-contained special education classroom.

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[50] TVDSB (2005) Pg. 84.

Physical Accessibility of School Buildings

The accessibility of schools within the TVDSB is generally poor. This is because the large majority of the existing buildings predate the theory of inclusion. The design never accommodated students with limited mobility, or physical disabilities. It is the intent of the TVDSB to retrofit the existing schools as budget allows, and as needs arise in a particular school. The TVDSB has made a commitment to adhere to the Ontarians With Disabilities Act, 2005. By complying with the provincial regulation, updates such as;

- Unisex barrier free washrooms,
- Ramps to allow students to access buildings,
- Automatic door openers,
- OBC compliant railings and
- Elevators and barrier free lifts will be accommodated throughout the school district until all facilities adhere to the Ontarians with Disabilities Act.

Summary

Although there are as many different options for support service as there are exceptionalities, the overall intent and end goal are the same. The exceptional student is best served in the regular classroom in the student's home school, with an Individual Education Plan to suit the child. To provide the best opportunity for a student to learn and grow at the optimum level, (for each individual,) it is essential that the student attend a regular classroom, with the necessary support system in place. The strategies listed are to be used as a foundation from which the Program Development Team creates the IEP. This strategy clearly supports the educational theory of inclusion. The ability for the TVDSB to provide an equal opportunity education for all students is confirmed by the multi-level approach to delivering education. An understanding of current practise provides a basis to develop design principles. The proposed design principles will create an environment to facilitate all levels of support for students with exceptionalities.

Figure 15 - Addressing the needs of the Accessibility of Schools.

CURRENT EDUCATIONAL THEORY

Introduction

In response to the preliminary research, this thesis focuses on three current educational theories for the delivery of instruction that will most benefit exceptional students. These are; Inclusion, Cooperative Learning and Multiple Intelligences.

In June E. Downing's book Including Students with Severe and Multiple Disabilities in Typical Classrooms: Practical Strategies for Teachers, *Second Edition,* the author describes the use of educational practices employing the theories of Inclusion, Cooperative Learning and Multiple Intelligences as promising developments for exceptional students.

> *"... educational approaches used in typical learning environments that, because they accommodate diversity among learners, appear to be promising for learners with severe and multiple disabilities. Because of the still infrequent cases of inclusion for learners with severe and multiple disabilities in general education classes, few efficacy studies have been conducted to determine teaching strategies that are successful with these learners. Thus, the strategies cited here offered as "promising practices" for two reasons. First, for some of these techniques (e.g., cooperative learning), data indicate that the technique was successful for learners with severe and multiple disabilities in general education classes and other contexts. Second, for other strategies (e.g., multiple intelligences), learning characteristics of students with severe or multiple disabilities suggest the need for such an approach."* [51]

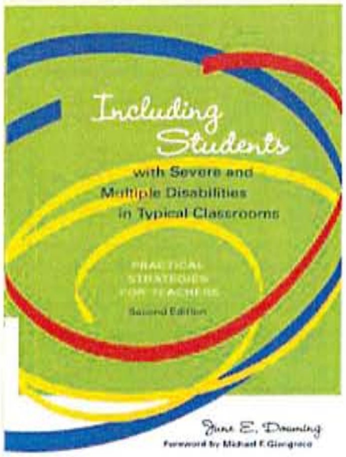
Including Students
with Severe and Multiple Disabilities in Typical Classrooms
Practical Strategies for Teachers
Second Edition
June E. Downing
Foreword by Michael F. Giangreco

Figure 16 - Cover of Including Students with Severe and Multiple Disabilities in Typical Classrooms

The linking of the selected educational theories is a relatively new approach to providing instruction for students with exceptionalities; the research explores the synergies created by this connection. Throughout various research materials Inclusion, Cooperative Learning and Multiple Intelligences were continually described as pertinent approaches to provide the optimum educational experience for students with disabilities. Invariably these theories will also be beneficial to the regular student. As described by Downing, the studies/theories are all on the leading edge of educational theory. Educational practise has been slow to evolve since the

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[51] Downing, June, E. (2002). Including Students with Severe and Multiple Disabilities in Typical Classrooms Practical Strategies for Teachers, Second Edition. Baltimore, Maryland. Paul H. Brookes Publishing Co. Pg 17.

days of the one room schoolhouse, where students were given information from a single source (teacher). Although the method of delivery has evolved due to technological advances and larger class sizes, it essentially remains a single source at the front of the room. Regardless of the arrangement of desks whether they be in rows, a horseshoe shape or clusters it is still a single source of information. Two of the theories, Cooperative Learning and the theory of Multiple Intelligences are departures from the single source style of educating while the theory of Inclusion is a departure from past educational practise, which segregated students with disabilities.

Figure 17 - "One room school house"

Inclusion

The first educational theory explored in order to develop design principles is Inclusion. The word Inclusion has many different definitions throughout the area of educational practise, from including children of different races and economic backgrounds, to including children with disabilities. For the purpose of this research, Inclusion, is the practise of including exceptional students into the regular classroom which is not to be confused with the educational practise of mainstreaming. The definition that is most relevant to this research is defined by Kathleen Garner-Winterman in her thesis dissertation to fulfill the requirements of her Doctor of Education, at the University of Cincinnati. Garner-Winterman's exploration of the Facilitating the social inclusion of students with autism spectrum disorders in responsive classrooms defines Inclusion as follows;

> *"Inclusion and mainstreaming are not synonymous terms. Their differences vary greatly. Inclusion is the full placement of a child with disabilities in the regular classroom with their nondisabled peers. Mainstreaming is the practice where the child with a disability assumes a visitor role in the regular classroom with a larger majority of the day spent in a special education class or resource room.*
>
> *The idea of bringing the student with disabilities into the regular classroom is becoming more common as the theory of Inclusion is making inroads into more education systems throughout the world. This is due in part to legislation as well as, forward thinking by educators and educational administrators. The basis for the theory of Inclusion is founded in research completed by Russian psychologist Lev Vygotsky. Vygotsky's theory implies that learning is a social activity, and the most effective learning takes place in the company of others and through social interaction not just with educators but peers as well. Author and educator Gary Bunch, in his book published by the Inclusion Press Inclusion: How to Essential Classroom Strategies, describes this practice."* [52]

The results of inclusive schools have been well documented, as an example, children with Autism benefit greatly from inclusion, peer support and structured daily lesson plan. Garner-Winterman's thesis concluded that the inclusion of students with Autism in the "regular" classroom was advantageous.

Figure 18 - "Inclusion"

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[52] Garner-Winterman, Kathleen (2003) Facilitating the social inclusion of students with autism spectrum disorders in responsive classrooms. University of Cincinnati. Pg.10.

> *"Learning is not a solitary activity, but one which rests on reflective problem solving discussion with at least one partner. Limiting social interaction with more sophisticated others, such as peers, due to special education practices, may actually be detrimental to learning.*
>
> *To me this is a major argument for accepting that a classroom should be organized to facilitate interaction with a range of others who can act as guides to a student, adults are, of course among these others. But a great resource are the other students in the class and in the school. Vygotsky suggests that peers may support and guide learning as long as they know more than does their partner. With guidance of the teacher and other adults, peers can create a vibrant relaxed learning environment for students with challenges to their learning."* [53]

As is clear from this quote it is essential that the exceptional student be included in the regular classroom. The benefits of peer education to both the exceptional student and the non disabled student are exponential. As an example, the exceptional student is learning in a more relaxed atmosphere, which is broadcast by the peer educator. The non-disabled student is learning to be a positive role model, a leader as well as a teacher. The clearest way to test if a student clearly understands a concept is the ability of the student to explain and teach the concept to his/her peers.

The inclusive classroom is not just beneficial to students with exceptionalities, but enables all students to develop better social skills as explained in the description by Garner-Winterman.

> *"The benefits of inclusion enables all students learn to live and survive in the real world by learning to accept differences. Students with special needs who participate in inclusive learning environments have improved self-esteem and self-confidence. They participate in more extra curricular activities than their non-included peers do. Both students with special needs and typical students demonstrate increased social skills in inclusive classrooms. This is demonstrated through improved problem solving, coping techniques and more appropriate classroom behaviours. Improved behaviour is attributed to positive peer pressure, clearly defined roles for the collaborating teachers, and strong discipline role models."* [54]

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[53] Bunch, Gary (1999) Inclusion: How to Essential Classroom Strategies, Inclusion Press, Toronto, ON. Pg.45.

[54] Garner-Winterman, Kathleen (2003) Pg.11.

As is evident in the previous excerpt from Garner-Winterman, the benefits of Inclusion to the typical student help to grow and develop a more caring, tolerant and accepting individual. This is further supported by the work of author/educator David Westling. Westling lists the benefits to students without disabilities in his book Teaching Students with Severe Disabilities. Westling lists six positive personality traits found in students with classmates who have disabilites.

1. *"Self-concept: growth in their understanding and appreciation of their own personal characteristics.*
2. *Social cognition: growth in their understanding of the feelings and beliefs underlying the behaviour of other people.*
3. *Reduced fear of human differences: reduced anxiety and fear of people who look or behave in an unusual fashion and or increased confidence in their ability to respond appropriately and effectively in interpersonal interactions with such people.*
4. *Tolerance [sic: acceptance] of other people: increased acceptance of the feelings, behaviour, and personal limitations of other nondisabled people, including family and friends.*
5. *Development of personal principles; relationships with students with disabilities contribute to reflection and/or action toward the further formation of clarification of, or commitment to personal moral or ethical principles.*
6. *Experiencing relaxed and accepting friendships."* [55]

These characteristics are the foundation of adults with strong moral character, the kind of person we would like to think the education system is developing to lead the future of the country. Westling's work also develops a list of strategies for schools to provide an Inclusive environment for the students to learn and develop in.

- *"Place students with disabilities in general education homerooms and classrooms*
- *Specialized instruction should occur in environments that are also used by nondisabled peers.*
- *Provide for initial and ongoing ability awareness activities.*
- *Provide information to everyone in the school community about the importance of inclusion.*

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[55] Westling, David L. (2000) Teaching Students with Severe Disabilities, Merrill, Upper Saddle River, NJ. Pg. 231.

- *Model positive and respectful interactions with students with disabilities.*
- *Use curriculum infusion to increase student and teacher knowledge about supporting students with disabilities.*
- *Develop collaborative teams to support school inclusion and individual student support*
- *Involve the parents of all students in supporting inclusion.*
- *Develop peer tutoring, special friends, and peer networks to support the inclusion of students with disabilities.*
- *Facilitate the interactions and friendship development of students with disabilities and their nondisabled peers."* [56]

The strategies to create an inclusive environment rely on peer socialization as a foundation of a successful environment. This is further supported by Garner-Winterman's findings concerning the social relationships within the classroom and the positive effects they have on cognitive development.

> *"social relationships not only foster pleasure and security but also provide a regulatory aspect that enables children to stay calm and alert for learning. Relationships establish patterns of behaviour that aids thinking and learning. Gestures and emotional cueing lay the foundations for complex problem solving and regulating interactions. Children develop mental pictures through interactions. These mental images emerge as symbols, words, and eventually thinking. Emotions organize thoughts and provide a foundation for cognitive development and creativity.*
>
> *The importance of social relationships cannot be understated. Given the significance of social interactions, the placement of students with autism in regular classrooms must be examined to determine the variety and quality of social structures in place to sustain that child's social emotional development. Students' social inclusion is not only vital to their happiness and state of mind but also essential to their academic growth and development."* [57]

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[56] Westling, David L. (2000) Pg. 24.

[57] Garner-Winterman, Kathleen (2003) Facilitating the social inclusion of students with autism spectrum disorders in responsive classrooms. University of Cincinnati. Pg. 8.

In order that students with Autism for example, are given the best opportunity to grow and learn, it is essential that these students be placed in the regular classroom. Although there are challenges to including these students, it will be beneficial in the long term for both the student with the disability and the non-disabled student. In the CBC's article on Autism, the vice-principal of Annapolis East Elementary School in Middleton, Nova Scotia, lists the differences, which set apart students with Autism.

> *"Three aspects set autistic students apart:*
> - *Communication disorders, which hamper the ability to understand instructions;*
> - *Social disorders, which make it difficult for autistic children to interact;*
> - *Sensory integration problems, which mean autistic kids need to be stimulated before they can be motivated to learn."* [58]

The three aspects aside, the Annapolis East Elementary School (AEES), makes an effort to include these students in the regular classroom, as is evident in the quote from the vice-principal.

> *"Our philosophy is kids are only as special as necessary," said Rafuse. "They should be here and included"* [59]

The AEES has developed strategies, which will maintain the focus of the student on the task, decreasing the chance of behaviour problems, by letting the students feel as if they are in control of their own work.

> *"Another factor is giving the students a sense of control. Since autistic children often have problems with socialization, they tend to have trouble switching tasks. The program includes visual prompts to show a child when it's time to change activities. Schedules are clearly posted, and the student checks it himself to see where to go next.*
>
> *Activities are laid out at a workstation in see-through plastic boxes. An autistic child therefore can see she has to do a few activities but then she'll be rewarded with something she likes to do. That way, the students have a sense of control and they're motivated to keep*

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[58] Ali, Amina CBC News Online | October 10, 2003 http://www.cbc.ca/news/background/autism/ns_school.html.

[59] Ali, Amina CBC News Online | October 10, 2003 http://www.cbc.ca/news/background/autism/ns_school.html.

working." [60]

Children with autism are but one example of an exceptionality that needs to be included in the regular classroom, not just as a visitor but a full time contributing member of the group. It is essential all students be included. The theory of Inclusion provides aspects that translate into positive design principles to enable a constructive educational environment.

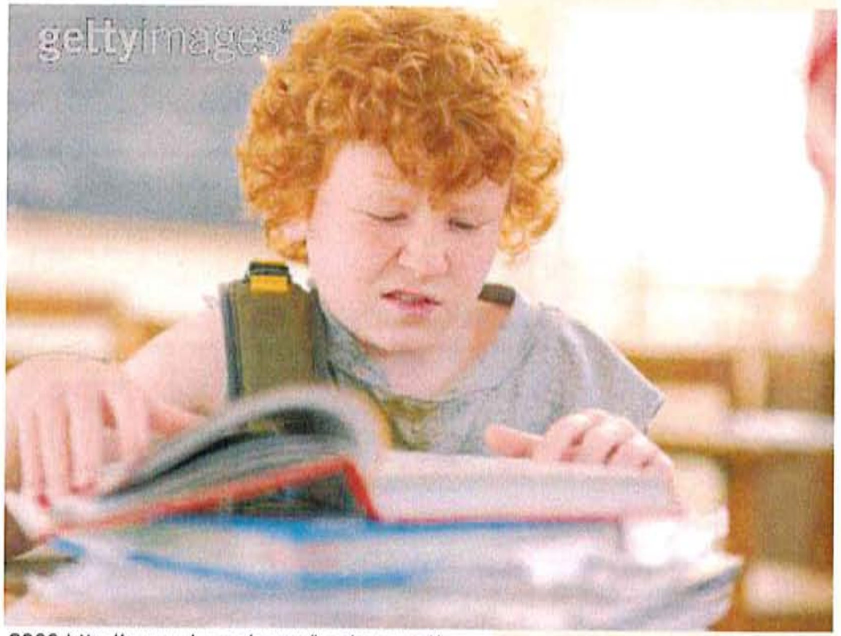

Figure 19 - "Discouraged Student."

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[60] Ali, Amina CBC News Online | October 10, 2003 http://www.cbc.ca/news/background/autism/ns_school.html.

Multiple Intelligences

> *"Once upon a time there was a school for animals. The teachers were certain it had a very comprehensive curriculum, but somehow all the animals were failing. The duck was the star in the class for swimming, but was flunking tree climbing. The monkey was great at tree climbing, but was getting F's in swimming. The chickens excelled in grain research, but disrupted the tree climbing class so much they were sent to the principal's office daily. The rabbits were sensational in running, but had to have private tutoring in swimming. Saddest of all were the turtles, who, after many diagnostic tests were pronounced "developmentally disabled." Yes, they were sent to a special class in a remote gopher hole. The question is, who were the real failures?*
>
> *Like the animals in the story, each student is a unique creation...a person who has a different set of talents, intelligences, and ways of learning, it is time to take seriously the fact that the predominant focus of American education favours students who are adept in verbal and logical mathematical skill and those ways of learning, but discourages those who have different innate intelligences. One might ask, all are not tree climbers, but are great swimmers or runners doomed to failure simply because they are in a system designed solely for a different type of animal?"* [61]

The colourful story clearly illustrates the problems facing the educational system today. We are now realizing that children whether they are a "duck, monkey, chicken, rabbit or turtle" are all different. Each child may excel in one subject area, but struggle in another. The current system does not allow for different strengths and weaknesses. It is and has been, since the days of the one room schoolhouse, catering to the students who are strong in verbal linguistic and mathematical learning. The result of this story paints a picture of a classroom full of animals just waiting for their favourite subject. We can all relate to having a favourite subject, one particular area that comes relatively easy to us. Educators and researchers have developed an understanding of the differences in children and learning styles. As an example, the following excerpt from Norm Forman's book Exceptional children, ordinary schools : getting the education you want for your special needs child clearly identifies the need for changes to the system for not only special needs students but all students in general.

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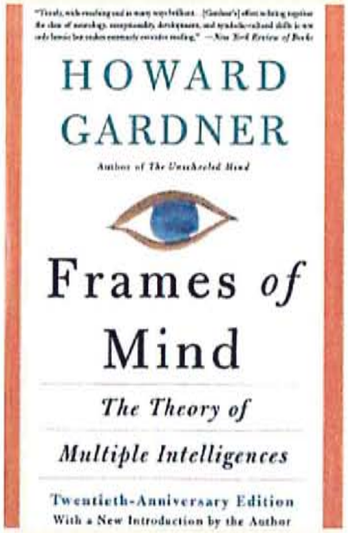
[61] Gibbs, Jeanne. (2001). TRIBES: A New Way of Learning and Being Together. Windsor, California. Center Source Systems. Pg. 63.

> *"Much research has been conducted recently on learning styles and multiple intelligences, both of which are important for children with special needs. Despite their names, learning styles and multiple intelligences actually have nothing to do with intelligence or ability. Rather, they help to explain how we go about learning or processing information. Some students are visual learners; they learn predominately by seeing. Others are auditory learners who learn best through verbal lectures and class discussions. These students need to hear the information before they can process it. Still others are kinaesthetic/tactile learners, learning through action and movement. Easily bored with traditional methods of instruction, kinaesthetic/tactile learners need lots of activity and hands on exploration.*
>
> *Schools traditionally focus on and reward intelligence that is strong in logic, reasoning, and math, areas that our society regards very highly. Exceptional children, who are often not strong in these areas, can be unduly discriminated against and made to feel inadequate. They are sometimes referred to, in this context, as being underachievers. It is very important, then, that the schools adopt a broader range of intelligences and help children to identify their strengths and value them accordingly. Schools must explore ways to incorporate these alternative concepts into programs not only for special needs children but for all children as well."* [62]

Forman proposes an educational delivery system based in the theory of Multiple Intelligences. Dr. Howard Gardner first proposed the theory of multiple intelligences in 1983 in his book Frames of mind: The theory of multiple intelligences. The initial hypothesis created a stir in educational systems throughout the United States, sparking debate and reform throughout the country. Since its introduction over twenty years ago, the theory has created volumes of secondary literature by educators and psychologists from around the world propagating the theory.

The theory asks educators to consider that people learn in various ways, and therefore may show their intelligences in various ways. The education systems throughout North America traditionally reward linguistic and logical-mathematical intelligences both in the design of the curriculum as well as the testing of the intelligence. Initially the Theory of Multiple Intelligences consisted of seven different types of intelligence or learning styles; *linguistic, logical-mathematical, musical, bodily-kinaesthetic, spatial, interpersonal,*



HOWARD
GARDNER
Author of The Unschooled Mind
Frames of
Mind
The Theory of
Multiple Intelligences
Twentieth-Anniversary Edition
With a New Introduction by the Author

Figure 20 - Cover of Frames of Mind.

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[62] Forman, Norm (2005) Exceptional children, ordinary schools : getting the education you want for your special needs child, Fitzhenry & Whiteside, Markham, ON. Pg. 28.

intrapersonal. Each intelligence describes a method of learning, not to say that each method is the only way a person learns but that a particular type of learning or intelligence is their strong point. There are many varied definitions of each of the intelligences; however, it is best left to the original author. Dr. Gardner describes each of the initial seven intelligences as follows:

> *"Linguistic intelligence involves sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. Lawyers, speakers, writers, poets are among the people with high linguistic intelligence*
>
> *Logical-mathematical intelligence involves the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. Mathematicians, logicians, and scientist exploit logical-mathematical intelligence.*
>
> *Musical intelligence entails skill in the performance, composition and appreciation of musical patterns.*
>
> *Bodily-Kinaesthetic entails the potential of using one's whole body or parts of the body (like the hand or the mouth) to solve problems or fashion products. Obviously, dancers, actors, and athletes foreground bodily kinaesthetic intelligence. However, this form of intelligence is also important for craftsperson's, surgeons, bench-top scientists, mechanics, and many other technically orientated professionals.*
>
> *Spatial intelligence features the potential to reorganize and manipulate the patterns of wide space (those used, for instance, by navigators and pilots) as well as the patterns of more confined areas (such as those of importance to sculptors, surgeons, chess players, graphic artists, or architects). The wide-ranging ways in which spatial intelligence is deployed in different cultures clearly show how a bio-psychological potential can be harnessed by domains that have evolved for a variety of purposes.*
>
> *Interpersonal intelligence denotes a person's capacity to understand the intentions, motivations and desires of other people and, consequently, to work effectively with others. Salespeople, teachers, clinicians, religious leaders, political leaders and actors all need acute interpersonal intelligence.*
>
> *Intrapersonal intelligence involves the capacity to understand oneself, to have an effective working model of oneself - including one's own desires, fears and capacities-and to use such information*

> *effectively in regulating one's own life."* [63]
>
> *Dr. Gardner created these descriptions of different intelligences by establishing a new definition of intelligence; "the ability to solve problems or to create products that are valued within one or more cultural settings."* [64]

Each of the defined intelligences was documented using eight criteria Dr. Gardner established in order to validate the proposed human intelligence. The criteria are founded in different roots, two of the criteria are developed from biological sciences, two are rooted in logical analysis, two are from developmental psychology and the final two are from traditional psychological research. These criterions validate the prospective intelligence and establish the guidelines for an equal frame of reference.

The first criteria "*The potential of isolation by brain damage*" [65] describes a candidate intelligence that is separated from other forms of intelligence, as an example a person who has suffered a brain injury, who is unable to communicate verbally, but can still communicate either in written form or via sign language would indicate separate linguistic intelligences.

The second criteria "*An evolutionary history and evolutionary plausibility*" [66] an example would be the inference that early hominids had to be capable of spatially finding their way around diverse terrains, as well we can study the highly developed spatial capacities of other mammals, such as rats learning the way through a maze. Therefore a historical precedent is established which directly relates to the proposed intelligence.

The third criteria "*an identifiable core operation or set of operations*" [67] an example of this criteria is linguistic intelligence. Linguistic intelligence includes core operations of phonemic discriminations, command of syntax, sensitivity to the pragmatic use of language, and acquisition of word meaning. Each of these "cores" or sub-intelligences" is so closely related that they can be grouped into one heading.

The fourth criterion is a *"susceptibility to encoding in a symbol system."*

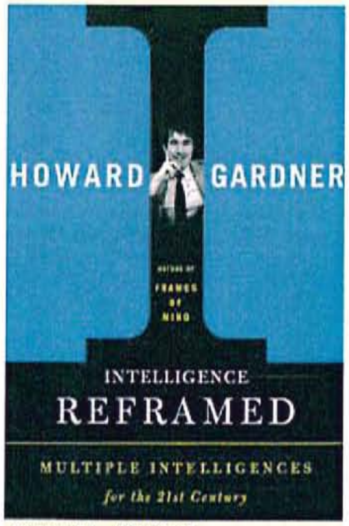

Figure 21 - Cover of Intelligence Reframed.

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[63] Gardner, Howard (1999) Intelligence Reframed, Multiple Intelligences for the 21st Century, Basic Books, New York, New York. Pg. 41-43.
[64] Gardner, Howard (1999) Pg. 33.
[65] Gardner, Howard (1999) Pg. 36.
[66] Gardner, Howard (1999 Pg. 36.
[67] Gardner, Howard (1999) Pg. 36.

[68] Almost everything we do is mastering and manipulating various kinds of symbol systems, spoken and written language, mathematical systems, charts, drawings, logical equations etc. These systems have been developed by people to convey culturally important information systematically and accurately.

The fifth criterion is *"a distinct developmental history, along with a definable set of expert "end-state" performances."* *Individuals do not exhibit their intelligences "in the raw"; they do so by occupying certain relevant niches in society, for which they must prepare by passing through an often-lengthy developmental process. In a sense, intelligences have their own developmental histories. Thus, people who want to be mathematicians must develop their logical-mathematical abilities in certain ways. Other people must follow distinctive developmental paths to become, for instance, clinicians with well developed interpersonal intelligence or musicians with well-developed musical intelligence."* [69] This criterion is defined by the ability of the individual to use the learned intelligence to operate in a specific area related to that of the intelligence as stated in the examples.

The sixth criterion is *"the existence of savants, prodigies and other exceptional people."* [70] These people provide examples of the isolation of intelligence. As an example, as cited by Dr. Gardner "*children with Autism are outstanding at numerical calculation, musical performance or reproduction of melodies, or drawing. At the same time, they characteristically evince marked impairments in communication, language and sensitivity to others."*[71] As stated the existence of special intelligence is often in areas that require little life experience, as an example mathematical ability or exceptional musical ability. The basics of these abilities are learned easily, and then expanded upon significantly by the individual. Researchers have identified that these abilities (intelligences) are processed in the left side of the brain. However, the ability to relate to other people in a caring and sensitive way is a function of the right side of the brain, which is the area savants are usually deficient in. By examining the abilities of rarities in nature such as savants, researchers are able to better understand the communication patterns of the human brain.

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[68] Gardner, Howard (1999) Pg. 37.
[69] Gardner, Howard (1999) Pg. 36.
[70] Gardner, Howard (1999) Pg. 39.
[71] Gardner, Howard (1999) Pg. 39.

The seventh criterion is *"support from experimental psychological tasks. Psychologists can tease out the extent to which two operations are related to each other by observing how well people can carry out two activities simultaneously. If one activity does not interfere with the other, researchers can assume that the activities draw on discrete brain and mental capacities. For example, most of us have no trouble walking or finding our way around while we are conversing; the intelligences involved are separate. On the other hand, we often find it very difficult to converse while we are working on a crossword puzzle or listening to a song with words; in these cases, two manifestations of linguistic intelligence are competing."* [72] The example set forth by Dr. Gardner explains that functions, which are similar in nature, are being processed in the same area of the brain therefore slowing down the process for both tasks. It does not mean that they cannot be accomplished.

The eighth criterion is *"support from psychometric findings."* [73] As Dr. Gardner explains, the development of the theory of multiple intelligences was developed out of a reaction to psychometrics, however, the testing is able to validate the existence of individual intelligences. Psychometric testing such as aptitude tests can validate both forms of personal intelligence as separate intelligences. With scientific criteria established to validate the proposed intelligences, they clearly become defined as separate entities.

Dr. Gardner has since updated his thoughts on intelligences in his most recent book Intelligence Reframed, Multiple Intelligences for the 21st Century. Dr. Gardner poses the question of the addition of two further intelligences. The process of examining the criteria of intelligence has also been advanced, in fact, Gardner has refined his definition.

> *"Nearly two decades later, I offer a more refined definition. I now conceptualize an intelligence as a biophysical potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture. This modest change in wording is important because it suggest that intelligences are not things that can be seen or counted. Instead they are potentials – presumably, neural ones - that will or will not be activated, depending upon the values of a particular culture, the opportunities available in that culture, and the personal decisions*

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[72] Gardner, Howard (1999) Pg. 40.

[73] Gardner, Howard (1999) Pg. 40.

> *made by the individuals and/or their families, schoolteachers, and others."* [74]

With this revised definition, Gardner has added two supplementary intelligences. The two proposed intelligences, naturalist and existential, did not necessarily meet the original eight criteria of the intelligences as set out by Gardner in his original proposal of the theory. The two new intelligences were on the periphery of making the list in 1983. A *naturalist intelligence* is an awareness of plants and animals with an ability to identify and recognize them. This is a quantifiable intelligence because cultures have always placed a high value on the natural environment and conservation, it now becoming more prevalent in North American culture.

The second new intelligence is *existential intelligence*, which is an understanding of a higher state of mind or being, with an understanding of religion or supernatural phenomenon. This intelligence also becomes quantifiable, given that all cultures around the world have a belief in some form of supernatural existence, whether it is through religion or other non-quantifiable form.

In order to create a learning environment which will be of benefit to all the students not just the students who are strong in linguistic and logical-mathematical intelligence it is necessary to cater to all of the intelligences.

> *"The recesses of our minds remain private, and no one can tell the mind exactly what to do. The challenge to the mind is to make sense of experiences, whether on the street or in the classroom. The mind maximally uses the resources at its disposal – namely, our intelligences."* [75]

Since 1983 schools across the United States have begun to alter the curriculum to include all types of learners.

> *"There is much evidence that schools influenced by MI theory are effective. The testimonials from satisfied administrators, parents, students, and teachers are legion. And many of the classes and schools claim that students are more likely to come to school, to like school, to complete school, and to do well in assessments. Of course, this evidence is almost entirely based on self-reports and is*

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[74] Gardner, Howard (1999) Pg. 34.

[75] Gardner, Howard (1999) Pg. 112.

> *thus skewed in favour of MI advocates, who are more likely to report their reactions than are MI critics.*
>
> *Thus, I am most pleased that the educational researches Mindy Kornhaber and her colleagues at Harvard's Project Zero have undertaken the SUMIT (Schools Using Multiple Intelligences Theory) project. The research team has been studying forty-one schools around the United States that have been applying MI theory for at least three years. The results from these schools are encouraging 78 percent of the schools reported positive standardized test outcomes, with 63 percent of these attributing the improvement to practices inspired by MI theory. Seventy-eight percent reported improved performances by students with learning difficulties. Eighty percent reported improvement in parent participation, with 75 percent of these attributing the increase to MI theory; and 81 percent reported improved student discipline, with 67 percent of these attributing the improvement to MI theory. Even though these figures may reflect a positive spin, they are based on empirical data, which an impartial party cannot dismiss."* [76]

In order to set up an educational experience based in the theory of Multiple Intelligence the SUMIT Team at Harvard's Project Zero have developed a set of guidelines called the *Compass Point Practices©*

- *"Readiness. It is important to launch processes that build awareness about MI ideas and how they might be implemented. Such processes could include a faculty seminar, a parent awareness night, or a visit to other MI schools. This process of building awareness can be lengthy if the school does not already have beliefs and practices that are at least loosely aligned with the themes and spirit of MI.*
- *Culture. MI practices are most likely to emerge in settings that support diverse learners and encourage steady, hard work.*
- *Collaboration. There should be ample opportunities for formal and informal exchanges, both within the school and with others who share experiences and concerns. These exchanges remain crucial once the processes of change have begun, because there are always problems to discuss and decisions to make.*
- *Choice. The school should offer meaningful options for curriculum as well as assessment of student growth and learning. The options should make sense both to the students and to the wider community. An "MI setting" can be undone if the curriculum is too rigid or if there is but a single form of*

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[76] Gardner, Howard (1999) Pg. 113.

> *assessment.*
>
> - *Tool. Multiple intelligences should be used as a means of fostering high-quality student work. In the last analysis, it is the students' work and their understanding of it that are the hallmarks of good schooling. MI approaches work best when integrally yoked to outcomes that everyone cares about strongly.*
> - *Arts. A program rich in the arts should assume a significant role in the school. Otherwise, it will be difficult to address the range of intelligences exhibited by students and teachers."* [77]

In addition to the *Compass Point Practices©* Dr. Gardner discusses "Entry Points" for the different intelligences, which help direct the delivery of curriculum based in Multiple Intelligences.

> *"Entry Points;*
>
> *1. Narrational – The narrational entry point addresses students who enjoy learning about topics through stories. Such vehicles-linguistic or filmic-feature protagonists, conflict, problems to be solved, goals to be achieved, and tensions aroused and, often, allayed.*
>
> *2. Quantitative/Numerical – The quantitative entry point speaks to students who are intrigued by numbers and the patterns they make, the various operations that can be performed, and insights into size, ratio, and change.*
>
> *3. Logical – The logical entry point galvanizes the human capacity to think deductively. Many events and processes can be conceptualized in terms of syllogisms.*
>
> *4. Foundational/Existential – This entry point appeals to students who are attracted to fundamental kinds of questions. Nearly all children raise such questions through myths or art; the more philosophically oriented pose issues and argue about them verbally.*
>
> *5. Aesthetic – Some people are inspired by works of art or by materials arranges in ways that feature balance, harmony, and composition.*
>
> *6. Hands On – Many people, particularly children, most easily approach a topic through an activity in which they become fully engaged – where they can build something, manipulate materials, or carry out experiments.*
>
> *7. Social – The entry points I've been describing address the individual. Many people learn more effectively, however, in a group setting, where they can assume different roles, observe others'*

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[77] Gardner, Howard (1999) Pg. 147.

> *perspectives, interact regularly, and compliment one another."* [78]

In order to provide an environment to enable the delivery of education based in the theory of Multiple Intelligence, it is essential to understand both the *Compass Point Practices©* and the *Entry Points*. Multiple Intelligence offers a new outlook for educating students with exceptionalities as well as regular students, by providing a positive experience to help the child reach a maximum potential.

> *"How can thinking about these varied forms of intelligence help teachers work with students who have disabilities? For too long, educators have looked at the deficits of students with disabilities and not at their strengths. This model can help teachers begin to focus on growth and to look at the positive contributions that can be made when students are given an opportunity to express their intelligence in different ways."* [79]

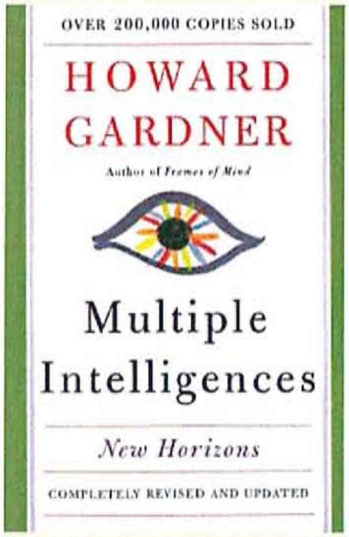

Figure 22 - Cover of Multiple Intelligences New Horizons.

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[78] Gardner, Howard (1999) Pg. 171.

[79] Mayberry, Sally C. (2002) Teaching Students with Special Needs in the 21st-Century Classroom, Scarecrow Press, Lanham, MD Pg. 38.

Cooperative Learning

> *What children can do together today, they can do alone tomorrow.*
> *Lev Vygotsky, 1962*

The third educational theory research explores is Cooperative Learning (CL), because as a theory Cooperative Learning is complimentary to both Inclusion and Multiple Intelligence. Cooperative Learning is a unique method of education, and there are large amounts of empirical data confirming the positive outcomes, as described in the quotation from Dr. Spencer Kagan an internationally acclaimed researcher and author.

> *"No other researched educational innovation has ever demonstrated such broad and consistent positive effects on students. When working cooperatively, students of all grades and content areas achieve more academically, acquire social skills, improve social relations including cross-race relations, feel better about themselves, and like school more. What could possibly be better for our students than giving them the tools to succeed in school and in our increasingly pluralistic society? What could possibly be better for our society at large than equipping our citizenry with the skills to not only tolerate diversity, but to appreciate it! Through cooperative learning, we provide a positive model in our classrooms of what our society ideally can be."* [80]

Cooperative Learning is simply described as instructing students in small groups, working together to achieve a greater level of success, contrary to working individually. The students receive instruction from the teacher for an assignment and then work together combining strengths and bolstering weaknesses. The group understands the level of success is directly dependent on all members of the group contributing to resolve the final goal, and the result is only as successful as the contributions of the entire group.

The following definition is an excerpt from two of the leading authorities on Cooperative Learning Roger T. Johnson and David W. Johnson.

> *"Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning. The idea is simple. Class members are organized into*

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[80] Kagan, Spencer, Cooperative Learning and Multiple Intelligences - What are the Connections?. Kagan Online Magazine, Fall 1998. http://www.kaganonline.com/KaganClub/FreeArticles/ASK02.html.

> *small groups after receiving instruction from the teacher. They then work through the assignment until all group members successfully understand and complete it. Cooperative efforts result in participants striving for mutual benefit so that all group members gain from each other's efforts (Your success benefits me and my success benefits you), recognizing that all group members share a common fate (We all sink or swim together here), knowing that one's performance is mutually caused by oneself and one's colleagues (We can not do it without you), and feeling proud and jointly celebrating when a group member is recognized for achievement (We all congratulate you on your accomplishment!). In cooperative learning situations there is a positive interdependence among students' goal attainments; students perceive that they can reach their learning goals if and only if the other students in the learning group also reach their goals."* [81]

Cooperative learning is not a new method of educating students; it has been around as long as people have been learning. The examples cited by Johnson and Johnson date back to one thousand years BC, the Talmud scholars who were recorded to have studied in pairs. As well as the example of Francis Parker, who using the Lancaster Schools in New England during the late 1800's, completed studies comparing the benefits of Cooperative Learning to Competition Learning or Individualistic Learning. Cooperative learning first became noted as an educational theory when Morton Deutsh, presented *The Social Interdependence Theory* as part of his 1949 Dissertation Study at Columbia University as described in the question and answer section of Roger and David Johnson's web site at The Cooperative Learning Centre at The University of Minnesota. [82]

Johnson and Johnson describe five basic elements to Cooperative Learning; Positive Interdependence, Face-to-Face Promotive Interaction, Individual Accountability, Interpersonal And Small Group Skills and Group Processing. Each of these five elements is defined as follows by Johnson and Johnson.

> *"Positive Interdependence*
> *Students perceive that they need each other in order to complete the group's task ("sink or swim together"). Teachers may structure positive interdependence by establishing mutual goals (learn and make sure all other group members learn), joint rewards (if all group members achieve above the criteria, each will receive bonus points), shared resources (one paper for each group or each*

Figure 23 - Children Learning in Groups.

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[81] http://www.co-operation.org/pages/cl.html. - September 21, 2006.
[82] http://www.co-operation.org/pages/qanda.html - September 21, 2006.

> *member receives part of the required information), and <u>assigned roles</u> (summarizer, encourager of participation, elaborator).*
>
> *Face-to-Face Promotive Interaction*
> *Students promote each other's learning by helping, sharing, and encouraging efforts to learn. Students explain, discuss, and teach what they know to classmates. Teachers structure the groups so that students sit knee-to-knee and talk through each aspect of the assignment.*
>
> *Individual Accountability*
> *Each student's performance is frequently assessed and the results are given to the group and the individual. Teachers may structure individual accountability by giving an individual test to each student or randomly selecting one group member to give the answer.*
>
> *Interpersonal And Small Group Skills*
> *Groups cannot function effectively if students do not have and use the needed social skills. Teachers teach these skills as purposefully and precisely as academic skills. Collaborative skills include leadership, decision-making, trust-building, communication, and conflict-management skills.*
>
> *Group Processing*
> *Groups need specific time to discuss how well they are achieving their goals and maintaining effective working relationships among members. Teachers structure group processing by assigning such tasks as (a) list at least three member actions that helped the group be successful and (b) list one action that could be added to make the group even more successful tomorrow. Teachers also monitor the groups and give feedback on how well the groups are working together to the groups and the class as a whole."* [83]

It is essential that all five basic elements are present. In addition, each element must be attained to a sufficient level in order for the group as well as the individual to be successful.

Cooperative Learning is based in the psychological theory of social interdependence. It is within the theory of social interdependence that cooperative learning becomes validated.

There are three psychological theories that formed the basis of Cooperative

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[83] David W. Johnson, Roger T. Johnson, Edythe Johnson Holubec.
Cooperation in the Classroom. Edina, MN: Interaction Book Company, 1991.

Learning; cognitive-developmental, behavioural and social interdependence. The cognitive developmental perspective is largely based on the theories of Jean Piaget and Lev Vygotsky. The work of Piaget and related theorists is based on the premise that when individuals co-operate within a contained environment, socio-cognitive conflict occurs. This conflict creates cognitive disequilibrium which in turn stimulates a perspective-taking ability and cognitive development. The work of Vygotsky and related theorists is based on the premise that knowledge is social; constructed from cooperative efforts to learn, understand, and solve problems. The behavioural theory perspective focuses on the impact of group reinforcers and rewards on learning. Skinner focused on group contingencies, Bandura focused on imitation, and Homans focused on the balance of rewards and costs in social exchange among interdependent individuals. While the cognitive-developmental and behavioural theoretical orientations have their followings, by far the most important theory dealing with cooperation is social interdependence theory. Theorizing on social interdependence began in the early 1900s, when one of the founders of the Gestalt School of Psychology, Kurt Koffka, proposed that groups were dynamic wholes in which the interdependence among members could vary. One of his colleagues, Kurt Lewin refined Koffka's notions in the 1920s and 1930s while stating that (a) the essence of a group is the interdependence among members (created by common goals) which results in the group being a "dynamic whole" so that a change in the state of any member or subgroup changes the state of any other member or subgroup, and (b) an intrinsic state of tension within group members motivates movement toward the accomplishment of the desired common goals. It is the drive for goal accomplishment that motivates cooperative and competitive behaviour. The basic premise of social interdependence theory is that the type of interdependence structured in a situation determines how individuals interact with each other that, in turn, determine outcomes. Positive interdependence tends to result in promotive interaction; negative interdependence tends to result in oppositional interaction, and no interdependence results in an absence of interaction.[84]

The research confirms the positive aspects of Cooperative Learning. With all of these positives, the question remains, why are all schools not cooperative learning centres? Johnson and Johnson create a constructive argument for the benefits as cited.

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[84] http://www.co-operation.org/pages/SIT.html - September 21, 2006.

> *"Schools are not buildings, curricula, timetables, and machines. Most fundamentally schools are relationships and interactions among people focused on learning. How interpersonal interactions are structured among everyone in the school environment determines how effective schools are. Cooperation among students is part of the larger issue of the organizational structure of the school.*
>
> *Schools need to change from a mass-production, competitive/ individualistic organizational structure to a high-performance, cooperative, team-based organizational structure. In doing so, traditional schools become cooperative schools. In a cooperative school, students work primarily in cooperative learning groups, teachers and building staff work in cooperative teams, and district administrators work in cooperative teams. The organizational structures of the classroom, school, and district are then congruent. Each level of cooperative teams supports and enhances the other levels."* [85]

The movement towards Cooperative Learning is happening. An example is the Thames Valley District School Board (TVDSB). The TVDSB is now supporting principals throughout the board to provide the opportunity for teachers to be trained as Cooperative Educators, through the *TRIBES LEARNING COMMUNITIES (TLC®)* program.

The TVDSB is forging ahead with this new direction in education, training educators to become *Tribes TLC® facilitators* as well as making strides to convert schools to *Tribes TLC®* Schools. Tribes as described by author Jeanne Gibbs is a *"process"*;

> *"It is based on a synthesis of studies on children's development, cooperative learning, cognition, systems theory, multiple intelligences, human resilience and the skills needed for the 21st century."* [86]

The initial drive towards the *Tribes* program was to achieve better levels of classroom discipline. The theory states that students will "police" themselves as part of a greater group is one of the positive spin-offs of cooperative learning. There are less recorded disturbances for discipline in the *Tribes TLC®* schools. The tribes program extends beyond the classroom; the goal of tribes is to be a positive influence throughout the overall school

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[85] http://www.co-operation.org/pages/cs.html - September 21, 2006.

[86] Gibbs, Jeanne. (2001). TRIBES: A New Way of Learning and Being Together. Windsor, California. Center Source Systems. Pg. 11.

community. The benefit of collegiality created amongst teachers and support staff provides a positive influence on planning and preparation time through a collaborative approach. The quotation from the *Tribes TLC®* workbook highlights these goals.

- *"re-culture and restructure the whole school as a learning community;*
- *develop teacher collegiality, reflective practise and collaborative planning;*
- *focus on the socialization of students as well as intellectual development;*
- *raise levels of academic achievement"* [87]

Author Jeanne Gibbs answers three essential questions; what is Tribes? What is the Mission of Tribes? Moreover, what is the goal of a tribe's school?

> *"What is Tribes?*
>
> *... small learning groups to increase participation and peer support.*
> *... tribes is a democratic group process.*
> *... A "process" is a sequence of events that lead to the achievement outcome.*
>
> *The mission of Tribes is*
> *To assure the healthy development of every child so that each has the knowledge, skills, and resiliency to be successful in a rapidly changing world.*
>
> *The goal for a Tribes school is*
> *To engage all teachers, administrators, students, and families in working together as a learning community that is dedicated to caring and support, active participation, and positive expectations for all students."* [88]

Tribes TLC® process is a packaged teaching aid. It provides instruction and reference materials for educators to change their school from the traditional competitive model to one of Cooperative Learning. The *Tribes TLC®* system changes the typical method of education delivery by changing the established elements of delivery that currently exist within the school system.

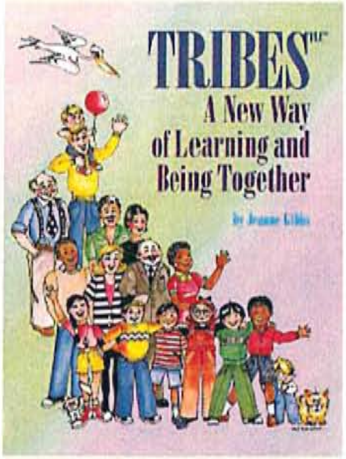

Figure 24 - Cover of Tribes: A New Way of Learning and Being Tgether.

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[87] Gibbs, Jeanne. (2001). Pg. 11.
[88] Gibbs, Jeanne. (2001). Pg. 11.

- *"The classroom is student-centred (people no longer relate primarily to the teacher, but work with peers)*
- *The teacher becomes a facilitator, using the proven group development process*
- *Everyone belongs to a long-term membership group and feels included and valued for their unique contribution*
- *Students themselves are involved in classroom management (defining agreements, problem-solving, choosing tasks, and sustaining the positive learning environment)*
- *Teachers use multiple strategies to reach and teach students of multiple cultures, intelligences and abilities*
- *Students learn both critical thinking and collaborative social skills along with academic content.*
- *Individual and group accountability is assessed jointly by students and teacher*
- *Inherent in the Tribes process are the protective factors that foster resiliency: caring/sharing, active participation, and positive expectations."* [89]

These changes to the traditional school and the delivery of the curriculum will help bring the school system to the forefront of education, mimicking the models used by successful businesses throughout the world.

Figure 25 - "Group Learning".

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[89] Gibbs, Jeanne. (2001). Pg. 24.

Summary

Throughout the research, the selected educational theories presented similar fundamental principles, which would be beneficial in the delivery of instruction to children with exceptionalities. These theories have been linked together to provide a promising instruction method for exceptional children as defined in Jane Downing's book. In the recent past, each of the individual theories has been applied in isolation; however, when applied collectively they compliment and create a comprehensive theory for educational reform. These theories are currently being applied in various forms throughout the Thames Valley District School Board among others. The "Tribes" program is a specific example applying these theories in combination, changing the education for the masses to an education for the individual in a collective setting. The changing dynamic of education for students with exceptionalities is demanding the educational environment keep pace with the evolving instruction methods. Schools are being retrofitted to provide barrier free accessibility options for students who require assistance. To assist the delivery of a new educational model a new environmental model, needs to be created. The development of a series of design principles, created from the educational theories will assist in the creation of a new learning environment.

Figure 26 - Children Interacting with the Built Environment.

ENVIRONMENTAL PERCEPTION

Introduction

In the previous chapter, different educational theories were presented in order to provide a knowledge base that will inform the development of design principles. In this chapter, the research examines ideas based in social sciences that will provide insight into a child's perception of the environment, both the natural environment and the built environment. In addition, the research reviews how the environment affects the development of the child. Additionally the research investigates the affects of nature and the natural environment on the development and well being of children.

> *"One primary motivation for our interest in children and the environment is the belief that stimulus impoverishment causes perceptual and learning deficits in the developing child. Conversely, it is believed that enriched environments will accelerate the development of perceptual, motor, and cognitive abilities."* [90]

As stated in the quote from Baird and Lutkens' transcript of a conference titled Mind, Child, Architecture there is a belief that the environment can be a negative or positive factor in the development of children. The understanding of environmental perception is essential in developing a positive dynamic to aid in the delivery of education, as well as creating a fostering atmosphere enabling children to learn more efficiently. Developmental psychologists have studied how children experience both the built and the natural environments, compiling data on the developmental stages of human perception and cognition. Architects who are creating environments for children are rarely using this data. The social sciences can provide a great asset in developing design principles to create enriched environments to assist in the delivery and understanding of curriculum. By utilizing the theories developed in the field of environmental perception and specifically the theories regarding learning as it relates to the built form and natural environments. It is therefore a general understanding that environmental perception and spatial cognition will inform the development of design principles. The following is a general description of environmental perception and spatial cognition.

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[90] Baird, John C. and Lutkens, Anthony D. (editors) (1982) Mind, Child, Architecture, University Press of New England, Hanover, NH. Pg. 5.

By definition, environmental perception is an emphasis on large-scale scenes that are treated as whole entities. Not only are the environments composites of objects, but they are viewed and experienced from varying perspectives as a person moves about the scene. In contrast, object perception emphasizes the properties of simple stimuli, such as brightness, color, depth, perceptual constancy, form, and apparent movement, which are all viewed from a static position. In fact, environmental perception can be divided into two distinct categories, utilitarian and aesthetic. Many studies have been completed on the aesthetic qualities of buildings, and results conclude that people actually pay more attention to the utilitarian elements within the environment.

How we perceive the environment is unique as well. We do not observe every item in an environment. The environment constantly offers more information than any of us can process at any one time; we are constantly selecting only small manageable portions of information for digestion. In fact, we sometimes pay little attention to our physical surroundings even when they cause us discomfort. This is a state known as environmental numbness. This numbness, or lack of awareness of our surroundings often occurs when we are distracted by other attentions such as reading, conversation with a friend or daydreaming. [91]

How do we perceive environments? What determines a utilitarian object from an aesthetic one? Theories as to how we process the environmental information are varied, however, James J. Gibson believed that certain arrangements of cues give the perceiver direct immediate perceptions of the environment. Gibson theorized that the world is composed of substances (i.e., clay, steel, glass) and surfaces. The arrangements of these surfaces (called layouts) provide affordances, or instantly detectable functions. For example, a solid horizontal surface is said to offer or afford support and rest. In addition, an extended solid horizontal surface affords locomotion, but a vertical solid surface affords mechanical contact and stops locomotion. The relevance of Gibson's ideas to environmental psychologists and the design professionals lies in the illustration that perception is not composed of elemental building blocks, such as colour, form, and shape. This is because most of us do not see form and shape when we see a place, we perceive

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[91] Gifford, Robert (2002) Environmental Psychology: Principles and Practice (3rd ed.2002), Allyn and Bacon, Inc. Boston, Massachusetts. Pg. 22.

affordances; or we ask ourselves what can the place do for us? Obviously then, designers should be concerned about the relations between surfaces and affordances rather than form and shape. Excessive interest with form and shape occurs when architecture is seen primarily as a visual art rather than a way to provide functional space in which people can work, live and play. [92]

Environmental perception is dependant upon spatial cognition. Spatial cognition involves the way we acquire, organize, store and recall information about locations, distances, and arrangements in the physical environment. It involves spatial problem solving, navigation, trying to make sense of chaotic street systems and being lost. It includes pictorial and semantic images in our heads and on signs. Evidence of cognitive mapping can be found in advertising, way-finding maps, and in every person's memory and thinking. We do not process information about our environment the way cameras or computers do. Spatial cognition is determined by two key elements. The first element would be differences in our individual backgrounds and second, that our imperfect images are quite useful to us. Both elements help us to solve spatial problems, such as how to infer the way from one place to another when we have never navigated the route before. They also simplify and facilitate communication. We absorb into these images the distinctive monuments, symbols and arrangements of streets and we can conjure them up to recognize and enjoy places we have known. [93]

Students of design, and a learned observers of the built environment can easily determine that some places are easier to understand and recall. The concept behind this is known as legibility, or the ease with which a setting may be recognized and or organized by people. Kevin Lynch established the concept in his book The Image of the City. Lynch offered five elements of city images that contribute strongly to legibility.

1. *"**Paths**. The routes along which people travel. Typically, paths are roads, walkways and public transit routes.*
2. ***Edges**. Nontravelled lines, such as cliffs or escarpments or the shores of rivers, lakes or oceans.*
3. ***Districts**. Moderate-sized areas that city residents identify as having a particular character.*
4. ***Nodes**. Well-known points that people travel to and from, often at the junctures of important paths, such as key intersections, transit*

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[92] Gifford, Robert. 2002. Pg. 29.

[93] Gifford, Robert. 2002. Pg. 31.

terminals, and popular plazas or squares.

5. ***Landmarks**. Easily viewed elements, either a grand scale (the tallest building in a town) or on a smaller scale (a statue or unique store front)."* [94]

The five elements are important components of cognitive maps. They comprise the stored images of the environments we know and are effective not only in the urban scale but they also expand to an international scale and collapse down to a room scale.

We do not acquire, store, and recall information about locations, distances, and arrangements mechanically as would be stored in a computer. Yet our ways of storing and recalling are effective and non-random. The study of cognitive maps reveals some human strategies for processing environmental information. However, neuro-science is still studying how this works. We do know that legible places are easier to comprehend because they have clear paths, distinct edges, districts, nodes, and landmarks, the five elements as stated in Lynch's theory.

We do know that how we recall and comprehend these items is dependent upon spatial cognition and the known influences on spatial cognition. The first influence is the stages of one's life. This influence is founded in Jean Piaget's influential theory of cognitive development. In the early stages of life, children are ***egocentric***; that is to say they believe they are the centre of the world. Their perception of the environment is based on how close something is to them and whether they can touch it (or not) or if it is a part of them (or not). The second stage of cognitive development occurs at roughly six years of age when the child enters school. This is the ***concrete operational stage***. This is marked by the ability of children to adopt viewpoints other than their own. In terms of spatial cognition, children are now able to think of various settings from various physical vantage points.

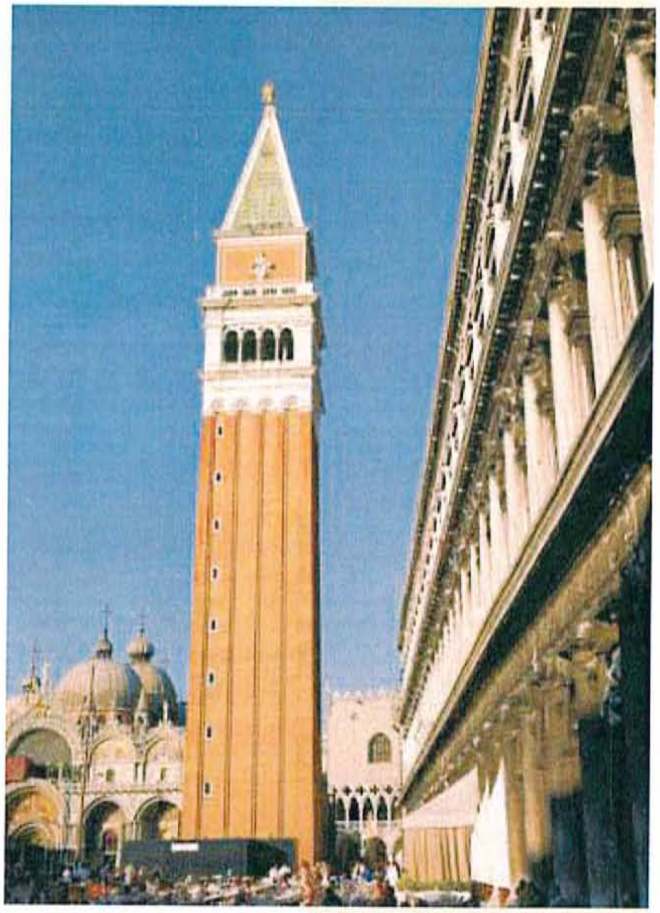

Figure 27 - "Landmark" Piazza San Marco Venice, Italy.

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[94] Gifford, Robert. 2002. Pg. 32.

The final stage of cognitive development occurs at around eleven years of age. This is known as the ***formal operational stage***. This is defined by the child's ability to think conceptually. The reflection of this change in spatial cognition is an ability to use abstract concepts like sets of Euclidian coordinates or directions such as north, south, east and west. [95]

A further influence on spatial cognition is a familiarity of experience. This can be defined as the more time we spend in an environment; the more our knowledge of the place will grow. Experience in a setting enables one to generate a fuller and better-organized cognitive image of the place, both concerning landmarks and paths to facilitate growth of place. In addition, when we are aware that it is important to learn the spatial layout of a place, we can do so very quickly and more quickly than when we are not instructed to pay close attention to the environment. An example of this would be a new student to a university campus; students are able to learn the five elements of legibility quickly as their attendance in class is relying on it. [96]

With the general understanding of environmental perception and spatial cognition, the research examines how both the built form and natural environment influence learning. By examining these two aspects of environmental perception, a sound knowledge base will be established in order to develop design principles to create a positive learning environment for all students.

Figure 28 - Classroom Corridor. W. Ross Mcdonald, Brantford, ON.

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[95] Gifford, Robert. 2002. Pg. 33.
[96] Gifford, Robert. 2002. Pg. 35.

Built Environment

> *"In recent years, there has been growing recognition of the importance of contextual variables in research on children's development. Missing from most considerations of context, however, has been an acknowledgement of the potential impact of the physical context – particularly the built environment – on children. Beyond appeals for "enriched' and "stimulating" settings, there has been a neglect of physical variables in mainstream child development research that reveals a tacit view of the physical setting as an unimportant backdrop."* [97]

There is a large amount of data to support the notion that the developmental process is influenced by characteristics of the built environment. Studies prove that very young children who have little control over their environment will spend much of their time interacting with their surroundings, as opposed to social interaction. These young children will show signs of improved development when influenced by a positive environmental experience. There are varied opinions as to the reasons for the lack of research in this specific field of environmental psychology; one is the limited numbers of child-environment investigators who are focusing on this speciality. The investigations taking place have been simple and focused on the identification and description of molar patterns of child-environment interaction. Measures of behaviour settings have tended to be simple and generally, little attention was given to individual differences in the physical setting. Environmental psychologist and author Carol Weinstein attributes this apathy toward the subject to three explanations: the lack of communication among child-environment researchers; the difficulty in measuring important environmental attributes; and the pragmatic function of the design process.[98]

Although there is a lack of research on how the built environment influences the development of children, there has been considerable research on how the built environment influences learning. However, researchers typically make assumptions about particular elements of the built environment and then focus their research on the effects of these elements. An example of an assumed elemental influence is the condition of the space. This is important because a classroom that is untidy or unorganized or in a state

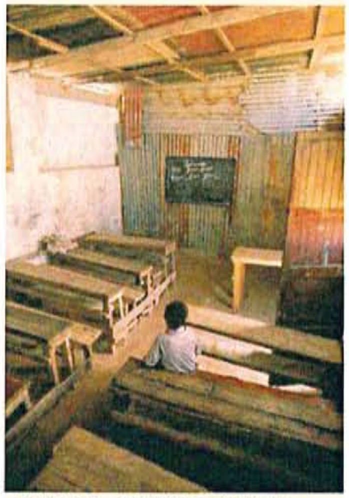

Figure 29 - Boy Sitting in Make Shift Classroom During War.

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[97] David, Thomas G. and Weinstien, Carol Simon (editors) Spaces for Children The Built Environment and Child Development, Plenum Press, New York, 1987. Pg. 4.

[98] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 5.

of disrepair will convey the message to the students that the staff does not care about the students or the quality of the education being provided. In addition to list environmental element Weinstien lists size, noise, light and climate as typical elemental assumptions made by researchers.

The first element assumed to be an environmental influence on learning as listed by Weinstein is size. The size, plan, and condition of the setting can be combined as a whole, and therefore considered as one set of spatial influences. Throughout North America budget crunches have created space crunches, increasing the student to teacher ratio and in turn the area of space per student. The resulting larger class sizes are linked with numerous difficulties in the learning process. Foremost of these is increased social density. In classrooms with increased social density, students experience amplified aggression as well as withdrawal. The resultant negative behaviours are a direct result of a negative environmental influence.

In addition to the size of a learning environment the layout of the setting, can affect the ability of the students to learn. The setting or layout of the classroom must be designed to enable the instructor to deliver the curriculum in a manner that is comfortable for the instructor as well as reflection of the instructor's training. As an example, open plan classrooms have been shown to be effective when the teacher or group of teachers working in the open area are appropriately trained to teach as a team in an open flexible environment and the students are able to handle the flexibility provided by the layout. With this example of an alternate learning environment, considerations need to be given to the noise levels with in the space.

The second environmental element assumed to affect to the learning environment is noise. The evidence strongly suggests that noise interferes with learning both while it occurs and if the learner is subjected to noise for long periods. The negative effects linger even after the noise is gone. Studies have shown that noisy classrooms may impair the performance of girls more than it will affect boys. The conclusions of the researchers has actually shown that the results of test scores go in opposite directions in relation to noise as far as boys and girls are concerned. Weinstien cites research which concluded that for boys, as the noise increases the results surprisingly improve to a point, while the test scores for girls decrease as the noise increases. However, there is a noise threshold where the effects of noise, causes test scores drop dramatically for both boys and girls.

Weinstien's studies reviewing the effects of noise on exceptional students showed differences in the effects similar to those on boys and girls. Results conclude that moderate noise actually helps hyperactive children learn, but not autistic children. Apparently, rock music encourages hyperactive children to be less disruptive and less verbally aggressive, but autistic children often respond to noise by becoming even more passive and repetitive than usual in their actions.

Noise hinders performance because it interferes with information processing, lowering the student's perception of control, and physically increasing blood pressure. Studies have determined that noise is bothersome to students working in typical classroom settings or higher density settings, as well as when students are participating in social activities. However, noise is less of an impediment when students are working on academic topics in a setting conducive to concentration such as library study carols or desks. Noise can have such an adverse effect on the environment and instruction that in order to combat noise instructors have changed their teaching methods, sometimes sacrificing a good method for a quiet method, which in some cases may not be as effective at getting the point across. In order to deal with noise some teachers have successfully employed behaviour modification techniques such as sound activated electrical relays that control pre-determined behaviour reinforcers such as automatically turning on a radio set to music, which indicates to the students that the sound level has exceeded acceptable levels. As with any behaviour modification technique, a reward was required and in this case, it was extra recess time offered to the students for their good behaviour.[99]

The final two environmental elements, which are assumed to affect learning, are the quality of light and climate. Results of research in this area are often, as one would expect, that an abundance of natural light and natural ventilation would increase the results of tests scores. Indicating that good quality lighting and ventilation has a positive effect on learning, however, poor quality lighting and ventilation would have an adverse effect on learning. For the most part educational environments usually have good quality lighting but can often be lacking in natural ventilation. The design of the optimum learning environment should facilitate both. The

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[99] Gifford, Robert. (2002) Pg. 274.

provision of operable windows on opposite sides of the room would allow for natural cross ventilation as well as natural light from two sides of a classroom. Studies researching the effects of temperature on the ability of students to learn indicate that a cooler temperature in the classroom provides an environment conducive to learning. The results of research comparing classrooms with and without air conditioning within the same school district and located in similar socio-economic areas in the southern states, indicated the classroom with air conditioning had better test scores. The cooler temperature allows the body to be more receptive to stimuli and more attentive. Whether the room is cooled by natural cross ventilation or mechanical means, the results remain the same, a cooler temperature is the preferred environment for learning.[100]

With a general understanding of the most common assumptions made by researchers as to the effects of the built environment towards learning, it is possible to propose recommendations to create positive effects. Thomas David and Carol Weinstien state that "*a systematic knowledge about children and their interaction with the built environment can be used to improve the design of children's settings.*" [101] From a historical perspective institutional environments that were designed to support the development of children, have often been stark, uninviting and designed for easy supervision and maintenance. There is a need for a new design direction with respect to learning environments, David and Weinstien offer three guiding propositions that allow designers to make decisions that are informed by an understanding of children. These are not intended to be absolute prescriptions of design to solve all the problems with institutional environments for children, but act as guidelines in order to develop better design solutions.

The first proposition advocates that "*built environments should have both direct and symbolic impacts on children.*" [102] Elements of the physical setting may influence behaviour directly by facilitating certain activities and obstructing others. Physical settings communicate symbolic messages about the intentions and values of the adults who control the setting. An example of this would be historic precedents of institutional settings for children. The

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[100] Gifford, Robert. (2002) Pg. 276.

[101] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 7.

[102] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 7.

bareness of the typical residential institution for developmentally delayed children may have had a direct, adverse impact on their cognitive and emotional development; it may have also conveyed the message to the children that they were not worthy of more comfortable or more pleasing surroundings. The symbolic meaning of the environment is particularly significant to an emotionally disturbed child. Emotionally disturbed children often have heightened awareness concerning their physical surrounding. The environment must convey a message of caring, warmth and security.

The second proposition put forward by David and Weinstien is that "*the built environment and children's development will benefit from a multi-setting perspective.*" [103] The designs of institutional settings are dominated by programming considerations that are in turn shaped by a guiding image of the institution's function. Yet there are certain common needs of building users that cut across setting types. Young children for example, have a need to play, whether they are in a home, school, hospital, or residential psychiatric setting. A sensitive design scheme can create niches for play within the overall scheme of the institution. A prime example is the work of Anita Olds, a designer and professor at the Child Study Department of Tufts University, who has "transplanted" the characteristics of preschool classrooms to paediatric hospital waiting rooms and playrooms. In her designs, the sterile, anxiety-producing waiting rooms so typical of hospitals and other institutions have been transformed into inviting, comfortable play spaces that clearly meet the needs of children.

The third proposition offered by David and Weinstien is that "*the built environments for children should serve certain common functions with respect to children's development : to foster personal identity; to encourage the development of competence; to provide opportunities for growth; to promote a sense of security and trust; and to allow both social interaction and privacy.*" [104] This proposition encourages designers to develop spaces that will affect the child on a cognitive level. These intrinsic goals set forth are easily attainable given the correct design response to the learning environment. By creating a space that the child will feel empowered and safe, the mind will be open to exploration as opposed to a concern with safety. This proposition describes five design function statements, which

Figure 30 - "Child Scaled Learning Environment".

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[103] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 7.
[104] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 8.

provide a designer a opportunity to create a meaningful developmentally enriching space.

The first design function statement is *"to foster personal identity."*[105] This can also be referred to as "place identity", or the notion that the sense of self includes a sense of place. We do not see ourselves as individuals in a vacuum, but as individuals who live in a certain place and own certain objects. The parent of any two-year old who has learned the word "mine" can attest to the fact that possessions and places are crucial elements in the development of personal identity. David and Weinstein define place identity as follows;

> *"Place identity or what can be referred to as the physical-world socialization of the child. Simply stated, place identity is conceived of as a substructure of the person's self-identity that is comprised of cognitions about the physical environment that also serve to define who a person is. The child develops particular preferences, skills, and behaviours within each setting; however, it is the interface between the settings that constitutes daily life and best captures what we mean by place identity."* [106]

Place identity or personal identity is a key factor in the development of children. From an early age, children develop principally through sensory and perceptual experiences. This stage of development is followed by the development of language skills. At this point, the child learns to label things and people, thus the beginning stage of socialization. Once a child is of an age where he or she has developed adequate socialization skills, the child usually enters the school system. From the time, the child enters the school system the learning environment is essentially a container for socialization. The school sets the acceptable standards of behaviour for society regardless of what the child learns in the home or the neighbourhood. It is essential the environment is conducive to fostering a sense of personal identity thus creating a positive learning environment. This example is of greater importance for children with developmental disabilities. These children are often delayed to the point where the child is still developing at a preoperational stage or concrete operational stage. During these stages of development, the child perceives the environment primarily through sensory information and is less likely to use previous experiences to interpret the

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[105] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

[106] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

environment. When the child is of an age to enter the school system, it is essential that the visual, auditory and tactile experiences be designed to facilitate positive development, in order to assist the child through the developmental stages ultimately towards socialization.

The school setting plays a vital role in the development of place identity. The child's repeated exposure to the school setting during the formative years, teaches the child acceptable behaviours as well as how to learn while in the classroom setting. As a social setting, it is essential the child learn to adapt to the surroundings of the classroom setting. The typical classroom with rows of desks is not necessarily a negative environment. This arrangement does provide a space that "belongs" to the child. However, an arrangement of desks in a group will give the child a personal space, as well as teaching the child to work and play in a group, which is essential to the child's social education. In order to establish a sense of belonging classrooms must be personalized in ways that communicate information about the identity, the uniqueness, and the importance of the children who use the space. For example, it is standard practice to provide children with a place to store their personal possessions such as jackets, lunch boxes, and treasures from home but cubbies can be more than just convenient storage. They can become a child's own special place if attractively lettered with the child's name and photograph. Children can decorate their cubbies or paint them their favorite colour. Similarly, the classroom walls and bulletin boards should reflect the existence of the children who work and play there. These simple changes to the learning environment will reinforce a sense of belonging for the child. Designers need to give more attention to experiencing learning in unique ways; to this end there has been a growing emphasis. For instance alternative schools within in New York City, have implemented smaller, theme-oriented classrooms and above all ready to consider individual needs within the already established group setting.[107]

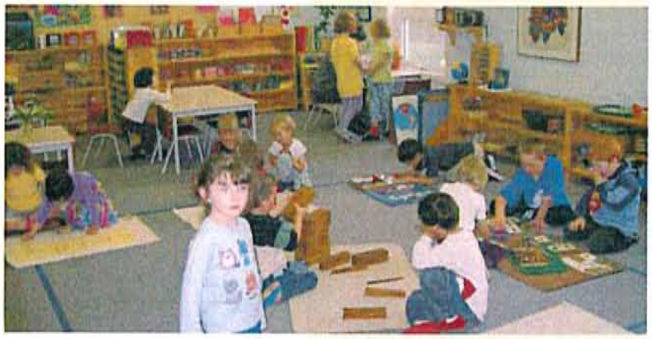

Figure 31 - Children Socializing in the Classroom.

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[107] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 36.

The second design function statement is "*to foster the development of competence.*" [108] The desire for competence is one of the basic motivations of human behaviour. In childhood, this drive for competence is even more intense, since the child is constantly faced with new tasks and challenges. A crucial function of the designed environment is to enhance this drive for competence by allowing children opportunities to develop mastery and control over their physical surroundings. The built environment should contain items such as coat racks, clocks, water fountains, lights and other fixtures, which are convenient for young children so that they can fulfill their basic personal needs without assistance. Shelving should be low, open, well organized, and labeled so that children can select items independently and return them to the proper places when finished. Work surfaces should be adjacent to storage so that children don't have to go searching for a place to work. Finally, it is essential to plan classroom space so that it is intelligible to children.

The layout of the built environment can also facilitate competence if it is "comprehensible". Environmental cues such as landmarks and boundaries help children represent the spatial environment and make it easier for them to plan and carry out goal-directed activities. The scale of the setting as a whole is also important. A more compact physical plan makes it easier for children to understand and influence what goes on within the space.[109]

The third design function statement is "*to provide opportunities for growth.*"[110] The opportunity to explore rich, varied environments is related to cognitive, social, and motor development. An example, of this would be studies of children, who were allowed to roam, explore, climb, move, and play with interesting materials. These children have been known to exhibit a higher level of competence in intellectual and social skills required in the classroom and schoolyard as opposed to children who had been restricted with playpens and gates and were not given the same opportunities to explore and roam. [111]

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[108] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

[109] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

[110] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

[111] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

Designing classroom spaces to encourage peer interaction not only supports the natural developmental progression toward group play but also enhances opportunities for role-taking experiences and consequently for pro-social behaviour. There are three basic design guidelines to consider: partitioning space, providing materials that support group play, and minimizing conflict by offering children sufficient activities.

The fourth design function statement is "*to foster a sense of security and trust.*"[112] It is reasonable to assume that predictable, comfortable surroundings foster feelings of security and trust that are so critical to the development of the child. Unless children feel secure, they will not explore their environment. The more architectural features that invite touch, and give an impression of security, the more readily the environment can be accepted as a "safe home". Anita Olds maintains that children feel frightened and disorientated by dramatic fluctuations of stimulation; she suggests that moderate variations in floor level, ceiling height, lighting, colour, and other physical elements will enhance the feeling of a comfortable, interesting and safe place. [113]

Olds also emphasizes the importance of having different kinds of space available for children. Some spaces that are small and cozy, others that are large and more open; some that are bright, some that are dim; some that are noisy; and some that are quiet. Since children differ in their need for stimulation, and since even individual children experience varying levels of arousal and need for stimulation during the school day, spatial options within the classroom increase the likelihood of finding a suitable environmental niche. Environments are more comfortable and less stressful if they contain elements that are soft or responsive to touch; beanbag chairs, stuffed couches, carpeting, sand, dirt, furry animals, sling swings, clay, paint and water. Water is a particularly effective vehicle for enhancing comfort. Not only does water play provide a tactile pleasure, but it constitutes a soothing, absorbing, non-threatening experience.[114]

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[112] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.
[113] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.
[114] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 165.

The fifth and final design function statement is "*to provide opportunities for both social contact and privacy.*"[115] The need to engage in social interaction has been frequently mentioned as a basic human drive. The need to limit social interaction should also be recognized. Physical space must be designed to meet both needs. A variety of spaces should facilitate contact when desired while preserving the possibility of privacy. Although children's need for privacy in the classroom has received little attention, there are some data suggesting that places to be alone are particularly important for children who are less popular and more aggressive. It is essential for these children who may have difficulty dealing with the constant presence of others so typical of school situations.

> *"Rarely are so many people placed together for such long periods of time, in such confined space, with so few options for withdrawal, as are children in schools. While the developmental consequences of this practice are unknown, it does suggest that the sizes of areas in the room should be varied to provide options for privacy."* [116]

Private spaces need not be entirely enclosed to seem private. Indeed, total enclosure may make them less desirable because children can not see what is going on. One solution to this problem would be to install clear acrylic panels, to provide children with a sense of physical privacy yet maintain visual access to the room.

The three design propositions and the five design function statements offer guides for designers to create a positive environment to foster positive development. As previously stated the environment is not the most important factor affecting development, however, the implementation of David and Weinstein's design propositions offer designers fertile soil, water and sunlight to produce an affirmative environment.

> *"By definition the school is a designed and premeditated agent of socialization. In comparison with the home and neighborhood settings, the school is in general the most predictable and most rigidly structured socio-physical setting in the child's early experience. Whatever physical space conceptions, needs, and expectations the child has developed in the home and neighborhood settings these must be fitted into the requirements, activities, and normative demands of the classroom and social learning environment."* [117]

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[115] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 165.

[116] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 165.

[117] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 34.

There has been some variability over time in the physical characteristics of the school, but it is also true that there has been remarkably little change in both popular and professional conceptions of what constitutes a proper classroom learning environment. Apart from the open education philosophy of the late 1960s and early 1970s which specifically promoted the idea of individualized learning in a flexible, multipurpose space, the concept of individual boxes with rows of desks and chairs facing the teacher's desk in the front and centre of the room can still be found throughout the education system. This example is more likely the case in senior levels of education as opposed to the primary and junior classes who have adopted either "U" shaped seating plans or desks in small groups. However, in reviews of the open classroom concept, studies have concluded that although open education attempted to address the unique learning and social needs of individual children, it ultimately returned to a focus on basic skills and traditional forms of teaching to a group. The conclusion that a changed physical environment, in this case a flexible classroom design, cannot improve the quality of education without corresponding changes in curriculum, teaching strategies, and methods of evaluation. In order for the open classroom concept to be successful a shift would have been required in the educational philosophy and goals, to match that of the proposed environment.

In the current educational system, the child's social experience is an experience, usually limited to children of the same age. The child is placed in a specific relationship to the teacher who is a supervising and authoritative adult who is not the child's parent, but who has a legitimized power over the child's experiences and activities in the school. It is the school's emphasis on control of the behaviour and experience of the child that establishes the institutional nature of its physical setting. Unrelated to educational goals is the reality of 20 to 30 children in one classroom, a "box" with rows of seats in which the teacher is not only the educator, but the agent of control. The most widely adopted strategy for teaching such a large group is to match the uniformity of the physical setting with uniformity in behaviour so that the children can be dealt with as a manageable unit rather than as a collection of 20 to 30 very different individuals. The theory of the group collective in order to maintain a sense of order can be detrimental to the educational development of many children. One has to wonder what the developmental

Figure 32 - Multi-purpose Room, W. Ross Mcdonald, Brantford, ON

consequences are of denying the children personal space and privacy and the inherent freedom of choice involved with both. Children do indeed have some need to separate themselves physically from the group at times. How do they compensate for the spatial restrictiveness of the classroom? One could make a convincing case that a child's psychological withdrawal, use of fantasy, and behavioural "acting out" are strategies for attaining a degree of privacy and isolation not permitted by the physical features of the classroom.[118]

As previously discussed a clearly defined environment is essential to development. In order to accomplish this, circulation paths should be separated from activity areas yet the circulation should allow and encourage movement between activities in order to stimulate exploration and cognitive development. In addition it is beneficial to provide circulation routes that lead to "on-task" engaged behaviour as well as having circulation routes that overlook areas of engagement. This will lead to a wider variety of developmental activities and to greater cognitive exploration. Finally, it will be easier to enforce a "walk, don't run" policy if the circulation route is meandering through different activity areas rather than a straight "runway" through the classroom. In order to design an environment in which it is easy to enforce the rules of acceptable behaviour it is essential to provide storage space that is uncluttered, categorized, labeled and adjacent to work areas or work surface which are sized age appropriately. By designing an environment that makes it easier to follow classroom rules and procedures, teachers can support children's efforts toward self-control.[119]

As discussed the built environment can be a positive influence on the learning. The design propositions and the design function statements offer intrinsic guidelines to bear in mind when designing an environment for children to learn. The research cites examples to achieve the goals from environmental psychologists and designers specializing in environments for children.

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[118] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 34.

[119] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 64.

Natural Environment

> *Teaching children about the natural world should be treated as one of the most important events in their lives.*
> *- Thomas Berry*

As the preeminent nature poet Gary Snider writes, we attach two meanings to the word nature, which comes from the Latin natura meaning birth, constitution, character, or the course of things and beyond natura, nasci meaning to be born. In its broadest interpretation, nature includes the material world and all of its objects and phenomena; by this definition, a machine is part of nature, as would be the built environment.[120] For the purpose of this thesis, the definition of nature will essentially refer to "outdoors" as well as animals. This excludes items that are man-made, but not shaped natural environments such as therapeutic gardens. The natural environment can be an essential part of the learning environment, contributing to the positive development of children. In order to do this we need to engage children in environmental education to maximize their exploration of, and interaction with nature such as bugs, pets, plants, trees, wind, rain, soil, and sunshine. It is also essential to recognize that children construct knowledge and values not only through interaction with a physical world (with nature) but through interaction with a social world and with social discourse. [121] By including experiences with nature as part of future education practices, we can reverse the current trend of declining interaction between children and nature. Within the span of two decades children's experience with nature has been in steady decline.

There are many reasons for this decline, however, three prominent examples are; the negative effects of urban sprawl, the invention of the video game (Atari and Coleco's "pong" to the latest release of Sony's PlayStation 3) and a heightened concern for the safety of "unsupervised" children.

As a child growing up in Komoka, my brother and I would meet up with our friends first thing in the morning and we would ride our bikes to the "dump" and not return until dinner. The "dump" was a large area of unoccupied land

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[120] Louv, Richard Last Child in the Woods Saving Our Children from Nature-Deficit Disorder, Algonquin Books, Chapel Hill, North Carolina. (2006) Pg. 8.

[121] Kahn, Peter H and Kellert, Stephen R. (editors) Children and Nature Psychological, Sociocultural, and Evolutionary Investigations. The MIT Press, Cambridge, Massachusetts (2002) Pg. 114.

Figure 33 - Chldren Playing on a Raft.

just east of the local athletic fields. We would spend all day imagining all kinds of adventures, hunting bugs and small animals, playing in the creek or the pond on small rafts we made, causing "avalanches" in the gravel pit. Essentially spending the entire day unsupervised experiencing nature first hand. This is no longer possible for the current generation to experience the same space as my friends and I. Due to development, the space we called the "dump" is now Firerock Golf Course. My brother and I have returned to play Firerock as adults, however, the landscape has been severely altered and only a few of the natural landmarks remain from our childhood. We are lucky enough to have a natural environment, which retains some of the memories of our childhood; this is sadly not the case for other areas we used to spend time in as children which have now been developed as residential subdivisions.

The second example cited for the decline in children experiencing nature is the invention of the video game. As a child we did have video games, however, the quality was so poor they did not maintain interest for any length of time. One can only handle turning a knob back and forth to manipulate a bar sliding horizontally along the bottom of a black and white television screen to prevent a dot from sliding through the bottom of the screen for so long. The advancement in video game quality and complexity has been exponential. The games are able to mesmerize children for hours, playing with partners on different continents, keeping the child indoors, limiting his or her exposure to the natural environment.

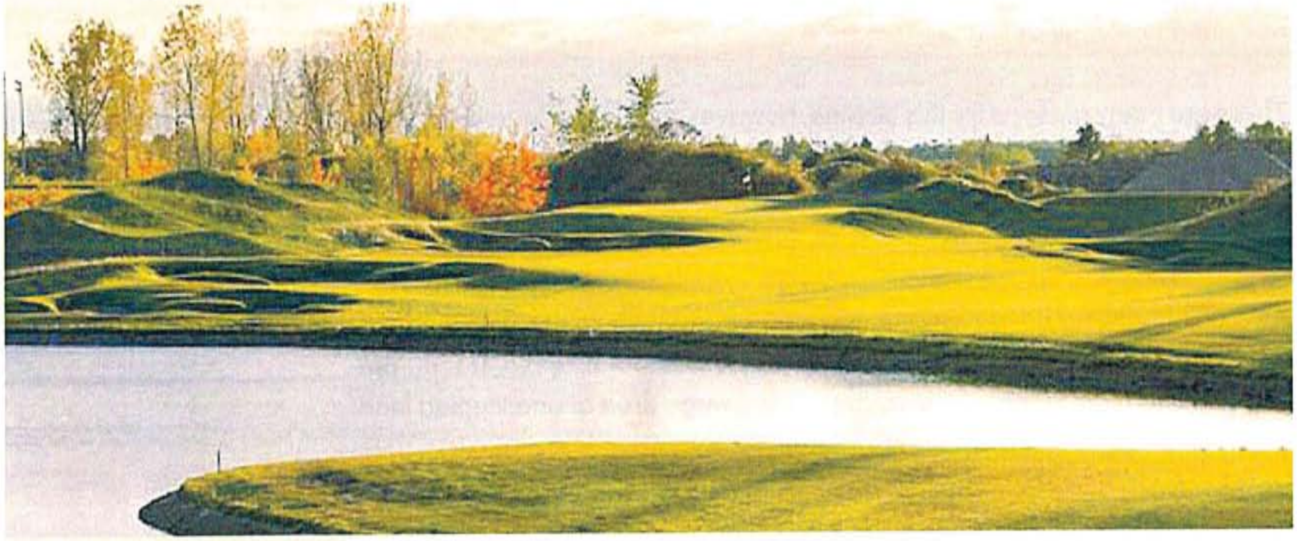

Figure 34 - FireRock Golf Course.

The third example cited is a concern for the safety of children. The advancement of the media has collectively opened the proverbial eyes of parents to the dangers all around us. Thus, parents are reluctant to let their children experience nature on their own. It should be noted that our parents did not exactly know where we spent the majority of our time and I would expect they would not have approved of our natural explorations, especially the raft building and ice breaking episodes.

These are but three reasons for a lack of natural environmental exposure for today's child. There has been a polar reversal in children's relationship with the natural environment. Children's physical contact with nature is fading; conversely, their natural awareness of global threats to the environment has greatly increased due to the global media and the internet. Children are aware of the negative effects of the diminishing rain forests in South America but sadly are not at tuned to the natural space evaporating all around them due to urban sprawl.

It is essential to understand how children experience nature and how that experience effects the child's development. In Children and Nature Psychological, Sociocultural and Evolutionary Investigations, editors Peter Kahn and Stephan Kellert classify children's experience of nature into three categories; direct, indirect and what they refer to as "vicarious" or "symbolic" experiences.

The first category is direct experience which involves actual physical contact with natural settings and nonhuman species. This definition restricts these direct encounters to creatures and environments occurring largely outside and independent of the human built environment. This is contact with plants, animals, and habitats that function, for the most part, apart from continuous human input and control. The child's direct experience of nature is viewed as largely unplanned rather than formally organized into structured programs and activities. A sub-category of direct experience is direct contact. This involves a child's spontaneous play or activity in a backyard, in a nearby forest, meadow, creek, or neighborhood park, or even an abandoned lot. In each case, the setting is natural although it is influenced by human manipulation.[122]

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[122] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 119.

The next category described by Kahn and Kellert is indirect experience. A child's indirect experience of nature involves actual physical contact but in far more restricted, programmed, and managed contexts. Indirect experience of natural habitats and nonhuman creatures is typically the result of a regulated human activity. Nature in these situations is usually the product of deliberate and extensive human manipulation. Examples might include children encountering plants, animals, and habitats in zoos, aquariums or other man-made nature experiences. A related but different expression of children's indirect experience of nature involves domesticated animals, plants and habitats, particularly animals and environments which are an integral part of the child's home or family life. These domesticated examples include the "true companion" animals like cats and dogs as well as flower and vegetable gardens. Essentially it is any form of nature which is manipulated and controlled by man and a part of the child's residential experience.[123]

Finally, vicarious or symbolic experience occurs in the absence of actual physical contact with the natural world. What the child encounters instead are representations or depicted scenes of nature that sometimes are realistic but also, depending on circumstance, can be highly symbolic or stylized characterizations. These vicarious images and symbolic depictions often occur in modern society through communication technologies like television, film, or computers, although traditional print media such as books and magazines continue to be important conveyors of images of nature for children. Children today clearly encounter an extraordinary array of vicarious images of nature. Yet the depiction of the natural world through symbolic means is ancient, perhaps as old as the human species itself, and is found extensively in cave and rock paintings, myths, totems, legends, and tales throughout human history.[124]

It is through these three different experiences that a comprehensive theory of nature in childhood personality and character formation is linked with varying modes of learning in childhood. A child's experience of nature encompasses a wide range of emotions – wonder, satisfaction, joy, but also challenge, fear, and anxiety as well. The natural world provokes pleasure

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[123] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 119.

[124] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 120.

and enthusiasm but also a sense of uncertainty, danger, and at times terror. From the other perspective of maturation of and growth, all these and other emotions associated with the child's experience of nature serve as a powerful motivation and stimuli for learning and development.[125]

The wide range of emotions evoked by natural environments fosters creative play. The effects of the natural environment are responsible for the creative development of children as cited by Kahn and Kellert;

> *"For much of our history, when children have been left to their own devices, their first choice has often been to flee to the nearest wild place-whether a big tree or brushy corner in the yard or a watercourse, or a woodland farther away. This is where they can imagine and enact an adventure, construct forts and intrigues, hunt crawdads and bugs. In aboriginal societies, this kind of play was essential for forming basic survival skills: today's crayfish and minnows are tomorrow's game and pot-fish. As the needs for brush skills evaporated, the atavistic pleasure in such play did not, and it continues to connect us to our hunting and gathering past, to our evolutionary legacy."*[126]

The notion that nature inspires creativity fostered through creative play is further supported by Richard Louv in his book Last Child in the Woods Saving Our Children from Nature-Deficit Disorder. Louv insists children need nature for healthy development of their senses and therefore, for learning and creativity. This need is revealed by witnessing the sensory magic that occurs when young people, even those beyond childhood, are exposed to even the smallest direct experience within a natural setting.[127] Louv cites Robin Moore as a champion for outdoor play and his opinion that natural settings are essential for healthy child development because they stimulate all the senses and integrate informal play with formal learning. According to Moore, a multi-sensory experience in nature helps build the cognitive constructs necessary for sustained intellectual development. Natural spaces and materials stimulate children's limitless imaginations serve as the medium of inventiveness and creativity observable in almost any group of children playing in a natural setting.

Louv uses a rather unique example to support the theory that experiences in

Figure 35 - Child Experiencing Nature.

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[125] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 128.
[126] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 312.
[127] Louv, Richard. (2006) Pg. 54.

nature develop creativity by citing Jerry Hirshberg the founding director and president of Nissan Design International. The Japanese auto company's design centre is located in California along with other domestic and foreign auto manufacturers. The Japanese have recognized instinctive design ability in Americans. Hirshberg claims the Japanese, have recognized that American creativity comes largely from their freedom and space. Hirshberg credits America's physical space as well as their mental space. He offers no academic studies to support his theory; nonetheless, his statement rings true as noted by the choice to locate design centres in California as opposed to Japan. Growing up, many Americans are blessed with natural space and the imagination that filled it. Louv goes on to recognize the importance of nature on the current American economy as well as expressing a concern for the future due to the evaporating contact with nature.[128]

> *"America's genius has been nurtured by nature – by space, both physical and mental. What happens to the nation's intrinsic creativity, and therefore the health of our economy, when future generations are so restricted that they no longer have room to stretch? One might argue that the internet has replaced the woods, in terms of inventive space, but no electronic environment stimulates all the senses. So far, Microsoft sells no match for nature's code."*[129]

The possibilities of creative play in nature are virtually endless. This is supported by Ben Nicholson's "loose-parts" theory. The theory states that "*in any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it.*"[130]

A typical list of loose parts for a natural play area might include water, trees, bushes, flowers, long grasses, a pond and the creatures within it. There are also other living things, sand, places to sit in, on, under; structures that offer privacy and views. Go beyond the play area, to woods, fields, and streams and the parts become looser and even more potent to the imagination.

The loose parts theory is supported by studies of play that compare green-natural play areas with hard surface playgrounds. Swedish studies found that children on asphalt playgrounds had play that was much more interrupted and as a result they played in short segments. On the other hand, in natural

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[128] Louv, Richard. (2006) Pg. 86.
[129] Louv, Richard. (2006) Pg. 96.
[130] Louv, Richard. (2006) Pg. 96.

play areas, children invent whole sagas that they carried from day to day to day continually making and collecting meaning.[131]

In addition to all of the creativity fostered by play in nature, there is also a growing body of evidence which indicates that direct exposure to nature is essential for physical and emotional health. For example, new studies suggest that exposure to nature may reduce the symptoms of Attention Deficit Hyperactivity Disorder (ADHD), and that it can improve all children's cognitive abilities and resistance to negative stresses and depression. In fact, new evidence suggests the need for such medications is intensified by children's disconnection from nature. Although exposure to nature may have no impact on the most severe depressions, research indicates that nature experiences can relieve some of the everyday pressures that may lead to childhood depression.[132]

The current trend to send "troubled youth" into nature experience programs signifies the positive therapeutic benefits of direct exposure to nature. Louv cites studies of outdoor-education programs geared toward youths diagnosed with mental-health problems. The results of these studies show a clear therapeutic value. The positive effect holds true whether the program is used as an add-on to more traditional therapy or as therapy in and of itself; it can even be seen when outdoor programs are not specifically designed for therapy.[133]

Louv also cites data to support the positive benefits for children with disabilities. Between 1994 and 1995, the National Survey of Recreation and the Environment conducted a national study of 17,216 Americans. A 2001 analysis of that data, focusing on people with disabilities, found that their participation in outdoor recreation and adventure activities was *equal to or greater than* that of people without disabilities. Other studies show that people with disabilities participate in the most challenging outdoor recreation activities; they seek risk, challenge, and adventure in the outdoors just as do their contemporaries without disabilities.

Figure 36 - Child in a theraputic Garden.

Researchers have also found that people with disabilities gain enhanced body image and positive behaviour changes from their camp experiences.

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[131] Louv, Richard. (2006) Pg. 97.
[132] Louv, Richard. (2006) Pg. 49.
[133] Louv, Richard. (2006) Pg. 225.

One study of fifteen residential summer camp programs with specialized programs for children with various disabilities; including learning disabilities, autism, sensory disabilities, moderate and severe cognitive disabilities, physical disabilities, and traumatic brain injury, revealed that participating children demonstrated improved initiative and self-direction that transferred to their lives at home and in school.[134]

In order for the therapeutic effects of the natural environment to be constructive, the children need to attach to the land. If this connection is not made they will not reap the psychological and spiritual benefits that they can glean from nature, nor will they feel a long-term commitment to the environment. This lack of attachment will exaggerate the very conditions that created the sense of disengagement in the first place. This results in a continued negative trend, in which children and the natural world are increasingly detached. [135]

The increased detachment is a result of many complex reasons. As stated earlier in the research, the loss of natural habitat is a key factor. A widening circle of researchers believe that the loss of natural habitat, or the disconnection from nature even when it is available, has enormous implications for human health and child development. The researchers note that the quality of exposure to nature affects our health at an almost cellular level. This effect is known as "biophilia," the hypothesis of Harvard University scientist and Pulitzer Prize-winning author Edward O. Wilson. Wilson defines biophilia as the "*urge to affiliate with other forms of life.*"[136] He and his colleagues argue that humans have an innate affinity for the natural world, probably a biologically based need integral to our development as individuals. Louise Chawla, a Kentucky State University environmental psychology professor and an international expert on urban children and nature, is skeptical about some of the claims made in the name of biophilia. However, she in turn offers a common sense approach similarly validating the need for nature. She recognizes "*the positive effects of involvement with nature on health, concentration, creative play, and a developing bond with the natural world that can form a foundation for environmental stewardship.*" [137]

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[134] Louv, Richard. (2006) Pg. 227.

[135] Louv, Richard. (2006) Pg. 157.

[136] Louv, Richard. (2006) Pg. 43.

[137] Louv, Richard. (2006) Pg. 43.

The idea that natural landscapes, or at least gardens, can be therapeutic and restorative is, in fact, an ancient one that has filtered down through the ages. Over two thousand years ago, Chinese Taoists created gardens and greenhouses they believed to be beneficial for health.[138]

In addition to a need to merge with natural settings to benefit from the therapeutic aspects of the environment there is a need to connect with animals. Studies have shown that in the presence of animals, highly aggressive children behave more cooperatively, become less antagonistic, and display greater social competence. Children with a wide variety of diagnoses who are nonverbal or withdrawn in the presence of adults become more socially interactive and are able to engage in dialogue more freely with less physiological arousal. The findings suggest that the presence of the animal permits a favorable redefinition of both the self and adult care givers. While the biophillia hypothesis might explain why animals hold children's attention, lower arousal, and decrease aggression there is no good explanation of the favorable alteration of social perceptions. [139]

For over a decade, Aaron Katcher, a psychiatrist at the university of Pennsylvania's School of Medicine, Dentistry, and Veterinary Medicine worked in conjunction with Dr. Gregory Wilkins, an expert on animal-facilitated therapy in residential treatment centres, to study the effects of therapeutic education structured around care of animals and nature. The study focused on the residential treatment of children with autism, developmental disorders, attention-deficit hyperactivity disorder (ADHD), conduct disorder, and oppositional-defiant disorder. The study also observed the effects of similar programs in three public schools with children in special education who are usually diagnosed as seriously emotionally disturbed (SED) or learning disabled (LD). The children were studied in nine settings. In all of the nine different settings the centre of activity was a building or a classroom housing a collection of animals that was referred to as a "companionable zoo" which was administered by procedures outlined in a manual of operations. The animals common to all the companion zoos included rabbits, gerbils, guinea pigs, birds, ferrets, chinchillas, iguanas, turtles, frogs and tropical fish. However, in six facilities there was also a

Figure 37 - Children Hunting 'Crawdads'.

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[138] Louv, Richard. (2006) Pg. 45.

[139] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 179.

barn and an outdoor paddock area for small farm animals. These included miniature horses, dwarf goats, pot-bellied pigs, sheep, and chickens. Some zoos had more exotic animals such as wallabies and sugar gliders. It was the impression of the researchers that the kinds of animals in the zoos was not significant, although their number may have been, in that zoos needed enough animals to create an environment that was distinctly different from an ordinary classroom. It was also important that most students were unfamiliar with at least some of the animals as fear and novelty played roles in directing and shaping the children's responses. In addition to the cages, tubs, and tanks for the animals, the rooms contained space for storage of feed, bedding, a table for conferences and discussions, a small library of nature magazines and field guides, and computers for working with the many compact discs devoted to animals, ecology, and natural history. There was sufficient wall and shelf space for the display of artwork and "found objects" from nature walks. In the classroom there was a collection of plants in the windows, and the zoo buildings had gardens near by.[140]

When therapeutic education was structured around contact with animals Katcher and Wilkens observed a decrease in aggression and negative social attribution and an increase in cooperative behaviour and social affiliation. Although there was some generalization of these improved behaviours to the children's regular classroom within six months of treatment, these positive changes were limited to the times when children were experiencing guided contact with animals and nature.[141]

Moreover, animals were readily perceived as positive transitional objects because most children who found their way into treatment had been injured by human beings, had control issues with people, and had been assaulted and controlled with words. The absence of speech and obvious controlling strategies in animals permitted them to serve as appropriate vehicles for the projection of positive feelings.[142]

The benefits of nature or as in this case animals acting as a calming influence for exceptional children is well documented. The practise of having a "class pet" is not exclusive to exceptional students, whether it is a hamster, goldfish or some other small animal it is common practise for primary educators to have a class pet. The class learns responsibility for the animal establishing

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[140] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 181.

[141] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 194.

[142] Kahn, Peter H and Kellert, Stephen R. (2002) Pg. 179.

feelings of competence and a sense of belonging, thus creating a positive learning environment by using an element of nature.

An increased awareness of nature's power to improve physical and emotional health should also guide the way classrooms are conceived and influence curriculum. The concept of environment-based education has been known by a number of names and is at least a century old. In The School and Society, John Dewey advocated immersing students in the local environment: "Experience [outside the school] has its geographical aspect, its artistic aspects of the one earth and the one life lived upon it." Far from radical, experiential education is at the very core of this older educational theory, an approach developed long before videotapes presented ring-necked snakes to the classroom. While environmental education focuses on how to live correctly in the world, experiential education teaches through the senses in the natural world. Finland encourages environment-based education throughout its educational system, and has moved a substantial amount of classroom experience into natural settings or the surrounding community. "*The core of learning is not in the information ... being predigested from the outside, but in the interaction between a child and the environment*,"[143] states Finland's Ministry of Social Affairs and Health.

> *"Ideally, school nature programs will go beyond curriculum or field trips: they will involve the initial, physical design of a new school; or the retrofitting of an old school with playscapes that incorporate nature into the central design principle.'*[144]

The idea of bringing nature into the classroom is not new but is relatively untried. The reasons for this are mainly budgetary and therefore not necessarily in the best interest of child development. The question remains, how does nature get into the classroom?

In order to attain an opinion regarding the ultimate ecoschool author Richard Louv asked friend and environmental teacher John Rick to describe his ultimate imaginary classroom saturated with the natural sciences and hands-on nature learning, he stated the following.

> *"I keep coming back to a class devoid of nature. Unfortunately, a class devoid of nature looks just like any classroom you would walk into today. We have industrialized the classroom to the extent*

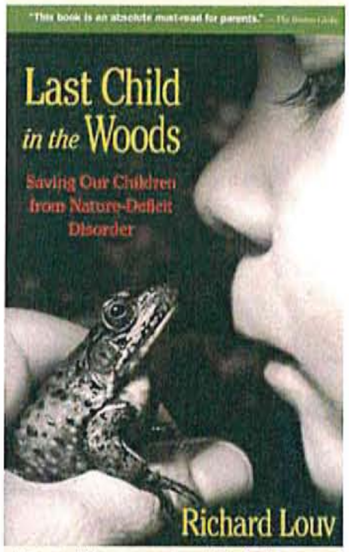
"This book is an absolute must-read for parents."
Last Child in the Woods
Saving Our Children from Nature-Deficit Disorder
Richard Louv

Figure 38 - cover Last Child in the Woods.

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[143] Louv, Richard. (2006) Pg. 201.

[144] Louv, Richard. (2006) Pg. 215.

Figure 39 - Children in an Outdoor Classroom.

> *that there is no room for nature in the curriculum. The curriculum standard adopted in the name of school reform restricts many districts to the basics of reading, writing, and mathematics. These are vital subjects, of course, but education reform has moved too far from what used to be called a well-rounded education.*
>
> *The society we are molding these kids toward is one that values consumer viability. The works of John Muir, Rachel Carson, or Aldo Leopold are seldom if ever taught to children in the public schools. Even in the sciences, where nature could play such an important role, the students study nature in a dry, mechanized way. How does the bat sonar work, how does a tree grow, how do soil amenities help crops grow? Kids see nature as a lab experiment.*
>
> *The alternative? I imagine a classroom that runs outward, both figuratively and literally. The grounds would become a classroom, buildings would look outward, and gardens would cover the campus. The works of naturalists would be the vehicle by which we would teach reading and writing. Math and science would be taught as a way to understand the intricacies of nature, the potential to meet human needs, and how all things are interlaced. A well-rounded education would mean learning the basics, to become part of a society that cherished nature while at the same time contributing to the well-being of mankind. Progress does not have to be patented to be worthwhile."* [145]

The classroom described by John Rick would create an environment in which nature is an integral feature of the learning environment. This space would be an epi-centre for creative learning, as well as an environment ideally suited to enable an education designed around the ideals of Gardner's eighth intelligence. The ecoschool would be a naturalized classroom flowing to the outdoors at any given time. The ideal classroom would also house a companion zoo, in order to instil a sense of competence and belonging for students. As stated in the research, the therapeutic benefits of the natural environment and animals will assist in the development of a positive learning environment for exceptional children and all students in the classroom.

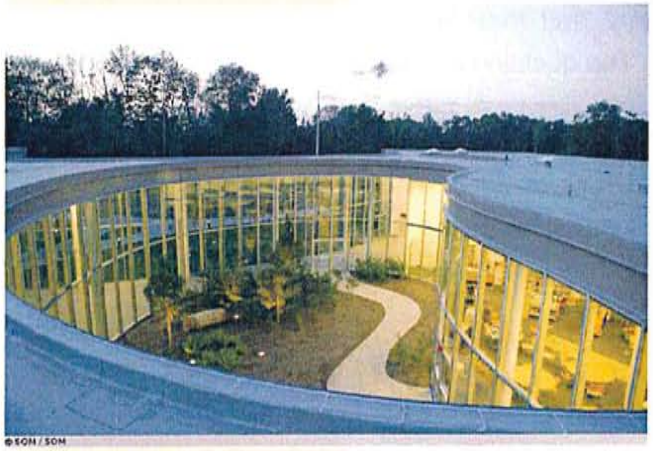

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Figure 40 - The Outdoor Classrom at Burr Elementary School, Fairfield CT.

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[145] Louv, Richard. (2006) Pg. 135.

Summary

The field of environmental psychology offers valuable data to designers; however, it is rarely utilized to its full potential. The benefits garnered by an understanding of environmental perception and spatial cognition are vital to the development of meaningful design principles.

Environmental perception places an emphasis on large-scale scenes that are treated as whole entities rather than individual objects. This is in contrast to object perception, which focuses on simple stimuli with a particular emphasis on utilitarian objects. The aesthetic objects are often ignored in favour of utilitarian objects because the human mind can only process small amounts of the vast information it is able to attain at any one time. James Gibson theorizes that the human mind perceives objects as an arrangement of substances and surfaces. Gibson refers to the surfaces as affordances because they afford a perception of what can the object do. Does it provide a place to sit?

In addition, environmental perception is dependant on spatial cognition, which is the way we acquire, organize, store and recall information about the arrangements of the physical environment. This is assisted by Kevin Lynch's theory of legibility, which is described as the ability to understand an environment because it is familiar to us due to the fact there are five cognitive elements (paths, edges, districts, nodes and landmarks) clearly defined within it. In fact, there are two factors, which further assist spatial cognition, the first of which is the developmental stage of one's life as theorized by Jean Piaget. Piaget's theory suggests that the further a person is advanced in the three stages of development (preoperational, concrete operational and formal operational) the more cognitive ability he/she will have acquired. The second factor influencing spatial cognition is one's familiarity with a particular environment and the more time spent in an environment, the better a person will understand and recall the environment.

The understanding of how we perceive our environment is essential to assist in the comprehension of the built environment. The amount of documented research studying the effects of the built environment on the development of children has been limited. However, of the research, which has been completed the researchers often have preconceived notions as to the results of these studies. As stated by David and Wienstien there are four environmental elements which are assumed to be factors in effecting the environment; size, noise, light and climate. As the research documents, these elements can have either a negative or positive effect. If all of the elements are addressed in a positive manor i.e. ample space, minimal noise, ample light and a comfortable climate, the results of test scores in the subjects studied were positive. In contrast, minimal space, high levels of noise, poor lighting and inadequate air quality or overheating all lead to poor results in test scores of the subjects studied.

The classroom is essentially a container for socialization. It is essential to provide different types of spaces to assist in the different types of interaction required in the classroom. David and Weinstien offer three design proposition statements and five design function statements in order to provide meaningful and positive learning environments.

A subsequent aspect of environmental perception that has a positive effect on the learning environment is the natural environment. The research cited indicates that the natural environment can assist in the positive development of the learning environment. Sadly, children's contact with nature is in decline due to various reasons. The thesis stresses that contact with nature needs to be re-established in order to reverse this disturbing trend. The effects of nature have been proven to have positive outcomes in the learning environment including studies which credit nature for developing creativity in children and adults as well as having therapeutic values. The future learning environment lies in the ecoschool or the natural classroom. That is to say, a classroom designed in such a way as to incorporate learning in a natural environment.

RESEARCH SUMMARY

The initial idea generator for this thesis came from reading a newspaper article which posed a question as to why Abbey Kastelein was no longer able to attend a school for children with special needs. Abbey's parents stated in the London Free Press article that Abbey was making good progress in her development at Madeline Hardy, and as a result were questioning the need for an alternative placement. The article further discussed the lack of spaces available to exceptional students in the London area which was supported by opposition MPP Bob Wood who was lobbying for the expansion of spaces. Easy solution, more space will allow more time for students like Abbey to develop and learn, so let's build a new school to accommodate the special needs students. The article simply implied that more money was needed from the government to solve this injustice; with this, a seed of an idea was planted to culminate in a thesis project. However, the initial research indicated a simple solution, was not so simple. The early findings indicated that in the best interest of exceptional students like Abbey the preferred solution is to include them in the student's home school in order that they grow and develop with their own peer group.

The research led to a general understanding of four areas in which the learning environment of exceptional students needed to be addressed. The first step was to understand what defines a student as exceptional. The provincial education act defines five categories of exceptionalities; Behaviour, Communication, Intellectual, Physical and Multiple. These five broad categories provide a classification for exceptional students; however, three of the categories are further sub-divided. The Communication category is divided into five sub-divisions, Autism, Deaf and Hard of Hearing, Language Impairment, Speech Impairment and Learning Disabilities. Each of these Communication sub-categories covers a wide range of exceptional students. The next (sub-divided) category is Intellectual, which is further divided into Giftedness, Mild Intellectual Disability and Developmental Disability. The final (sub-divided) category is Physical, which is further divided into Physical Disability and Blind and Low Vision. The research provides a glimpse into each of the exceptionalities; however, as a result of these general understandings it becomes clear that the exceptionality is only one facet of the student that makes him or her unique. In order to define design principles to accommodate exceptional students, one must understand that there are more similarities to regular students than there are differences.

Figure 41 - Child Receiving Individual Attention (IEP)

With a general understanding of the exceptionalities and how they affect the student's ability to participate in the current educational environment, the research provides a overview of the current practises as outlined in the Thames Valley District School Boards Special Education Plan for 2005-2006. The multi-disciplined approach towards providing a meaningful educational experience for students with exceptionalities is mandated throughout the province. Each student is provided with an Individual Education Plan (IEP) regardless of the exceptionality or placement in the system. The system is essentially a three-tiered support system. The first level of support accommodates the student in his or her home school in an age appropriate classroom. If further support is required beyond the IEP, additional instructional support from a Learning Support Teacher or an Educational Assistant is provided within the regular classroom. The next level of support provides additional support in a resource classroom on a part time basis. The student still spends time in the regular classroom with the additional support as outlined in the first level of support. The final level of support is placement in a provincial demonstration school or residential school geared to specific exceptionalities. The preference is that the student is returned to the home school after a satisfactory period, usually one school semester or an entire year at the most. As is clearly defined in the TVDSB Special Education Plan, inclusion is the end goal for students with exceptionalities.

The recurring educational theories, which were prevalent throughout the research material, were Inclusion, Multiple Intelligences and Cooperative Learning. The first of these three theories was presented as the favourable solution in the TVDSB's Special Education Plan. Inclusion was similarly favoured throughout a variety of North American research citing the benefits for all. The placement of the exceptional students within the regular classroom fosters a sense of belonging, social growth, social cognition, reduced fear of human differences and tolerance. In addition to the benefits noted for all students, there is a greater societal benefit of increased equality. Allowing exceptional students the opportunity to learn and grow with their peer group in turn creates tolerance of differences among all people in the future generations. Legislation mandates that all buildings be universally accessible to all people providing evidence of the growing trend towards inclusion, not only for the school system but within society as a whole.

Throughout the research, material supporting student inclusion was reflected in the educational theories of Multiple Intelligences and Cooperative Education, as positive methods of curriculum delivery for exceptional students. These theories indicate co-relationships to the theory of Inclusion, and were not originally intended for exceptional students. However, it is clear that aspects of both of these theories create a positive learning experience for all students.

Dr. Howard Gardner first proposed the theory of Multiple Intelligences in 1983 in his book Frames of mind: The theory of Multiple Intelligences. The theory stated that people learn in different ways, and may express intelligence in different ways. The original list of eight intelligences (linguistic, logical-mathematical, musical, bodily-kinaesthetic, spatial, interpersonal and intrapersonal) were all tested against a list of eight criteria, based in different fields of research (two in biological science, two in logical analysis, two in developmental psychology and two in traditional psychology). Since the initial presentation of his theory, schools around the world have adopted this method of curriculum delivery including schools specializing in the education of exceptional children. The new theory spawned a research project at the Harvard Graduate School of Education. The Project Zero program began to focus on the theory of educating using multiple intelligences as a curriculum method. As part of this research a team was created called the SUMIT (Schools Using Multiple Intelligence) team which has been tracking the implementation of multiple intelligences throughout the world. In 1999, Dr. Gardner added two more intelligences, naturalist (intelligence) and existential (intelligence). These two new intelligences were on the periphery of making the original list in 1982, however, he did not feel they met the strict criteria at the time, he has since had a refinement of his criteria and these two intelligences now qualify. These nine intelligences offer a wide range of students the opportunity to learn within their individual skill sets. At the root of the theory, the focus shifts from deficiencies in learning to strengths in learning. The theory of Multiple Intelligences offers designers an interesting opportunity to design an environment which assists a variety of learning styles. The learning environment should facilitate the different styles of learning and promote the creativity of the instructor and student.

The final educational theory explored was Cooperative Learning. This theory is complimentary to both Inclusion and Multiple Intelligences. There is a large amount of empirical data confirming the positive outcomes as established by the research. Cooperative Learning is simply described as students learning in small groups working together to achieve a greater level of success. Cooperative Learning is composed of five basic elements; positive interdependence, face-to-face interaction, individual accountability, interpersonal and small group skills and group processing. The positive aspects of Cooperative Learning are already being implemented by the TVDSB, as indicated by the Tribes Learning Communities program currently underway within various schools throughout the district. The Tribes program is a packaged teaching aid to assist educators in implementing cooperative learning strategies. The tribes program promotes a re-culture and restructure of the whole school learning community, develops teacher collegiality and raises the level of academic achievement. There are several clear benefits of cooperative learning to exceptional students. The first of which is a positive social interaction with the student's peer group. This positive interaction helps to foster self-esteem and a feeling of interdependence with a peer group. The aspects of cooperative learning are particularly effective in managing behaviour issues, the student's feel a part of a group and do not want to "act out" and create a negative outcome for the rest of the group.

Each of the selected educational theories examined can be applied to the teaching environment individually. However, as stated by Jane Downing, *"when combined together they show a promising future for educating exceptional students in the regular classroom".*[146] A new learning environment would support this new method instruction. The environment would be founded in design principles established with inclusion, multiple intelligences and cooperative learning as the basis of the principles. A new learning environment cannot be established based on educational theories alone, it is essential to understand how the environment affects learning.

Therefore, the final aspect of the research is environmental perception, and how the built and natural environments affect learning. The understanding of environmental perception is essential to developing a positive dynamic to aid in the delivery of education, as well as creating a constructive atmosphere enabling children to learn more efficiently. The information compiled by environmental psychologists is readily available to designers,

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[146] Downing, June, E. (2002) Pg 17.

but sadly is rarely used. The understanding of how humans perceive and interact with the built environment provides information to develop design principles which elicit a positive interaction with the built environment. Additionally, research indicates, "*stimulus impoverishment causes perceptual and learning deficits*".[147] Therefore, it is essential to provide an enriched environment to promote positive development. The general understanding of environmental perception and spatial cognition assist in the development of design principles to create the enriched educational environment. The understanding of Lynch's theory of Legibility and its ability to scale upwards to inform users of a space as large as a city and conversely to scale downwards to a single room, such as a classroom, assists in developing design principles to inform the space and make it easily understandable and comfortable. Comfort within a space is essential to the learning environment because a child is only able to learn if he or she is comfortable in the environment and is not preoccupied with safety, anxiety (concerning home-life) or other negative stressors.

The research illustrates the focus of environmental psychologists is often on four elements. The following elements are often assumed to have the greatest effect on the learning environment size, noise, light, and climate. The size of the learning environment can be a negative factor if there is not enough physical space provided. The research cites that overcrowding will increase aggression and withdrawal thus contributing to negative behaviour due to an adverse environmental influence. The second environmental element often assumed to affect the learning environment is noise. It is often presumed that too much noise will have an adverse effect on the learning environment; this is true to a point. However, studies indicate that some amounts of noise can be beneficial to certain groups enabling them to increase concentration. The final two environmental elements, which are studied by environmental psychologists and assumed to affect the learning environment, are light and climate. The effects of light on the learning environment are as one would expect, good light levels will promote positive learning, and more natural light will positively affect test scores in the students studied. Conversely, a lack of adequate lighting levels and minimal natural light will negatively affect the learning environment. The effects of climate on the learning environment can similarly have either a positive or a negative effect. The levels of fresh air must be adequate;

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[147] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 5.

air, which is oxygen rich, will have a positive affect on the students in the environment. In addition, cooler room temperatures will promote alertness and studies indicate positive test results in rooms that are cooled with either air conditioning or natural cross ventilation providing fresh cool air.
The general understanding of the most commonly studied environmental elements provides an opportunity to designers to create an environment, which exceeds the prospects afforded by these elements. The design propositions presented by David and Weinstien offer designers a chance to instil positive feelings within children as they relate to their learning environment. The design propositions suggest the learning environment can create a positive feeling amongst the students, which can often be achieved with simple design solutions. David and Weinstien state that the design of objects in a space that are scaled to the child and are easily manipulated by the child without assistance will foster the development of personal competence.

Furthermore, the research confirms the importance of the natural environment to both development and learning. The research cited clearly identifies the positive effects the natural environment can have on children, in particular children with Attention Deficit Hyperactivity Disorder (ADHD). The expanding diagnosis of children with ADHD has a relationship to the children's decreasing direct contact with the natural environment. The research illustrates three factors causing the decreased contact with nature; the negative effects of urban sprawl, the invention of the home video game system and a heightened awareness of safety for unsupervised children. These three factors are all relatively recent phenomena, and have all expanded within the last two decades, coinciding with the increased awareness of the problems of ADHD. The research proposes a link between creativity and direct exposure to nature. Author Richard Louv cites the example of the Japanese car manufacturer choosing to locate its design facilities in North America based on the idea that creative people are developed due to an exposure to nature and large open spaces. The hypothesis that American children are afforded the freedom to roam and explore wide-open space, which fosters creativity an affordance Japanese children do not have. This evidence of creativity is further supported by Ben Nicholson's theory of "loose parts" which describes an infinite number of possibilities for discovery and inventive play because the parts in nature have a large number of variables as to the outcomes of play.

Figure 42 - Nissan Design Centre, Farmington Hills, MI.

Additionally, Wilson's theory of "biophilia", defined as the urge to affiliate with other forms of life in order to establish a sense of well being, supports the positive results of nature as documented with the use of therapeutic gardens and relationships with animals. As a further example, research documenting the positive outcomes of the ten-year study conducted by Katcher and Wilkins proved that a relationship with animals is beneficial to students with exceptionalities. The research indicates that nature is an integral part of the learning environment. Decidedly, contact with nature is essential to the positive development of children and an influential factor contributing to a successful learning environment.

The precedents were chosen to provide samples of learning environments, which support the conclusions of the research. The selection of schools which focus on the educational requirements of exceptional students exclusively were chosen as a baseline to understand the program requirements for this type of facility. In addition to the schools which serve exceptional students exclusively, schools with resource classrooms were examined to gain an understanding of the needs and responses for this particular group of students. The third type of educational environment reviewed was schools with the curriculum based in Multiple Intelligences. These schools were examined to identify different physical responses to the learning environment based upon the different delivery of curriculum. The final schools examined are schools, which were designed with the intent of bringing nature into the educational setting.

Figure 43 - Exceptional Student.

RESEARCH CONCLUSION

The culmination of the research has defined several clear conclusions, which form the basis of design principles that create a learning environment for all.

1. **Students with exceptionalities are the same as any other student and should be offered the same educational opportunities as the "regular" student.**

The defined exceptionality is only a part of what makes that student unique, the same as any other student is unique. Students with exceptionalities must be included in their home school in a regular classroom; however, there is a clear understanding that extra support may be required for some students.

2. **The current guidelines outlining the different levels of support for exceptional students should be maintained. The guidelines establish the three main learning environments (regular classroom, special education classroom and a special education school).**

These guidelines have been established by experts in the field of special education and are required regardless of the method of instruction or learning environment. The design principles reflect the understanding that different types of learning environments will still be required regardless of the change in curriculum delivery. The redefined learning environments should assist the implementation of new educational goals for exceptional students.

3. **The selected educational theories cited in the research; Inclusion, Multiple Intelligences and Cooperative Learning provide an opportunity to develop a new type of learning environment to enable these theories.**

The selected educational theories are all new methods of curriculum delivery currently in the early stages of implementation throughout the Thames Valley District School Board. These new methods will not only benefit exceptional students but all students. To facilitate this change in the curriculum delivery the learning environment must move in a new direction to support the future of education. The current model of the learning environment is based on the one room schoolhouse from the turn of the century. The design of the inclusive learning environment should reflect and incorporate the new research based knowledge pertaining to learning styles and effective instruction.

4. The understanding that the perception of the environment is important to the development of young minds is essential to providing a positive environment for development.

The built environment must have a positive effect on learning. Ideally incorporating the natural environment into the educational setting in order to establish a sense of well being and foster creativity.

The research has led to the development of a series of architectural design principles to create a redefined learning environment. These principles are influenced by the educational theories of Inclusion, Multiple Intelligences and Cooperative Learning as well as the environmental perception of students with exceptionalities.

Figure 44 - Inclusion.

DESIGN PRINCIPLES

Introduction

The objective of this thesis is to develop a series of design principles to enable the creation of an architectural response to a new learning environment for all elementary (K-8) students. In order to establish design principles the research examines five areas of research;

- Understanding the Problem,
- Understanding Current Practise,
- Current Educational Theory,
- Environmental Perception,
- Precedent Studies.

Each of these areas of research provides insight to develop design principles, some of the principles have been informed solely from an individual area of research while others arise from the research collectively.

The first area of research examines the Ontario Ministry of Education's defined exceptionalities. In developing an understanding of the exceptionalities, it becomes clear that a design solution cannot be created to assist each exceptionality individually. The solution lies in the development of principles to create a learning environment, which will support the exceptionalities communally. Although in creating a united solution, the principles must still respect that certain elements of the environment can be detrimental to individual exceptionalities. For instance, creating a setting that causes a "stimulus overload" would prove detrimental for children with Autism or Pervasive Development Disorders.

The second area of research examines the current practice for delivering education to students with exceptionalities. These practices have been defined by a multi-disciplinary team, to provide exceptional students with the best possible opportunity to learn and grow. The "regular" classroom, the special education or resource room and a special education school are all learning environments which will continue to best serve the student. The design principles for each of these established settings will provide a basis for a redefined learning environment to assist with a new method of curriculum delivery.

The third area of research outlines current educational theories which are a departure from past practice. The theories of Inclusion, Multiple Intelligence and Cooperative Learning are leading edge methods of curriculum delivery which support the education of all students, with or without exceptionalities. These new styles of learning would benefit from a redefined educational setting. The design principles reflect the needs of this innovative approach to learning.

The fourth area of research depicts the effects of the environment on learning. The child's perception of the setting in which they learn must be positive in order to support effective learning. Conversely, negative environmental influences create undesirable effects such as poor impulse control and other behavioural issues. The incorporation of natural elements into the learning environment has been shown to have a calming effect and foster creativity. In order to support this research, the design principles will maximize the use and incorporation of nature to create an optimal educational setting.

The final area of research reviews precedents of four distinct learning environments. These include schools for exceptional children, resource classroom for exceptional children, schools with teaching based in multiple intelligences and schools which incorporate nature. Each of these educational settings provides insight into previous design processes which provides accommodation for a unique client group. The intent of the design principles is to incorporate a variety of philosophies to create a learning environment for all.

Design Principle 1

Create an environment that is universally accessible.

In order to attain this goal, the environment should accommodate all possible physical disabilities and the assistive devices that accompany such disabilities. The facility must be accessible to the entire population. This principle is based on the theory of Inclusion which promotes the equal treatment of all students, thus ensuring they can attend the school closest to their home. The environment should be designed to exceed the requirements of current City of London, Facility Accessibility Design Standards (FADS) for public buildings. The design will be conscious of items such as glare from windows and materials which promote noise reflection. These are but two examples of environmental stimuli which can cause adverse reactions in students with exceptionalities. This will lead to careful consideration when selecting building materials and finishes.

Design Principle 2

Create an environment to facilitate different styles of learning.

This principle is based on the educational theory of Multiple Intelligences. The built environment will provide varying spaces which assist in the delivery of curriculum for each type of intelligence and enhance each of the different learning styles.

The following outlines describe the intended use and "spirit of place" for each of the nine types of intelligence.

1. Verbal Linguistic Intelligence

A space designed to support activities such as dramatic exercises, creation of poetry, learning foreign languages, recording a daily journal. The practice of verbal linguistic skills require two different types of space. The first of which is a more intimate setting that promotes reflection, self-contemplation and quiet conversations. In order to achieve this goal, the area should be designed with soft comfortable seating surfaces, small adjustable writing surfaces and muted indirect lighting. This should be a space that is shielded from the noise of other activities in surrounding areas, as verbal linguistic skills are easily interrupted by other verbal activity. The second type of space should be designed to accommodate medium sized group discussions and debate as well as dramatic verbalizations. Therefore, this space should be an acoustically balanced room shielded from external noise.

2. Logical-Mathematical Intelligence

This space should support activities such as solving math problems, learning patterns, following a recipe or instructions, deciphering codes, composing music from a matrix, using a computer or calculator. This space should provide two types of work surfaces at which to experiment and create. The first of which is a central group collaboration area that consists of work surfaces to promote interaction among four to five students. Around the perimeter of the room are small individual workstations to promote independent study and exploration. The walls and windows of the space will be highlighted with mathematical calculations and formulas to provide inspiration and reference.

3. Bodily-Kinesthetic Intelligence

A space designed to support physical activities such as dancing, inventing, building items or conducting hands-on experiments. This space should provide an expansive open area with high ceilings and a wooden athletic flooring for physical activity. In addition, the space should provide work surfaces to create, mold and shape items with one's hands. The space should be well ventilated with natural cross ventilation and an abundance of natural light to instill an energizing feeling of being outdoors.

4. Spatial Intelligence

This space should be conducive to activities such as; creating visual art or sculpture, developing maps, plotting navigational courses, building models or drawing to music. To accomplish these tasks this work area should provide adjustable surfaces such as, easels, desks and drafting tables. The space should be of a large volume with natural warm materials such as cork flooring. In addition, the room should be flooded with north-facing indirect natural light. The space should provide views to the outdoors as well as surrounding interior activities to promote and sustain interest and inspiration.

5. Interpersonal Intelligence

An area which supports activities such as; playing cooperative games, role playing, story telling, arranging social events and the debate of controversial issues. This space should be a comfortable area to promote and contain lively conversation and communication. To engage social interaction and participation the room should be designed in a circular formation with soft seating around the perimeter. The arrangement of furniture will be flexible to accommodate a variety of activities and intensity of discussions. Similarly, the lighting will be adjustable to attain the same goals.

6. Intrapersonal Intelligence

The requirements for this space should support activities such as; keeping a personal journal, practicing relaxation techniques or contemplating personal reflection questions. In order to promote introspection the space should be of a small intimate scale with idyllic views of nature. Soft lighting and warm natural materials should be used to enhance the tranquility of the individually sized space.

7. Musical Rhythmic Intelligence

This space fosters the creation of music through song, dance and the playing of musical instruments. As a result, the acoustical integrity of this room is of utmost importance. To achieve the quality of sound required the volume should be designed to minimize reverberation and provide adequate sight lines to the focal point of the room. The floor surface should be tiered from the front to the back and sound absorbing surfaces will be used at the rear of the space.

8 Naturalist Intelligence

This space promotes the study and exploration of nature from its broadest to its most cellular levels. Activities will include examining plants and animal species through a microscope, collecting and categorizing insects and maintaining a small animal study centre. This area requires laboratory benches to work and study in small groups. In addition, there must be direct access to the outdoors to enable the students to work outside in an exterior classroom.

9 Existential Intelligence

A space designed for meditation, philosophical reflection and worship. This should be a small scale minimalist space with indirect natural light. In addition, light and sound will be reflected by a calming water feature which serves to mask outside ambient noise.

Figure 45 - Child Studying Plants.

Figure 46 - Cooperative Learning.

Design Principle 3

Create an environment to facilitate Cooperative Learning.

This theory suggests that optimal learning is achieved through social interaction within small groups. To accomplish this goal, small gathering spaces should be provided throughout the facility to promote interaction within the classroom and public circulation spaces. Classrooms should be designed to allow for the arrangement of student desks in small groupings, with the teacher as a facilitator of discussion. In addition, areas such as reading nooks within the public circulation spaces should be extended and enlarged to allow for group conversation and meaningful academic discussion.

Design Principle 4

Create an environment that is legible and assists in spatial cognition.

This principle is founded on Kevin Lynch's theory of Legibility. Each space should be designed to promote a sense of familiarity regardless of scale. The clear definition of Paths, Edges, Districts, Nodes and Landmarks should invoke feelings of comfort and familiarity in exceptional students. Each of these elements of Legibility should be applied in varying scales, from the small scale of the classroom, to an expanding scale of the entire building and an even greater scale of the site and surrounding landscape.

As an example, to create identifiable "**paths**" in spaces, the routes which people travel in the classroom should have similarities to the identified routes in the corridors or site. This may be achieved by identifiable floor finishes, route markers in a ceiling pattern. Similar identifiable treatments such as a glazed wall in the classroom or a glazed corridor wall should serve to identify the "**edges**". Areas which will be defined as "**districts**" in the classroom such as work spaces for different intelligences should be recollected in the groupings of classrooms throughout the school. The "**nodes**" in the classroom, such as a specially designed classroom module, should be repeated on a larger scale in the public areas to identify key intersection points throughout the facility. The final element which promotes Legibility is "**landmarks**". These should be identified in the classroom via a symbolic reference which should be repeated on a larger scale in the building as a whole.

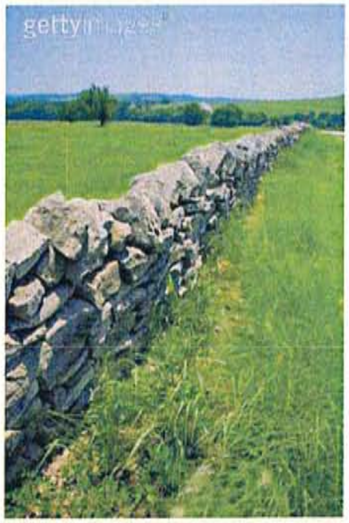

Figure 47 - "Edges".

Design Principle 5

Create an environment that has a direct and symbolic impact on the children using the space.

This principle is based on David and Weinstein's design propositions established to improve the design of children's settings based on a systematic understanding of a child's interaction with the built environment. The cited research supports the theory that physical settings communicate symbolic intentions, thereby imposing the values of the adults who control the setting. This is especially important for emotionally disturbed children who often have a heightened awareness of their physical surroundings. It is essential that the environment convey a message of caring, warmth and security. This will enable the child to learn in an environment which is free from external stressors, thus assisting children to succeed socially as well as academically. In order to communicate these messages, the use of warm natural materials should be employed throughout the facility. In addition, tactile surfaces should be welcoming to the touch and the introduction of water features and fresh outside air will trigger sensory stimulation of sound and smell.

Design Principle 6

Create an environment that positively effects a child's development.

This principle is based in David and Weinstein's design function statements developed to create meaningful and developmentally enriching learning environments. In order to accomplish positive development the space should be designed "*to foster personal identity; to encourage the development of competence; to provide opportunities for growth; to promote a sense of security and trust; and to allow both social interaction and privacy.*" [148]

The goal of fostering personal identity will be achieved by allowing students to take responsibility and ownership of a personal space. Examples should include the personalization of compartments for individual belongings and bulletin board areas intended to celebrate each student's work and accomplishments.

The development of competence will be attained by creating a space in

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[148] David, Thomas G. and Weinstien, Carol Simon (1987) Pg. 10.

which the student can become self-sufficient. The built environment should contain fixtures such as coat racks, light switches and water fountains designed so that all children can independently access these in order to fulfill their basic needs.

Opportunities for cognitive, social and motor growth should be realized through the application of rich and varied environments. These environments should be designed to promote peer interaction and support group play. These spaces should accommodate a multitude of uses varying from physical activity to quiet introspection.

Children require a sense of security and trust in order to explore their environment. To accomplish this feeling, architectural features should invite touch and give an impression of security. To avoid disorientation and apprehensive feelings Anita Olds recommends using only moderate variations in floor levels, ceiling heights, lighting and colour. Transitions should be noticeable enough to create interest yet subtle enough to maintain predictability and familiarity.

It is essential to provide opportunities for both social contact and privacy. To accomplish this ideal, a variety of spaces should be provided which promote interaction as well as additional spaces that allow a student to withdraw into a safe and secure personal space. The need to retreat is particularly important for children who experience difficulty interacting in socially appropriate ways. However, this sense of privacy does not mean a total isolation from the group activities. It is necessary to provide a visual connection to the group to maintain a sense of belonging.

Design Principle 7

Create an environment that is connected with nature.

The incorporation of natural elements into the learning environment has been shown to have academic and social benefits. To maximize these positive effects, the interior environments should be able to meld with the outdoor environments, creating a seamless transition between the two. The creation of outdoor classrooms should allow children to attach to the land thus reaping the therapeutic and psychological benefits nature provides. In addition, incorporating natural elements such as a living stream through the building should magnify the students' ability to interact with nature.

Figure 48 - "Living Stream".

Design Principle 8

Create a sustainable environment to facilitate sustainable learning.

This design principle is founded in the belief that "Creating a Learning Environment for All" is not only responsible to the immediate neighbourhood but the global village as a whole. The hope is that through the creation of a sustainable building and surrounding environment students will learn the importance of global stewardship and transfer these values into life long lessons.

This design principle is developed from varying resources, but was first introduced by Douglas Atkins, Executive Director of the Chartwell School in Seaside California. Mr. Atkins expressed that designing a LEED® certified building was not only important to the students but the community as a whole. In order to accomplish this goal, they selected a local contractor and sub-trades to build the facility with no previous experience in sustainable construction. The idea driving this initiative was that it would be a learning process for the larger local community. These contractors are now working outside the community on larger LEED® projects and continually expanding the knowledge and experience learned from building a small school. The initial design intent was to use the LEED® principles to make the students aware that the conscious efforts of their school community are minimizing the impact on the environment while creating a new high performance school in which to learn.

> *"Maintain a view of the building and site as a seamless whole within the context of its community.*
>
> *Work with the understanding that the building exists within the context of a natural ecosystem even when the setting is urban.*
>
> *Maximize student performance by keeping standards high for air quality and increasing the use of day lighting."* [149]

These three underlying principles are expanded in The Collaborative for High performance Schools (CHPS) Best Practices Manual, Volume II, Design, 2006 Edition which outlines ten design factors that dictate a successful sustainable educational facility.

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[149] United States Green Building Council, "About LEED® for Schools, Fact Sheet" http://www.usgbc.org/ShowFile.aspx?documentID=2078.

1. Health and indoor air quality.

> *"Children are growing, their organs are developing, and they breathe more air relative to their body size than adults, and as a result sustain greater health problems and risks than adults from toxics and pollutants common in schools."* [150]

The quality of the air inside the school is critical to the health and performance of the occupants. The facility should provide superior air quality by controlling and eliminating sources of contaminants, providing ample ventilation and preventing moisture accumulation. To accomplish these guidelines, materials that are low emitters of volatile organic compounds (VOCs) should be employed throughout.[151]

2. Thermal Comfort.

Thermal comfort is an elemental variable in student and teacher performance. Hot stuffy rooms and cold drafty rooms have been proven to reduce attention spans and limit productivity. It is essential that building systems maintain a "comfort zone" for optimal productivity. The architectural design of the facility should be considerate of solar heat gains through windows and building elements in order to minimize the load on building systems.[152]

3. Visual Comfort.

Performing visual tasks is an essential component of the learning process for the majority of children. The facility should provide a rich visual environment that enhances learning. To provide visual comfort both natural light and artificial light should be used in combination to supply a controllable quality light source that eliminates glare. The optimal use of natural light will result in lower energy consumption supporting the sustainability of the facility.[153]

Figure 49 - Indoor Air Qulality

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[150] Mendell and Heath, "Do indoor pollutants and thermal conditions in schools influence student performance? A critical review of the literature" *Indoor Air,* Vol. 15, p. 27, 2004.

[151] The Collaborative for High performance Schools (CHPS) Best Practices Manual, Volume II, Design, 2006 Edition http://www.chps.net Pg.18.

[152] CHPS (2006) Pg. 20.

[153] CHPS (2006) Pg. 21.

4. Acoustic Comfort.

Acoustic comfort is a central element of the learning process. The learning environment must have good acoustical qualities. Noises from outside the classroom (traffic, conversations in corridors, etc.), the building systems (HVAC, computer fans, etc.) and even reverberation within the classroom can all lessen a student's concentration. As concentration decreases, learning is impaired. Careful consideration should be given to the acoustical quality of the learning environment by reducing sound reverberation, limiting the transmission of noise from outside and minimizing background noise from building systems.[154]

5. Security and Safety.

A safe and secure environment should be created by designing and by optimizing areas for natural surveillance and creating a sense of territory, while controlling access. Landscaping design should minimize places that are hidden from view while assuring that areas of activity such as drop-off points, parking and play areas are all easily observable from inside the building. To reinforce a sense of ownership or territory the treatment of boundaries should be clearly delineated with landscaping treatments. In addition, common areas such as corridors should be designed to be more "room-like" with views into classrooms and the exterior.[155]

6. Ecosystem Protection.

The design of the facility should be environmentally responsive to the site, incorporating natural features such as prevailing winds and solar energy to enhance the building's performance. Natural features of the site should be protected and damaged areas should be restored where possible. The design should be cognizant of storm water runoff and measures should be taken to minimize the affects of adjacent ecosystems. In addition to the protection of the site, material selection should give preference to renewable resources as well as locally available items to minimize the impact on the ecosystem due to delivery.[156]

Figure 50 - "Ecosystem Protection".

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[154] CHPS (2006) Pg. 22.
[155] CHPS (2006) Pg. 23.
[156] CHPS (2006) Pg. 24.

7. Energy Efficiency.

The building should be designed to be energy efficient thus minimizing the emissions to the environment. In order to be energy efficient, the facility should incorporate Photovolatic cells to generate power, making the school a "net generator" returning excess electricity to the grid. In addition, an artificial lighting system will interact and monitor the abundance of natural day lighting provided to limit the amount of power consumed by lighting. The day lighting should be a controlled admittance of light through windows, light shelves, clerestory windows and roof monitors to avoid undesirable glare and heat gain. Furthermore, the energy efficient design should consider envelope systems for the ability to reflect or absorb thermal energy to enhance the building's performance. The heating and cooling systems will utilize geo-thermal energy to maximize efficiency while maintaining the "comfort zone".[157]

8. Water Efficiency.

The design should establish water efficiency by reducing storm water runoff from the site, consuming fresh water as efficiently as possible, collecting rain water and reusing "grey" water wherever possible. The collection of rainwater should be a design feature in order to provide a source for irrigation as well as the educational tool of the living stream. The "grey" water will be treated on site by an organic filtration system in order to return the water to the plumbing system for non-potable uses.[158]

9. Materials Efficiency.

The design should be material efficient by utilizing materials which are manufactured to conserve raw materials. This includes using products which come from renewable resources, include recycled material or materials that can be recycled or reused at the end of the service life of the product. In addition, the building should be designed to facilitate recycling in every area as well as providing space to sort and store the recyclables prior to transport.[159]

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[157] CHPS (2006) Pg. 25.

[158] CHPS (2006) Pg. 31.

[159] CHPS (2006) Pg. 33.

10. Building a teaching tool.

The facility will be used as an educational tool by integrating issues of efficiency and conservation into curriculum thus allowing the built environment to become an interactive teaching tool. The curriculum can align itself with the efforts to positively impact the environment by following the nine previous sustainable design statements.[160]

Summary

The test of the design principles will be to create a new type of inclusive school. The architectural response will include a prototypical classroom, resource classroom and an integrated community for exceptional students. These environments will be combined into one school complex. The application of the design principles will create similar learning environments, which foster familiarity and a sense of belonging as the exceptional student transitions through the special education system.

Figure 51 - "Creating an Educational Tool.

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[160] CHPS (2006) Pg. 16.

PRECEDENTS

The selected precedents critically analyze four types of educational environments; schools which have been designed to accommodate exceptional students, individual resource rooms within the "home" school, schools with teaching based in the theory of Multiple Intelligences and schools which incorporate nature. These four types of facilities are integral to the development of a series of architectural design principles.

The review of existing facilities provides further understanding of current educational practices for the selected types of facilities. In order to inform the design principles, the investigation reviews the current population, and identifies specific exceptionalities being addressed by the educators. In addition, the research provides insight into the overall facility.

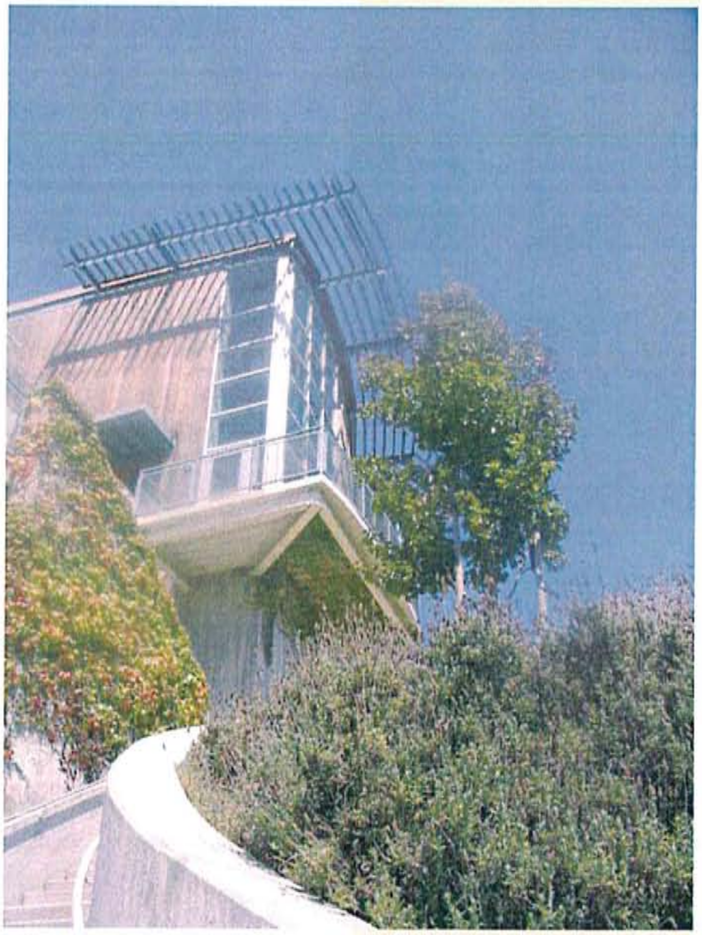

Figure 52 - Cragmont Elementary, Berkerley, CA.

Schools for Exceptional Students

Madeline Hardy School - CPRI

London, Ontario

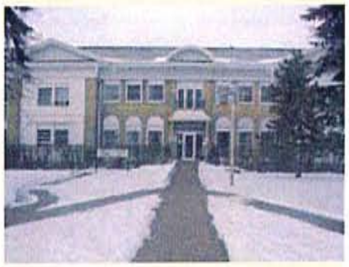

Figure 53 - Madaline Hardy School, London, ON

> *"Madeline Hardy School is connected to and on the campus of the child and parent resource institute. CPRI is a regional care and treatment facility serving a catchment area of 16 counties, 26 public and separate school boards and private and pre-schools located in south-western Ontario. The very specialized classes serve students who are in the care and treatment of CPRI as residential or day-treatment clients. Working closely with the staff of CPRI, school staff implement educational programs to meet the needs of students with developmental and multiple disabilities as well as those with complex behavioural, emotional or psychological disturbances. Children and youth of CPRI are provided with a specialized learning environment to make gains academically, socially, physically and emotionally in order to successfully return to their community school."* [161]

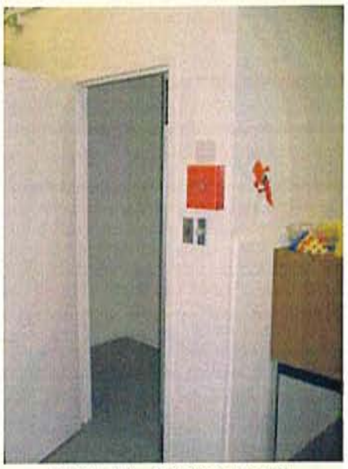

Figure 54 - Isolation Room

As described by the above excerpt from the TVSDB Program Services – Overview, Madeline Hardy provides educational services for children with complex exceptionalities. The school is staffed by the TVDSB, however the building they occupy is owned and operated by CPRI. The school is located on the ground floor of an old tuberculosis sanatorium, which has been modified into small classrooms. The current population of the school is approximately 40 children and the typical class size is four to eight students. The typical length of stay has been reduced from one school year, as was the case when Abbey Kastelein attended in 2002, to three months. The goal of inclusive education is readily being practised within the TVDSB.

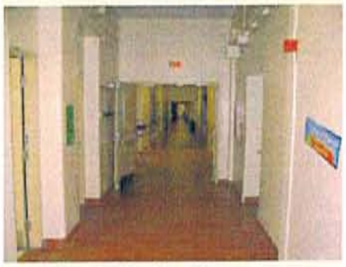

Figure 55 - Corridor

The main floor is a double loaded corridor with rooms on either side. As this was once a medical facility for patients with tuberculosis around the turn of the century; it is a long straight corridor. The majority of the classrooms are considered to be small for the teaching that is currently taking place. The remaining load bearing walls are located at approximately two thirds of the length of the classrooms remain. At one time these were the location for very large glazed doors which opened to a breezeway running the length of the patient ward. This is now in-filled with windows and forms the exterior wall of the classroom. There is an abundance of natural light flooding in

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[161] TVDSB (2006) Program Services – Overview Pg. 2 http://tvdsb.on.ca/welcome/program_over.pdf

from the windows and all the windows are operable, allowing for natural ventilation. Three of the classrooms currently have small isolation rooms for students who are behaving aggressively. The desks in the classrooms are arranged in rows, separated from one another, as well as individual desks separated from the classroom for independent work. Each classroom has open shelves for storing educational materials around the perimeter of the room. There is no place in the classroom for personal storage and coats and belongings are hung in the corridor on simple hooks (boots remain on the floor.)

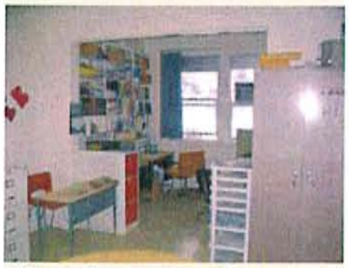
Figure 56 - Remnants of Patient Ward.

The small library and reference centre are located at the east end of the corridor, and a small gymnasium is located off the main corridor at the west end of the facility. The majority of the students lack the necessary motor skills to participate in strenuous physical education, however they enjoy the time spent riding tricycles and scooters stored in a small room in the east end of the room.

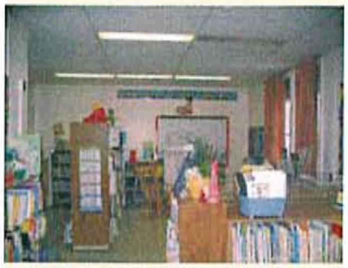
Figure 57 - Library

Summary

This space cannot be described as a learning environment that is conducive to learning. Madeline Hardy is a place that only provides opportunities to learn by the shear dedication of the staff who work there. The staff are providing the best possible environment they can by creating a caring environment in spite of the physical surroundings.

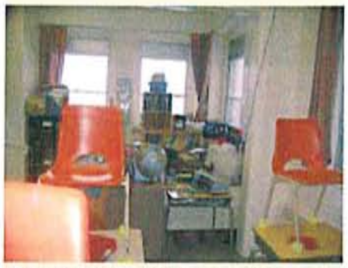
Figure 58 - Typical Classroom

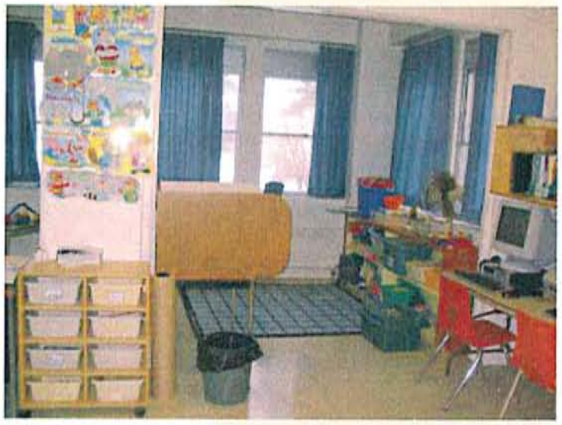
Figure 59 - Double Sized Classroom

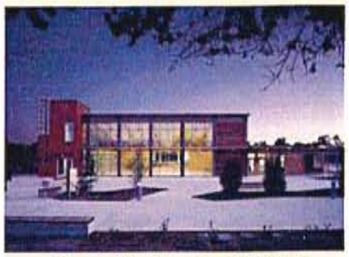

Figure 60 - Chartwell School, Seaside, California

Figure 61 - Photovalatic Cells

Figure 62 - Corridor

Figure 63 - Typical Classroom

Chartwell School
Seaside, California

> *"October 2006- Chartwell school in Seaside, California, opened the doors in September to its first students to start their first full semester. Chartwell school is a K-8 school that educates children with dyslexia and related language learning disabilities. The new campus provides a high performance educational environment and healthy classrooms for the students, showcasing design principles that support and enhance learning. The building is designed to achieve LEED Platinum rating. The school hopes to be a model for development in the region demonstrating and disseminating sustainable building practices that create exceptionally healthy and comfortable learning environment while dramatically reducing environmental impacts."* [162]

As described in the above excerpt from EHDD Architecture's website, the Chartwell School is a recently completed school for exceptional students. The school is in Seaside California on a former Fort Ord military base that overlooks the Monterey Bay. The school is a private school that specializes in the education of children with a wide range of visual, auditory and language-related learning difficulties. The goal at Chartwell School is to provide students with the skills and confidence to return successfully to mainstream education. Phase One of the construction houses 120 students in four buildings. The south classroom wing contains ten classrooms as well as an art classroom and science classroom. The first phase of the project also includes the Multi-Use/Outreach building and the outdoor recreation facilities. The second phase of the project encompasses the north classroom building, the library and main offices which will be completed when funding allows. Once completed the student population will grow to 160 students.

> *"The school was designed to be a sustainable learning environment, with the use of abundant natural daylight, comfortable natural ventilation, radiant floor heating, healthy materials to minimize allergens, and careful attention to acoustic design to minimize noise and distractions. Flexible spaces to allow hands-on learning for indoor and outdoor projects."*[163]

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[162] EHDD Architecture – Headlines October 2006 – "Chartwell Opens its Doors" http://www.ehdd.com

[163] Chartwell School, Seaside, CA. "Chartwell Moves Dirt" October 2005. http://www.chartwell.org

Summary

The typical classroom would be described as a pleasant and positive learning environment with ample natural light, and positive cross ventilation through the operable windows. The class size is typically eight students. From almost every point in the entire facility, there is a view to the exterior and the surrounding natural landscape. In addition, the multi-use outreach building has been designed with a wooden athletic floor. Large glazed overhead doors that open up to the courtyard to allow activity to spill outward. The campus is surrounded by a nature trail which is utilized in the curriculum of various subjects, thus incorporating nature into education. This school can be described as an excellent example of designing a sustainable learning environment.

Figure 64 - Multi-purpose Room

Figure 65 - "Rendering - Courtyard with Catapult"

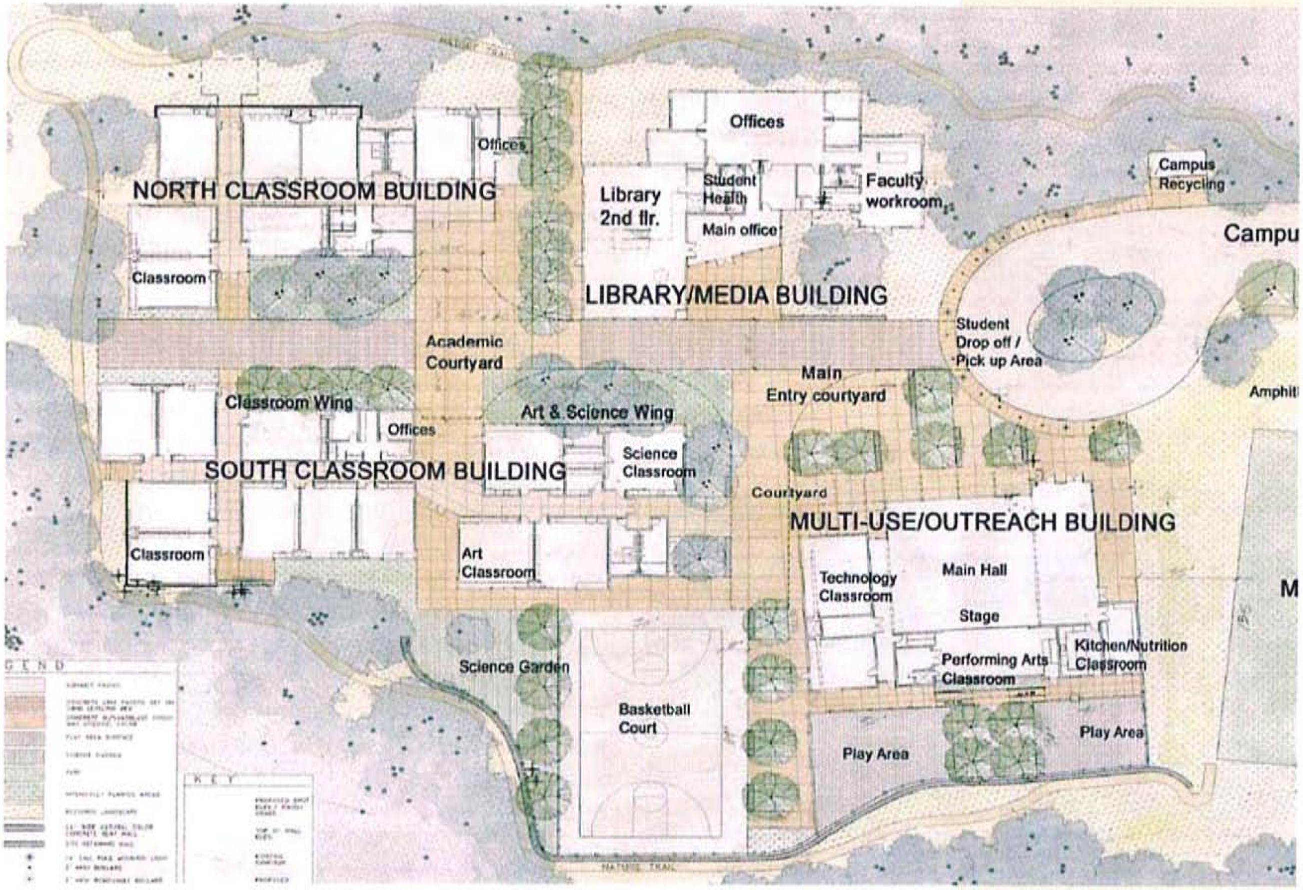

Figure 66 - "Site Plan"

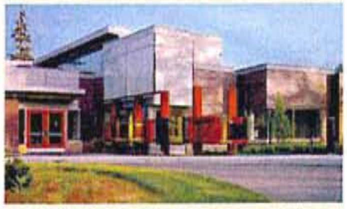

Figure 67 - W. Ross Macdonald , Brantford, ON.

W. Ross Macdonald School for the Blind

Brantford, Ontario

The W. Ross Macdonald School for the Blind was originally established in Brantford, Ontario in 1872. The facility is a provincial school for the blind and is operated by the Ministry of Education. The catchment area for the school encompasses the entire province. The current student population is approximately 200 students, from grade one through twelve. The building featured in both Canadian Architect (February 2005) and Architectural Record (December 2005) is a replacement building for two older buildings. The new facility is a 30,000 square foot primary education building for students in grades one to five, a six student residence and a health services building. The building is sited next to the campuses main classroom building for older students completed in the 1980's and provides an enclosed link to the main residence building and cafeteria.

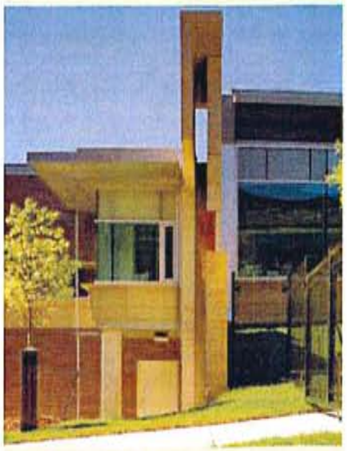

Figure 68 - Exterior

Rhys Phillips describes the design methodology of architect Bruce Stratton in formulating a school for blind children, as shifting the emphasis from a primarily visual medium to one that caters to the heightened senses of touch and hearing.

> *"His response was to pay close attention to the functional specifics--particularly as they related to touch, sound, and physical orientation--required to ease the complex living and learning challenges faced by the 32 blind, deaf/blind, and visually challenged students attending grades 1 through 6. At the same time, Stratton considered his objective for the $8 million, 30,000-square-foot facility as "not only accommodating pragmatic needs, but also serving intangible spiritual and sensory purposes." Stratton shares with Finnish architect and critic Juhani Pallasmaa the belief that architecture requires broader sensory depth than just the visual. In his essay "The Eyes of the Skin" (1996), Pallasmaa touted the "tacit wisdom of the body," in which vision must share architecture with touch, hearing, and smell. How a door handle greets the hand is more important than how it meets the eye. It is a position that emphatically resonates at the school, where students characteristically have a heightened sense of hearing, touch, and smell."* [164]

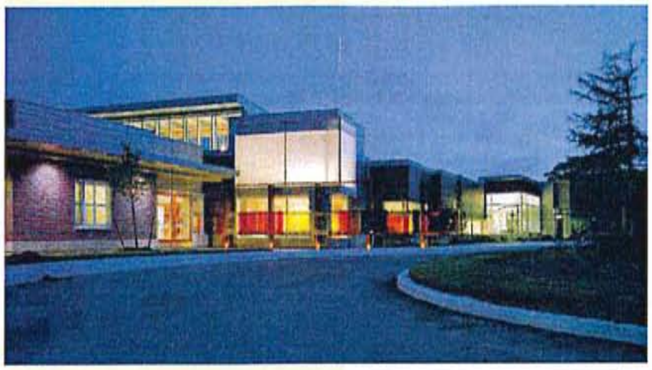

Figure 69 - Front Entrance at Night

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[164] Phillps, Rhys. "School design for the blind: learning to see without sight." Architectural Record, December 2005. Vol. 193, Iss. 12; Pg. 67.

The school has eight typical classrooms which share a study/workroom space, and a private barrier free washroom. There are individual lockers located in the corridor outside the classrooms identified with Braille nameplates. These lockers are constructed of cherry wood and are extra wide with a bench seat and boot storage below. The circulation spaces and doorways are wider than a typical school to accommodate students who navigate with the aid of a cane. Phillips further describes the connection to program spaces and there relationships to each other;

> *"The school is organized along a wider-than-standard, 10-foot corridor that facilitates students' quick and safe navigation. In addition, every attempt has been made to eliminate sharp corners and minimize obstructions that could cause injury. This interior street is broken into two offset wings. The shorter eastern wing houses student residences, a health services center, classrooms, music practice studios, a multipurpose space, and a doubleheight entrance atrium, spanned by exposed steel beams and almost encircled by clerestory windows. The longer west wing has meeting rooms and offices clustered near the atrium before the hallway traverses four teaching pods. Each pod has two classrooms for six to eight students divided by a washroom and a shared-use activity room that projects outward."* [165]

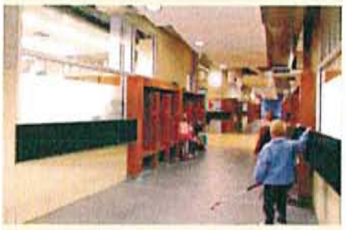

Figure 70 - Interior Corridor with Individual Lockers.

The selection of interior finishes have been thoughtfully detailed with respect to contrasting colours, the tactility of surfaces as well as the auditory qualities of the material. This attention to detail is described in the following description by Phillips in Architectural Record, December 2005.

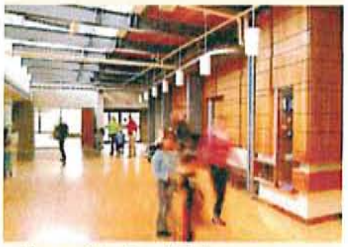

Figure 71 - Front Entrance Corridor.

> *"Stratton uses a range of materials to provide both haptic and aural experiences. By varying tactile qualities, he provides the students with orienting clues. Raw concrete block walls detailed with smooth ceramic tiles work with a continuous, 14-inch-wide, black-phenolic rail along the walls that children use to guide them. Both floor and wall finishes vary in type and texture depending on their location, in order to act as touch-sensitive markers to orient the children as they navigate the building. The corridor and classroom floors are typically dark porcelain tile, but at intersections with classrooms and in the atrium, maple flooring signals the transition. In addition, material variation results in tonal cues through the sound made by footsteps or by canes."* [166]

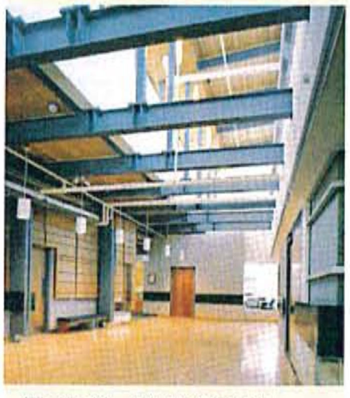

Figure 72 - Interior Corridor

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[165] Phillps, Rhys. "School design for the blind: learning to see without sight." Architectural Record, December 2005. Vol. 193, Iss. 12; Pg. 68.

[166] Phillps, Rhys. "School design for the blind: learning to see without sight." Architectural Record, December 2005. Vol. 193, Iss. 12; Pg. 68.

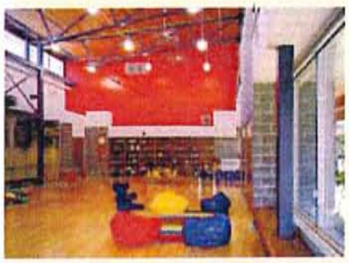

Figure 73 - Multi-purpose Room - Diffused natural light, warm materials and brilliant colours.

Similarly to the considerations given to material selection, the careful attention to the lighting is very important to students with impaired vision. Bright lights, glare from direct sunlight. Reflections from materials have all been thoughtfully arranged. The building is flooded with natural diffused light, and the majority of artificial light sources are all equipped with dimmers. Phillips describes the treatment given to the light by Stratton;

> *"While this visual treatment serves to signal different functional components, the building's external massing and detailing also act to mediate how light enters the building; important for children who are highly sensitive to glare. Broad concrete eaves and a series of exaggerated concrete fins are designed to block strong, late-afternoon sun from entering directly into classrooms. Most light fixtures, which are primarily indirect to reduce glare on work surfaces, operate with dimmers. Exterior glazing, particularly in the classrooms, is extensive; windows have lower than normal window heads and employ Solarfective blinds that block out 95 percent of outdoor light. On many interior walls, use of sandblasted and clear glass ensures indirect natural light is teased into central corridors from the classrooms."* [167]

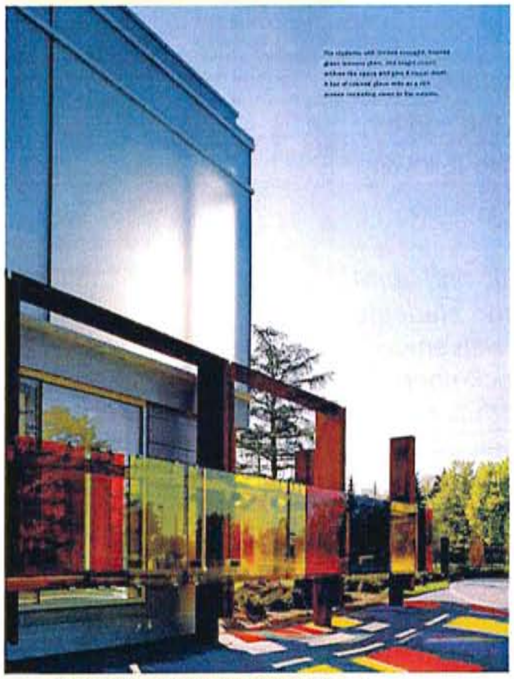

Figure 74 - Front Entrance with Coloured Glass Screen.

Summary

This is a well designed facility; it is flooded with naturally diffused light, "teased" all the way into the corridors. The ten foot corridor width creates a "street" feeling and the change in the flooring at the classroom intersections signifies a warm and welcoming entrance. The use of natural materials for the construction of the lockers adds to this feeling of warmth and gives the students a personal space that instills a sense of pride and ownership in the facility.

"the sensory richness present in the level of considered detail and material palette transforms this institution into an engaging place of learning for these children, and a home away from home." [168]

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[167] Phillps, Rhys. "School design for the blind: learning to see without sight." Architectural Record, December 2005. Vol. 193, Iss. 12; Pg. 68.

[168] Jen, Leslie. "Uncommon Sense" Canadian Architect, February 2005. Vol. 50, Iss. 2;. Pg. 35.

Resource Classrooms for Exceptional Students

Aberdeen Public School

London, (ISC, Intensive Support Classroom)

> *"The original school was built in 1883 facing Hamilton Road. After Lord Aberdeen, Governor General of Canada, visited London in 1893, the Board of Education decided to name the school in his honour. The present building with the entrance on Grey Street was opened in 1914. It looks very similar today.*
>
> *Today, Aberdeen consists of 15 classrooms offering everything from JK to Grade 8, special education (junior and intermediate), Steps for Success (behavioural) and Native as a Second Language programming."* [169]

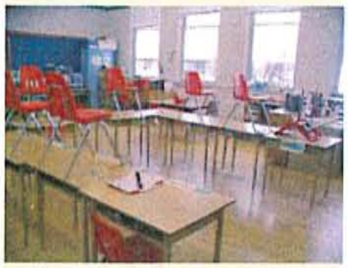
Figure 75 - ISC Classroom

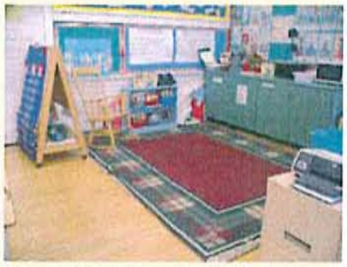
Figure 76 - Intimate Learning Space.

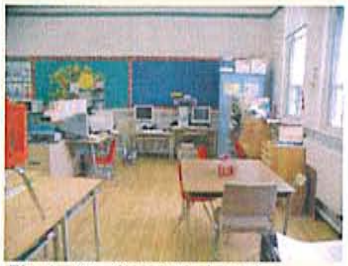
Figure 77 - Computer Learning Centre

The intensive support classroom is located on the second floor at the west end, in the primary division of the school. This special education room is a "regular" classroom that houses the students in the intensive support program. These nine students have a defined learning disability and range in grade level from four to six. These students receive individual attention from a full time intensive support teacher as well as an educational assistant in order to fulfill their Individual Education Plan (IEP). The classroom is divided into three areas, the first of which is the main instruction and work space. The individual desks arranged in a U-shaped pattern facing the blackboard define this area. The remaining two areas divide the rear of the room in half. One area has four computers arranged in a U-shape, and the other area is a small group instruction area with an area rug to define this space.

The instructor determined the u-shape desk arrangements to maximize efficiency in moving to provide individual attention to the students, as well as instruction from a central position to maintain visual contact with the entire class. The use of the area rug defines the expectations and behaviour for this location. The softer surface signifies a quiet and intimate level of instruction and learning. The remainder of the floor is hardwood, maintained from the renovation in 1914.

On a bulletin board located near the entrance of the classroom, there is a picture of each student that defines an area of personal space for each

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[169] TVDSB School Profile – Aberdeen Public School
https://apps.tvdsb.on.ca/employees/profile/profile.asp?schoolcode=1015

student to display work. The classroom has four large operable windows along the west wall, however in the afternoon direct sunlight from these windows creates a "glare" on the blackboard and makes it difficult for the students to see the work. At the perimeter of the classroom is open shelving to house instructional materials.

Summary

This classroom is containing a use other than was originally intended as the school design in 1914 did not accommodate special education classes. The container for learning has been adapted, to provide different instructional areas to deliver the curriculum. The space can be described as adequate, only because the instructor has manipulated the environment to serve the instructional needs.

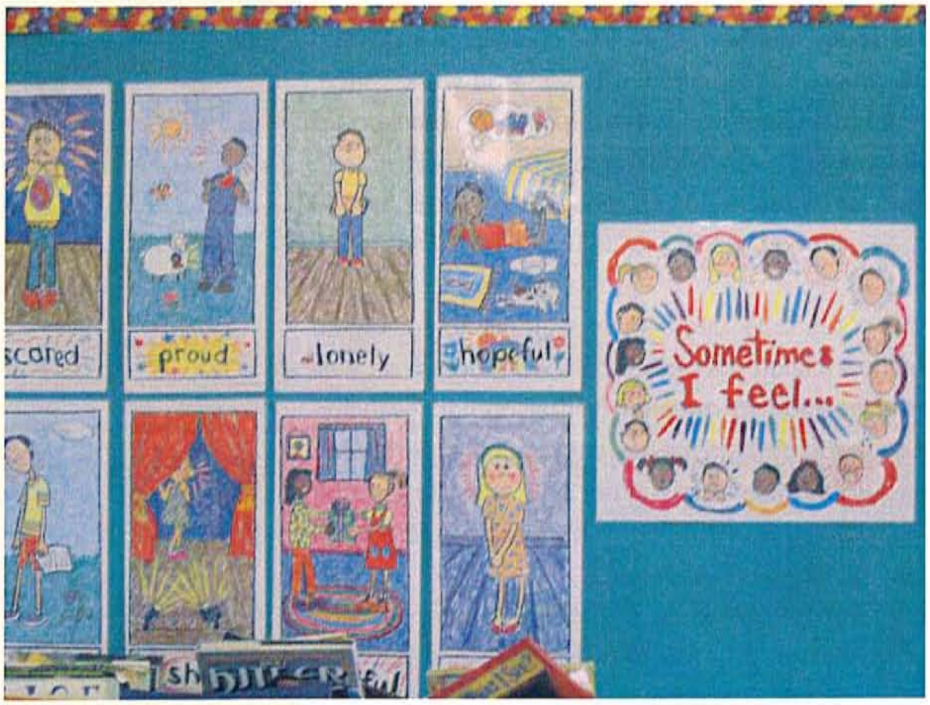

Figure 78 - Behaivour Expectations Board.

Nicholas Wilson Public School

– London (STEPS Classroom)

> *"Nicholas Wilson is a one story school which was built in the "open concept" model in 1971. There are four quads and a gymnasium which surround the open resource centre, the core of the school. In the past years one corner of each quad has been walled but the quad situation continues to support much collaboration and team work between teachers and classrooms."* [170]

Figure 79 - Nicholas Wilson Public School, London ON.

Although the school was designed in the "open concept" model the STEPS behaviour classroom is a single confined windowless room down the corridor from the central resource area. The intended use for the classroom was as a "life skills" room which is no longer a part of the curriculum. The decision to place the STEPS classroom in this room appears to be out of necessity. The STEPS program element did not exist at the time of design and replaces the life skills program that is no longer required.

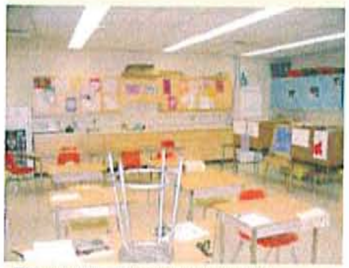
Figure 80 - Desk arranged in rows with group work space at baca of room.

The classroom serves seven students with behaviour exceptionalities. The students attend the classroom on alternating days and return to their home school in a regular classroom every other day. Similar to the ISC room, the space is divided into three areas. The desks are arranged in rows in the middle of the room. There is a table at the back of the room for group instruction and another area near the front with two computer workstations. The desks are organized in rows, to accommodate individual work that is provided by the instructor in the student's home school. Storage units that contain instructional materials are closed to prevent distraction and occupy the perimeter of the room. The storage units on the west wall display life sized drawings of each student to identify their personal display space in the room.

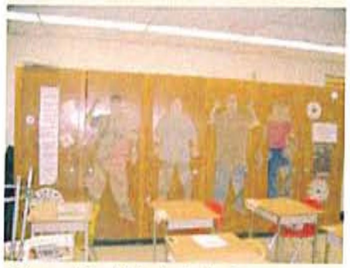
Figure 81 - "Student display space".

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[170] TVDSB School Profile – Nicholas Wilson Public School https://apps.tvdsb.on.ca/employees/profile/profile.asp?schoolcode=1440

Summary

The windowless room is not a warm and welcoming learning environment. The instructor has planned the room to accommodate the different types of instruction required and is making the "best" of the space provided.

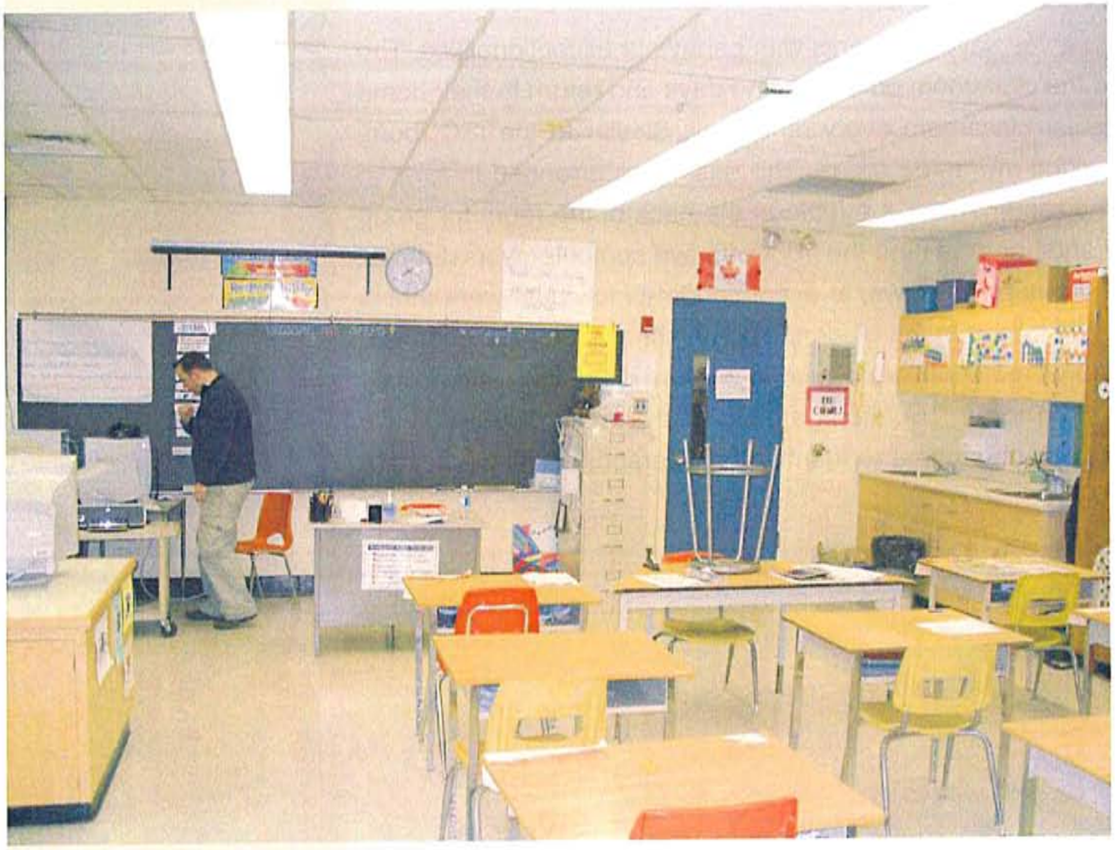

Figure 82 - Front of clasroom.

Knollwood Park Public School

London (PDD Resource Classroom)

> *"Knollwood Park Public School is a vibrant school with a very enthusiastic, dedicated staff and a very supportive community.*
>
> *Classes are clustered JK/SK. In addition to the grade JK-8 classes are three system special needs classes. Students assigned to the special needs program come from across Thames Valley. Knollwood's PDD (Pervasive Developmental Disorder) classes are comprised of a maximum of five students per class, one teacher and a number of educational assistants."* [171]

Figure 83 - Knollwood Park Public School, London ON

The Pervasive Development Classrooms in Knollwood Park occupy three classrooms in the primary wing of the school. There are 12 students in the program from throughout the school district.

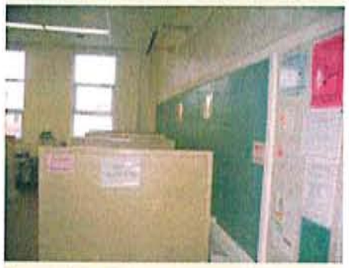

Figure 84 - Classroom divided into small private workspaces.

The first space is a modified classroom. The room is divided into two halves separated by a quiet room (isolation) in the middle of the space. The perimeter of each half is divided into several small isolated workspaces. These individual workspaces are arranged so the student works from left to right for all tasks required. The student selects a work assignment from a file folder on the left side of the workspace, works individually at the desk (centre) and deposits the completed assignment in a basket on the right. Each student rings a bell when assistance is required and one of the four instructors attends to the student. There is one instructor (Teacher or Educational Assistant) for every two students. The room layout is a collection of small individual spaces designed for solitary study; the partitions limit the views of the students to minimize distraction. In order to minimize stimulus there are no posters or bulletin board displays in the room.

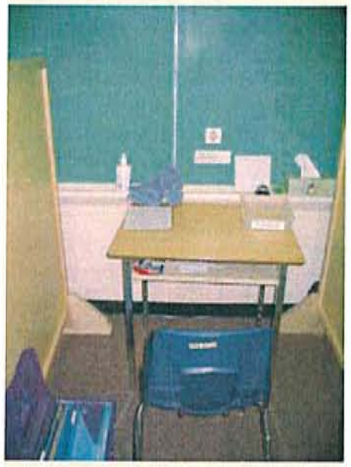

Figure 85 - Individual workspace.

In planning the conversion of a regular classroom to a specialized learning environment for children with PDD several environmental factors were considered. The intention was to limit the environmental stimuli, which lead to the selection of a muted colour for the walls (beige). In addition to the colour selection, it was determined that the noise from the fluorescent ballasts was an irritant to the PDD students. The decision to add incandescent pot lights has proven ineffective. The pot lights are no longer in use and the noise

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[171] TVDSB School Profile – Knowlwood Park Public School https://apps.tvdsb.on.ca/employees/profile/profile.asp?schoolcode=1330

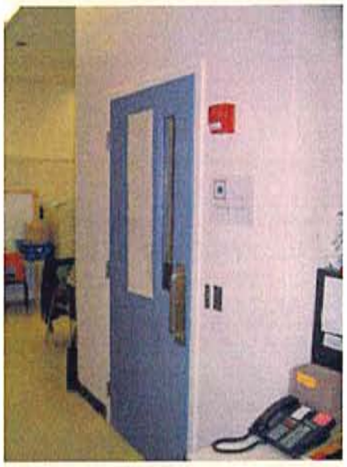

Figure 86 - Quiet Room

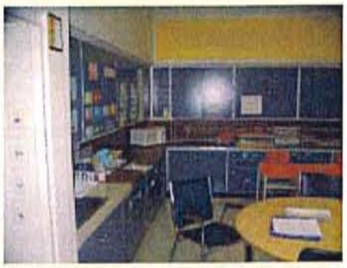

Figure 87 - Arts and Crafts Area.

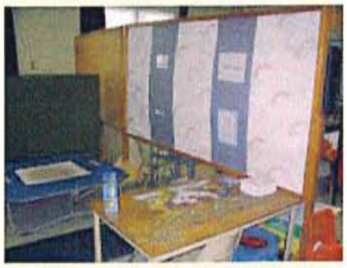

Figure 89 - "Puzzle Table"

from the fluorescent ballast has been replaced by the noise from computer fans.

The second classroom, across the corridor is a typical classroom that has been divided into three separate areas. This classroom was not originally intended to be part of the PDD resource space. The space was acquired as the need for different types of learning spaces were required to satisfy curriculum developments. The three separate areas are; a space at the front of the room with desks arranged to accommodate group work, a space at the rear of the class for arts and crafts projects and a larger space for physical activity.

The first area at the front of the room resembles a typical classroom arranged to promote group interaction and learning. The desks are situated near the blackboard in a large group. Adjacent to the group learning space is an area for coats and personal belongings. This area defines personal space by placing a nametag above each hook.

The arts and crafts area at the rear of the room is a space with three separate small tables with four chairs each. Along two sides of this area are cupboards for the storage of art supplies.

The final and largest area is defined by carpet with a soft under pad. This area is for physical activity and around the perimeter is a treadmill and small trampoline. The space in the middle is open and contains two large physiotherapy balls. The students use this area during the allotted "free time" (the daily work schedules are clearly defined for students with PDD, the routine provides a sense of stability for the student). In the corner of the "free time" space is a separate divided area that is screened from the activity, which contains a "puzzle" table. This area provides an opportunity for quiet and private "free time."

The third classroom was occupied and unavailable for viewing at the time of the site visit. However, it was described as similar to the first classroom without the isolation room.

Summary

Each of these spaces would not be considered ideal environments for students with PDD exceptionalities. They are spaces that have been modified although constrained by the given perimeter. Ideally, these two rooms should be combined into one large area to better accommodate these students. The areas defined within the space have all been arranged by the instructors to suit the current curriculum. The physical space has not kept pace with the curriculum. The space was described by the principal Jennifer Jolliffe as "not very special, it is the staff that make it work and make it special".

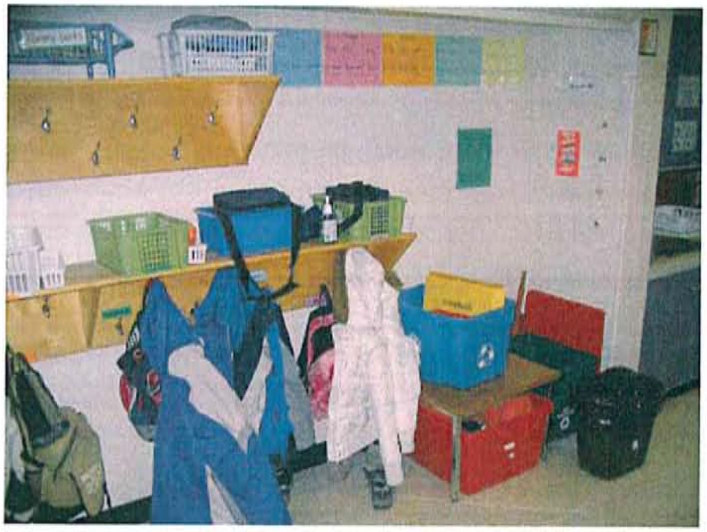

Figure 89 - "Personal Space".

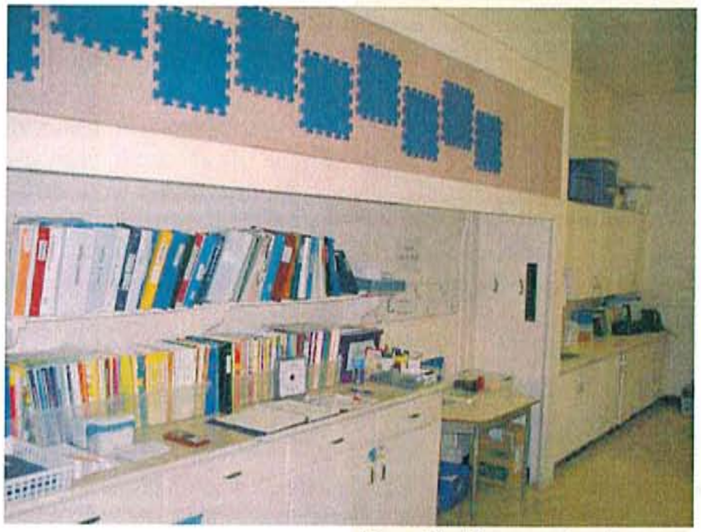

Figure 90 - "Resource Area"

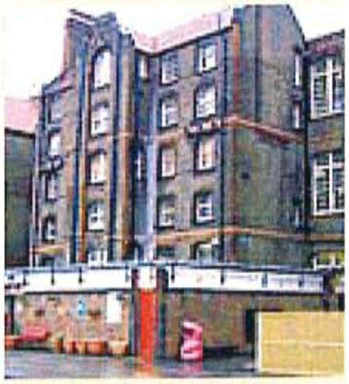
Figure 91 - The New City School, St. Louis MO.

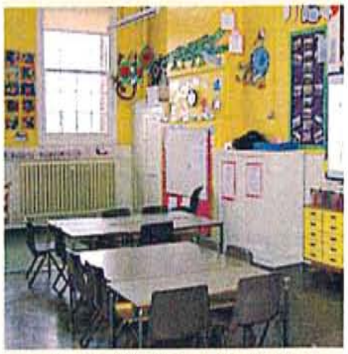
Figure 92 - Group Workspace.

School with Teaching Based In Multiple Intelligence

The New City School

St. Louis, Missouri

> *"'Live to learn and you will learn to live'*
> *This Portuguese proverb expresses the philosophy behind the unique educational experience at New City School."* [172]

The New City School was founded in 1969, as a small school catering to diverse children operating from the basement of a Unitarian Church. The school has grown to occupy a turn of the century school building purchased in 1971. The current facility has three floors of classrooms housing pre-primary and kindergarten students through to sixth grade classrooms. In addition the school has a full-size gymnasium, 250 seat theatre, dedicated spaces for science, art, performing arts, movement and music, computers and Spanish instruction. The School recently completed two additions; a 2,200 square foot dining hall which opens onto a large amphitheatre and a 5,400 square foot library to support learning through Multiple Intelligences.

The site amenities include pre-primary and primary playgrounds, a soccer field, track, softball field and a centennial garden designed for play and learning. [173]

The educational philosophy at the New City School is based on the theory of Multiple Intelligences.

> *"Since 1988, the theory of Multiple Intelligences, conceived by Harvard University Professor Howard Gardner, has been used as a tool for teaching and learning at New City School. This unique academic learning approach capitalizes on students' strengths and creates a deep level of understanding that allows children to use what they've learned in new and different situations.*
>
> *New City School teachers create opportunities for children to learn and express what is learned through eight different intelligences; linguistic, logical-mathematical, interpersonal, intrapersonal, bodily-kinesthetic, musical, naturalist, and spatial.*

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[172] New City School – Prospective Parents – Viewbook. http://www.newcityschool.org/GetFileFromDb.aspx?ContentID=57

[173] New City School – Prospective Parents – Our Campus http://www.newcityschool.org/Home.aspx?ContentID=17

In combination with New City School's strong commitments to teaching students to read, write, and calculate at the highest levels of proficiency, the Multiple Intelligences approach to teaching and learning produces graduates who are well prepared for their future academic endeavors.

In a study of the use of Multiple Intelligences to educate children, it was found that schools using Multiple Intelligences, "commonly had a culture of hard work, respect, and caring: a faculty that collaborated and learned from each other; classrooms that engaged students through constrained but meaningful choices, and a sharp focus on enabling students to produce high quality of work."[174]

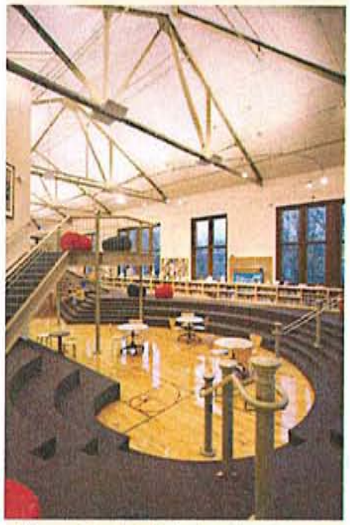
Figure 93 - Multiple Intelligence Library

Summary

New City School is an urban school recycling an old school building from the turn of the century. The building provides a basis for the curriculum. The new library designed to assist Multiple Intelligence learning is an exciting interactive environment that offers varied types of space to suit different learning requirements.

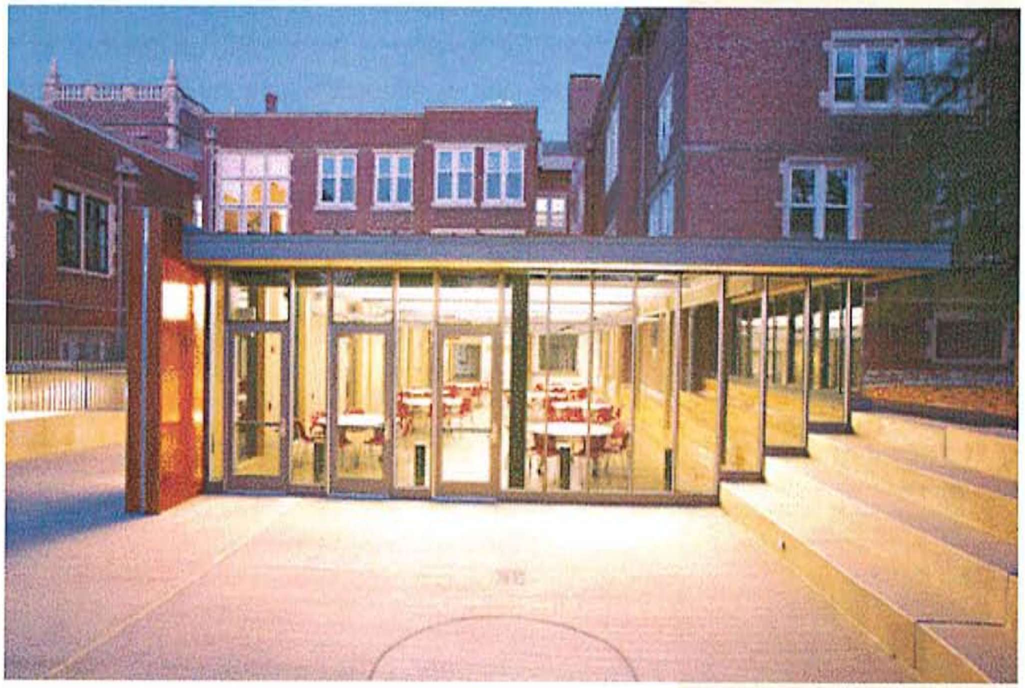
Figure 94 - Dining Hall at Dusk.

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[174] New City School – Prospective Parents – Viewbook. http://www.newcityschool.org/GetFileFromDb.aspx?ContentID=57

Schools Which Incorporate Nature

Cragmont Elementary School

Berkeley, California

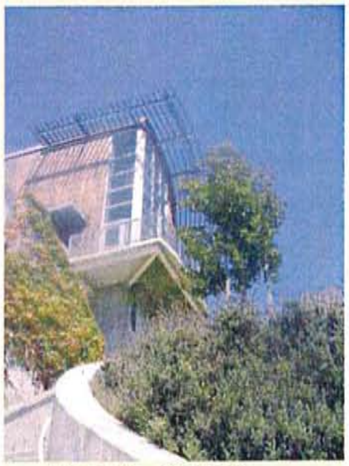

Figure 95 - Cragmont Elementary School, Berkeley CA.

Cragmont Elementary School replaced an existing school that was deemed to be seismically unsafe. The landslide zone setback and a respect for the surrounding neighborhood were determining factors in the location of the building on the site. Author Lisa Annunziato describes the school in Contact Magazine in March 2003;

> *"Nestled in the affluent hills of Berkeley, Calif., the new Cragmont Elementary School, designed by hometown firm ELS, not only assimilates into the 1930s architecture of the neighborhood, but provides soaring views, an interactive environment, and design that inspires youngsters to succeed."* [175]

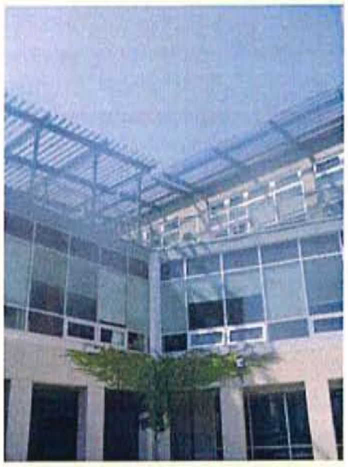

Figure 96 - Classroom with Atrium.

The school completed in 2001, has approximately 400 students ranging from kindergarten to grade five. There are two levels with ten classrooms on each level. The classrooms are spread over two wings that follow the existing residential street to the north. The wings are separated at the "knuckle" of the plan by the double height multi-purpose room. Annunziato describes the collaborative planning process employed by the design team;

> *"The program and design of the school were developed in an intensive series of workshops with parents, teachers, administrators, neighbors, and students. Each building element is clearly articulated to reduce the mass of the school and respond to the scale of nearby homes. The design also allows for space and technology flexibility. In the future, classrooms on the upper level may add loft mezzanines, creating new spatial relationships not provided by the standard classroom design. Room for expansion is also considered in the structure on the hillside below the lower floor. And free-form corridors, following the hillside contours, have nodes for small breakout groups outside the classrooms."* [176]

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[175] Annunziato, Lisa "Site Lines", Contract. San Francisco: March 2002. Vol. 44, Iss. 3; Pg 66, 4 pgs.

[176] Annunziato, Lisa, Contract March 2002. Pg. 66

The result of the design allows the indoor spaces to expand to the outdoors, into the thoughtfully designed landscape.

> *"Utilizing the outside as an extension of indoor spaces, the design of the new Cragmont school offers amenities such as a rooftop terrace and a large outdoor patio that physically and visually connects with the gymnasium for large events. Wood siding and residential details help Cragmont assimilate into the 1930s style of the neighborhood.*
>
> *Contributing to the success of the school, both architecturally and functionally, is the connection to the landscape. A clever tiered design permits the use of a tight, almost vertical portion of the original site that was previously thought to be unusable. Outside play areas, including the amphitheater, ball courts, play structure, and turf fields, are organized on different terraces along the hillside terrain to maximize use. Outdoor spaces extend the classrooms. The ground floor classrooms even open up to patios with trellises, where students and teachers can have gardens or conduct lessons outside!"* [177]

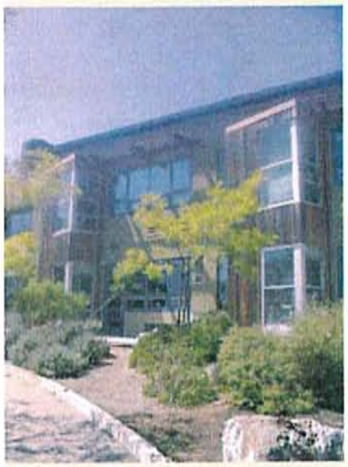

Figure 97 - Classrooms with a View.

The connection between the landscape and the learning spaces creates an enriching environment for learning.

> *"The new Cragmont takes advantage of the pristine environment and provides children with a connection to the region. Overall the views of the San Francisco Bay, complete with Golden Gate Bridge and the hills, have apparently had a positive effect. "One day I saw a student waving out the window," says Lustig. "She told me that every morning she waves to her mom who works across the Bay in San Francisco." To the designers, this type of connection was fully intentional, as children need to feel that they are part of the community."* [178]

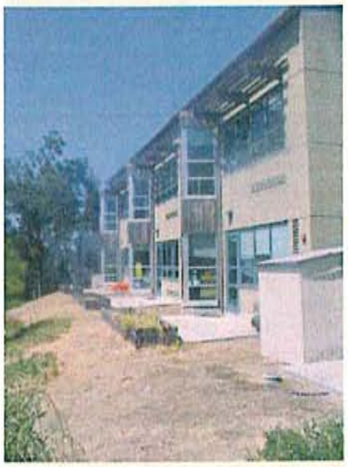

Figure 98 - Classrooms expand into the outdoors.

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[177] Annunziato, Lisa, Contract March 2002. Pg. 66.

[178] Annunziato, Lisa, Contract March 2002. Pg. 66.

Figure 99 - Site Plan.

This positive connection has been validated by the increase in student performance.

> *"Post-occupancy test scores confirm that the new facility has made a difference in the lives of the children. The student body raised standardized test scores by 38 percentile points one year after moving from the more institutional school building where they had been temporarily housed for almost a decade. And special education teachers report a marked improvement in attention spans of ADD students, due to the calming effect of views and light."*[179]

Summary

Cragmont Elementary School blends seamlessly with the site. At every opportunity, the designers connect the learning environment to nature. The selection of exterior finishes, the scale and respecting the surrounding neighbours existing views of the San Francisco Bay characterize this school as a good neighbour.

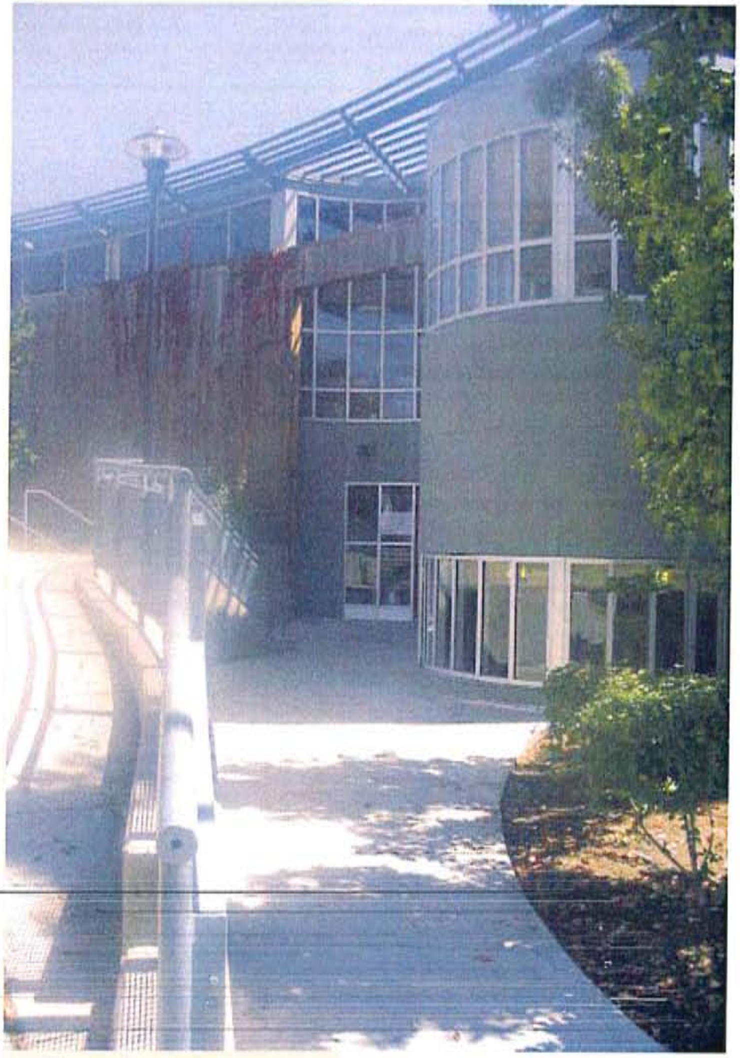
Figure 100 - Front Door.

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[179] Annunziato, Lisa, Contract March 2002. Pg. 66.

Burr Elementary School

Fairfield, Connecticut

Burr Elementary is located in Fairfield, Connecticut, a commuter suburb, 88km from New York City. This town is experiencing a large population growth, and Burr is one of two new schools to support the expanding population. The school is located on a 15.5 acre wooded site, which provided an opportunity to inform the design of the facility.

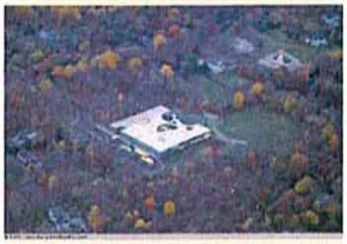
Figure 101 - Burr Elementary School, Fairfield CT., Aerial photograph

> *"One of the primary objectives was to integrate the architecture of the school into the preserved landscape," says SOM design partner Roger Duffy, AIA. "This was a heavy wooded, undeveloped site incorporating wetlands so environmental conservation was a priority."*[180]

The design of the school integrates seamlessly into the natural environment blurring the delineation between inside and out.

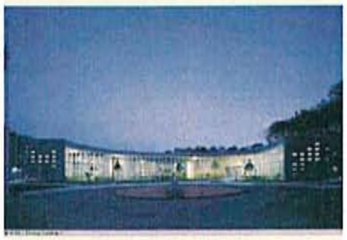
Figure 102 - Front Entrance at Night.

> *"The new school is situated on a 15.5 acre wooded site set in a secluded residential neighborhood. One of the school's primary design objectives is the incorporation and integration of architecture and landscape. This design will be achieved through the campus plan which includes curved, circular, landscaped courtyards and open spaces. The integration is furthered by an "indoor landscape", literally bringing the outdoors in. The exterior of the buildings are clad in natural, locally occurring stone that preserves the "country road" feel of the immediate community and provides a physical and visual connection to the surrounding environment."* [181]

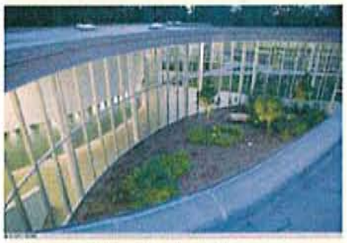
Figure 103 - Courtyard

The school accommodates 500 students from grades kindergarten to grade five. The facility is approximately 71,000 square feet over two floors. There are 20 classrooms; 4 kindergarten classrooms, science classroom, art classroom, media centre, gymnasium/auditorium, eight resource and support classrooms and a language lab.

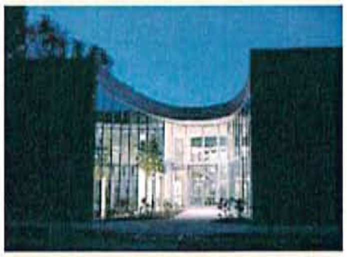
Figure 104 -Rear Entrance at Night.

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[180] Weathersby, William, Jr.. "Skidmore, Owings & Merrill Designs a Public Elementary School that opens onto the landscape, and even surrounds some trees.." Architectural Record, December 2005. Vol. 193, Iss. 12; Pg. 142.

[181] Skidmore, Owings & Merrill – Architecture – Projects – Education 1-20 – Fairfeild Elementary School. http://www.som.com//resources/projects/3/3/2/printPreview.html

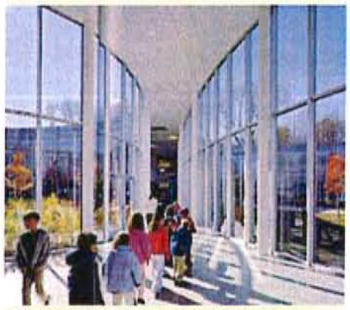

Figure 105 - Interior Circulation.

> *"The school's design creates a variation on the traditional double-loaded corridor school layout, locating the communal library, art, science, and cafeteria spaces at the center of the two-level plan. Existing tress perforate at the footprint, within a series of amoeba shaped courtyards that function as outdoor classrooms contained in the building volume. In addition to the perimeter curtain walls, these atriums allow natural light and air into the building; because they reside as easily observable spaces within the building envelope, security is not an issue. Circulation routes occupy the residual spaces between the courtyards, creating a continuous space onto which all classrooms and instructional areas open."*[182]

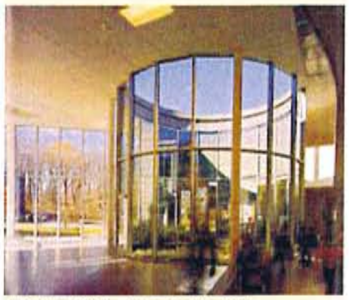

Figure 106 - Interior Court.

Not only does the school integrate the architecture with the landscape, but the school respects the environment by incorporating sustainable design principles.

> *"The Burr Street School is a true "green building" in every sense. In addition to the use of stone, woods and other natural materials, the design will integrate as much natural day lighting as possible. Other sustainable design initiatives include: an SOM designed low-energy curtain-wall, the integration of recycled materials, a waste management plan, storm water and irrigation systems, and high quality air and energy systems. Unification of the campus will be achieved through the selective preservation of existing materials and elements throughout the school and environment. The Burr Street site includes wetland and vernal pool areas. In an effort to preserve these areas SOM is leading a team of environmental specialists who are working through both the design and approvals processes. When complete, the school will be able to take advantage of these preserved natural areas for student study and educational development."* [183]

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[182] Weathersby, William, Jr.. Architectural Record, December 2005. Pg. 142.

[183] Skidmore, Owings & Merrill – Architecture – Projects – Education 1-20 – Fairfeild Elementary School. http://www.som.com//resources/projects/3/3/2/printPreview.html

Summary

This facility creates a sustainable learning environment intertwined with the natural environment. The voids in the plan flood the core of the school with natural day lighting and integrate the site as classroom spaces. This integration allows for continuous views of the surrounding landscape through the building.

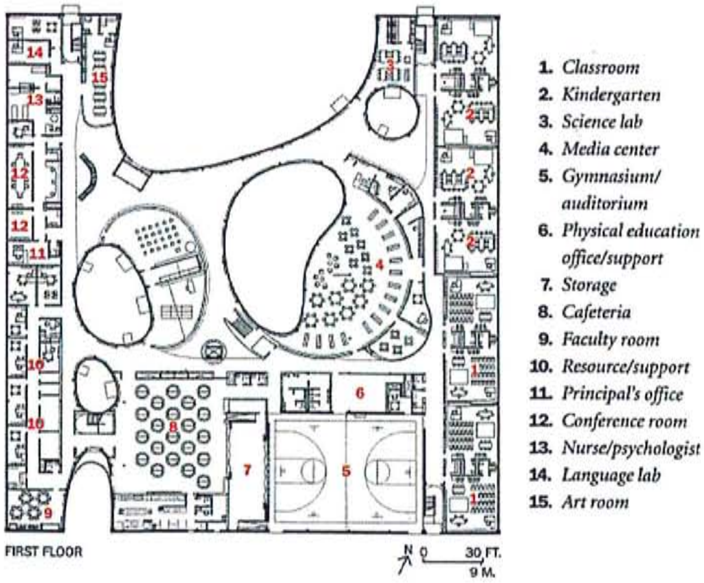

Figure 107 - First Floor PLan

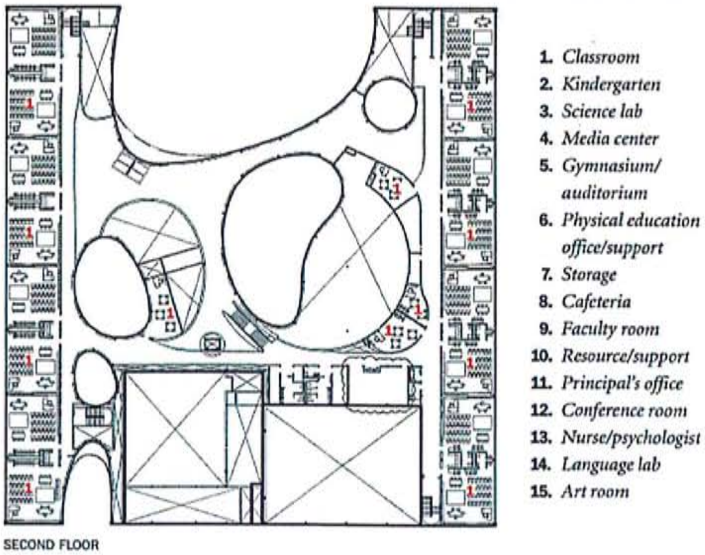

Figure 108 - Second Floor Plan

Precedent Summary Chart

Schools for Exceptional Students	
Madeline Hardy School - CPRI	This space cannot be described as a learning environment that is conducive to learning. Madeline Hardy is a place that only provides opportunities to learn by the shear dedication of the staff who works there. The staff are providing the best possible environment they can by creating a caring environment in spite of the physical surroundings.
Chartwell School	The typical classroom would be described as a pleasant and positive learning environment with ample natural light, and positive cross ventilation through the operable windows. The class size is typically eight students. From almost every point in the entire facility, there is a view to the exterior and the surrounding natural landscape. In addition, the multi-use outreach building has been designed with a wooden athletic floor. Large glazed overhead doors that open up to the courtyard to allow activity to spill outward. The campus is surrounded by a nature trail which is utilized in the curriculum of various subjects, thus incorporating nature into education. This school can be described as an excellent example of designing a sustainable learning environment.

W. Ross Macdonald School for the Blind	This is a well designed facility; it is flooded with naturally diffused light, "teased" all the way into the corridors. The ten foot corridor width creates a "street" feeling and the change in the flooring at the classroom intersections signifies a warm and welcoming entrance. The use of natural materials for the construction of the lockers adds to this feeling of warmth and gives the students a personal space that instills a sense of pride and ownership in the facility.
Resource Classrooms for Exceptional Students	
Aberdeen Public School	This classroom is containing a use other than was originally intended as the school design in 1914 did not accommodate special education classes. The container for learning has been adapted, to provide different instructional areas to deliver the curriculum. The space can be described as adequate, only because the instructor has manipulated the environment to serve the instructional needs.
Nicholas Wilson Public School	The windowless room is not a warm and welcoming learning environment. The instructor has planned the room to accommodate the different types of instruction required and is making the "best" of the space provided.

Knollwood Park Public School	Each of these spaces would not be considered ideal environments for students with PDD exceptionalities. They are spaces that have been modified although constrained by the given perimeter. Ideally, these two rooms should be combined into one large area to better accommodate these students. The areas defined within the space have all been arranged by the instructors to suit the current curriculum. The physical space has not kept pace with the curriculum. The space was described by the principle Jennifer Jolliffe as "not very special, it is the staff that make it work and make it special".
School with Teaching Based In Multiple Intelligence	
The New City School	New City School is an urban school recycling an old school building from the turn of the century. The building provides a basis for the curriculum. The new library designed to assist Multiple Intelligence learning is an exciting interactive environment that offers varied types of space to suit different learning requirements.
Schools Which Incorporate Nature	
Cragmont Elementary School	Cragmont Elementary School blends seamlessly with the site. At every opportunity, the designers connect the learning environment to nature. The selection of exterior finishes, the scale and respecting the surrounding neighbours existing views of the San Francisco Bay characterize this school as a good neighbour.

Burr Elementary School	This facility creates a sustainable learning environment intertwined with the natural environment. The voids in the plan flood the core of the school with natural day lighting and integrate the site as classroom spaces. This integration allows for continuous views of the surrounding landscape through the building.

DESIGN DEMONSTRATION INTRODUCTION

Thesis Statement

The purpose of this thesis is to create a series of design principles to shape a new learning environment, which assists in the learning process, thereby enhancing the well-being of the child/student. The design principles will be cognisant of children with exceptionalities and their unique requirements in order to facilitate a positive learning environment.

In order to generate the design principles, the research document examined five areas of research;
Understanding the Problem,
Understanding Current Practise,
Current Educational Theory,
Environmental Perception,
Precedent Studies.

Initially the research proposed a series of design principles to create three different learning environments; the "regular" classroom, the special education classroom and the special education school. However, the exploration of the design process led to a new understanding of the requirements of these spaces. This in turn developed a conclusion that the three proposed learning environments should be similar if not the same. A singular classroom design would assist in establishing a sense of familiarity within the students, not only with the spaces but also with the expectations of behaviour and learning that would take place within the different spaces. This familiarity will ease the transition for the exceptional students through the different levels of support in the special education system and provide a comfort level through each of the levels of support, culminating in the end goal of including all students in a redefined learning environment.

Modified Objectives

Develop a series of architectural design guidelines to enable a designer to create a new learning environment. Test the guidelines to develop three examples of the classroom module solution in three different conditions. The first example is tested in a new school, the second is a renovation/addition to an existing school and finally the third is as an addition of standalone port-a-pack of four modules. The third example is a replacement of four portable classrooms on a current site.

The knowledge gained has identified that a space for learning; whether it is a special education school, a special education classroom or the "regular" classroom, should all be one in the same. Therefore, every classroom would have the same configuration from kindergarten through to grade eight, with built-in furniture and furnishings scaled appropriately for each grade level.

DESIGN GUIDELINES

Introduction

Initially, the intended resolution of the research was the design of a new facility consisting of clasrooms and support spaces that embodied the established design principles. To this end, a replacement facility for the existing Madeline Hardy School located at the Child and Parent Resource Institute (CPRI) in London, Ontario was proposed and partially developed. This would have completed the circle of thought or the idea generator for my thesis. As stated earlier, the research led to a discovery that building a new special education facility did not mean that more spaces for exceptional students would mean longer stays at specialized facilities. This is not the answer to the special education problem; the end goal of all exceptional students is take up a place in the "regular" classroom of their home school with their peers.

Through the journey of discovery during the design process it became clear that the best test of the research was not the development of a new stand-alone school, but rather the exploration and discovery of a new classroom typology for the new method of curriculum delivery. The design process generated an understanding of the requirements for a new classroom typology, using the design principles as the starting point, guidelines have been generated for the classroom module.

The guidelines propose that a typical classroom module will serve varying numbers of students depending on the intended use of the classroom. The module has been designed to accommodate a facilitator and an educational assistant. The student population varies depending on the classroom. As an example, the special education classroom would accommodate eight students for a one to four ratio (educator: student), where as the "regular" classroom accommodates twenty students for a one to ten ratio.

The knowledge gained during the design exercise proved that there is no one "silver bullet" response to create a new classroom module that will help educators deliver a new curriculum, with a new method of curriculum delivery. With the use of the Design Principles and the Design Guidelines a designer will be able to generate an appropriate individual architectural response to assist in the delivery of education.

Design Guideline 1
Create an environment that is universally accessible.

This guideline establishes that the learning environment is universally accessible by accommodating all manner of assistive devices that accompany physical disabilities. In order to ensure universal accessibility, any level changes must be accessible by ramp or elevating device. Ideally the facility should be at grade level; however this is not always attainable due to site conditions. Allow for level transitions between interior and exterior spaces.

The configuration of the spaces within the classroom shall be configured to allow access to every part of the classroom, and allow a student with mobility difficulties to access every part of the classroom without assistance. This requirement shall be mindful of the five foot diameter turning circle, and thus should be accommodated within the space.

In addition to mobility issues within spaces, careful consideration should be taken when selecting materials. The design must be aware of items such as glare from windows and materials which promote noise reflection. These are but two examples of environmental stimuli which can cause adverse reactions in students with exceptionalities. This will lead to careful consideration when selecting building materials and finishes. Windows are to be placed to minimize glare from direct sunlight either by placing a premium on north facing windows or providing overhangs to shield high sun angles. The use of noise absorbing materials should be employed to avoid sound reflections and echoes. This can be accomplished by the use of a bamboo slat ceiling with gaps to allow for sound transference to an absorptive material above.

Design Guideline 2
Create an environment to facilitate different styles of learning.

This guideline is based on the educational theory of Multiple Intelligences. The built environment should provide varying spaces which assists in the delivery of curriculum for each type of intelligence and enhance each of the different learning styles. Due to the similarities in the requirements for some of the defined intelligences, there is an ability to provide spaces that can be shared by two or more intelligences. The design principles provided a list of activities and intended uses or "spirit of place" for each of the nine types of intelligence. Each of these intelligences can be accommodated within six separate spaces

The following outlines describe the guidelines for creating spaces for the delivery of a multiple intelligence curriculum.

Bodily-Kinesthetic/Spatial/ Musical Rhythmic Learning Environment

These three different intelligences can share the same space. The space should be approximately four hundred square feet, consisting of a large open area with high ceilings of a minimum of fifteen feet. The space should be situated to face north with large glazed areas with exterior views of natural surroundings to accommodate visual art activities. The space should be designed to open up to the exterior and have operable clerestory windows to promote natural cross ventilation with an abundance of natural light to instill an energizing feeling of being outdoors. The floor construction should be a wooden athletic floor for bodily-kinesthetic activities such as interpretive dance. The acoustical integrity of this room is also of consideration. To achieve the quality of sound required the volume will be designed to minimize reverberation and provide adequate sight lines to the focal point of the room.

The furnishings within this space should be moveable and be able to be manipulated by the students without educator assistance. This shared intelligence space should be the central hub of the classroom with all of the remaining spaces radiating outward, while maintaining visual and auditory connections to the remaining spaces.

Verbal Linguistic/Intrapersonal Learning Environment

Two intelligences share this space due to the similarities of the activities associated with each of these intelligences. The space should be an intimate space of approximately eighty square feet to support activities of groups of two to four students. As with all of the spaces, visual connectivity to other learning environments is essential. However, the activities within this space require the ability to block out sounds from other activities. It is essential that the light to this space be controllable, there should be the ability to diffuse natural light, and to supplement natural light with task lighting. Soft lighting and warm natural materials should be used to enhance the tranquility of the intimately sized space. In addition, the space should promote introspection with idyllic views of nature.

Verbal Linguistic/Interpersonal Learning Environment

Again, two intelligences share this space due to the similarities of the activities associated with each of these intelligences. The space should be a welcoming space of approximately one hundred twenty square feet to support activities of groups of four to eight students. As with all of the spaces, visual connectivity to other learning environments is essential. However, the activities within this space require the ability to block out as well as contain sound. The arrangement of furniture should be flexible to accommodate a variety of activities and intensity of discussions. Similarly, the lighting should be adjustable to attain the same goals. This space should have visual connections to the exterior, with an ability to open clerestory windows in order to provide natural ventilation when required.

Logical-Mathematical Learning Environment

This space should be approximately one hundred sixty square feet, with visual connections to the other learning environments. The ability to block out or contain sound is not a requirement of this space. The space will contain two different work areas, one area with computer workstations for individual study and a second large central area for group collaboration. The space should have the ability to control natural day lighting and controllable indirect artificial light. In addition, the ability to provide natural ventilation is beneficial to the type of activities within the learning environment.

Naturalist Intelligence Learning Environment

This space should be approximately one hundred sixty feet, and is a greenhouse/science lab. The space should have age appropriately scaled work benches around the perimeter to accommodate the activities described in the design principles. The construction of the space should allow for thermal control by mechanical means, in order to provide filtering of day lighting and the operation of windows for natural ventilation. In addition, the floor construction should be constructed to act as a thermal heat sink to provide supplemental heating in the winter months.

Existential Intelligence Learning Environment

This is an intimate space of approximately sixty square feet. The space must have a visual connection to the exterior as well as the remaining interior learning environments. The student must be able to block out the sounds from other learning environments, and retreat to this space to "reset". The materials and lighting should be warm and calming.

Design Guideline 3
Create an environment to facilitate Cooperative Learning.

This guideline establishes the creation of spaces for social interaction. All of the learning environments should be designed to accommodate group interaction. Even the Existential Learning Environment should be of a size to accommodate multiple students within the space. The environment should be designed to accommodate the group learning activities outside the classroom as well, weather it be an exterior space or a small space for contemplation in a circulation corridor that should be extended and enlarged to allow for group conversation and meaningful academic discussion.

Design Guideline 4
Create an environment that is legible and assists in spatial cognition.

By using the same classroom design through out a student's Kindergarten to Grade Eight experience, the spaces will be familiar and comfortable. The student will learn the "paths" in the classroom from one learning environment to another, and will identify with each of the learning environments as a district. The "nodes" are created at the intersections of the different learning environments. The front entrance to the classroom should be designed to be a "landmark." The module should be designed to create an identifiable front door to the classroom, which can be individualized to provide an identity for the class as a whole.

Design Guideline 5
Create an environment that has a direct and symbolic impact on the children using the space.

This guideline establishes a learning environment that is warm, welcoming and caring and represents the good intentions of the adults controlling the environment. The use of a warm wood ceiling and wood floors will help to represent feelings of caring. Attention given to the tactile surfaces within the space, and ensuring that they are welcoming are all essential to conveying a welcoming message. In addition to providing large amounts of glass and operable windows to provide fresh natural ventilation to assist in sensory stimulation by smell and the feel of fresh air on exposed skin.

Design Guideline 6
Create an environment that positively effects a child's development.

Provide opportunities for a child to individualize a personal space, each child is assigned a "cubbie" for coats, boots, etc. The ability to place pictures and nameplates is essential. In addition the ability for each child to post a translucent picture of themselves on the glass that separates the "cubbie" and the corridor, not only identifies the child within the class but the school community as a whole. The scale of furniture and built-in millwork should be age appropriate and easily manipulated by the specific age group. This will develop competence by creating a space in which the student can become self-sufficient. In designing a learning environment for multiple intelligences, the space will inherently be rich and varied, while providing spaces that will promote a multitude of uses varying from physical activity to quiet introspection. Children often require a sense of security and trust in order to explore their environment. To accomplish this feeling, architectural features will invite touch and give an impression of security. To avoid disorientation and apprehensive feelings the avoidance of sharp angled corners or converging spaces is necessary.

Design Guideline 7
Create an environment intertwined with nature.

The module should be designed to blur the boundaries between interior and exterior. The design should allow for the classroom to flow outside uninterrupted. As an example the use of large pivot doors allowing the entire wall of the bodily-kinesthetic to expand to the outdoor classroom. Create varied outdoor learning environments of differing scales to accommodate different uses and group sizes. Provide an opportunity for the class to grow a vegetable garden, which allow the children to attach to the land. Finally, bring the outside in. The use of a water feature and a living wall will identify each class throughout the school community and improve indoor air quality for the occupants.

Design Guideline 8
Create a sustainable environment to facilitate sustainable learning.

This design principle is founded in the belief that "Creating a Learning Environment for All" is not only responsible to the immediate neighbourhood but the global village as a whole.

The design guideline focuses on how to achieve this goal by using the established ten design factors listed in The Collaborative for High performance Schools (CHPS) Best Practices Manual, Volume II, Design, 2006 Edition. The ten factors are as follows:

1. Health and indoor air quality.

Provide ample opportunities to use natural ventilation, in addition to controlling and eliminating sources of air contamination by preventing moisture accumulation and using materials which are low emitters of volatile organic compounds.

2. Thermal Comfort.

Provide shading and overhangs to avoid solar heat gains, and provide mechanically operated clerestory windows to allow hot air to escape thus utilizing the benefits of the stack effect.

3. Visual Comfort.

Provide an optimal use of natural light, by minimizing overhangs on the north facing windows, and utilizing overhangs to provide naturally diffused light.

4. Acoustic Comfort.

Minimize the amount of background noise in mechanical systems, by employing micro fans and utilizing ground source heat pumps and radiant floor heating. The use of large deciduous trees in the landscaping design will assist with noise pollution in the warmer months in addition to providing shading and natural cooling, while allowing for thermal gains in the winter months.

5. Security and Safety.

The design of the classroom should be such that it allows for opportunities of natural surveillance, while creating a sense of territory. Site lines through out the module should allow for views into adjacent modules, through modules from exterior and in to the interior.

6. Ecosystem Protection.

The design of the facility should be responsive to the site, being cognizant of prevailing winds and utilizing solar energy to enhance the building's performance. The use of photovoltaic cells on roofs as well as films on exposed south and west windows will help to minimize the impact on the environment. In addition storm water management should be controlled by using green roofs and permeable paving materials for landscaped hard surfaces.

7. Energy Efficiency.

The building will be designed to be energy efficient thus minimizing the emissions to the environment. In order to be energy efficient, the facility will incorporate Photovolatic cells to generate power. In addition, an artificial lighting system will interact and monitor the abundance of natural day lighting provided to limit the amount of power consumed by lighting. The day lighting will be a controlled admittance of light through windows and clerestory windows to avoid undesirable glare and heat gain. Furthermore, the envelope systems should be designed to reflect or absorb thermal energy to enhance the building's performance. The finish material of the envelope will be highly insulated and use a panel system with a finish designed to reflect heat. The heating and cooling systems will utilize geo-thermal energy to maximize efficiency while maintaining the "comfort zone".

8. Water Efficiency.

The design will establish water efficiency by reducing storm water runoff from the site, consuming fresh water as efficiently as possible, collecting rain water and reusing "grey" water wherever possible.

9. Materials Efficiency.

The design will be material efficient by utilizing materials which are manufactured to conserve raw materials. This includes using products which come from renewable resources such as bamboo flooring and ceiling panels, include recycled material or materials that can be recycled or reused at the end of the service life of the product. In addition, the building will be designed to facilitate recycling in every area as well as providing space to sort and store the recyclables prior to transport.

10. Building a teaching tool.

The facility will be used as an educational tool by integrating issues of efficiency and conservation into curriculum thus allowing the built environment to become an interactive teaching tool. The curriculum can align itself with the efforts to positively impact the environment by following the nine previous sustainable design statements.

Summary

These design guidelines follow the previously established Design Principles. The intent of the guidelines is to utilize these in conjunction with the principles to create a new type of prototypical classroom serving all students. The intent is that the response will be a new classroom for the "regular" student and the exceptional student, who may be in transition through the different levels of support. The application of the design principles will create similar learning environments, which will foster familiarity and a sense of belonging as the exceptional student transitions through the special education system.

DESIGN DEMONSTRATION

Introduction

The research document developed a series of design principles to enable the creation of an architectural response to create a new learning environment for all students. The design principles were founded in the five areas of research (Understanding the Problem, Understanding Current Practise, Current Educational Theory, Environmental Perception and Precedent Studies). From these principles Design Guidelines have been developed to assist designers in creating a new type of learning environment. The knowledge gained during the design exercise proved that there is no one "silver bullet" response to create a new classroom module that will help educators deliver a new curriculum, with a new method of curriculum delivery. The process generated a multitude of design solution possibilities, each with varying degrees of architectural success and failure. The one constant was the application of the established principles and guidelines, success of a scheme could be determined if all the guidelines were attained within the design.

An early response to the design problem met all the requirements of the guidelines and was considered successful until the module design was incorporated into a larger whole. The merits of the design soon fell short when the attempt was made to link the module with other modules. This design flaw spawned a whole new generation of the module, which successfully meets the requirements of the Design Principles and Design Guidelines. The first example is the module in isolation, depicted as a senior classroom and a primary classroom.

The new module has been tested in three different conditions. The first of which is a module in a new school. The new school is a proposed design for the replacement of Madeline Hardy School. The school is located in the meadow area of the expansive site, with idyllic views of nature surrounding the entire facility. The second test of the Classroom Module is a renovation and addition to an existing classroom in an existing facility. The school chosen was Homedale Public School in St. Thomas, Ontario. This site was selected because it represents a small urban school and is a typical example of the majority of schools in the Thames Valley District School Board. Homedale was originally built in 1949 and has had several additions over the years. It is a one storey school with a level grade access and the renovation and addition represents one typical classroom within the school. The third example is Bradley Avenue Public School. This facility was chosen as representation of a new school with "portable" classrooms adjacent to the existing facility. These act as standalone units, accessed from the exterior of each classroom from outdoors. The test is a removal of these classrooms and replaced with four modules and a linking corridor.

Classroom Module
Investigation of a Prototypical Module - Senior

The Typical Classroom Module plan demonstrates the diferent learning environments for different intelligences. The module represents a departure from the classroom box and offers a new prototypical classroom. This module has been designed with a large central double height studio space which is approximately 400 sq. ft. to accommodate activities that focus on Bodily-Kinestheitic Intelligence, Spatial Intelligence and Musical Rhythmic Intelligence. The space has been has a north oreintation with large operable pivot doors to allow the space to flow to the outdoors. In addition, the space has mechanically operated clerestory windows around the perimeter that are controled by a building automation system to allow for natural cross ventilaton and controlled daylighting. These windows are protected by an overhanging green roof on the East, South and West sides. The finishes in the space consists of a wooden athletic floor, with a bamboo wear surface. The ceiling finish is also a bamboo slat ceiling with gaps to allow for sound absorption, this finish also carries through to the soffit to give the roof the appearance of floating on glass. This space acts as the central hub for the classroom, the remaining five learning environments are connected to this space as well as the entrance hall and storage or washroom space.

The second learning environment accomodates Small Verbal Linguistic and Intrapersonal Intelligences (SV-L). This intimate space is approximately 100 sq. ft. to accommodate small group coversations of two to four students. The space is accessed by a sliding glass pocket door from the northwest section of the Bodily-Kinesthetic (B-K) Learning Environment. The bamboo flooring and ceiling continue into this space. The ceiling follows a wave contour from the south to north to give a sense of motion toward the large picture window to the north. The large north facing window has mechanicaly operated windows at the floor and ceiling levels to promote positive air movement within the space.

The third Learning Envionment moving west across the B-K environment is the Existential Learning Environment. This is a small intimate space of approximatley 80 sq. ft. it is similar to SV-L space only a smaller scale with similar finishes and ceiling treatment. The space is able to be separated from the remainder of the module by means of a sliding glass pocket door on the east side and a glass pivot door on the south. This will enable the students to retreat from that classroom to "reset" while maintaining a visual connection to the remaining activities.

Moving directly south in the module is the Medium Verbal-Lingustic/ Interpersonal Learning Environment. This is an active space of approximately 160 sq. ft. to accommodate medium sized group discussions of four to eight students. As with the previous spaces the bamboo flooring and ceiling continue into this space. The ceiling follows the wave contour from the south to north to give a sense of motion toward the large picture window to the north. The large north facing window has mechanicaly operated windows at the floor and ceiling levels in addition to a clerestory window above the existential learning environment to promote positive air movement within the space and provide a view of the native plant material moving in the wind on the roof. This space can be separated from the remainder of the module as required by utilizing the two large glass pivot doors to provide an acoustical separation from the B-K learning environment as well as a glass wall along the south boundary of the room.

Directly south of this learning environment is the Logical-Mathematical Learning Environment. This is an active space of approximately 160 sq. ft. to accommodate medium sized group coversations of four to eight students. In addition, to providing individual workstations around the perimeter for independent study. Due to the loaction of this space, it has a single exterior window facing north, with mechanically operated clerestory windows along the north and south faces. The space also has a large matching interior window on the south face, to provide visual acces into and through the space from the corridor. The bamboo flooring and ceiling treatments are continued in this space. The ceiling treatment is similar to the B-K learning environment only on a smaller scale.

The module has been designed to interact with a circulation corridor, a water feature and a living wall. The roof monitor provides natural light for the living wall. This wall is maintained by the students and provides an interior connection to nature combined with the oportunity for individual class identification to the school community as a whole. This connection initiative is continued with the glazing between the students personal "cubbie" spaces and the circulation corridor. The "cubbies" located at the south end of the B-K Learning environment have been designed to be universally accessible and can be decorated to allow for personal identification. The ability for students to post a picture of themselves printed on an acetate film allows for a continuous visual connection between circulation space and the module.

The acces to the module from the corridor is through a small entrance hall. The recess from corridor is divided into a solid wall which acts as a classroom identification space, to create displays which identify the students to the greater school community. The second half of the entrance hall is a glass pivot door, with a view through the aquarium between the entrance hall and the Naturalist Learning Environment. Adjacent to the entrance hall is a storage space or alternately a barrier free washroom for the primary grade levels.

The last remaing space is the Naturalist Learnig Environment. This is a green house of approximatley 160 sq. ft. The green house has mechanically controlled operable windows and window shades to maintain temperature controls within the desired "comfort zone". The floor construction has been designed to be a thermal heat sink and is finished with polished concrete. A laborartory work surface wraps around the south and west walls, to provide space to study plants and insects, as well as two computer workstations. In the centre of the space is a small science work bench with a sink and gas outlets for science experiments. These built-in items should be appropriately scaled for the students in this classroom. This space can be separated from the B-K Learning Environment by large glass pivot doors as required.

The design of the module continues to the exterior, to provide an opportunity to blur the boundaries of the classroom. Each module provides three different exterior learning environments. The first is located outside the Logical-Mathematical Learning environment and provides a space for group activities at a table. The second is a grouping of concrete benches to accommodate various sizes of Verbal Linguistic activities. Finally, there is an outdoor classroom with a sink and teaching space, combined with a "L-shaped" bench next to the classroom garden area.

Investigation of a Prototypical Module - Primary

This module is the same as the senior module, with the exception that the furniture and built-ins are sized appropriately for the occupants. In addition, the storage space is utilized as a small barrier free washroom for primary students.

New Facility
Replacement of Madeline Hardy School CPRI, London, ON.

The development of the Madeline Hardy School is to act as a replacement for the existing facility. Currently the school is housed on the ground floor of an old tuberculosis sanatorium with a population of 40 students, with a typical class size of four to eight students. A spatial program was developed based on this student population to accommodate students from Kindergarten to Grade 8. The spatial program includes ancillary spaces, such as Administration, Library/Resource Centre, Nutrition Centre, Interaction Environments, Recreation Facilities, Staffroom/Lounge and Building Services. After completing a site analysis the site location was determined to be in the former meadow area of what was once a working farm on the site. The test of the classroom modules represents the typical module paired along two separate circulation spines surrounding the Recreation Facility component of the program. The primary division classrooms were located on the south side due to the fact that fine motor skills required for visual arts are not as tuned as senior students who would benefit from the indirect north lighting. The spatial representation of the program elements defines the relationships between these elements and how the paired module interrelates with the supporting spaces to create a school community. The Administration Element and the Staffing Element splay to create a welcoming entry, providing direct access to a large interaction space of the Lobby and Exhibition space. The largest volume of space being the Recreation facilities has been centrally located and is easily accessible from all sides. The Library/Resource element and the Nutrition Centre have been located so they have a large south facing spill out areas. The remaining foundations from the former farm out-buildings have been incorporated into the landscaped areas.

Renovation/Addition to an Existing Facility
Homedale Public School, St. Thomas, ON.

The second test of the Classroom Module is a renovation and addition of an existing classroom in an existing facility. Homedale Public School in St. Thomas, Ontario was selected because it represents a small urban school and is a typical example of the majority of schools in the Thames Valley District School Board. Homedale was originally built in 1949 and has had several additions over the years. It is a one storey school with a level grade access. The renovation and addition represent one typical classroom within the school. The classroom selected is Classroom 106; it is was constructed as part of the 1951 addition and is located on the north side of the corridor and is 836 sq. ft. The original windows on the north elevation were approximately 32' x 8', these were at some point removed and replaced with a single 6' x 6' window.

The design of the module follows the Design Principles and Design Guidelines as set forth as a result of the research. Three of the Learning Environments remain unchanged from the Typical Module. These are the Bodily-Kinesthetic Learning Environment, Naturalist Learning Environment and Small Verbal Linguistic/Intrapersonal Learning Environment. The remaining Learning Environments have been altered to accommodate the existing conditions.

Existential Learning Environment has been located south of the Naturalist Learning Environment and maintains the same configuration of the prototypical classroom module. This relocation of the space still meets the requirements of the space by providing a view to the exterior and maintains visual connections to the interior spaces, while maintaining the ability for auditory privacy via a sliding glass pocket door.

The relocation of the Existential Learning Environment allows the Medium Verbal-Lingustice/Interpersonal Learning Environment (MV-L) to move north. The configuration of the room remains similar to the prototypical classroom module, however in place of glass pivot doors, auditory privacy is attained by a sliding glass pocket door.

In addition to moving the MV-L north, the Logical-Mathematical Learning Environmemt rotates 90 degrees and slides north. The configuration of this room remains similar to the prototypical module in that the mechanicaly operated clerestory windows are provide on three sides of the space and are protected by an overhanging roof. The location causes the loss of the exterior window facing north as well the interior south window providing the visual connection to the circulation corridor. The glass wall separating the MV-L space allows for views through to the exterior, and connections to the corridor are now through the relocated aquarium. The entry hall and storage space have been flipped and are now located on the west side of the module.

Addition – Replacement of Existing Portables
Bradley Avenue Public School, London, ON.

The third test of the Classroom Module is an addition of four modules to replace existing portables. Bradley Avenue Public School in London, Ontario was selected because it is a recently renovated school, which added the portables as a change to the construction contract in 1997. This represents an opportunity to provide a permanent replacement of the temporary structures installed in 1997 without disturbing the original design of the facility.

This project was a joint venture between the City of London and the Board of Education. The 50,000 sq.ft. school was renovated and an additional 80,000 sq.ft. of new construction was integrated into the existing building. The program included a large free form pool, a smaller conversation pool, a triple gymnasium, gallery space, multiple change rooms, classrooms, a multi-purpose room, stage, administration, day care facilities, and a lunchroom. The current building form has become a symbolic community identifier. The building exterior has large expanses of glass with a wave like roof and strategically placed viewing portholes. Inside, the larger pool is shaped like a playful whale, while the smaller conversation pool is shaped as small fish. The building is a very dynamic and energetic community centre.

The design of the module follows the Design Principles and Design Guidelines as set forth as a result of the research, and as with the second test of the module, some of the Learning Environments remain unchanged from the prototype. Four of the Learning Environments remain unchanged from the Typical Module. These are the Bodily-Kinesthetic Learning Environment, Naturalist Learning Environment, Small Verbal Linguistic/ Intrapersonal Learning Environment and the Logical-Mathematical Learning Environment. The remaining learning environments have been altered to create a shared circulation corridor and an interior commons space, as well as accommodating the existing site constraints.

The relocation of the Existential Learning Environment to a location south of the Naturalists Learning Environment assists with a few modifications to suit the circulation corridor and interior commons space. This relocation also allows the entry hall to move towards the interior of the complex, creating an intersection similar to a street corner. The location of the Logical-Mathematical Learning Environment creates the interior commons space and provides views to the exterior through the building as well as a view from one side to the other.

Summary

The objective was to test the module in three different conditions. The prototypical module was designed to be a classroom in a new facility. Therefore the Design Principles and Design Guidelines were created with this fact in mind. The challenge was to determine how the module could be altered to accommodate existing conditions and site restraints, while maintaining the integrity of the Design Principles and Design Guidelines. The two tests at existing facilities demonstrate that it is possible to maintain the design integrity and positively react the existing conditions.

The initial idea generator of this thesis was to create a replacement school for Madeline Hardy School at CPRI. The journey of this thesis developed a new understanding of exceptional students and the Thames Valley District School Board's Special Education system. What started out as design for a special education classroom developed into a design for new typology for the regular classroom. The understanding that the problems facing the special education system are forever expanding and are in a state of constant flux, has lead to the resolve that there is no "silver bullet" classroom. In addition, current curriculum delivery is moving toward the three researched educational theories, and the current classrooms are being modified by instructors to suit these new theories. The proposed classroom module would create an architectural response to assist in the new method of curriculum delivery, thereby enhancing the well-being of the child/student.

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Figure 28	Classroom Corridor – W. Ross Mcdonald School for the Blind, Brantford, ON. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 29	Boy sitting in makeshift classroom during war. *Source*: Getty Images – 200429960-001 – Andrea Booher.
Figure 30	"Child scaled learning environment." *Source*: Unknown.
Figure 31	Multi-purpose Room – W. Ross Mcdonald School for the Blind, Brantford, ON. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 32	Children playing on a raft. *Source*: Getty Images – 200211727-001 – David De Lossy.

Figure 33	Fire Rock Golf Course. *Source*: http://www.firerockgolf.com.
Figure 34	Child experiencing nature. *Source*: Getty Images – 64073838-166a8alfay – Unknown.
Figure 35	Nissan design headquarters, La Jolla CA. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Paul Rivera.
Figure 36	Child in a therapeutic garden. *Source*: Unknown.
Figure 37	Children hunting 'crawdads'. *Source*: Getty Images – 72582489 – Ricky John Malloy.
Figure 38	Cover Last Child in the Woods. *Source*: Anne Winslow.
Figure 39	Children in an outdoor classroom. *Source*: Getty Images – 200409069-001 – Ciaran Griffin.
Figure 40	The outdoor classroom at Burr Elementary School, Fairfeild, CT. *Source*: Skidmore, Owings & Merrill, http://www.som.com.
Figure 41	Child receiving individual attention (IEP). *Source*: Getty Images – 200461225-001 – Lisa Pines.
Figure 42	Nissan Design Centre, Farmington Hills, MI. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Paul Rivera.

Figure 43	Exceptional Student. *Source*: Getty Images – 200355476-001 – Barros & Barros.
Figure 44	Inclusion. *Source*: Getty Images – 200174746-001 – Rebecca Emery.
Figure 45	Child studying plants. *Source*: Getty Images – 200425552-001 – Gone Wild.
Figure 46	Cooperative Learning. *Source*: Getty Images – 200449956-002 – Tim Platt.
Figure 47	"Edges". *Source*: Getty Images – 72655875 – altrendo nature.
Figure 48	"Living Stream". *Source*: Getty Images – 200478545-001 – Kieran Scott.
Figure 49	Indoor Air Quality. *Source*: Getty Images – 5988-062081 – CSA Plastock.
Figure 50	"Ecosystem Protection" *Source*: Getty Images – 200366406-001 – Karl Weatherly.
Figure 51	"Creating an Educational Tool". *Source*: Getty Images – 200288185-001 – Steve Mason.
Figure 52	Cragmont Elementary School, Berkeley, CA. *Source*: Author.
Figure 53	Madeline Hardy School, London, ON. *Source*: Author.
Figure 54	Isolation Room. *Source*: Author.
Figure 55	Corridor. *Source*: Author.

Figure 56	Remnants of patient ward. *Source*: Author.
Figure 57	Library. *Source*: Author.
Figure 58	Typical Classroom. *Source*: Author.
Figure 59	“Double sized” Classroom. *Source*: Author.
Figure 60	Chartwell School Seaside, CA. *Source*: http://www.ehdd.com.
Figure 61	Photovolatic Cells. *Source*: Author.
Figure 62	Corridor. *Source*: Author.
Figure 63	Typical Classroom. *Source*: Author.
Figure 64	Multi-purpose Room. *Source*: Author.
Figure 65	Rendering. *Source*: http://www.chartwell.org.
Figure 66	“Site Plan”. *Source*: http://www.chartwell.org.
Figure 67	W. Ross Mcdonald, Brantford, ON. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.

Figure 68	Exterior. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 69	Front entrance at night. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 70	Interior corridor with individual lockers. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 71	Front entrance corridor. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 72	Interior corridor. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 73	Multi-purpose room – diffused natural light, warm materials and brilliant colours. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 74	Front entrance with coloured glass screen. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12; Steven Evans.
Figure 75	ISC Classroom. *Source*: Author.
Figure 76	Intimate learning space. *Source*: Author.
Figure 77	Computer learning centre. *Source*: Author.

Figure 78 Behavour Expectations Board.
Source: Author.

Figure 79 Nicholas Wilson Public School, London, ON.
Source: Author.

Figure 80 Desks arranged in rows with a group work space at back of room.
Source: Author.

Figure 81 "Student display space".
Source: Author.

Figure 82 Front of classroom.
Source: Author.

Figure 83 Knollwood Park Public School, London, ON.
Source: Author.

Figure 84 Classroom divided into small private workspaces.
Source: Author.

Figure 85 Individual workspace.
Source: Author.

Figure 86 Quiet Room.
Source: Author.

Figure 87 Arts and crafts area.
Source: Author.

Figure 88 "Puzzle Table".
Source: Author.

Figure 89 "Personal Space".
Source: Author.

Figure 90	"Resource Area". *Source*: Author.
Figure 91	The New City School, St. Louis, MO. *Source*: http://www.newcityschool.org.
Figure 92	Group work space. *Source*: http://www.newcityschool.org.
Figure 93	Multiple Intelligence Library. *Source*: http://www.newcityschool.org.
Figure 94	Dining hall at dusk. *Source*: http://www.newcityschool.org.
Figure 95	Cragmont Elementary School, Berkeley, CA. *Source*: Author.
Figure 96	Classroom with a view. *Source*: Author.
Figure 97	Classrooms with a view. *Source*: Author.
Figure 98	Classrooms that expand outdoors. *Source*: Author.
Figure 99	Site Plan. *Source*: http://www.designshare.com/index.php/projects/cragmont-elementary.
Figure 100	Front Door. *Source*: Author
Figure 101	Burr Elementary School, Fairfield, CT. Aerial Photograph. *Source*: Skidmore, Owings & Merrill, http://www.som.com.

Figure 102	Front entrance at night. *Source*: Skidmore, Owings & Merrill, http://www.som.com.
Figure 103	Courtyard. *Source*: Skidmore, Owings & Merrill, http://www.som.com.
Figure 104	Rear entrance at night. *Source*: Skidmore, Owings & Merrill, http://www.som.com.
Figure 105	Interior circulation. *Source*: Skidmore, Owings & Merrill, http://www.som.com.
Figure 106	Interior courtyard. *Source*: Skidmore, Owings & Merrill, http://www.som.com.
Figure 107	First Floor Plan. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12.
Figure 108	Second Floor Plan. *Source*: Architectural Record, Dec, 2005. Vol. 193, Iss. 12

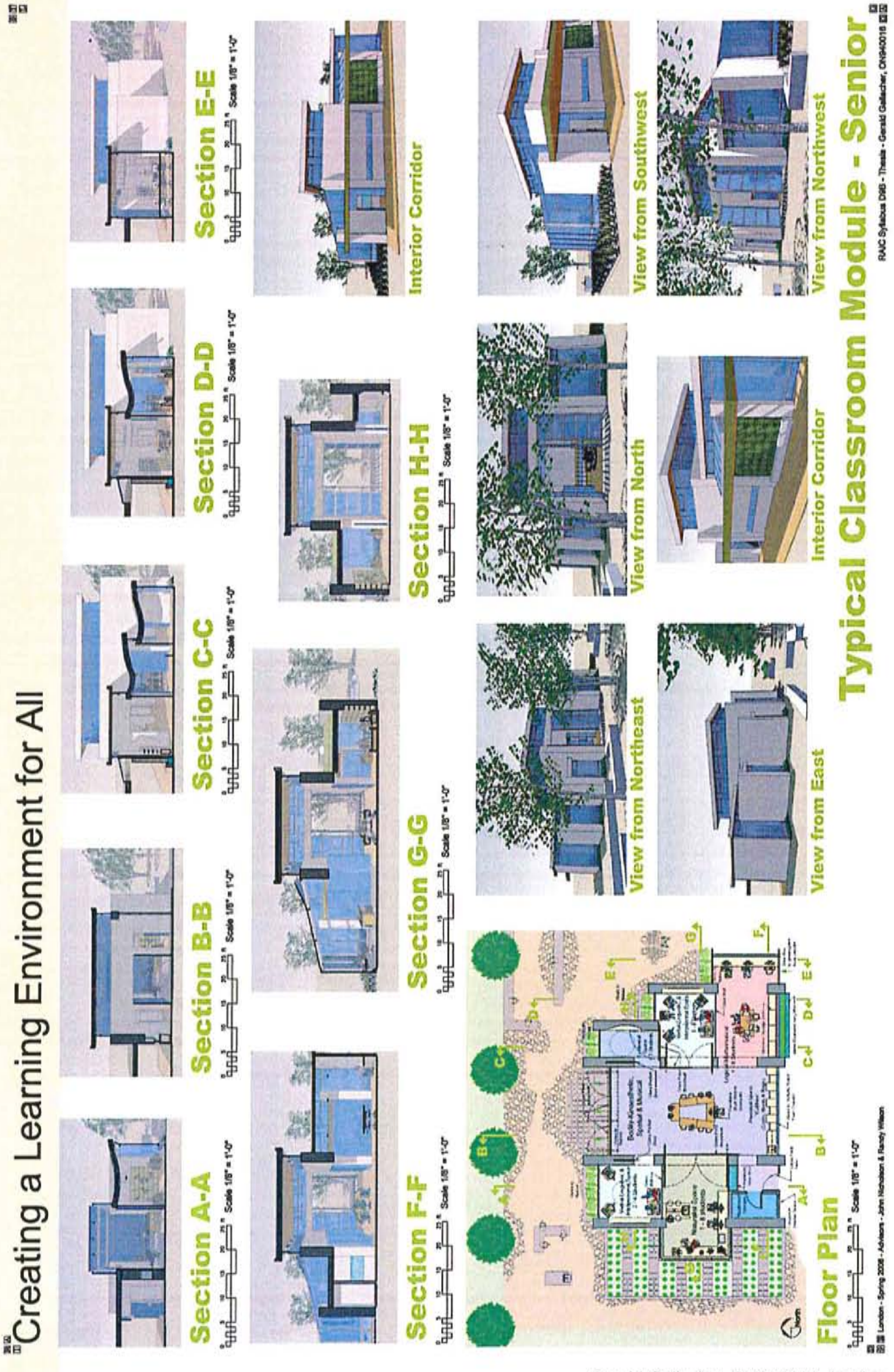
ACRONYMS RELATED TO SPECIAL EDUCATION

ADD	-	Attention Deficit Disorder
ADHD	-	Attention Deficit Hyperactive Disorder
CCAC	-	Community Care Access Centre
CPRI	-	Child Parent Resource Institute
DC	-	Developmentally Challenged
EA	-	Educational Assistant
HI	-	Hearing Impaired
IEP	-	Individual Education Plan
IPRC	-	Identification, Placement and Review Committee
ISA	-	Intensive Support Amount
ISC	-	Intensive Support Class
LC	-	Learning Coordinator
LD	-	Learning Disability
LST	-	Learning Support Teacher
MID	-	Mild Intellectual Disorder
OT	-	Occupational Therapist
PDD/ASD	-	Pervasive Developmental Disorder / Autism Spectrum Disorder
PDT	-	Program Development Team
PT	-	Physiotherapist
S/LP	-	Speech/Language Pathologist
SEAC	-	Special Education Advisory Committee
SEPPA	-	Special Education Per Pupil Amount
TVCC	-	Thames Valley Children's Centre
TVDSB	-	Thames Valley District School Board

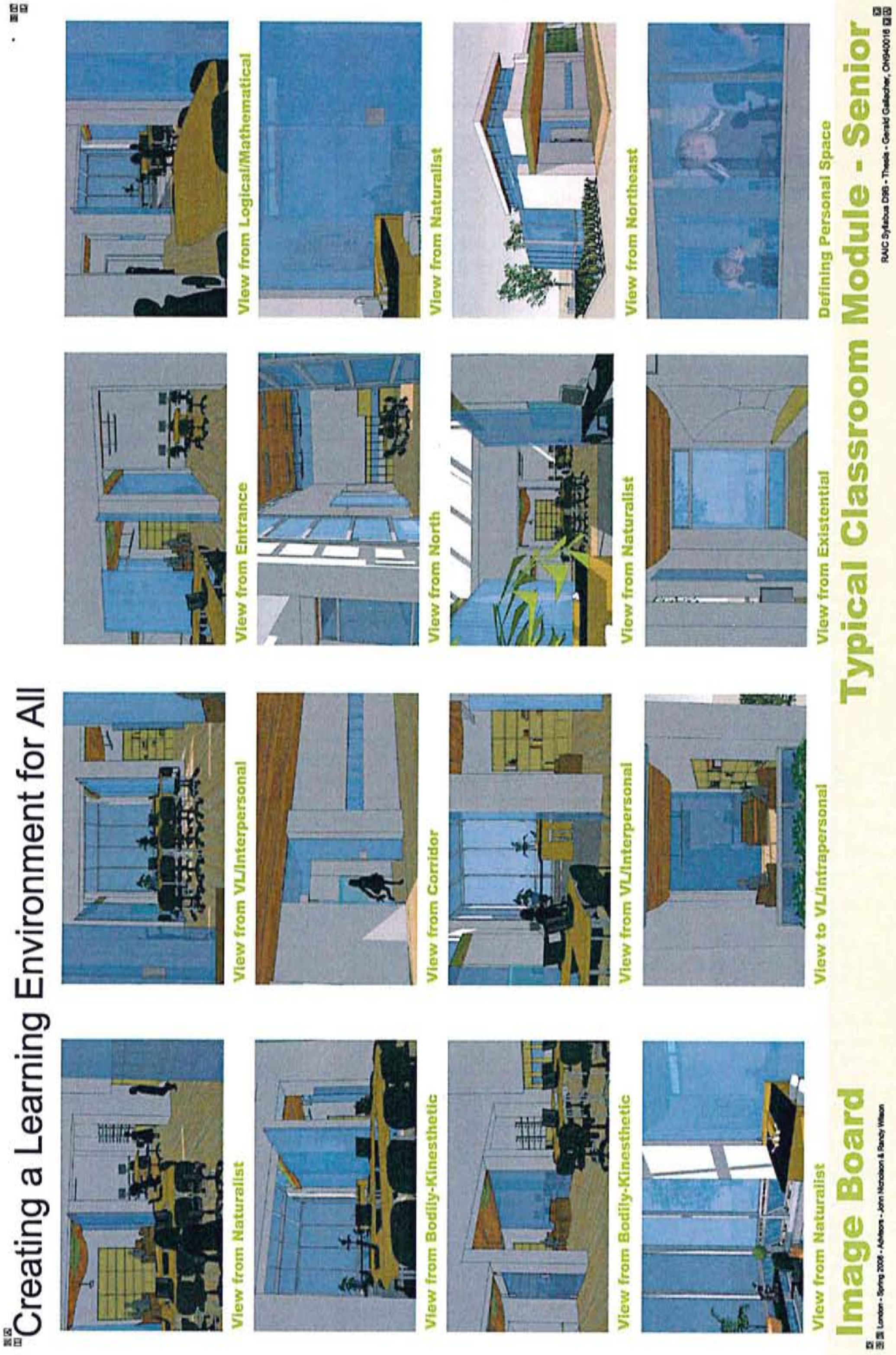
APPENDIX A

Drawings

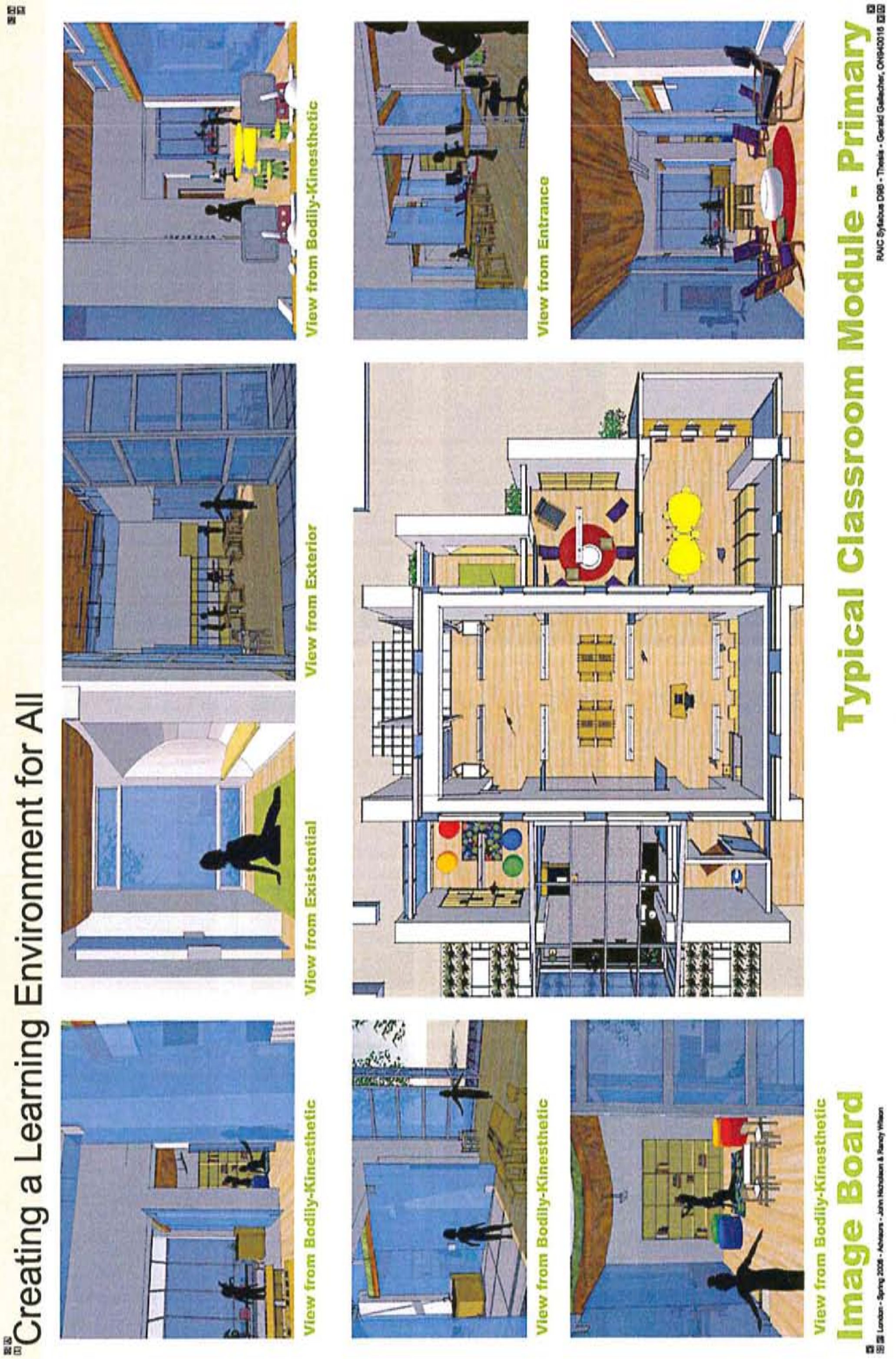
Typical Classroom Module – Senior



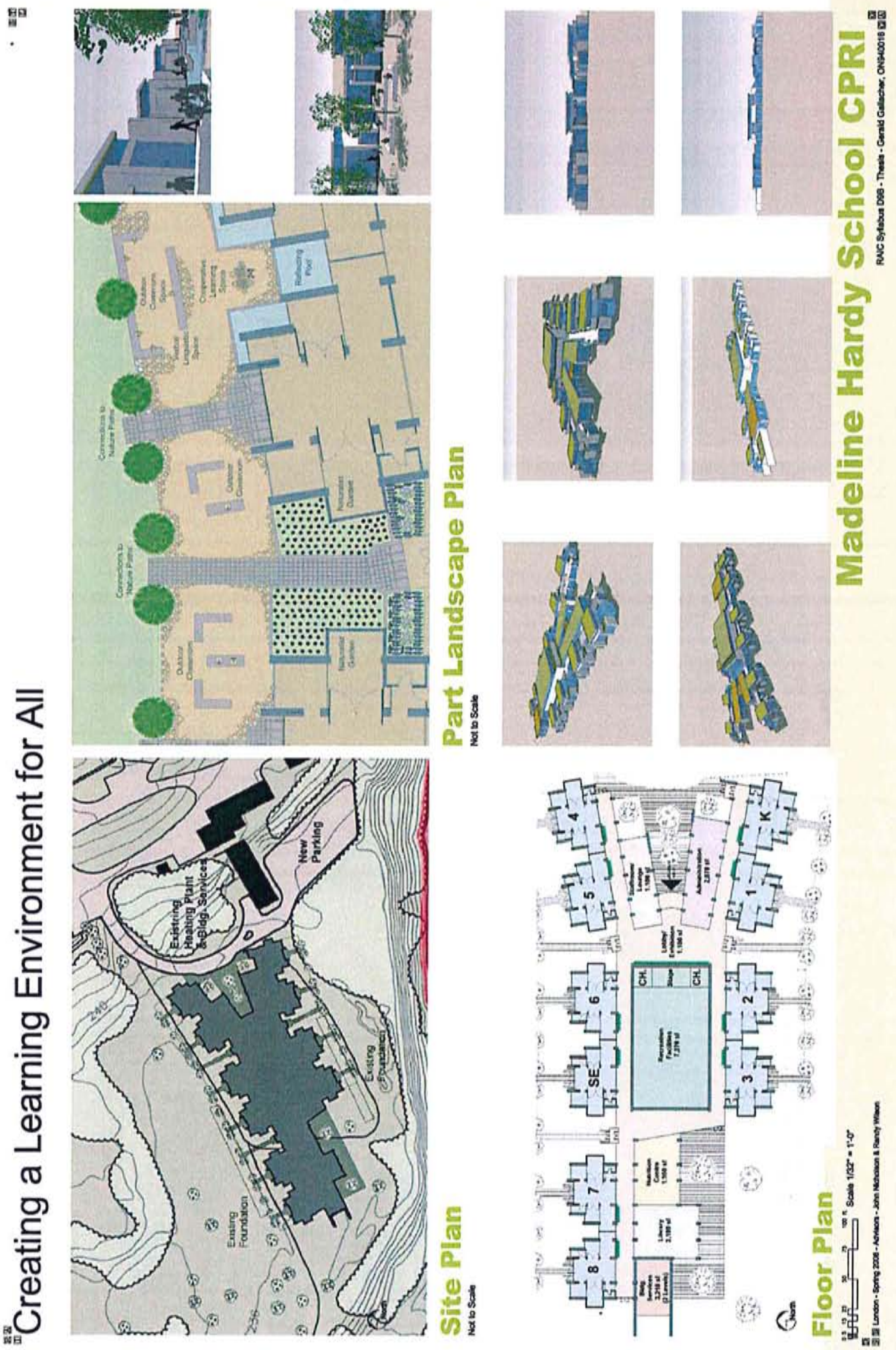
Typical Classroom Module – Senior – Image Board


Creating a Learning Environment for All
View from Naturalist
View from VL/Interpersonal
View from Entrance
View from Logical/Mathematical
View from Bodily-Kinesthetic
View from Corridor
View from North
View from Naturalist
View from Bodily-Kinesthetic
View from VL/Interpersonal
View from Naturalist
View from Northeast
View from Naturalist
View to VL/Intrapersonal
View from Existential
Defining Personal Space
Image Board
Typical Classroom Module - Senior
London - Spring 2008 - Advisors - John Nicholson & Randy Wilson
RAIC Syllabus D98 - Thesis - Gerald Gallacher, ON940016

Typical Classroom Module – Primary


Creating a Learning Environment for All
View from Bodily-Kinesthetic
View from Existential
View from Exterior
View from Bodily-Kinesthetic
View from Bodily-Kinesthetic
View from Entrance
View from Bodily-Kinesthetic
Image Board
Typical Classroom Module - Primary
London - Spring 2008 - Advisors - John Nicholson & Randy Wilson
RAIC Syllabus D9B - Thesis - Gerald Gallacher, ON940016

New Facility – Madeline Hardy School, CPRI



Creating a Learning Environment for All

Site Plan
Not to Scale

Part Landscape Plan
Not to Scale

Floor Plan
Scale 1/32" = 1'-0"

London - Spring 2008 - Advisors - John Nicholson & Randy Wilson

Madeline Hardy School CPRI

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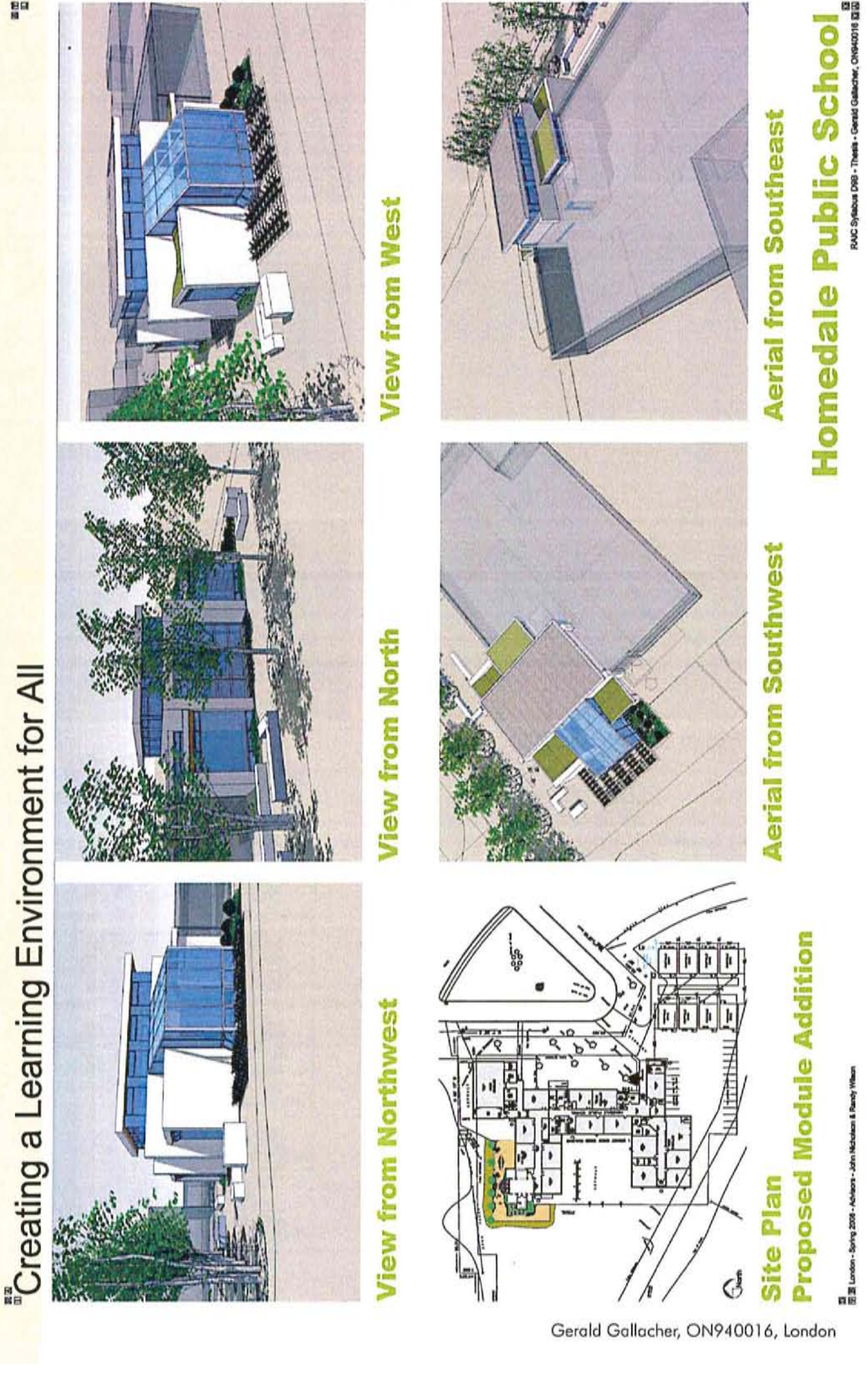
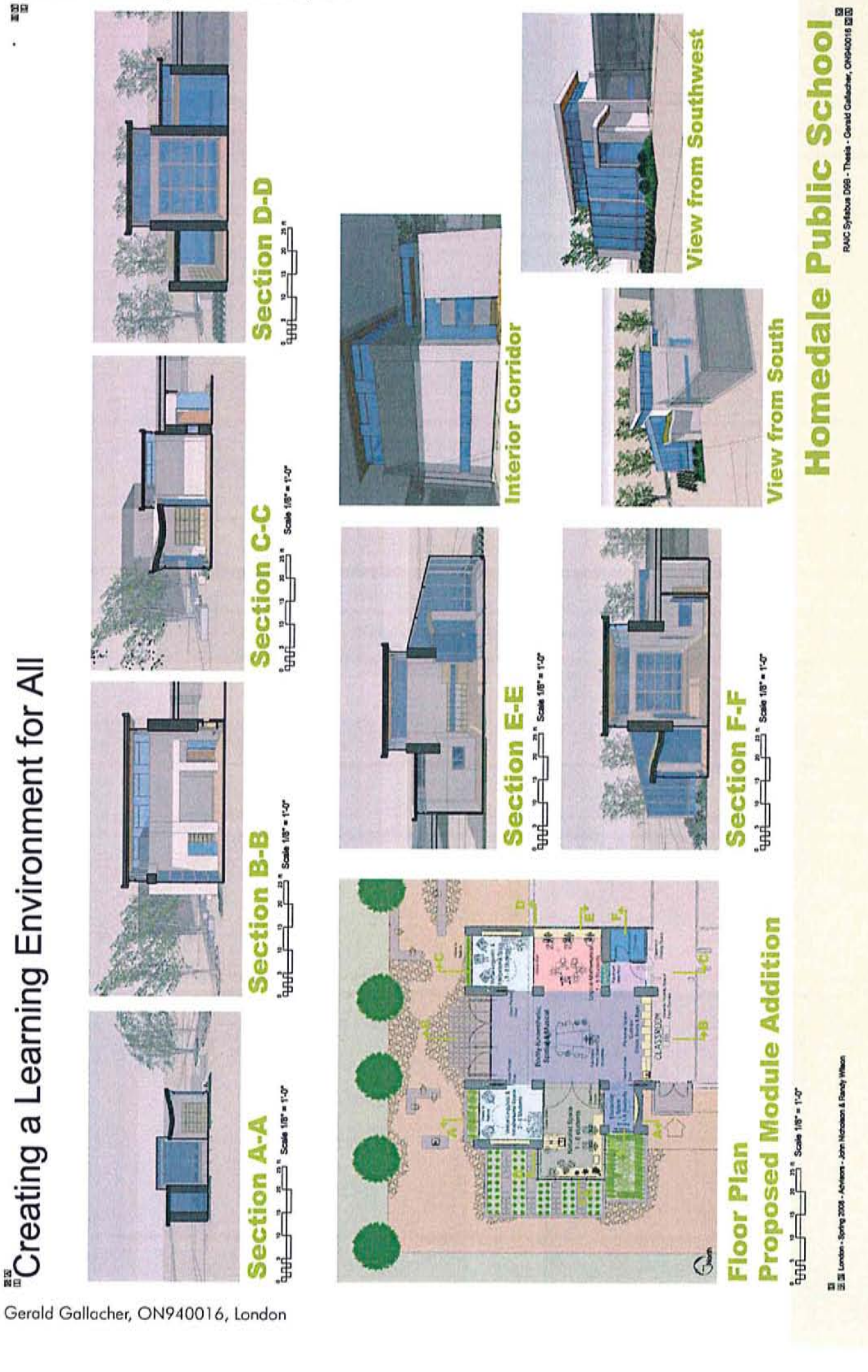
Renovation/Addition to an Existing Facility: Site Plan - Homedale Public School, St. Thomas, ON


Creating a Learning Environment for All
View from Northwest
View from North
View from West
Site Plan
Proposed Module Addition
Aerial from Southwest
Aerial from Southeast
Homedale Public School
RAIC Syllabus D93 - Thesis - Gerald Gallacher, ON940016
London - Spring 2008 - Advisors - John Nicholson & Randy Wilson

Gerald Gallacher, ON940016, London

Renovation/Addition to an Existing Facility: Floor Plan - Homedale Public School, St. Thomas, ON



Creating a Learning Environment for All

Section A-A
Scale 1/8" = 1'-0"

Section B-B
Scale 1/8" = 1'-0"

Section C-C
Scale 1/8" = 1'-0"

Section D-D

Floor Plan
Proposed Module Addition
Scale 1/8" = 1'-0"

Section E-E
Scale 1/8" = 1'-0"

Interior Corridor

Section F-F
Scale 1/8" = 1'-0"

View from South

View from Southwest

Homedale Public School

RAIC Syllabus DSB - Thesis - Gerald Gallacher, ON940016

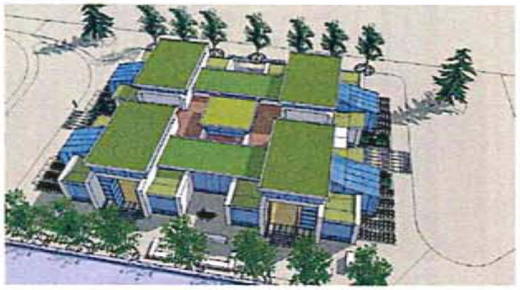
London - Spring 2008 - Advisors - John Nicholson & Randy Wilson

Addition – Replacement of Portables: Site Plan – Bradley Avenue Public School, London, ON

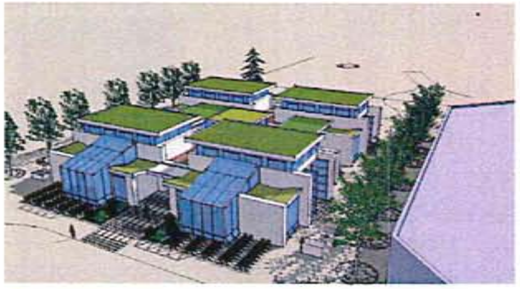
Creating a Learning Environment for All

Existing - Site Plan

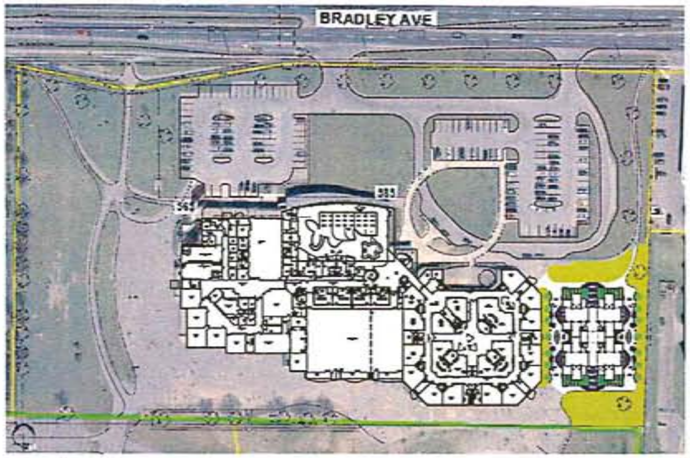
Not to Scale



Aerial view from West



Aerial view from Northwest

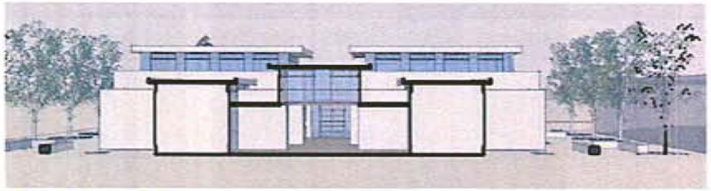


Site Plan

Proposed Portable Replacement

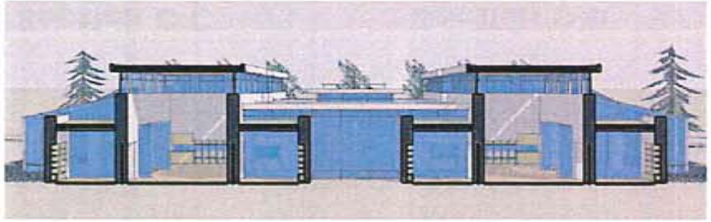
Scale 1/64" = 1'-0"

London - Spring 2006 - Advisors - John Nicholson & Randy Wilson



Section D-D

Scale 1/8" = 1'-0"



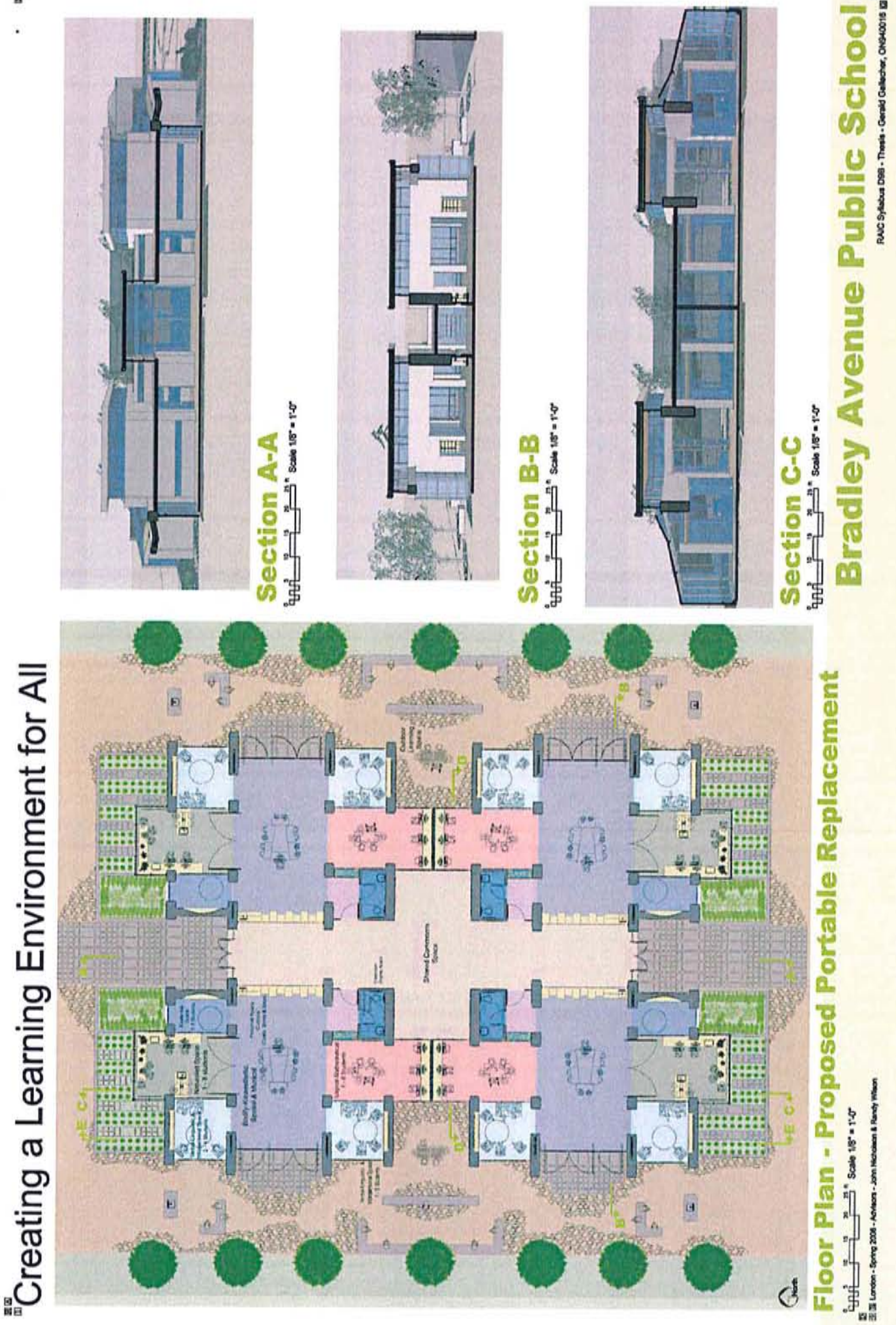
Section E-E

Scale 1/8" = 1'-0"

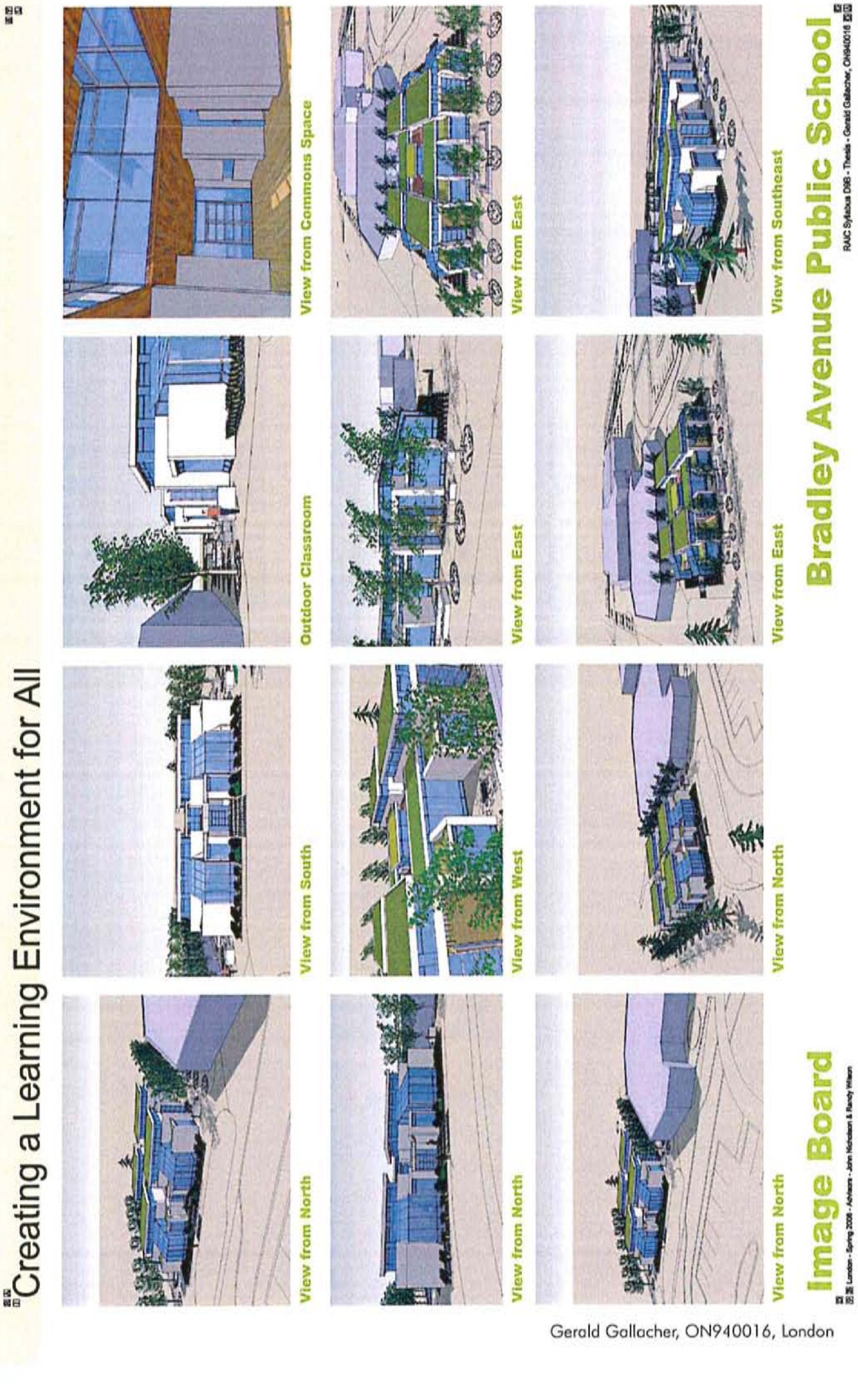
Bradley Avenue Public School

RAIC Syllabus D9B - Thesis - Gerald Gallacher, ON940016

Addition – Replacement of Portables: Floor Plan – Bradley Avenue Public School, London, ON


Creating a Learning Environment for All
Section A-A Scale 1/8" = 1'-0"
Section B-B Scale 1/8" = 1'-0"
Section C-C Scale 1/8" = 1'-0"
Bradley Avenue Public School
RAIC Syllabus D9B • Thesis • Gerald Gallacher, ON940016
Floor Plan - Proposed Portable Replacement
Scale 1/8" = 1'-0"
London - Spring 2006 - Advisors - John Nicholson & Randy Wilson
Shared Commons Space
Outdoor Learning Space

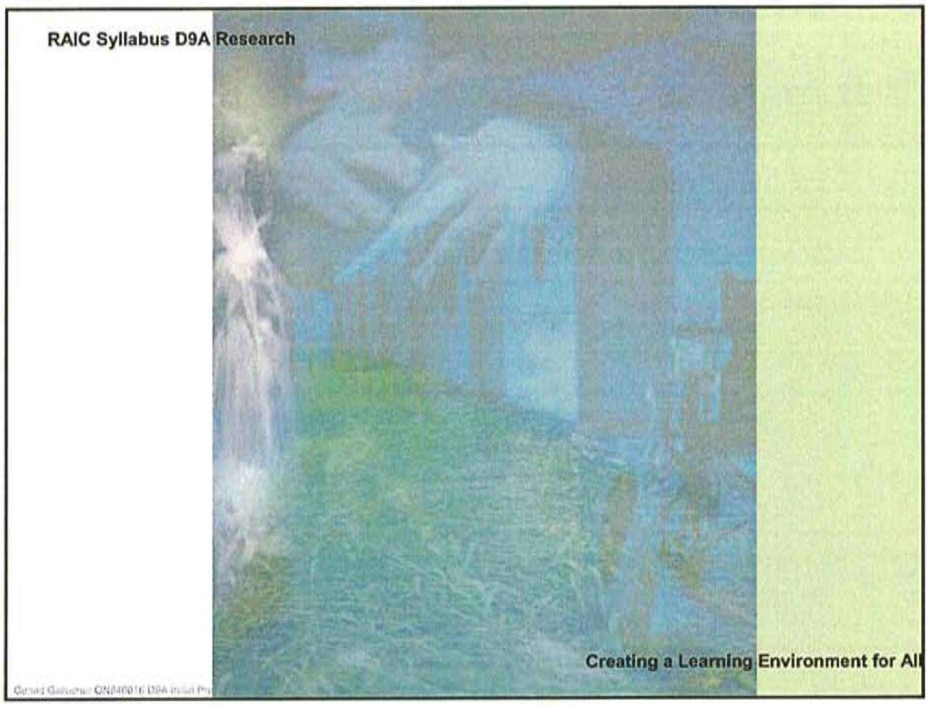
Addition – Replacement of Portables: Image Board – Bradley Avenue Public School, London, ON



APPENDIX B

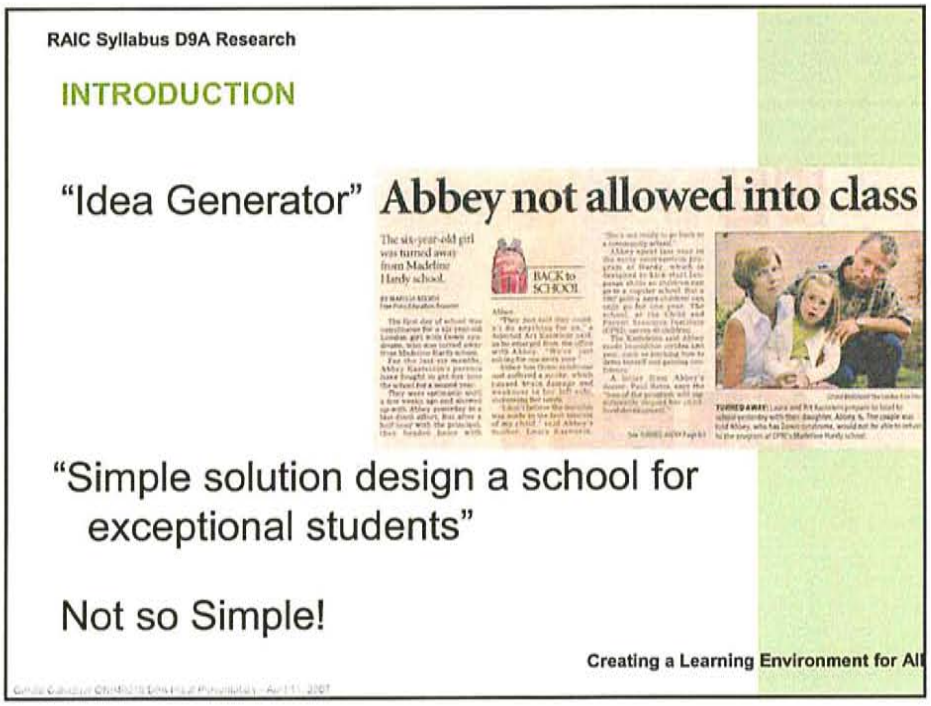
Slide Presentations

Initial Presentation – April 11, 2007



RAIC Syllabus D9A Research

Creating a Learning Environment for All



RAIC Syllabus D9A Research

INTRODUCTION

“Idea Generator”

Abbey not allowed into class

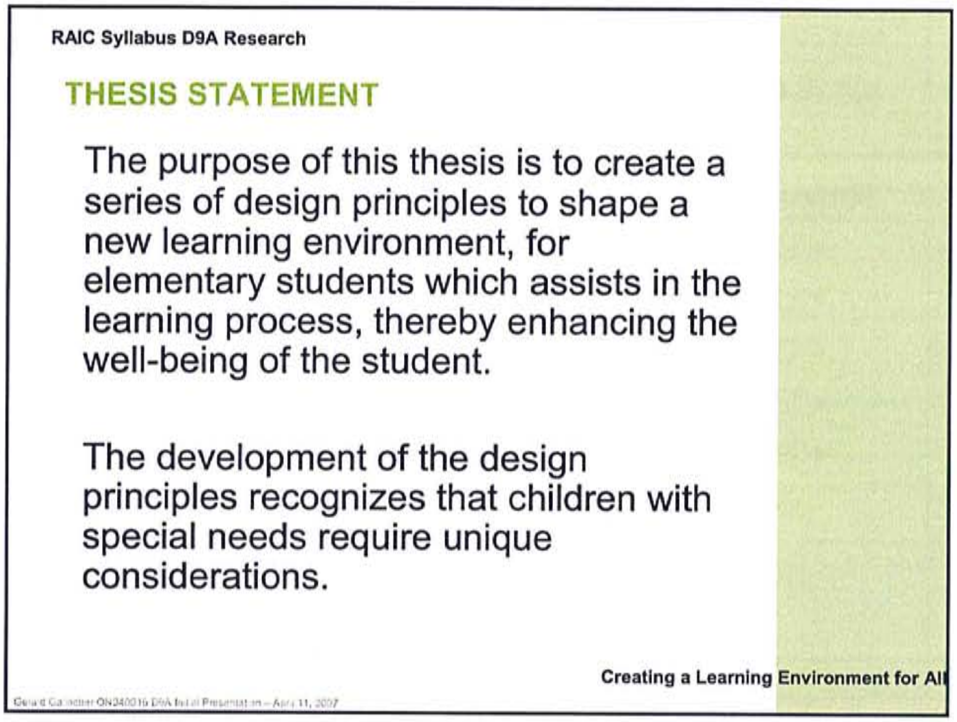
The six-year-old girl was turned away from Madeline Hardy school.

BACK to SCHOOL

“Simple solution design a school for exceptional students”

Not so Simple!

Creating a Learning Environment for All



RAIC Syllabus D9A Research

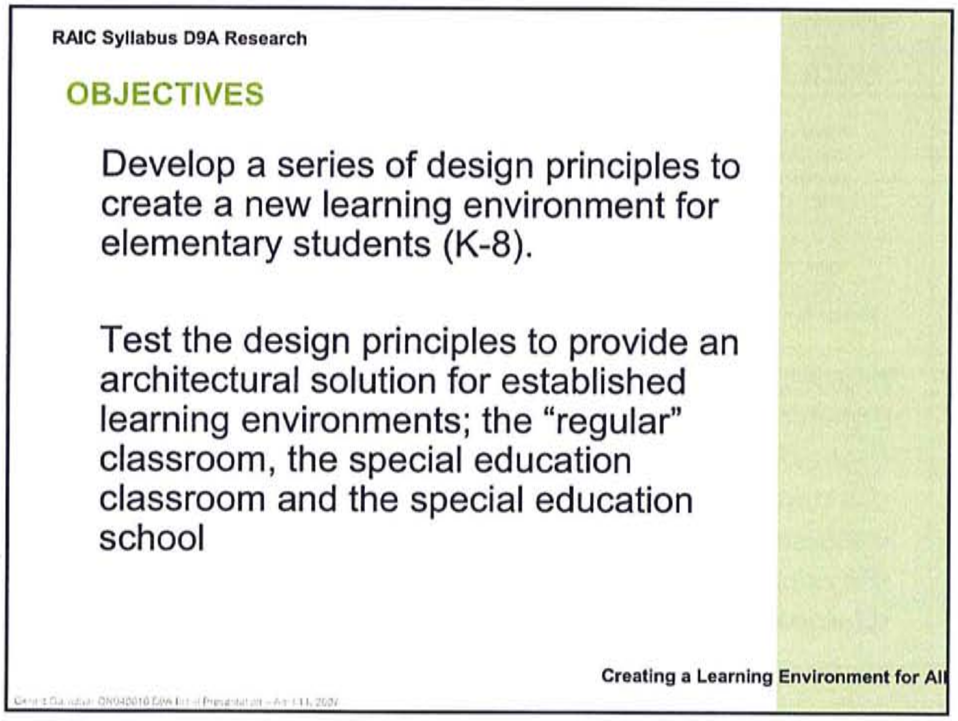
THESIS STATEMENT

The purpose of this thesis is to create a series of design principles to shape a new learning environment, for elementary students which assists in the learning process, thereby enhancing the well-being of the student.

The development of the design principles recognizes that children with special needs require unique considerations.

Creating a Learning Environment for All

Gerald Gallacher ON040016 D9A Initial Presentation – April 11, 2007



RAIC Syllabus D9A Research

OBJECTIVES

Develop a series of design principles to create a new learning environment for elementary students (K-8).

Test the design principles to provide an architectural solution for established learning environments; the "regular" classroom, the special education classroom and the special education school

Creating a Learning Environment for All

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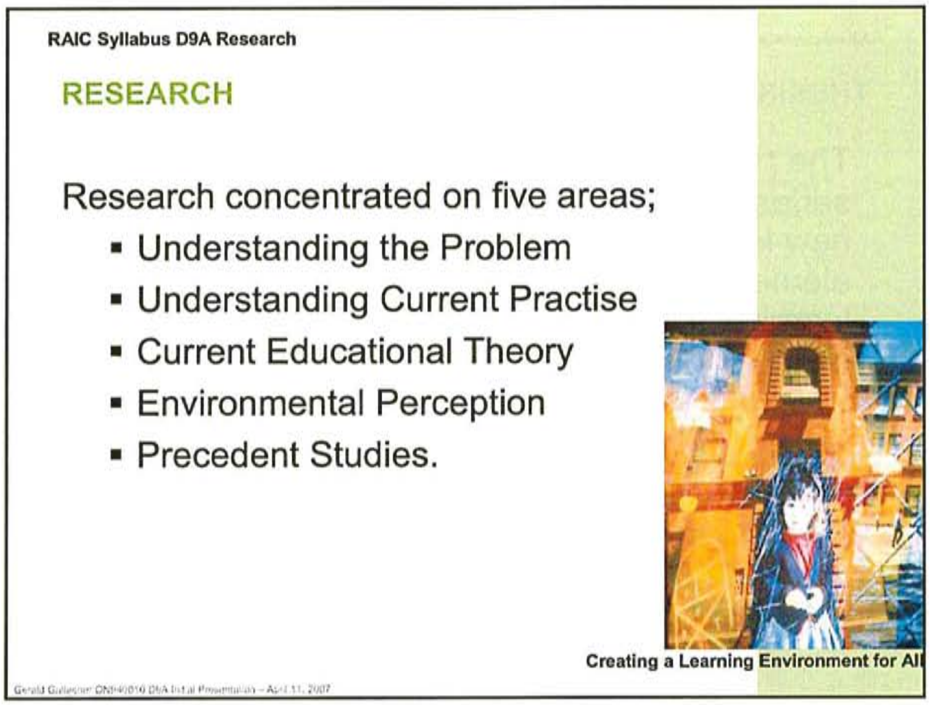


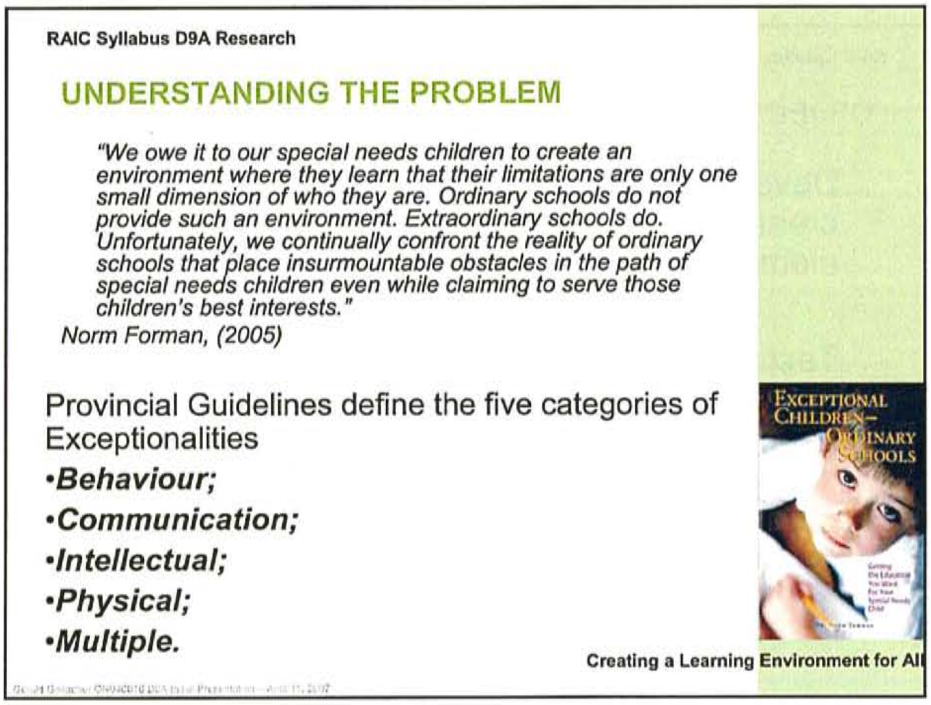
RAIC Syllabus D9A Research

RESEARCH

Research concentrated on five areas;

- Understanding the Problem
- Understanding Current Practise
- Current Educational Theory
- Environmental Perception
- Precedent Studies.

Creating a Learning Environment for All



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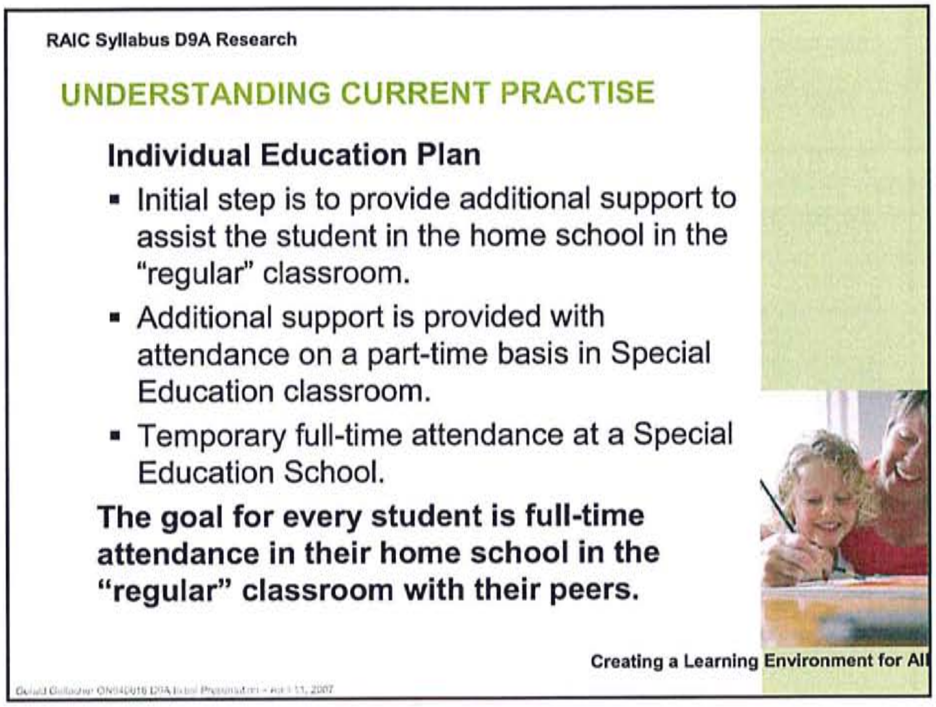
UNDERSTANDING THE PROBLEM

> *"We owe it to our special needs children to create an environment where they learn that their limitations are only one small dimension of who they are. Ordinary schools do not provide such an environment. Extraordinary schools do. Unfortunately, we continually confront the reality of ordinary schools that place insurmountable obstacles in the path of special needs children even while claiming to serve those children's best interests."*
>
> *Norm Forman, (2005)*

Provincial Guidelines define the five categories of Exceptionalities

- ***Behaviour;***
- ***Communication;***
- ***Intellectual;***
- ***Physical;***
- ***Multiple.***

Creating a Learning Environment for All



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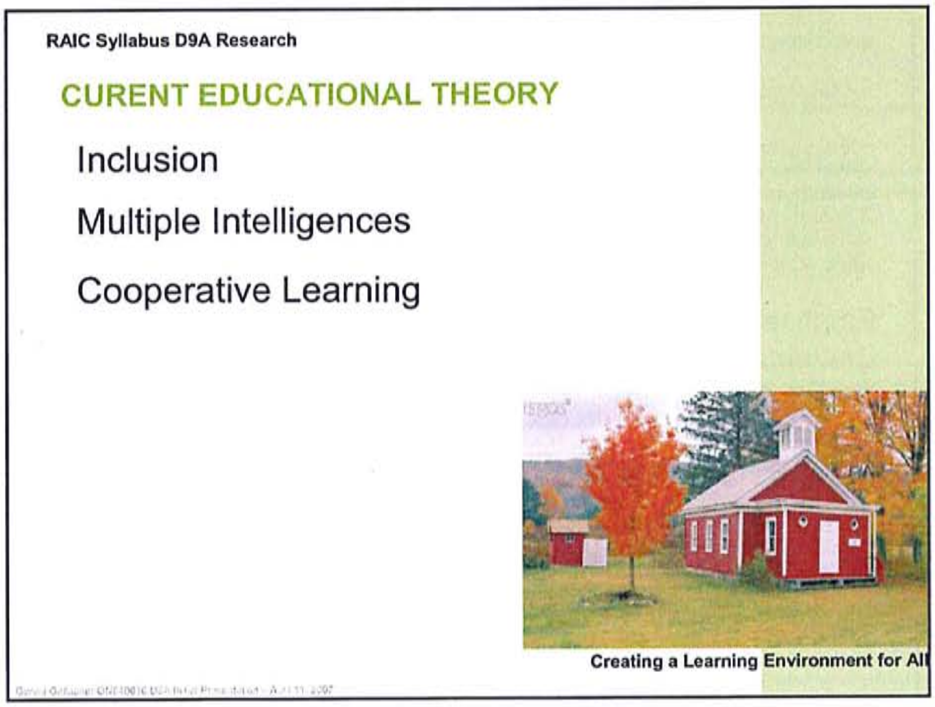
UNDERSTANDING CURRENT PRACTISE

Individual Education Plan

- Initial step is to provide additional support to assist the student in the home school in the "regular" classroom.
- Additional support is provided with attendance on a part-time basis in Special Education classroom.
- Temporary full-time attendance at a Special Education School.

The goal for every student is full-time attendance in their home school in the "regular" classroom with their peers.

Creating a Learning Environment for All



RAIC Syllabus D9A Research

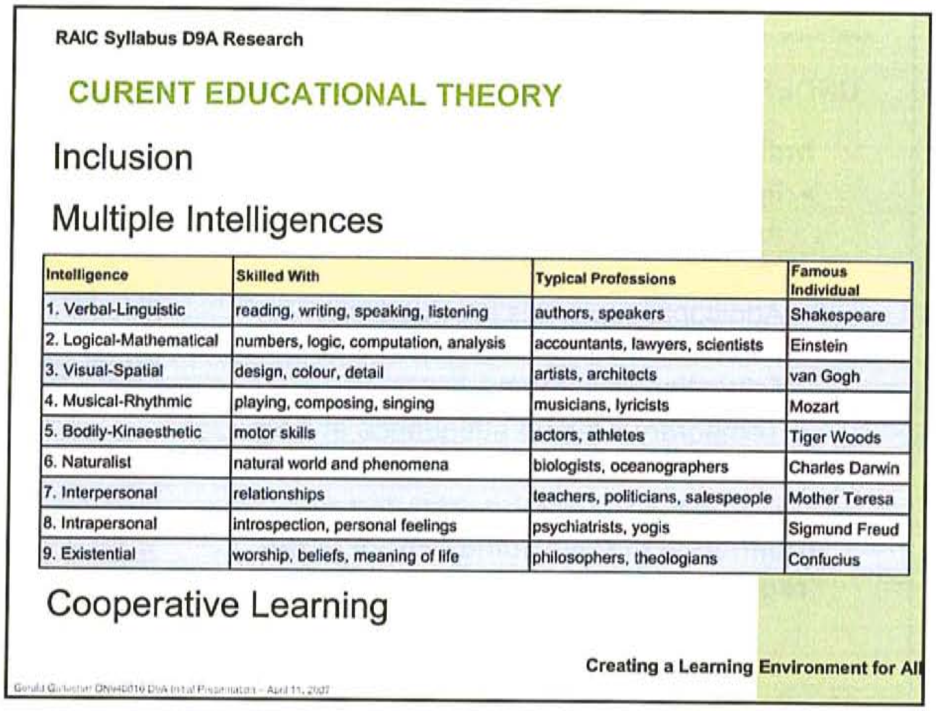
CURENT EDUCATIONAL THEORY

Inclusion

Multiple Intelligences

Cooperative Learning

Creating a Learning Environment for All



RAIC Syllabus D9A Research

CURENT EDUCATIONAL THEORY

Inclusion

Multiple Intelligences

Intelligence	Skilled With	Typical Professions	Famous Individual
1. Verbal-Linguistic	reading, writing, speaking, listening	authors, speakers	Shakespeare
2. Logical-Mathematical	numbers, logic, computation, analysis	accountants, lawyers, scientists	Einstein
3. Visual-Spatial	design, colour, detail	artists, architects	van Gogh
4. Musical-Rhythmic	playing, composing, singing	musicians, lyricists	Mozart
5. Bodily-Kinaesthetic	motor skills	actors, athletes	Tiger Woods
6. Naturalist	natural world and phenomena	biologists, oceanographers	Charles Darwin
7. Interpersonal	relationships	teachers, politicians, salespeople	Mother Teresa
8. Intrapersonal	introspection, personal feelings	psychiatrists, yogis	Sigmund Freud
9. Existential	worship, beliefs, meaning of life	philosophers, theologians	Confucius

Cooperative Learning

Creating a Learning Environment for Al

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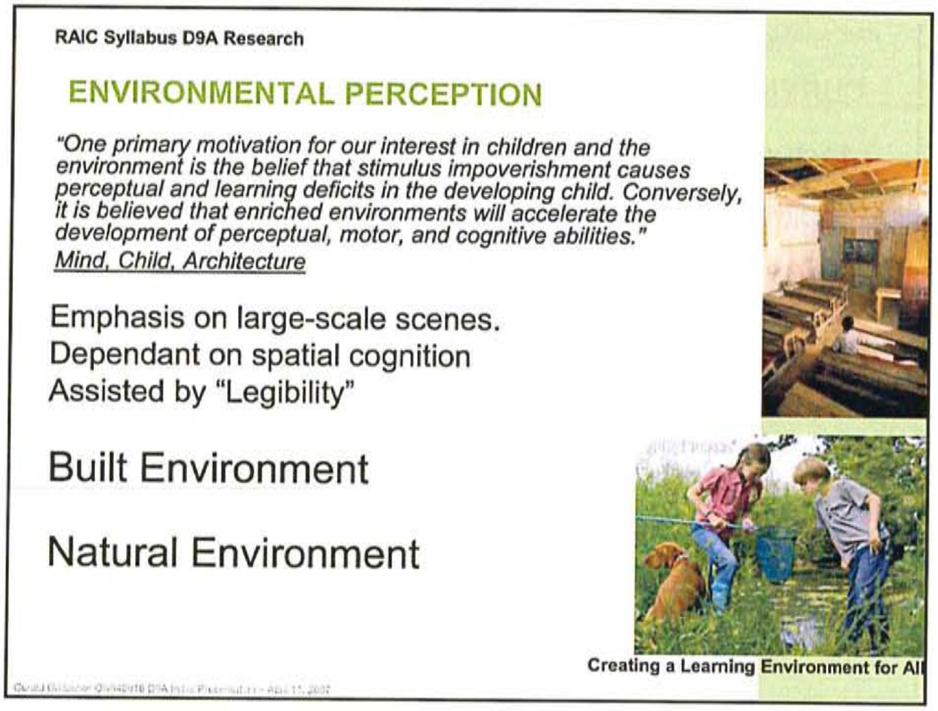


RAIC Syllabus D9A Research

ENVIRONMENTAL PERCEPTION

"One primary motivation for our interest in children and the environment is the belief that stimulus impoverishment causes perceptual and learning deficits in the developing child. Conversely, it is believed that enriched environments will accelerate the development of perceptual, motor, and cognitive abilities."
Mind, Child, Architecture

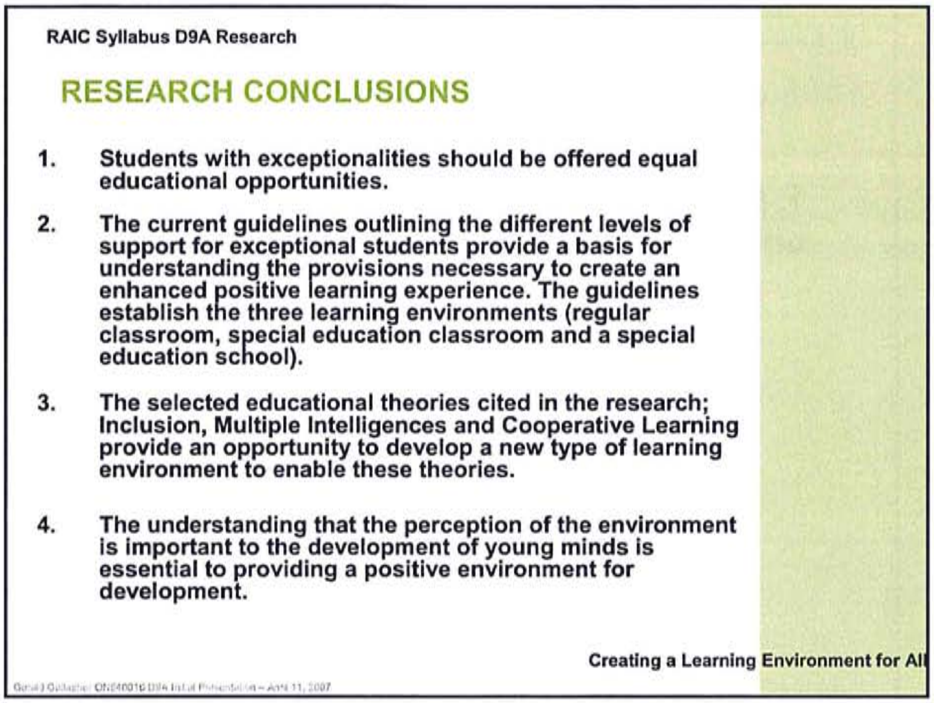
Emphasis on large-scale scenes.
Dependant on spatial cognition
Assisted by "Legibility"

Built Environment

Natural Environment

Creating a Learning Environment for Al

Gerald Gallacher ON940016 D9A Initial Presentation – April 11, 2007

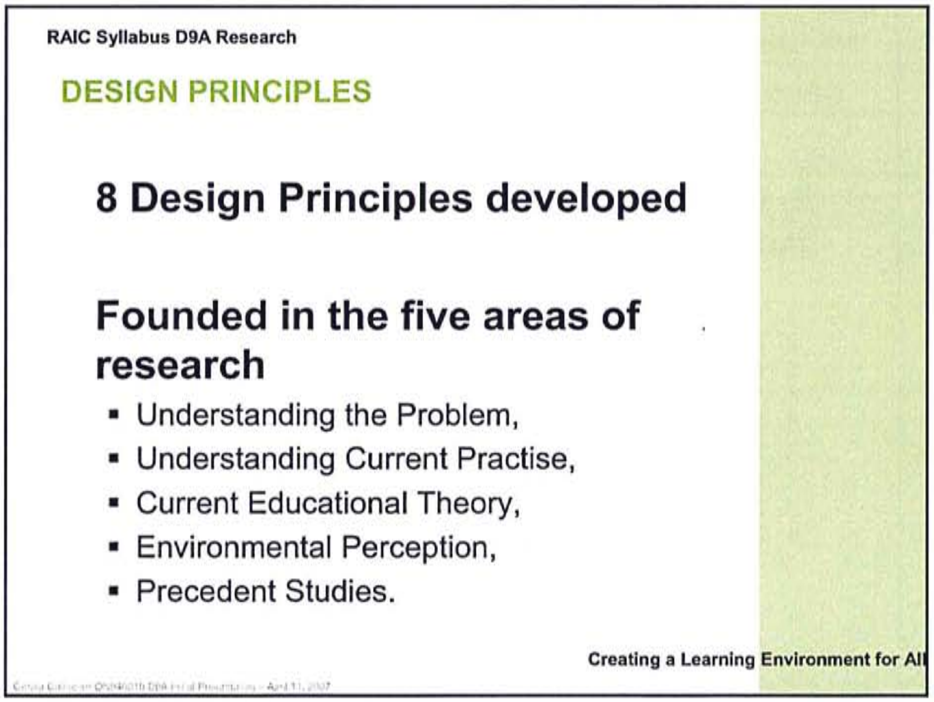


RAIC Syllabus D9A Research

RESEARCH CONCLUSIONS

1. Students with exceptionalities should be offered equal educational opportunities.
2. The current guidelines outlining the different levels of support for exceptional students provide a basis for understanding the provisions necessary to create an enhanced positive learning experience. The guidelines establish the three learning environments (regular classroom, special education classroom and a special education school).
3. The selected educational theories cited in the research; Inclusion, Multiple Intelligences and Cooperative Learning provide an opportunity to develop a new type of learning environment to enable these theories.
4. The understanding that the perception of the environment is important to the development of young minds is essential to providing a positive environment for development.

Creating a Learning Environment for Al



RAIC Syllabus D9A Research

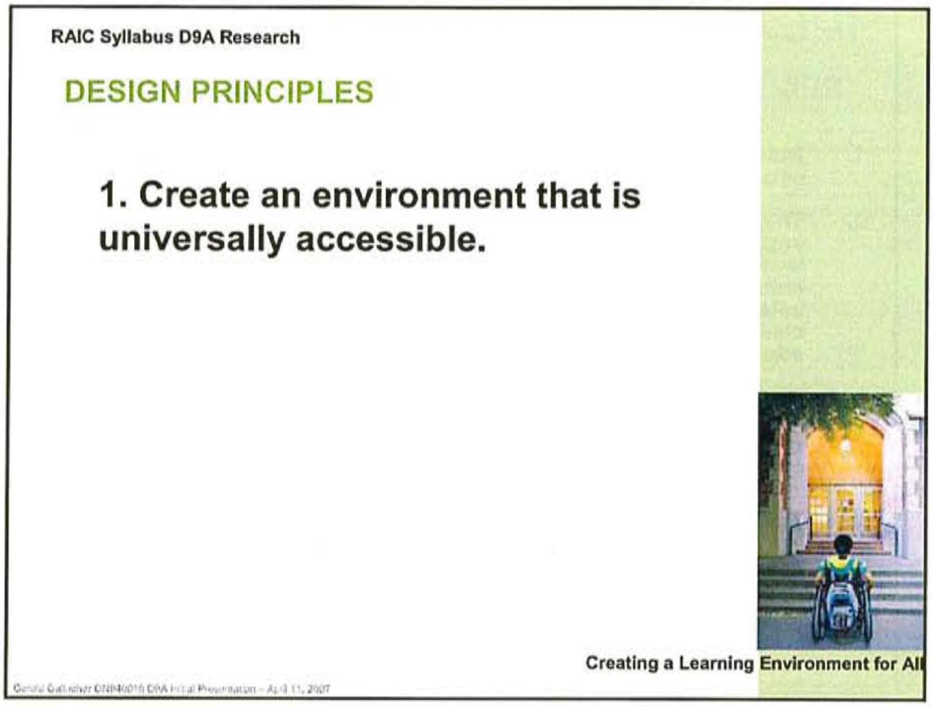
DESIGN PRINCIPLES

8 Design Principles developed

Founded in the five areas of research

- Understanding the Problem,
- Understanding Current Practise,
- Current Educational Theory,
- Environmental Perception,
- Precedent Studies.

Creating a Learning Environment for Al



RAIC Syllabus D9A Research

DESIGN PRINCIPLES

1. Create an environment that is universally accessible.

Creating a Learning Environment for All

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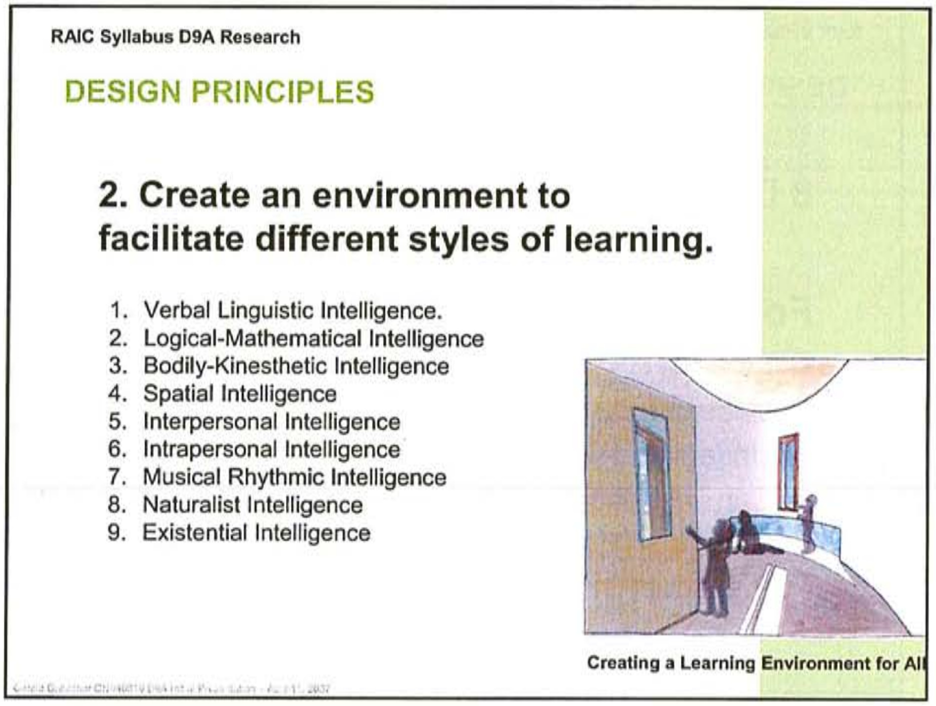


RAIC Syllabus D9A Research

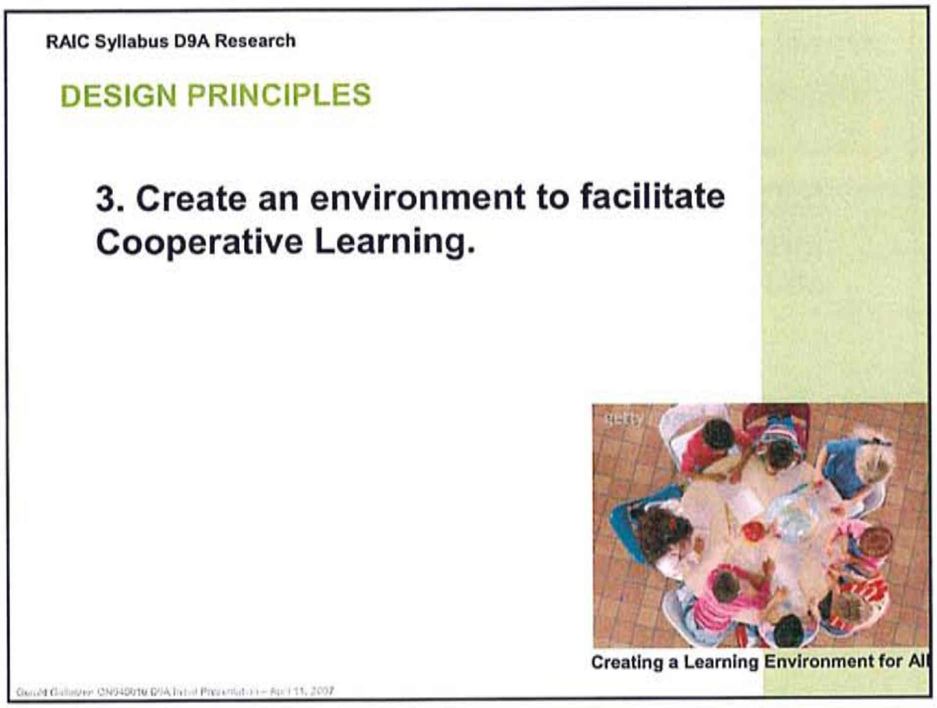
DESIGN PRINCIPLES

2. Create an environment to facilitate different styles of learning.

1. Verbal Linguistic Intelligence.
2. Logical-Mathematical Intelligence
3. Bodily-Kinesthetic Intelligence
4. Spatial Intelligence
5. Interpersonal Intelligence
6. Intrapersonal Intelligence
7. Musical Rhythmic Intelligence
8. Naturalist Intelligence
9. Existential Intelligence

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9A Initial Presentation – April 11, 2007

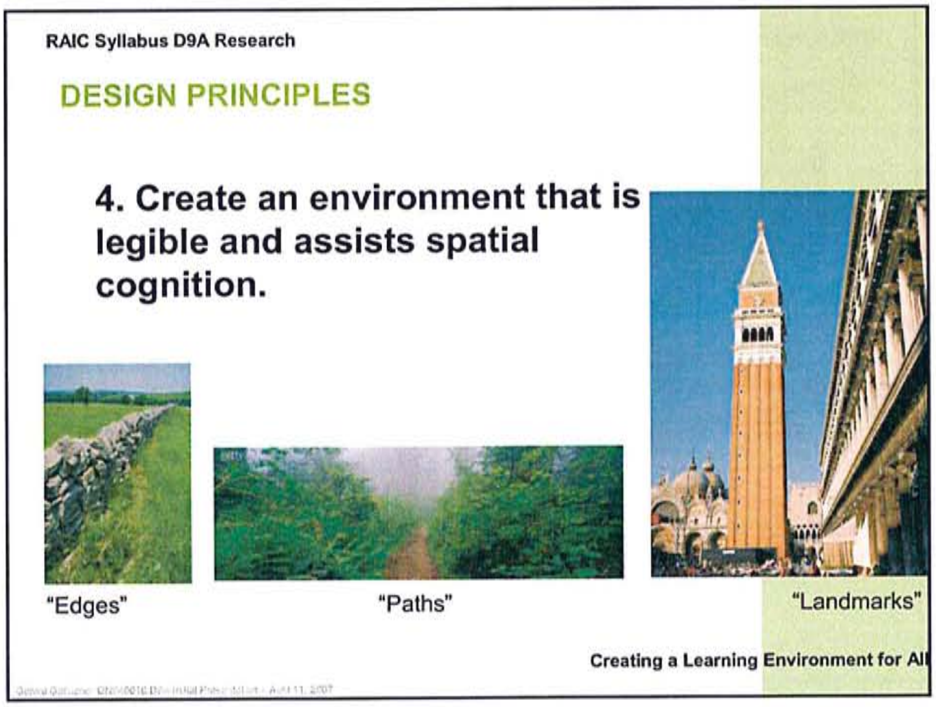


RAIC Syllabus D9A Research

DESIGN PRINCIPLES

3. Create an environment to facilitate Cooperative Learning.

Creating a Learning Environment for All



RAIC Syllabus D9A Research

DESIGN PRINCIPLES

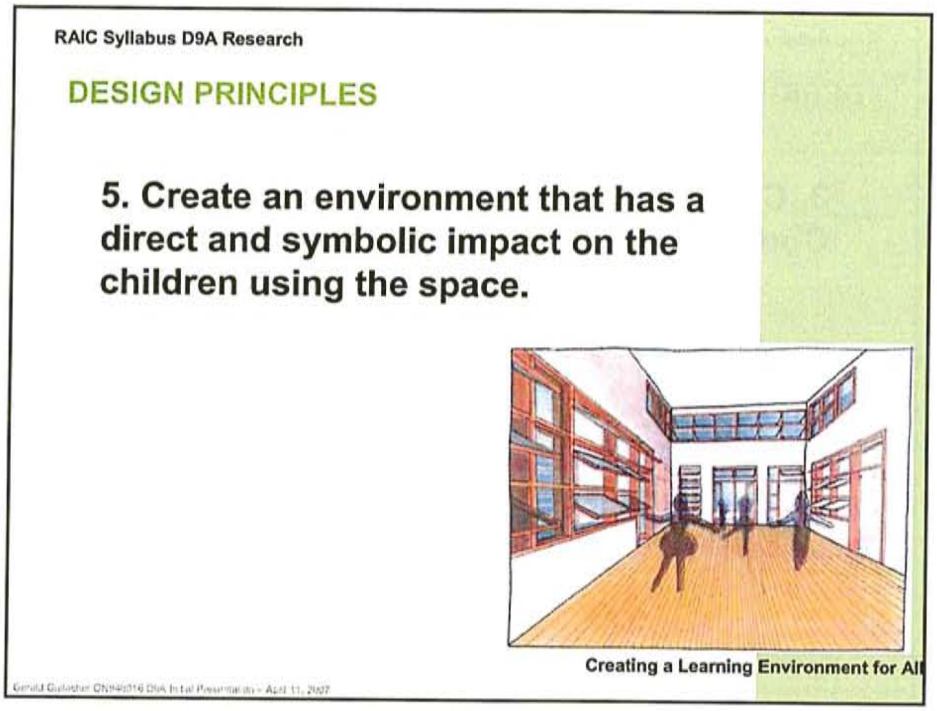
4. Create an environment that is legible and assists spatial cognition.

"Edges"

"Paths"

"Landmarks"

Creating a Learning Environment for All



RAIC Syllabus D9A Research

DESIGN PRINCIPLES

5. Create an environment that has a direct and symbolic impact on the children using the space.

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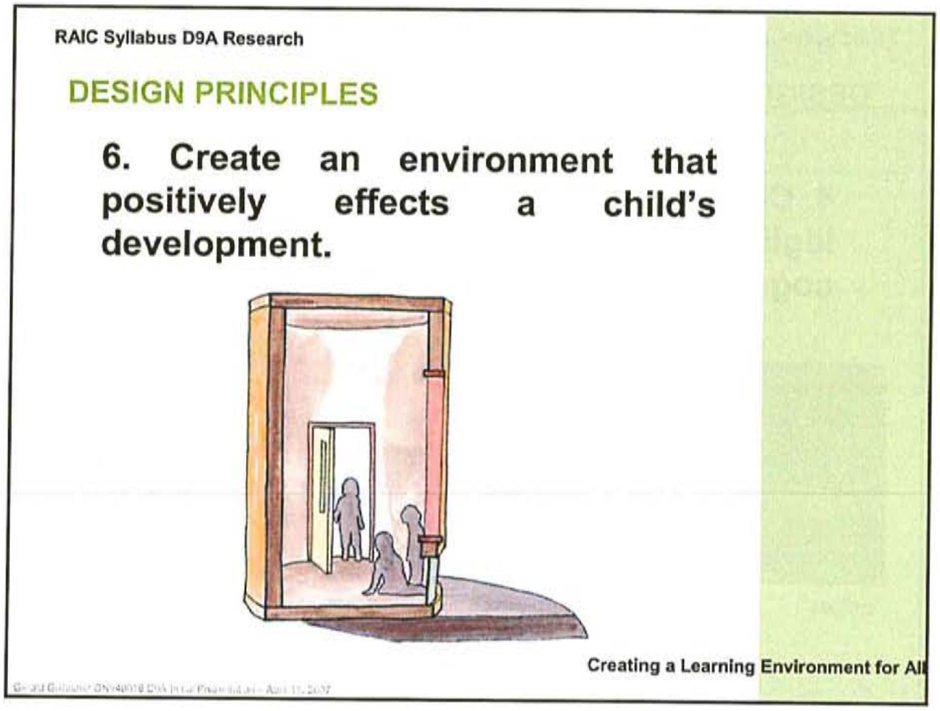

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DESIGN PRINCIPLES

6. Create an environment that positively effects a child's development.

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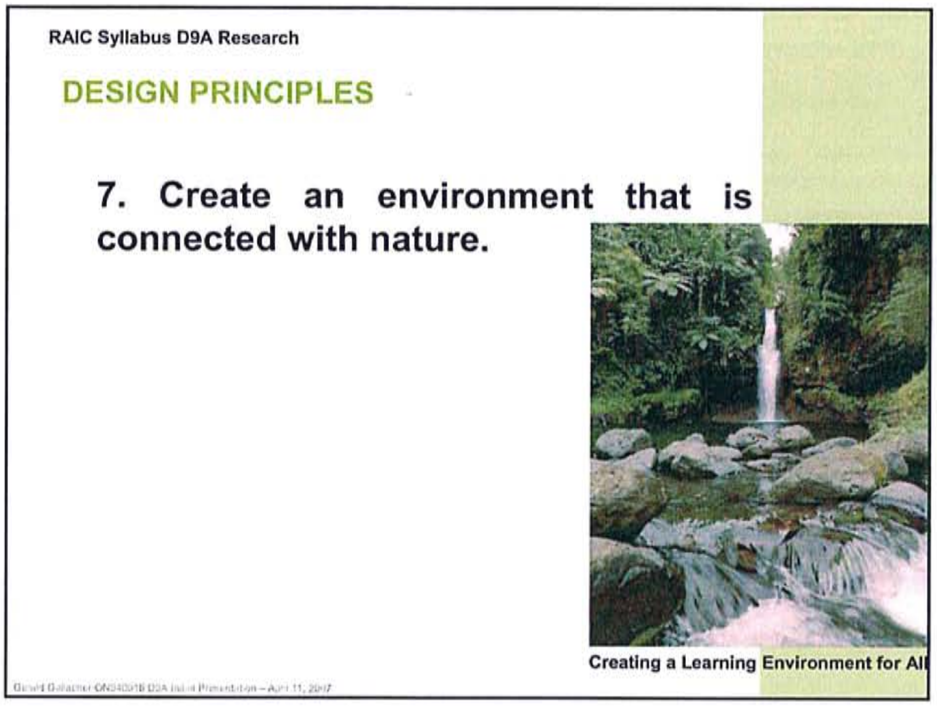

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DESIGN PRINCIPLES

7. Create an environment that is connected with nature.

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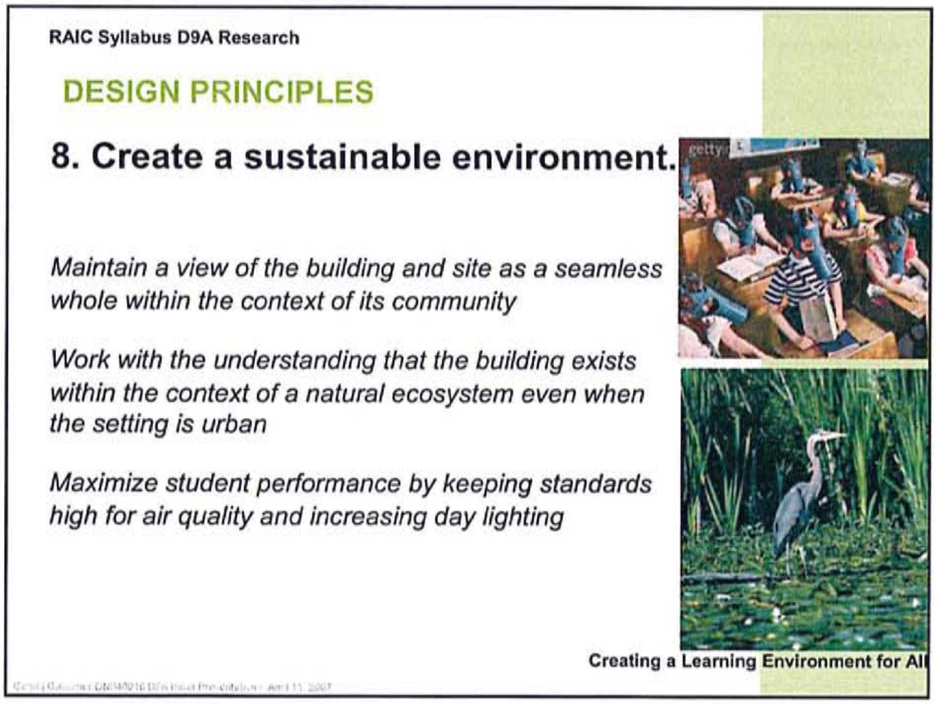

RAIC Syllabus D9A Research

DESIGN PRINCIPLES

8. Create a sustainable environment.

Maintain a view of the building and site as a seamless whole within the context of its community

Work with the understanding that the building exists within the context of a natural ecosystem even when the setting is urban

Maximize student performance by keeping standards high for air quality and increasing day lighting

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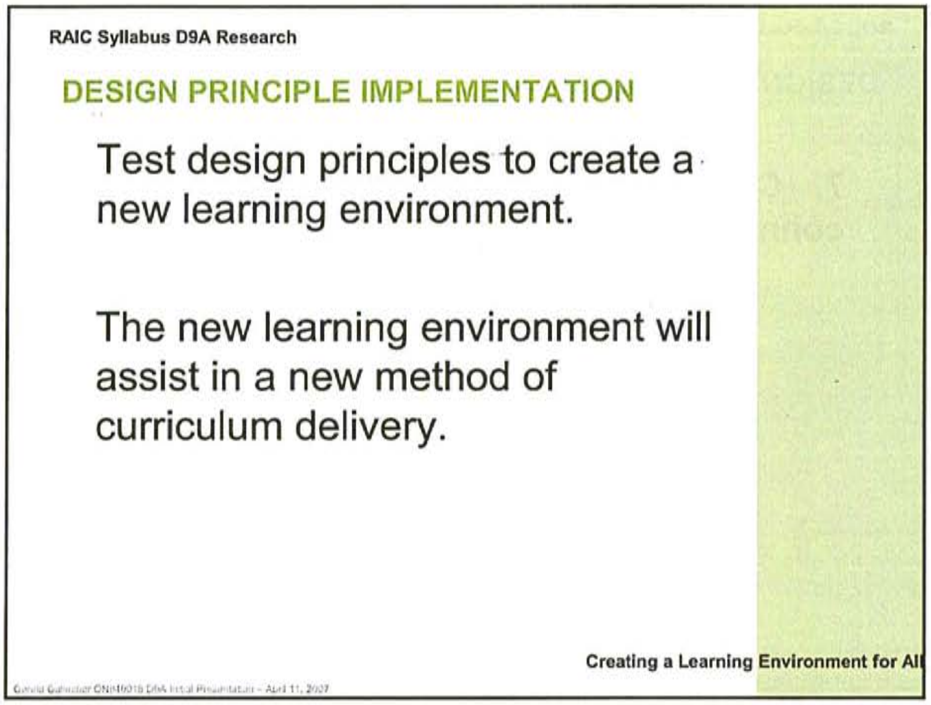

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DESIGN PRINCIPLE IMPLEMENTATION

Test design principles to create a new learning environment.

The new learning environment will assist in a new method of curriculum delivery.

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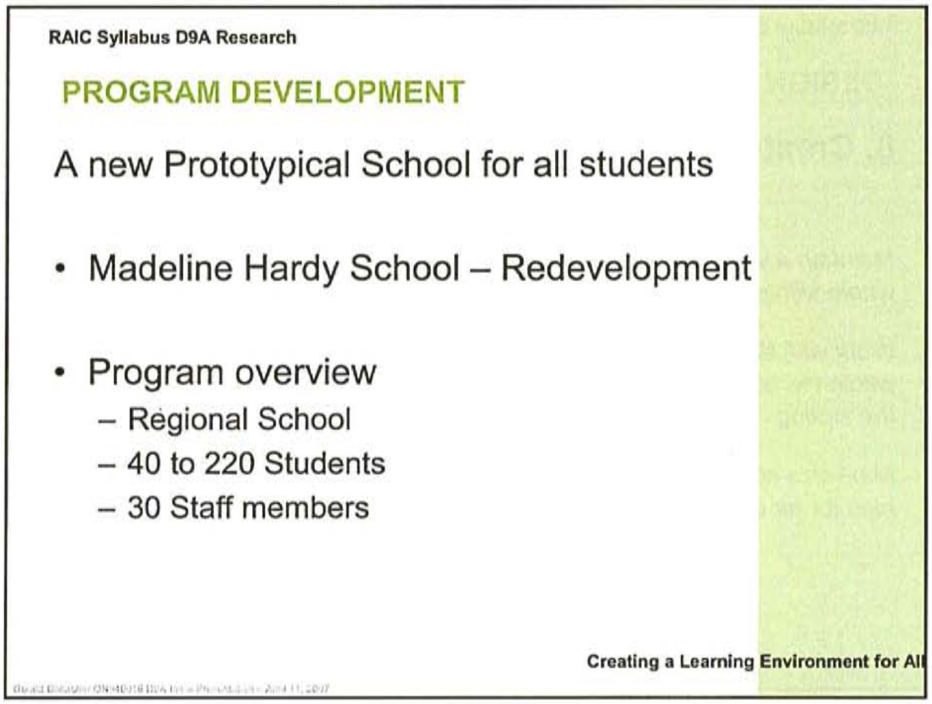

RAIC Syllabus D9A Research

PROGRAM DEVELOPMENT

A new Prototypical School for all students

- Madeline Hardy School – Redevelopment
- Program overview
  - Regional School
  - 40 to 220 Students
  - 30 Staff members

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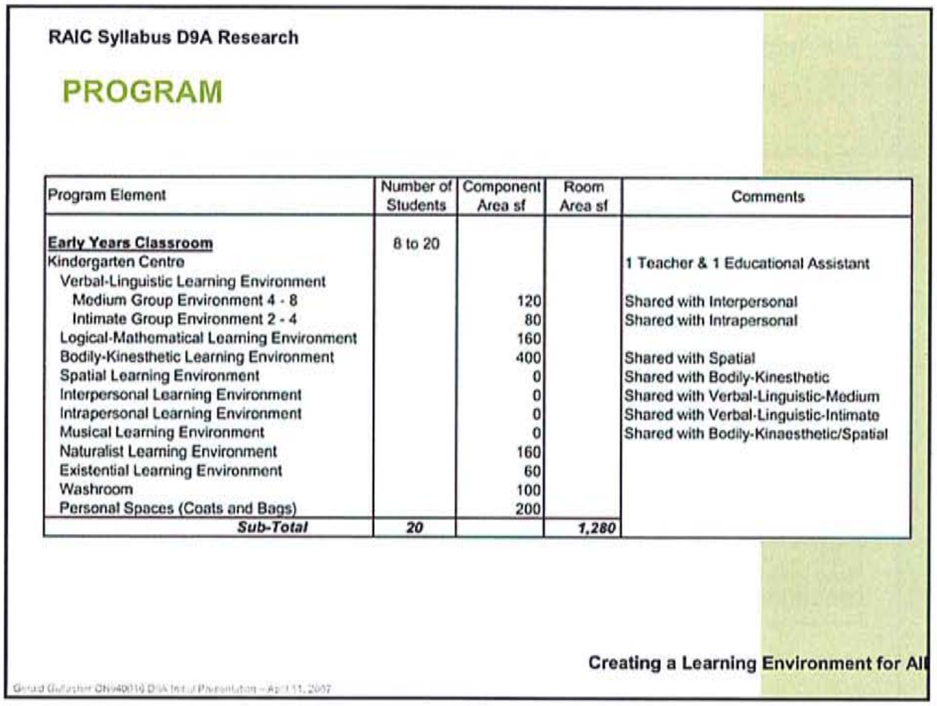

RAIC Syllabus D9A Research

PROGRAM

Program Element	Number of Students	Component Area sf	Room Area sf	Comments
Early Years Classroom	8 to 20			
Kindergarten Centre				1 Teacher & 1 Educational Assistant
Verbal-Linguistic Learning Environment				
Medium Group Environment 4 - 8		120		Shared with Interpersonal
Intimate Group Environment 2 - 4		80		Shared with Intrapersonal
Logical-Mathematical Learning Environment		160		
Bodily-Kinesthetic Learning Environment		400		Shared with Spatial
Spatial Learning Environment		0		Shared with Bodily-Kinesthetic
Interpersonal Learning Environment		0		Shared with Verbal-Linguistic-Medium
Intrapersonal Learning Environment		0		Shared with Verbal-Linguistic-Intimate
Musical Learning Environment		0		Shared with Bodily-Kinaesthetic/Spatial
Naturalist Learning Environment		160		
Existential Learning Environment		60		
Washroom		100		
Personal Spaces (Coats and Bags)		200		
Sub-Total	***20***		***1,280***	

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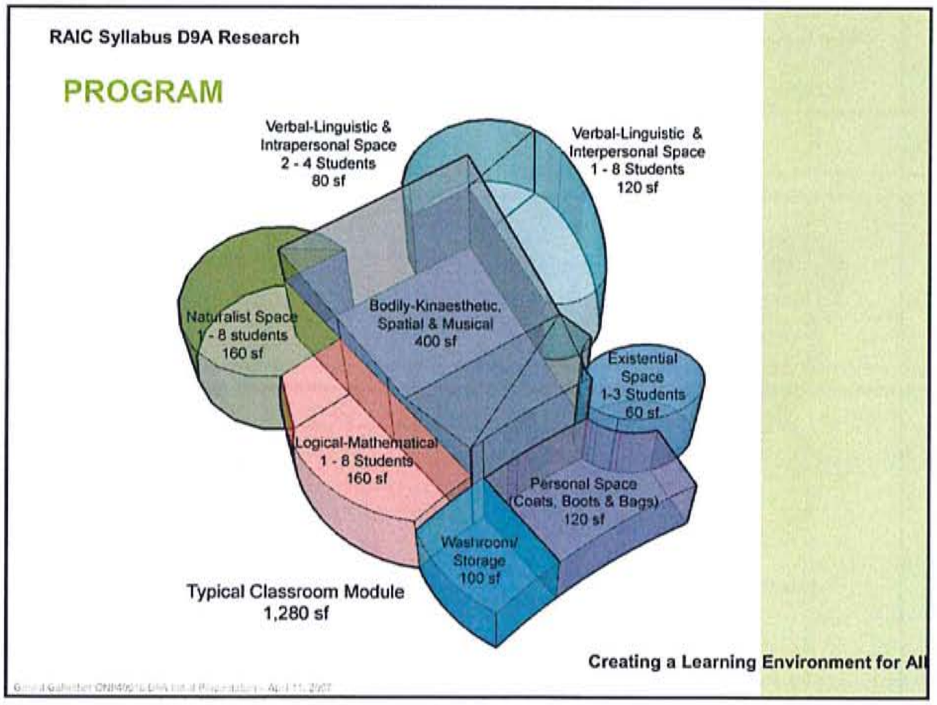

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PROGRAM

Verbal-Linguistic & Intrapersonal Space 2 - 4 Students 80 sf
Verbal-Linguistic & Interpersonal Space 1 - 8 Students 120 sf
Naturalist Space 1 - 8 students 160 sf
Bodily-Kinaesthetic, Spatial & Musical 400 sf
Existential Space 1-3 Students 60 sf
Logical-Mathematical 1 - 8 Students 160 sf
Personal Space (Coats, Boots & Bags) 120 sf
Washroom/ Storage 100 sf

Typical Classroom Module
1,280 sf

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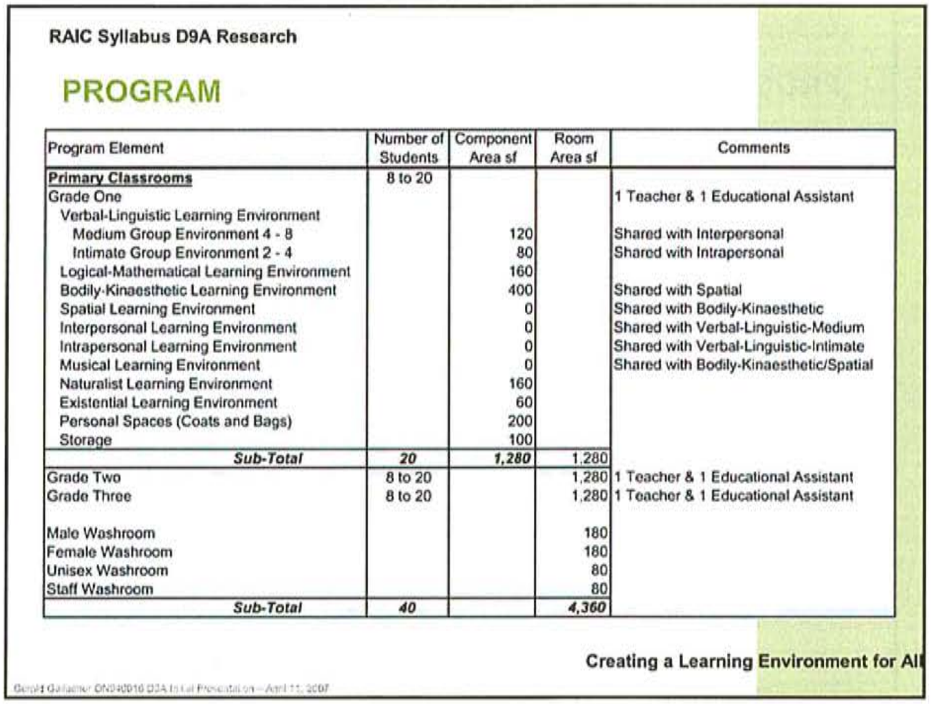

RAIC Syllabus D9A Research

PROGRAM

Program Element	Number of Students	Component Area sf	Room Area sf	Comments
Primary Classrooms	8 to 20			
Grade One				1 Teacher & 1 Educational Assistant
Verbal-Linguistic Learning Environment				
Medium Group Environment 4 - 8		120		Shared with Interpersonal
Intimate Group Environment 2 - 4		80		Shared with Intrapersonal
Logical-Mathematical Learning Environment		160		
Bodily-Kinaesthetic Learning Environment		400		Shared with Spatial
Spatial Learning Environment		0		Shared with Bodily-Kinaesthetic
Interpersonal Learning Environment		0		Shared with Verbal-Linguistic-Medium
Intrapersonal Learning Environment		0		Shared with Verbal-Linguistic-Intimate
Musical Learning Environment		0		Shared with Bodily-Kinaesthetic/Spatial
Naturalist Learning Environment		160		
Existential Learning Environment		60		
Personal Spaces (Coats and Bags)		200		
Storage		100		
Sub-Total	***20***	***1,280***	1,280	
Grade Two	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Grade Three	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Male Washroom			180	
Female Washroom			180	
Unisex Washroom			80	
Staff Washroom			80	
Sub-Total	***40***		***4,360***	

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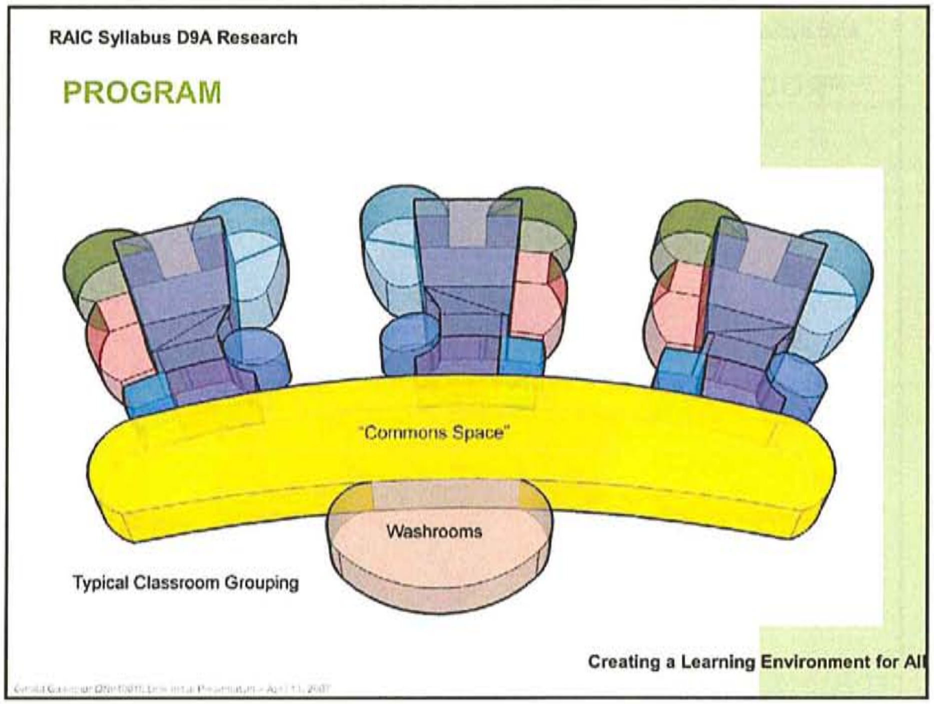

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PROGRAM

Typical Classroom Grouping

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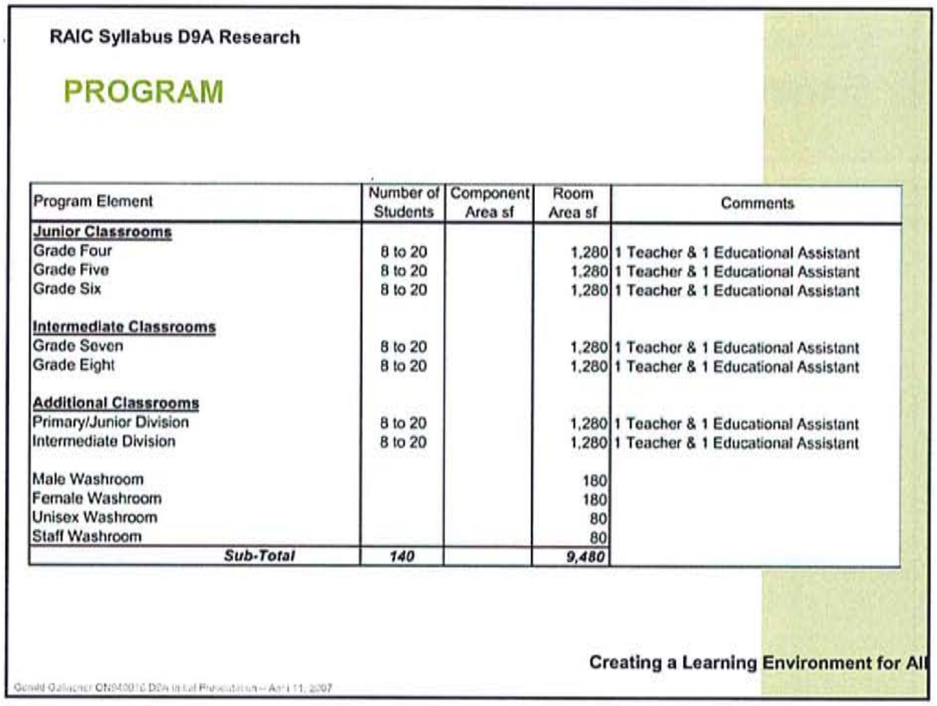

RAIC Syllabus D9A Research

PROGRAM

Program Element	Number of Students	Component Area sf	Room Area sf	Comments
Junior Classrooms				
Grade Four	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Grade Five	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Grade Six	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Intermediate Classrooms				
Grade Seven	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Grade Eight	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Additional Classrooms				
Primary/Junior Division	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Intermediate Division	8 to 20		1,280	1 Teacher & 1 Educational Assistant
Male Washroom			180	
Female Washroom			180	
Unisex Washroom			80	
Staff Washroom			80	
Sub-Total	***140***		***9,480***	

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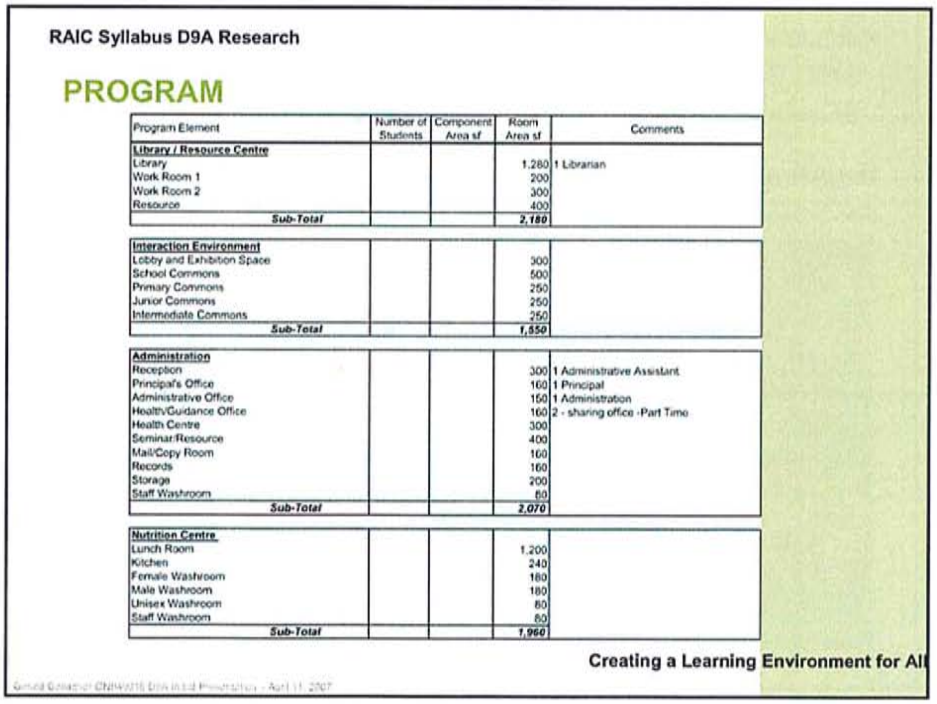

RAIC Syllabus D9A Research

PROGRAM

Program Element	Number of Students	Component Area sf	Room Area sf	Comments
Library / Resource Centre				
Library			1,280	1 Librarian
Work Room 1			200	
Work Room 2			300	
Resource			400	
Sub-Total			***2,180***	
Interaction Environment				
Lobby and Exhibition Space			300	
School Commons			500	
Primary Commons			250	
Junior Commons			250	
Intermediate Commons			250	
Sub-Total			***1,550***	
Administration				
Reception			300	1 Administrative Assistant
Principal's Office			160	1 Principal
Administrative Office			150	1 Administration
Health/Guidance Office			160	2 - sharing office -Part Time
Health Centre			300	
Seminar/Resource			400	
Mail/Copy Room			160	
Records			160	
Storage			200	
Staff Washroom			80	
Sub-Total			***2,070***	
Nutrition Centre				
Lunch Room			1,200	
Kitchen			240	
Female Washroom			180	
Male Washroom			180	
Unisex Washroom			80	
Staff Washroom			80	
Sub-Total			***1,960***	

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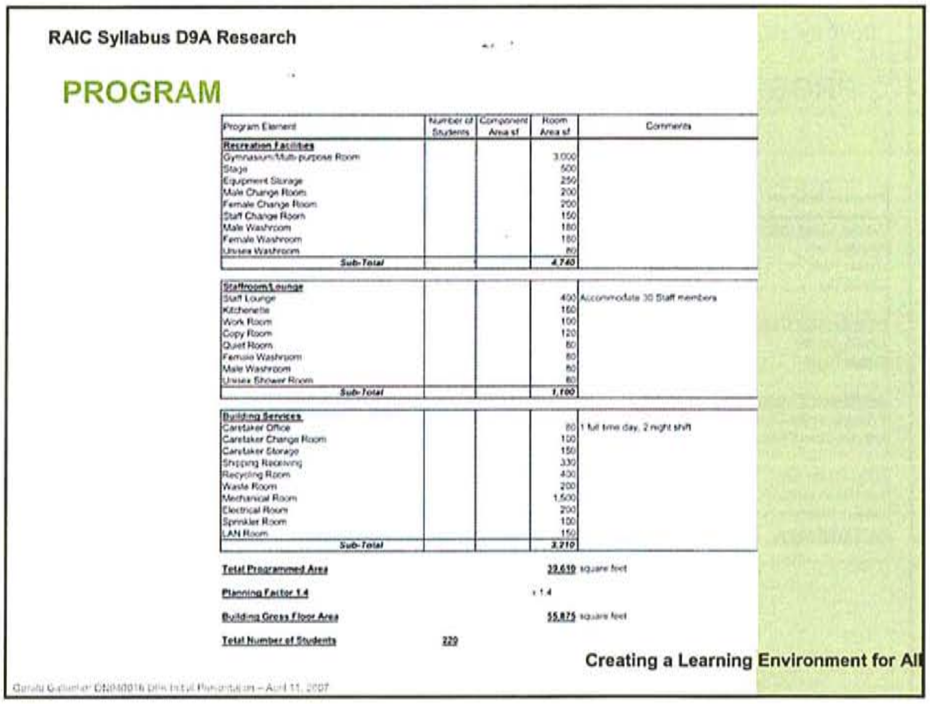

RAIC Syllabus D9A Research

PROGRAM

Program Element	Number of Students	Component Area sf	Room Area sf	Comments
Recreation Facilities				
Gymnasium/Multi-purpose Room			3,000	
Stage			500	
Equipment Storage			250	
Male Change Room			200	
Female Change Room			200	
Staff Change Room			150	
Male Washroom			180	
Female Washroom			180	
Unisex Washroom			80	
Sub-Total			***4,740***	
Staffroom/Lounge				
Staff Lounge			400	Accommodate 30 Staff members
Kitchenette			160	
Work Room			100	
Copy Room			120	
Quiet Room			80	
Female Washroom			80	
Male Washroom			80	
Unisex Shower Room			80	
Sub-Total			***1,100***	
Building Services				
Caretaker Office			80	1 full time day, 2 night shift
Caretaker Change Room			100	
Caretaker Storage			150	
Shipping Receiving			330	
Recycling Room			400	
Waste Room			200	
Mechanical Room			1,500	
Electrical Room			200	
Sprinkler Room			100	
LAN Room			150	
Sub-Total			***3,210***	

Total Programmed Area		**39,910**	square feet
Planning Factor 1.4		x 1.4	
Building Gross Floor Area		**55,875**	square feet
Total Number of Students	**220**		

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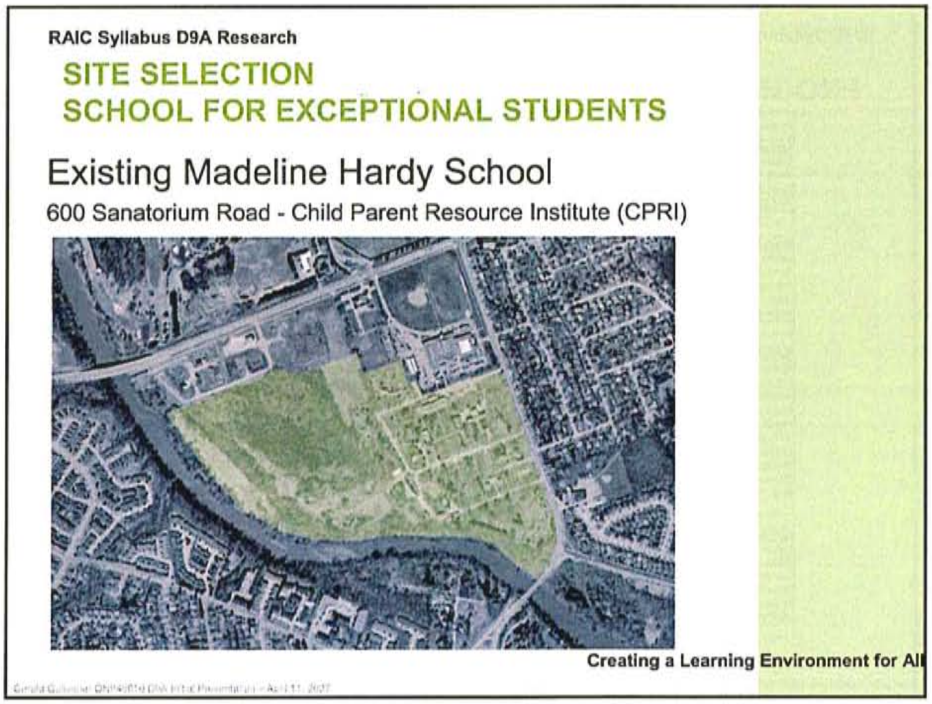

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SITE SELECTION
SCHOOL FOR EXCEPTIONAL STUDENTS

Existing Madeline Hardy School

600 Sanatorium Road - Child Parent Resource Institute (CPRI)

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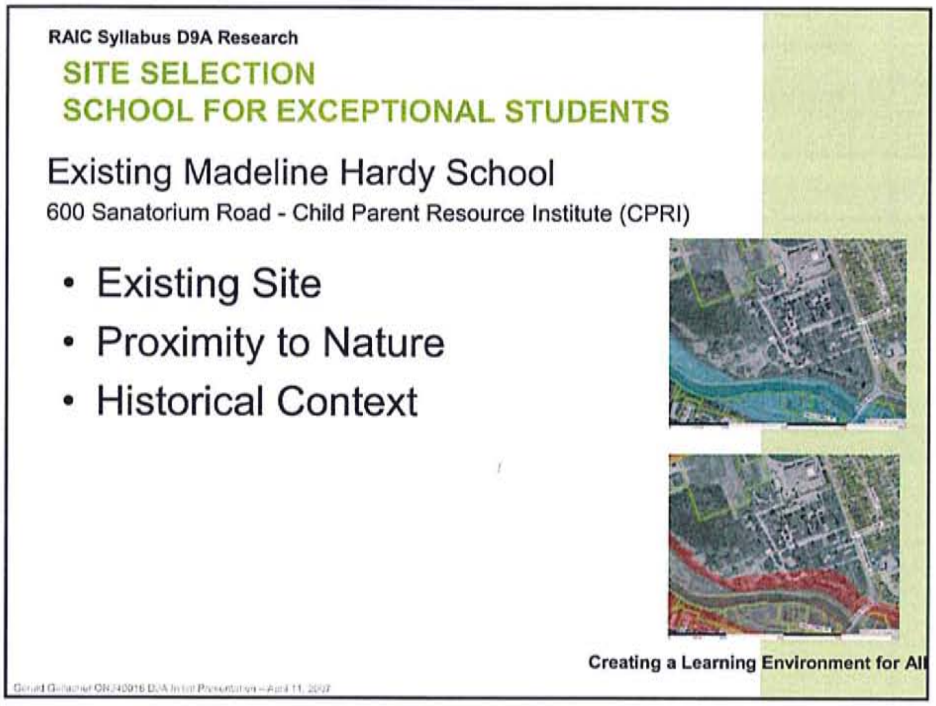

RAIC Syllabus D9A Research

SITE SELECTION
SCHOOL FOR EXCEPTIONAL STUDENTS

Existing Madeline Hardy School

600 Sanatorium Road - Child Parent Resource Institute (CPRI)

- Existing Site
- Proximity to Nature
- Historical Context

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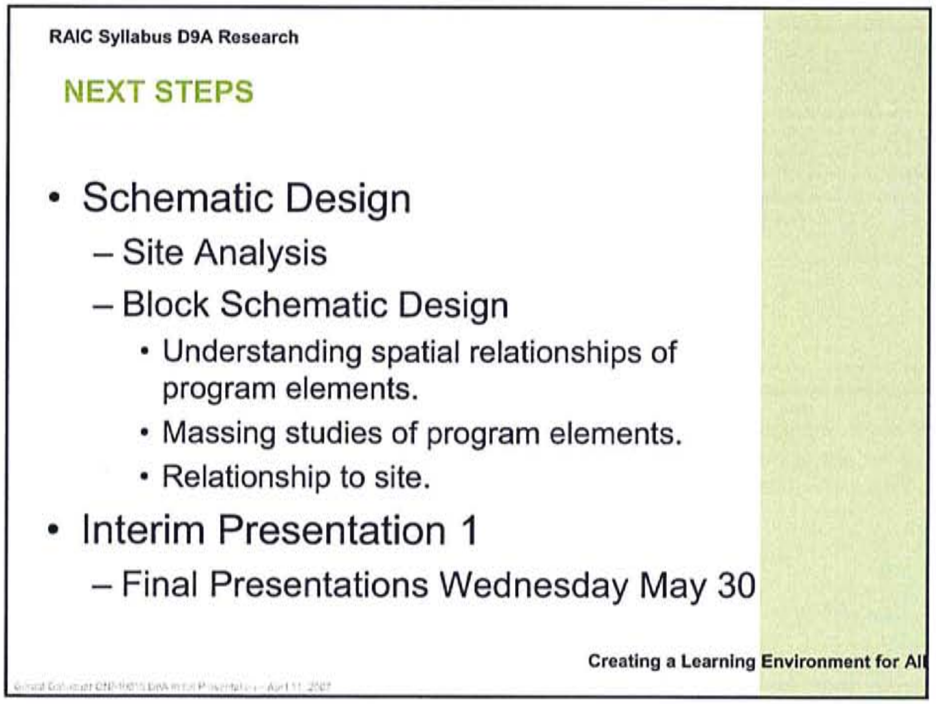

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NEXT STEPS

- Schematic Design
  - Site Analysis
  - Block Schematic Design
    - Understanding spatial relationships of program elements.
    - Massing studies of program elements.
    - Relationship to site.
- Interim Presentation 1
  - Final Presentations Wednesday May 30

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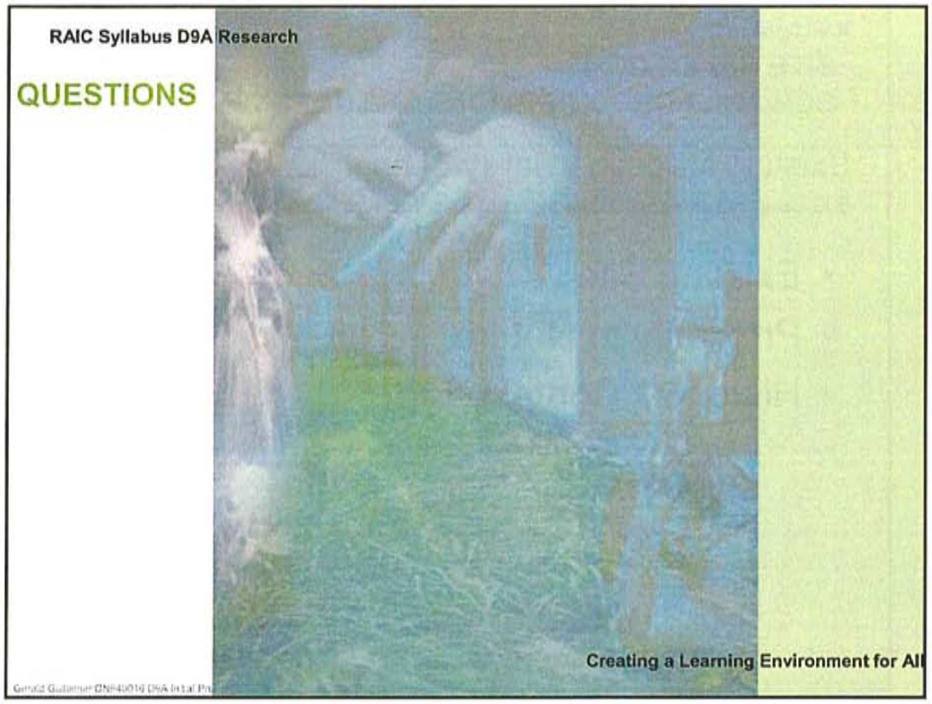

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QUESTIONS

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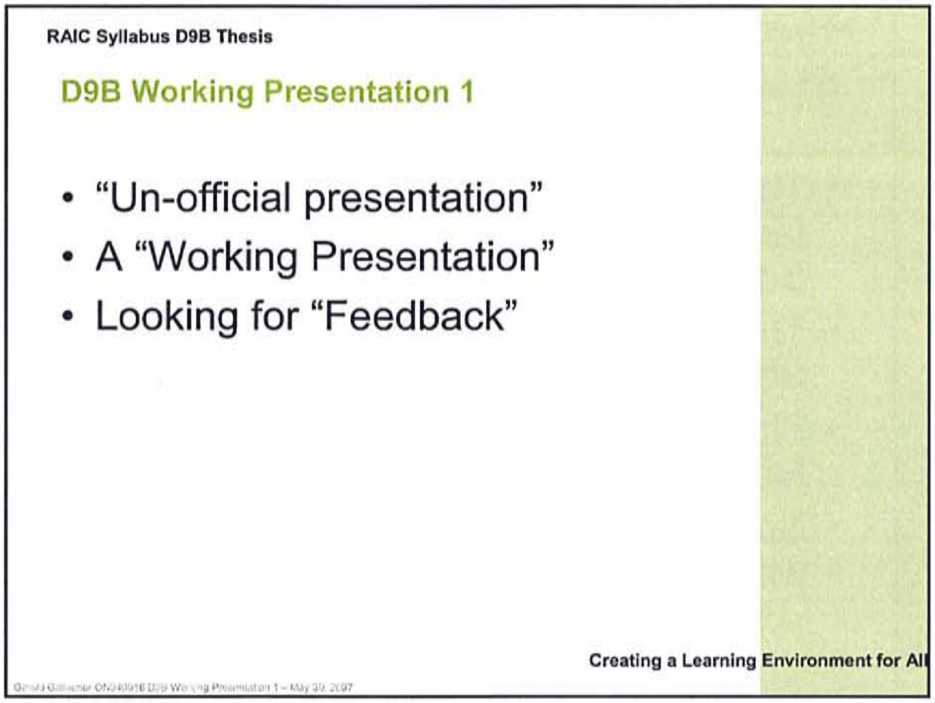
Working Presentation 1 – May 30, 2007



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D9B Working Presentation 1

- "Un-official presentation"
- A "Working Presentation"
- Looking for "Feedback"

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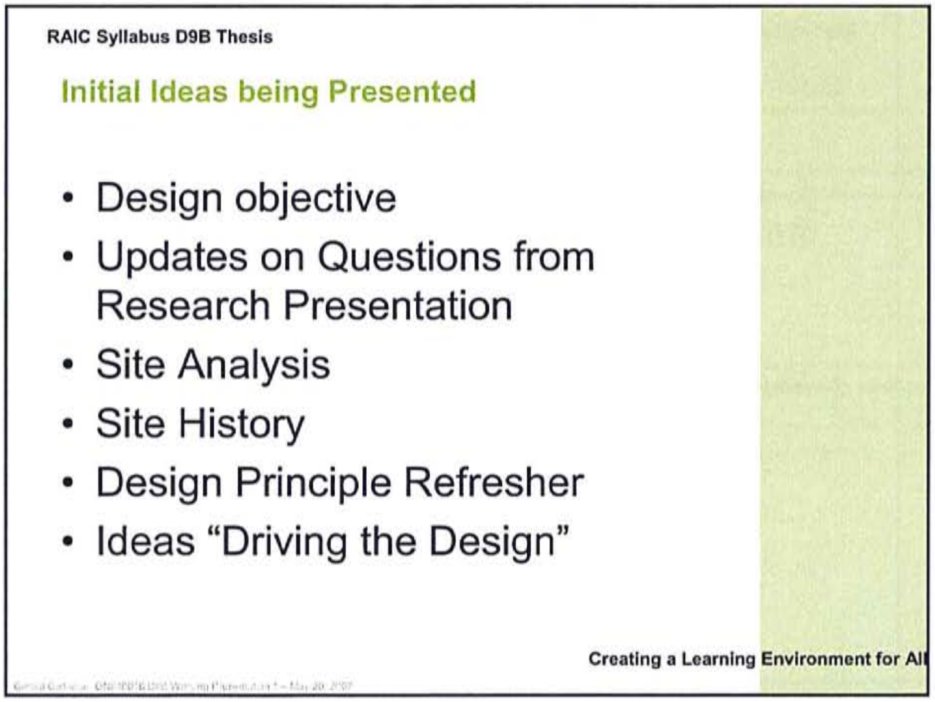

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Initial Ideas being Presented

- Design objective
- Updates on Questions from Research Presentation
- Site Analysis
- Site History
- Design Principle Refresher
- Ideas "Driving the Design"

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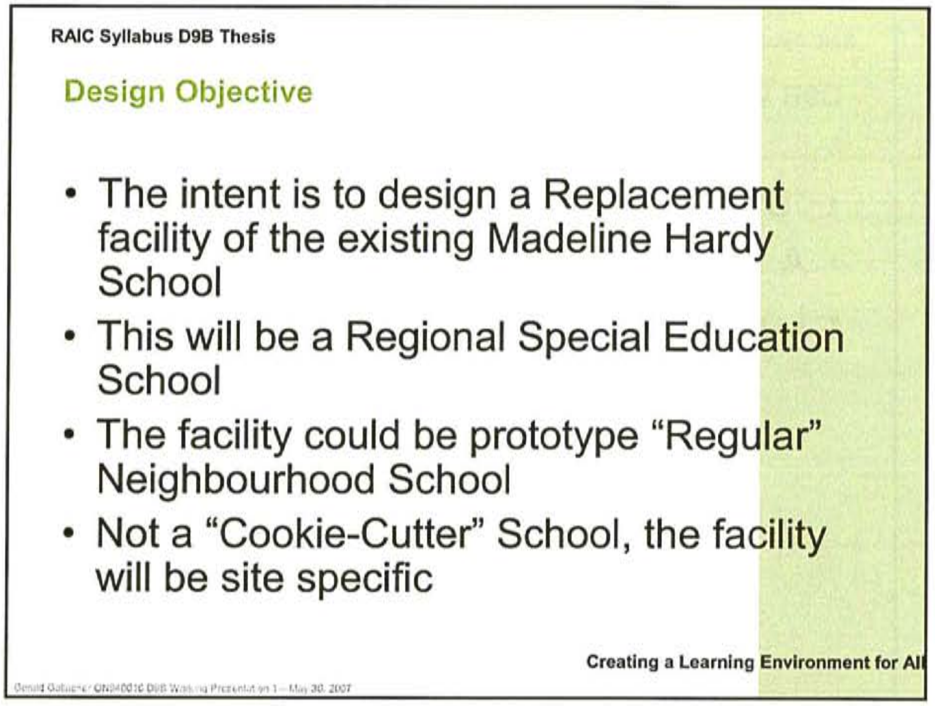

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Design Objective

- The intent is to design a Replacement facility of the existing Madeline Hardy School
- This will be a Regional Special Education School
- The facility could be prototype "Regular" Neighbourhood School
- Not a "Cookie-Cutter" School, the facility will be site specific

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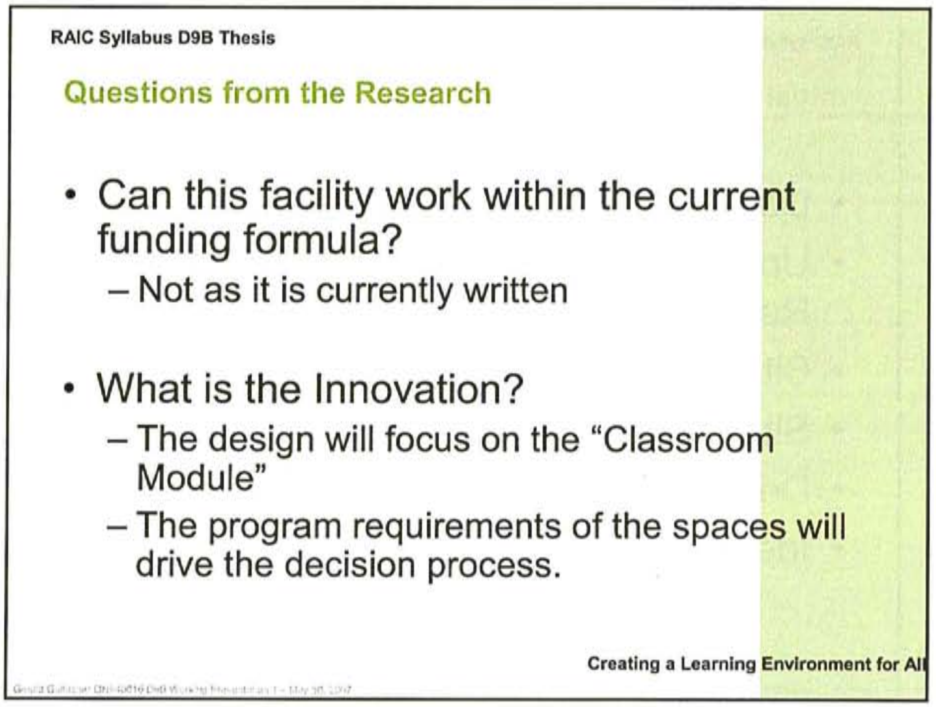

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Questions from the Research

- Can this facility work within the current funding formula?
  - Not as it is currently written
- What is the Innovation?
  - The design will focus on the "Classroom Module"
  - The program requirements of the spaces will drive the decision process.

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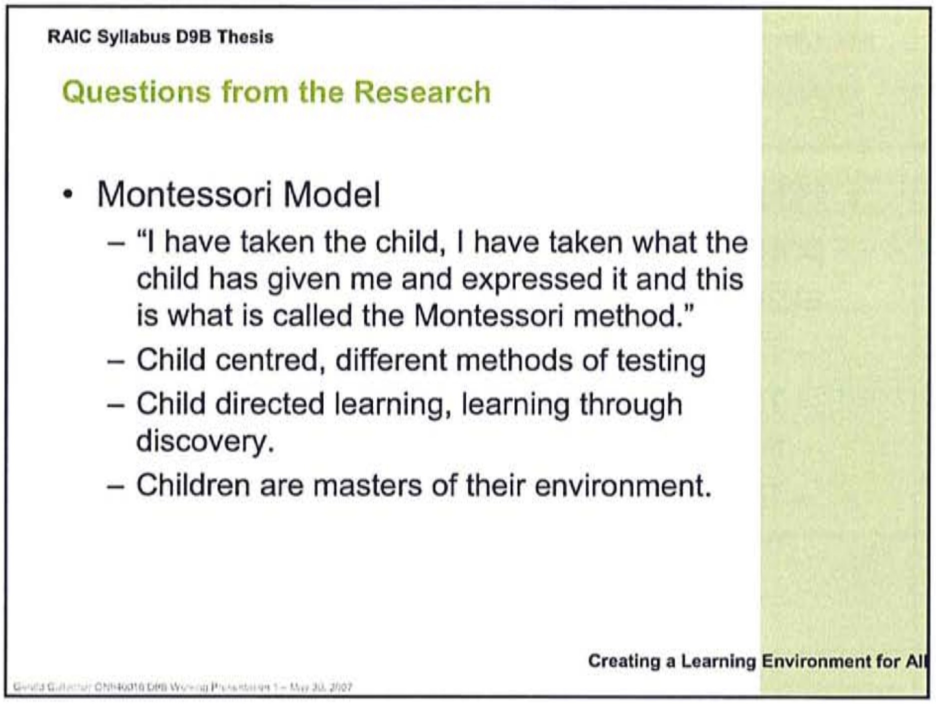

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Questions from the Research

- Montessori Model
  - "I have taken the child, I have taken what the child has given me and expressed it and this is what is called the Montessori method."
  - Child centred, different methods of testing
  - Child directed learning, learning through discovery.
  - Children are masters of their environment.

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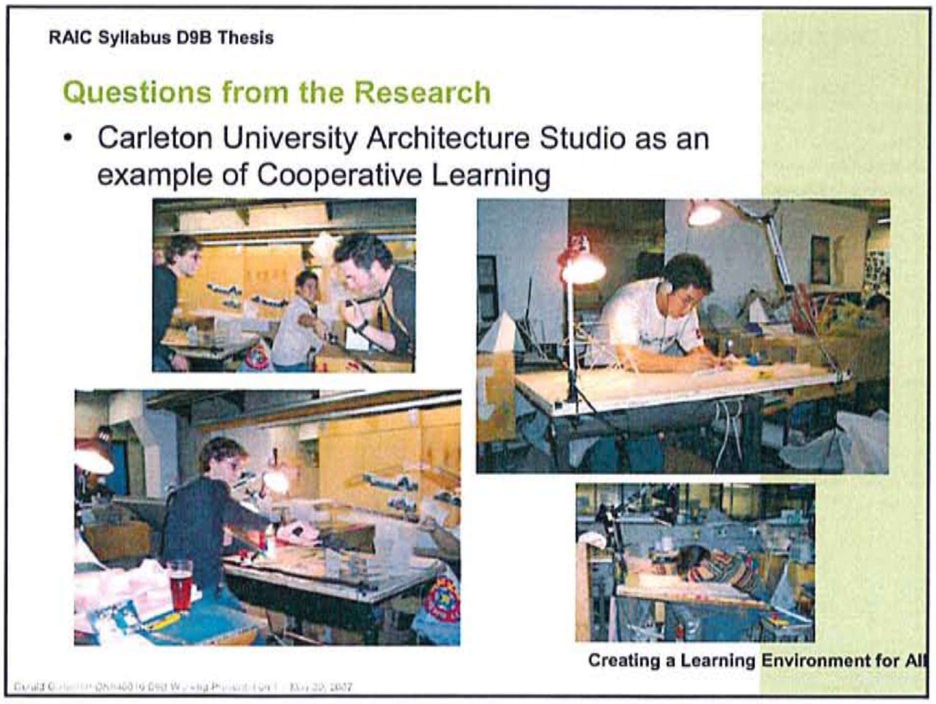

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Questions from the Research

- Carleton University Architecture Studio as an example of Cooperative Learning

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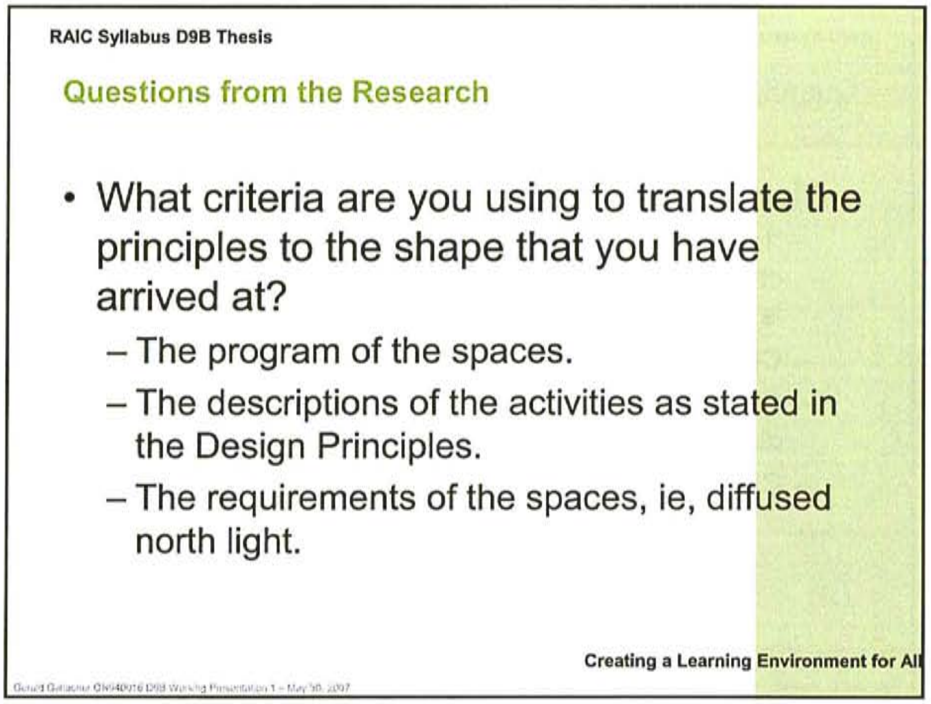

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Questions from the Research

- What criteria are you using to translate the principles to the shape that you have arrived at?
  - The program of the spaces.
  - The descriptions of the activities as stated in the Design Principles.
  - The requirements of the spaces, ie, diffused north light.

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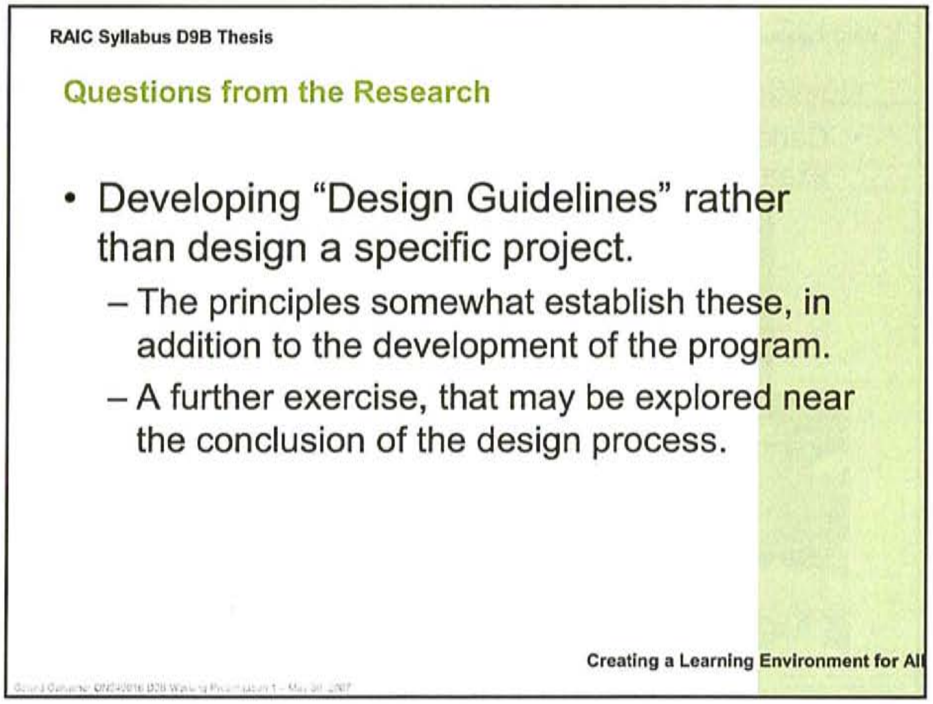

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Questions from the Research

- Developing "Design Guidelines" rather than design a specific project.
  - The principles somewhat establish these, in addition to the development of the program.
  - A further exercise, that may be explored near the conclusion of the design process.

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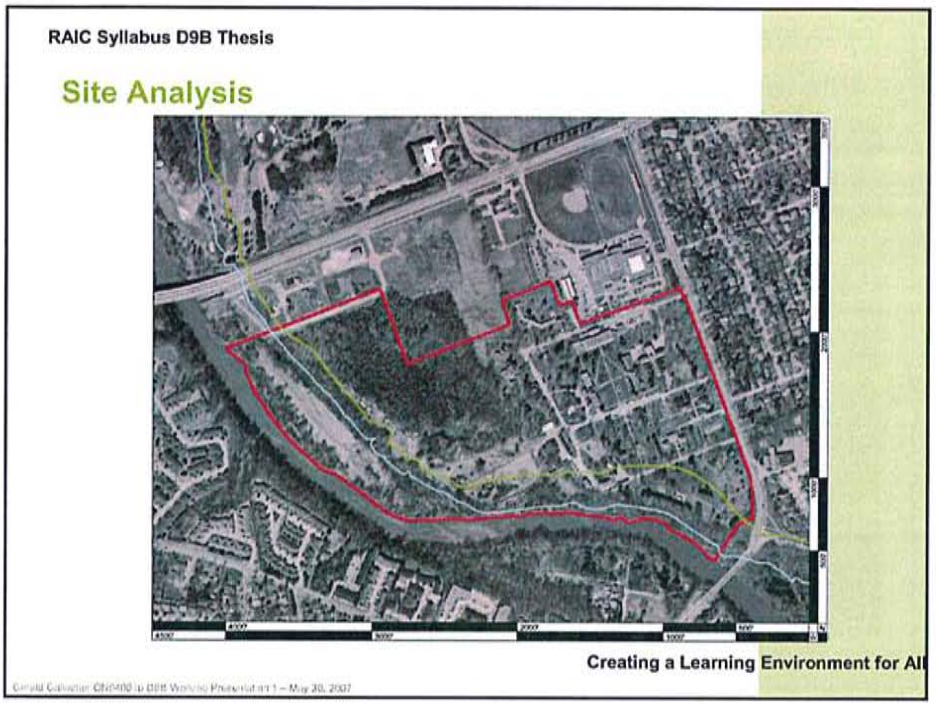

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Site Analysis

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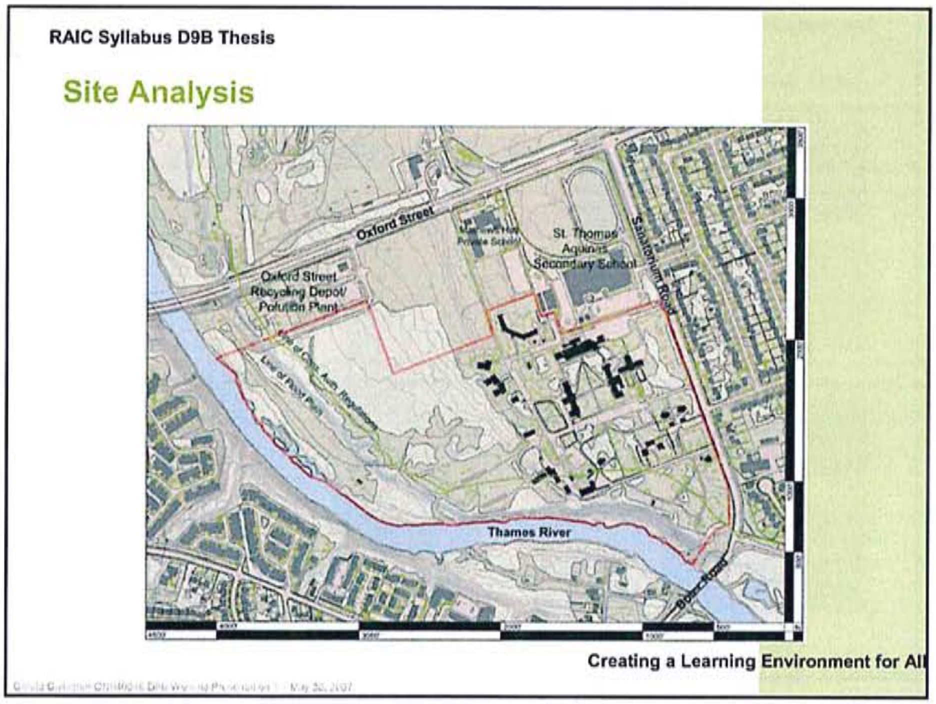

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Site Analysis

Oxford Street
St. Thomas Aquinas Secondary School
Sanatorium Road
Oxford Street Recycling Depot/ Pollution Plant
Line of Flood Plain
Line of Cons. Auth. Regulation
Thames River
Boler Road

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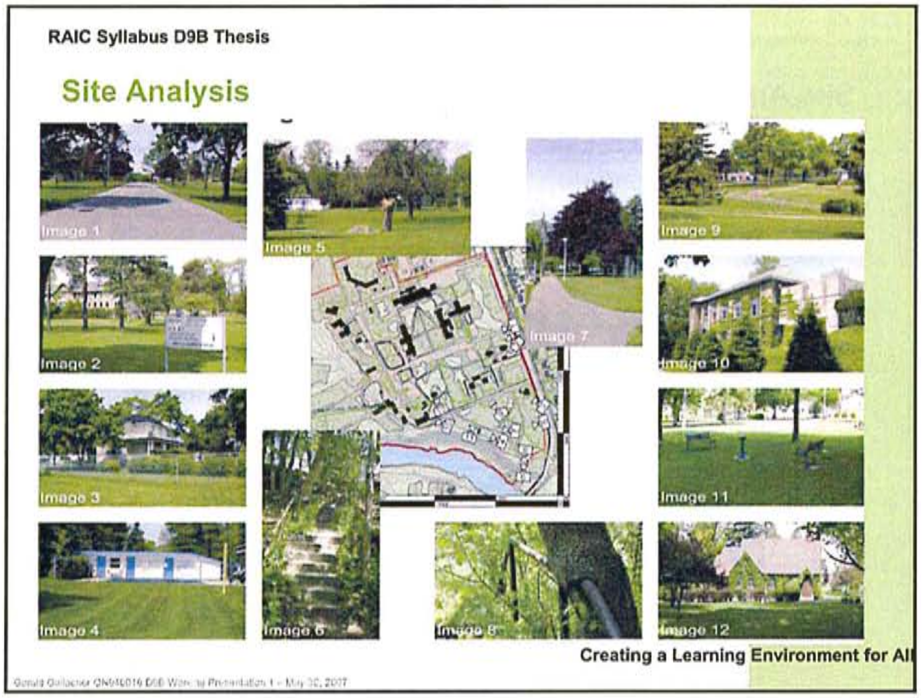

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Site Analysis

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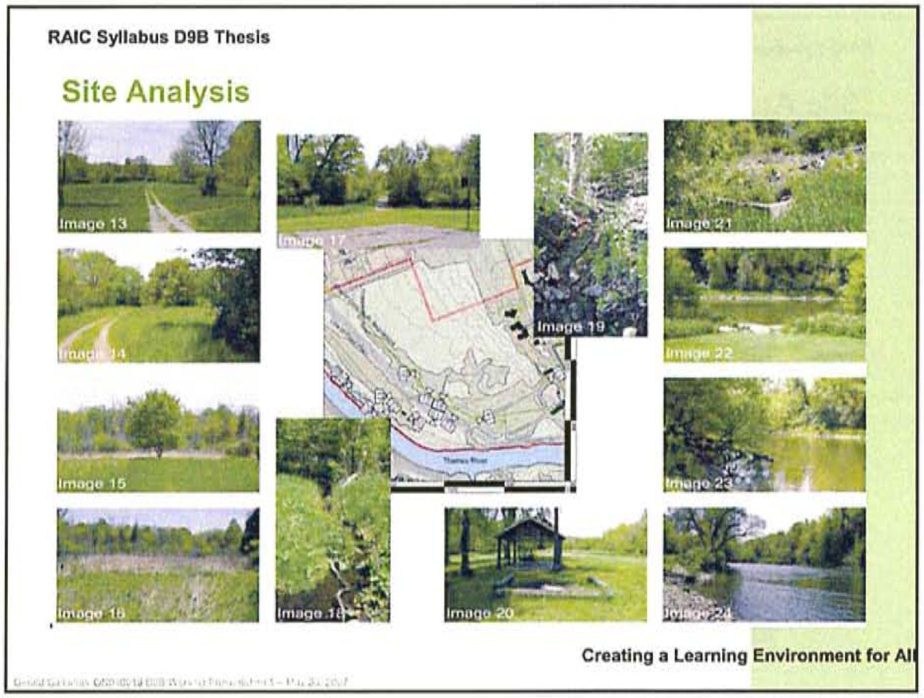

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Site Analysis

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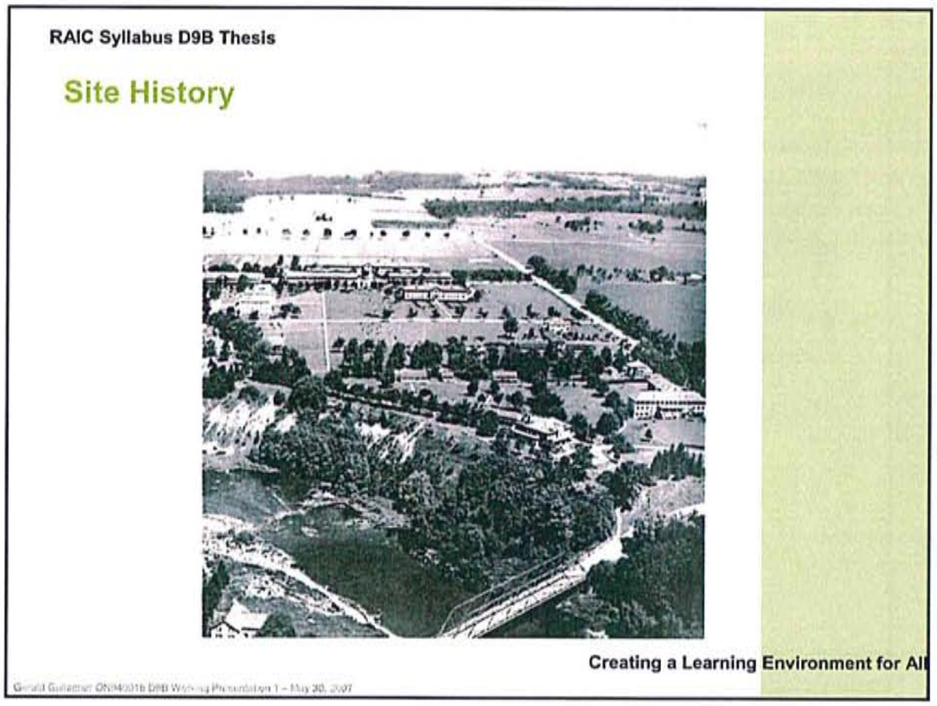

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Site History

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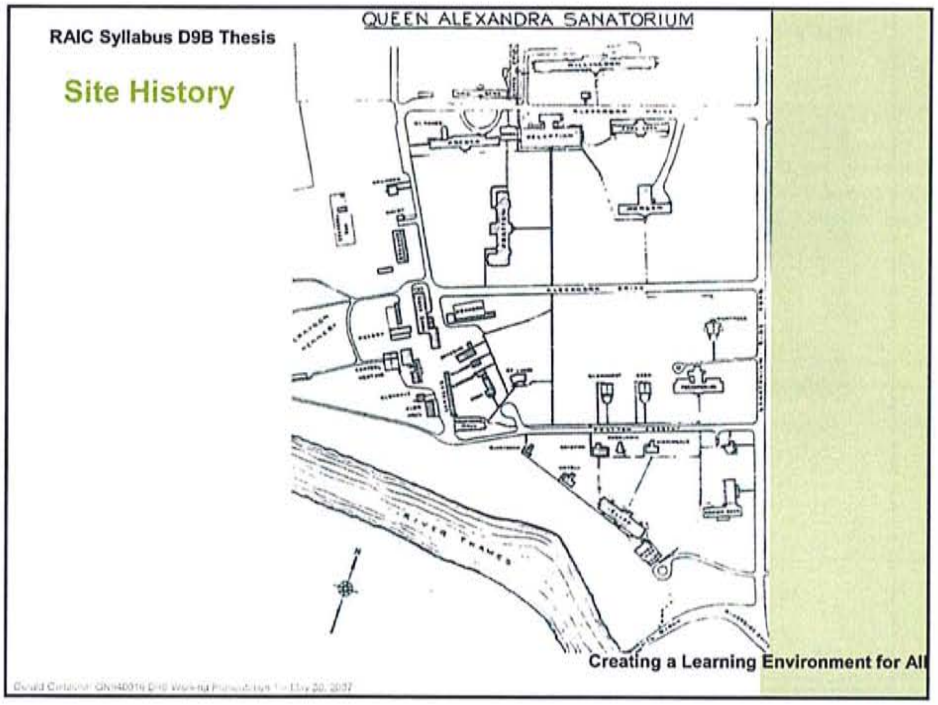

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Site History

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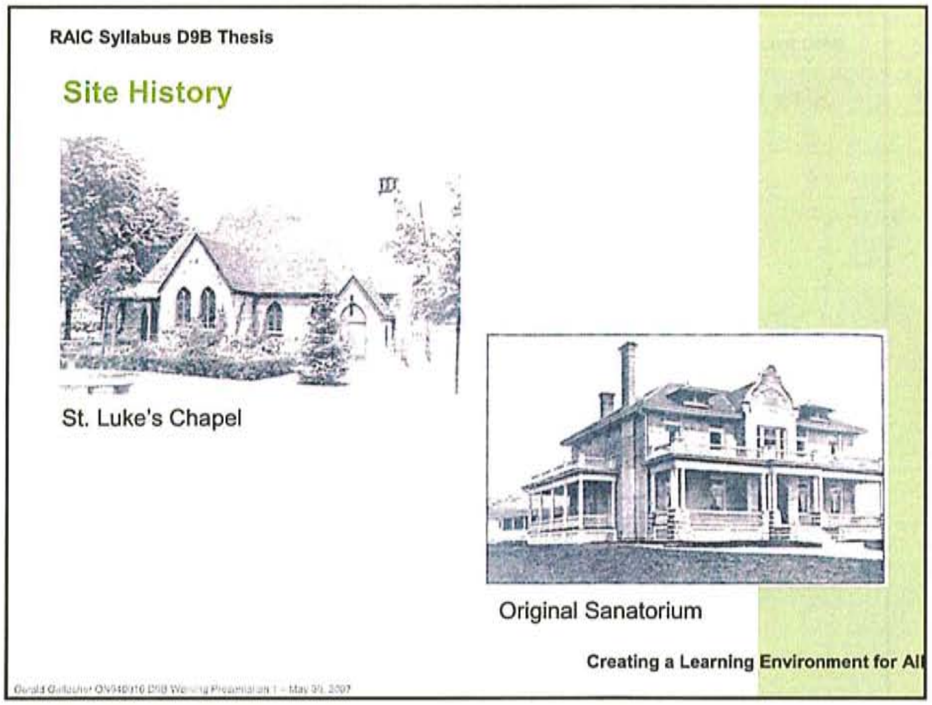

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Site History

St. Luke's Chapel

Original Sanatorium

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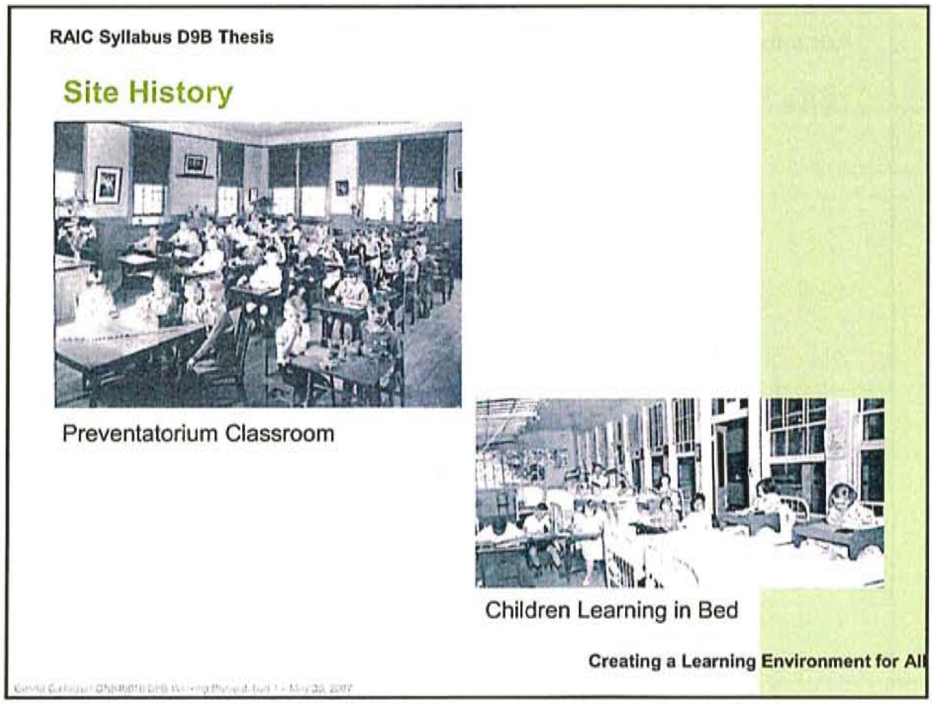

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Site History

Preventatorium Classroom

Children Learning in Bed

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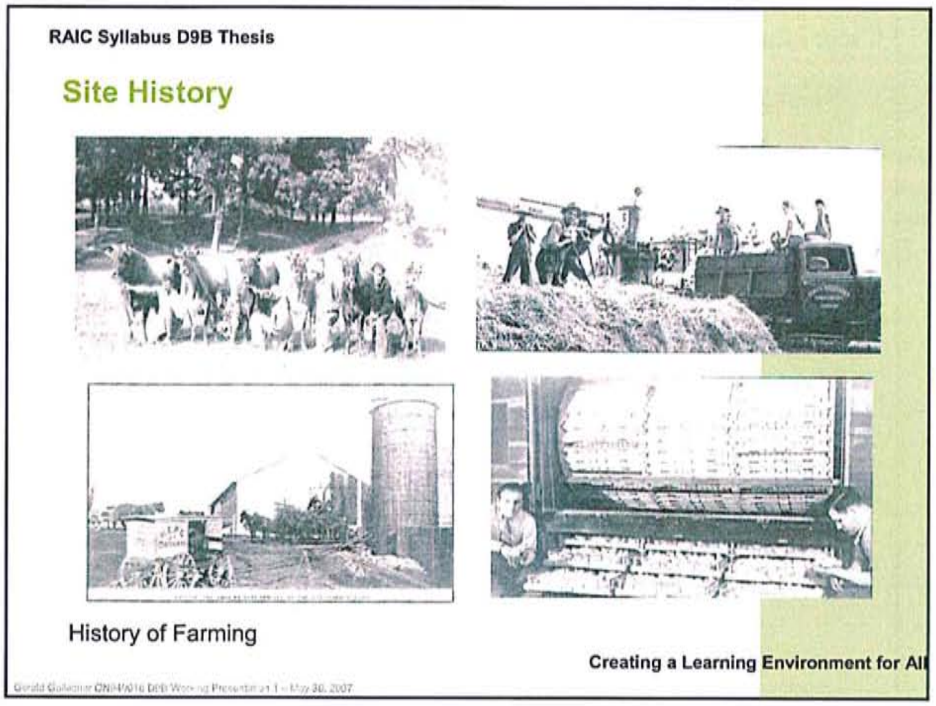

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Site History

History of Farming

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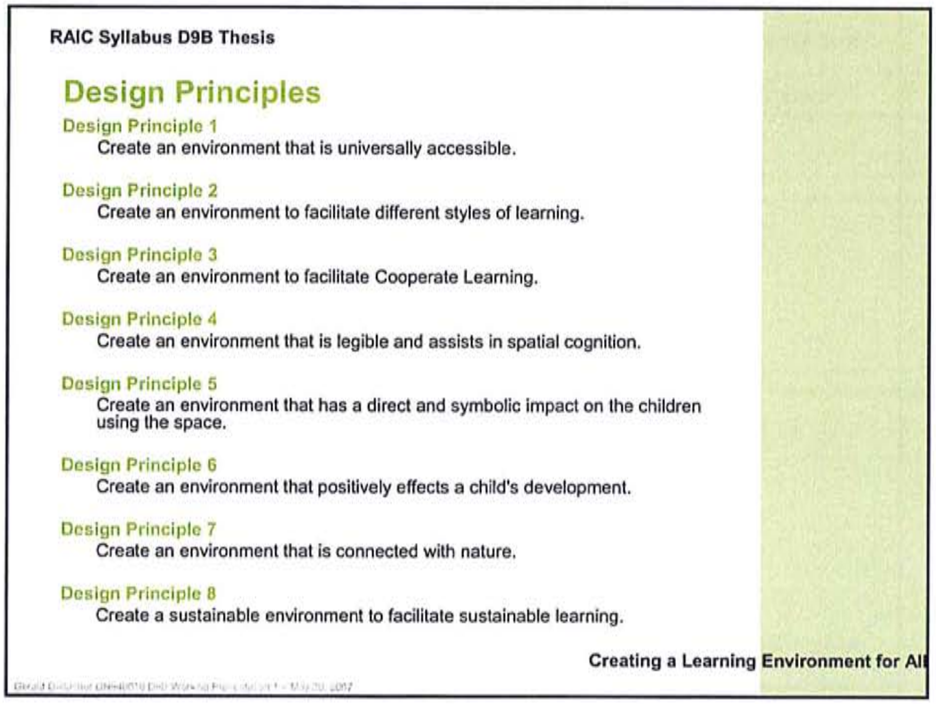

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Design Principles

Design Principle 1
Create an environment that is universally accessible.

Design Principle 2
Create an environment to facilitate different styles of learning.

Design Principle 3
Create an environment to facilitate Cooperate Learning.

Design Principle 4
Create an environment that is legible and assists in spatial cognition.

Design Principle 5
Create an environment that has a direct and symbolic impact on the children using the space.

Design Principle 6
Create an environment that positively effects a child's development.

Design Principle 7
Create an environment that is connected with nature.

Design Principle 8
Create a sustainable environment to facilitate sustainable learning.

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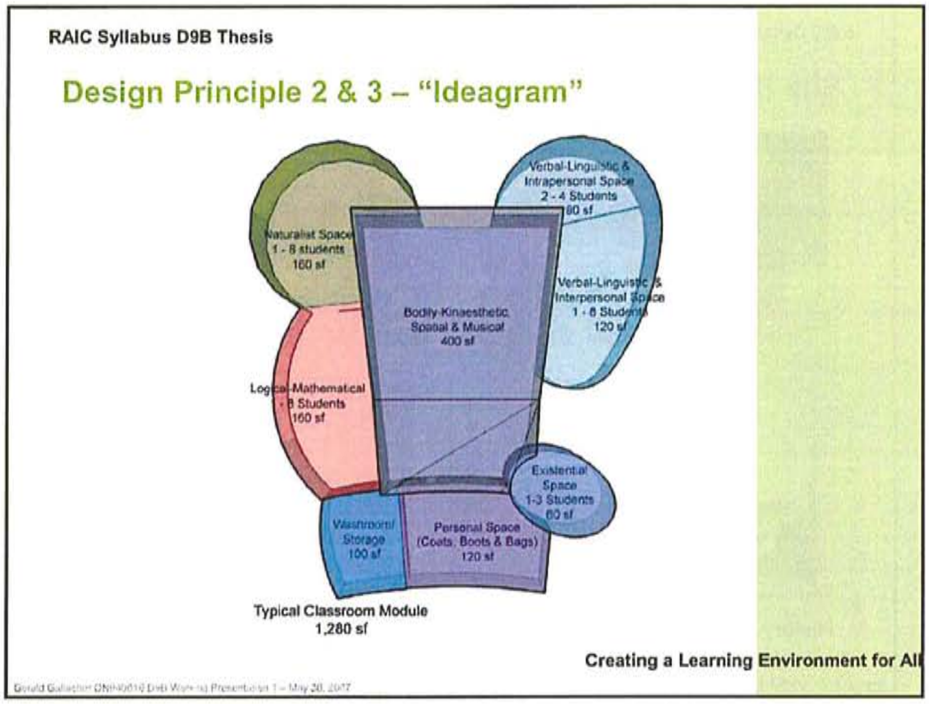

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Design Principle 2 & 3 – "Ideagram"

Typical Classroom Module
1,280 sf

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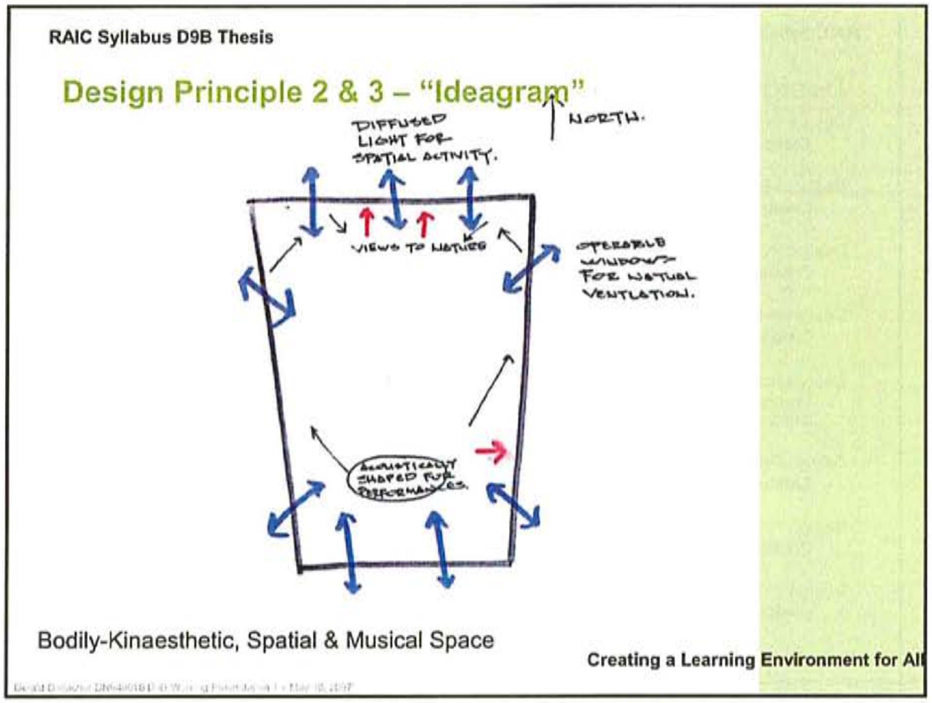

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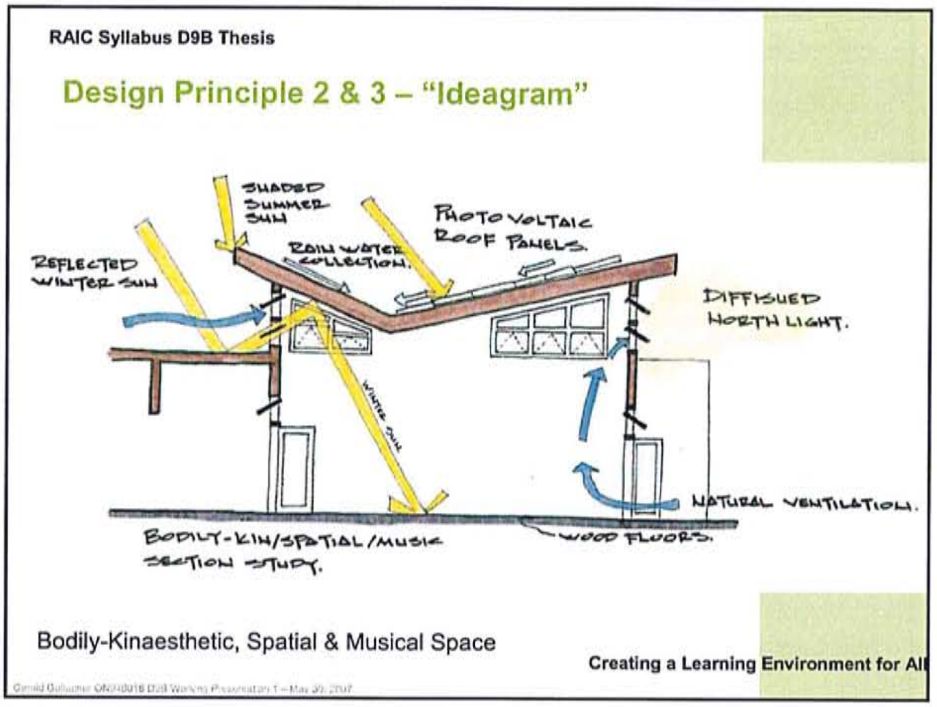
Design Principle 2 & 3 – "Ideagram"

NORTH.
DIFFUSED LIGHT FOR SPATIAL ACTIVITY.
VIEWS TO NATURE
OPERABLE WINDOWS FOR NATURAL VENTILATION.
ACOUSTICALLY SHAPED FOR PERFORMANCES.

Bodily-Kinaesthetic, Spatial & Musical Space

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Ideagram"

Bodily-Kinaesthetic, Spatial & Musical Space

Creating a Learning Environment for All

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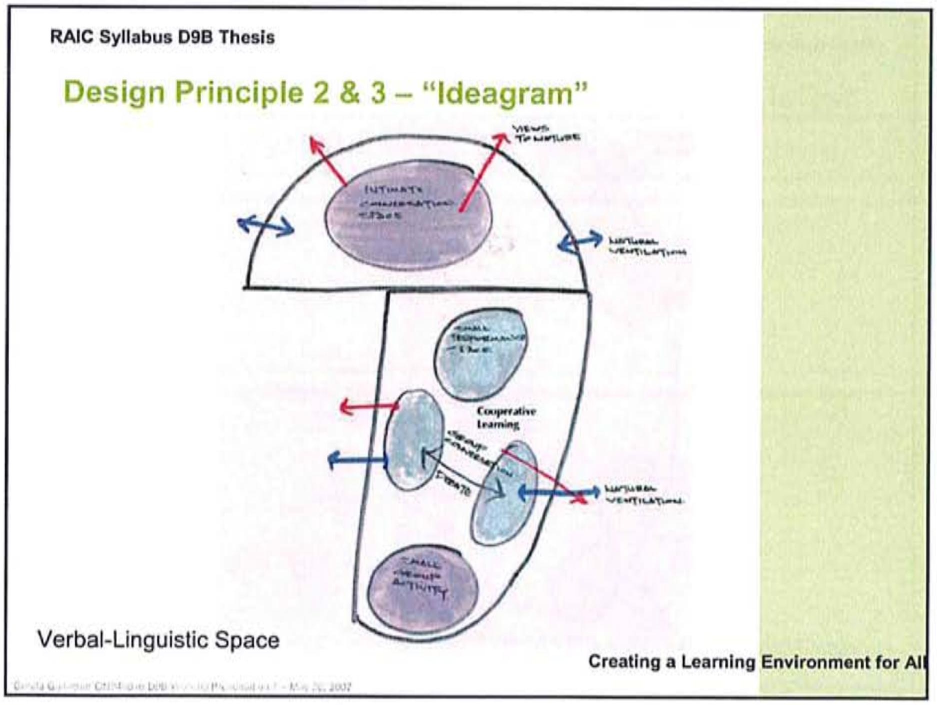

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Design Principle 2 & 3 – "Ideagram"

Verbal-Linguistic Space

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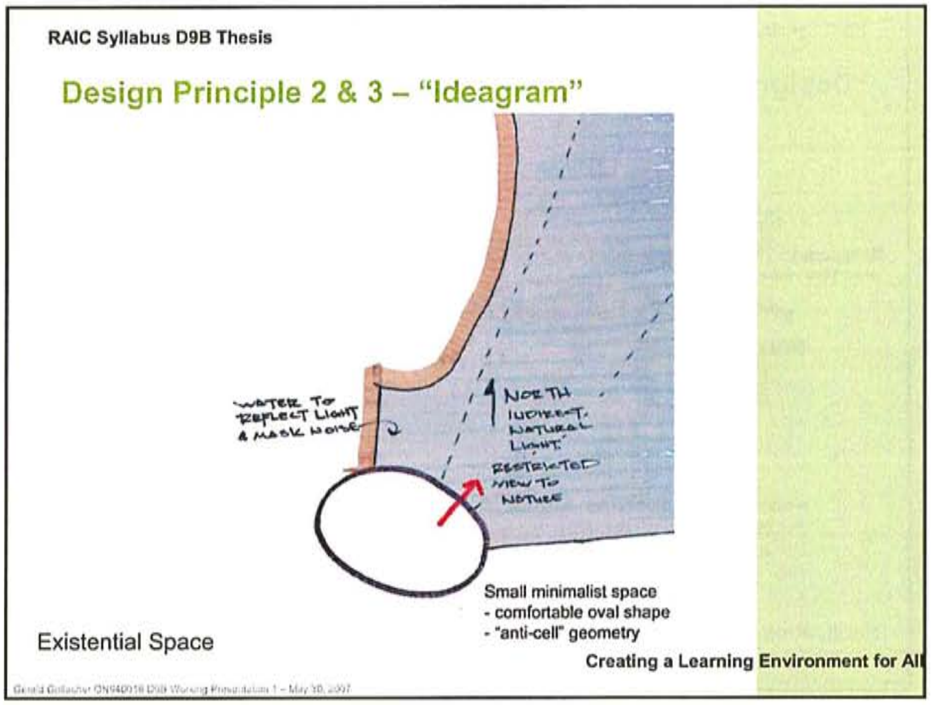

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Design Principle 2 & 3 – "Ideagram"

Small minimalist space
- comfortable oval shape
- "anti-cell" geometry

Existential Space

Creating a Learning Environment for All

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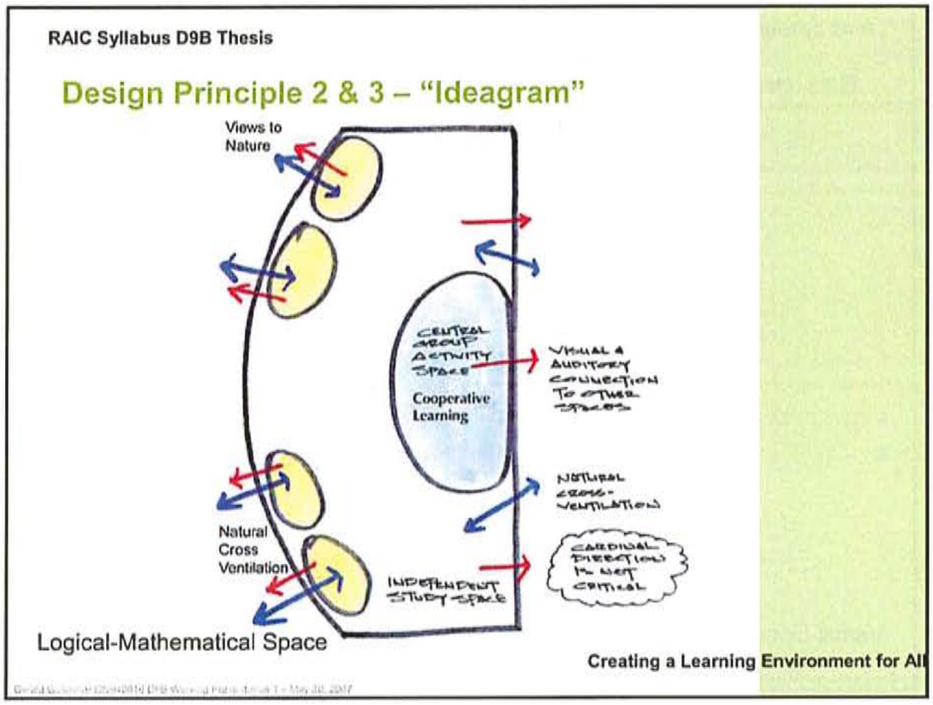

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Design Principle 2 & 3 – "Ideagram"

Views to Nature

Cooperative Learning

Natural Cross Ventilation

Logical-Mathematical Space

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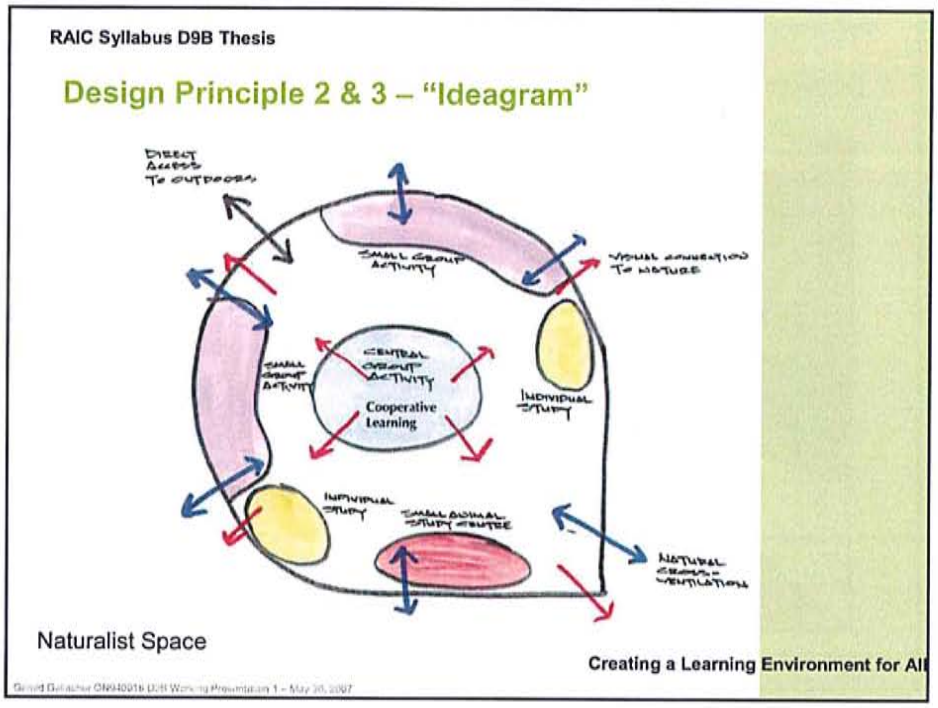

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Design Principle 2 & 3 – "Ideagram"

Naturalist Space

Creating a Learning Environment for All

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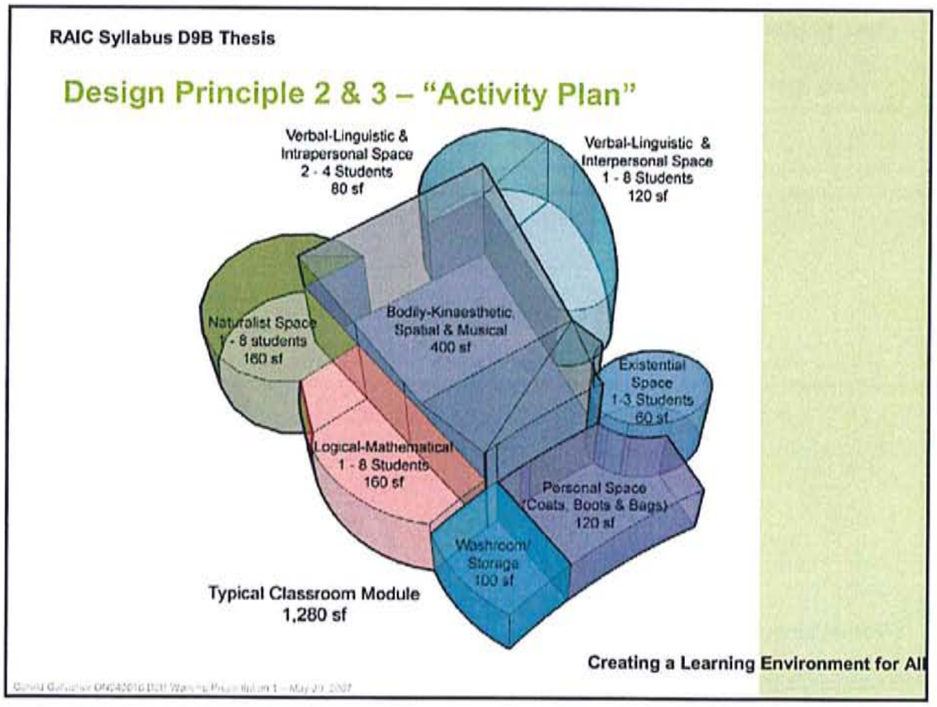

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Design Principle 2 & 3 – "Activity Plan"

Typical Classroom Module
1,280 sf

Creating a Learning Environment for All

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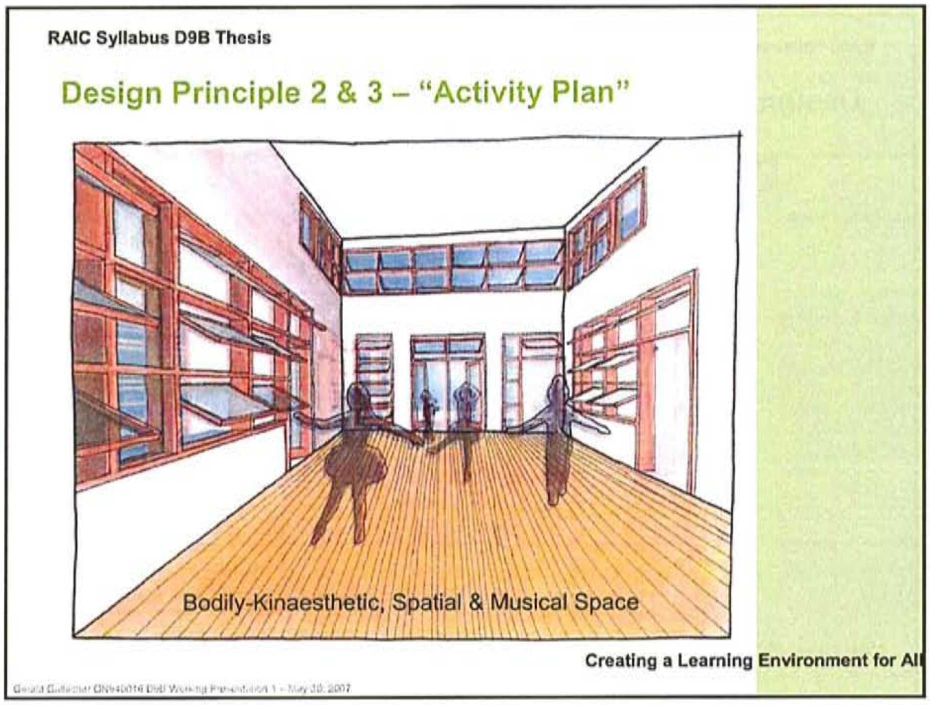

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Design Principle 2 & 3 – "Activity Plan"

Bodily-Kinaesthetic, Spatial & Musical Space

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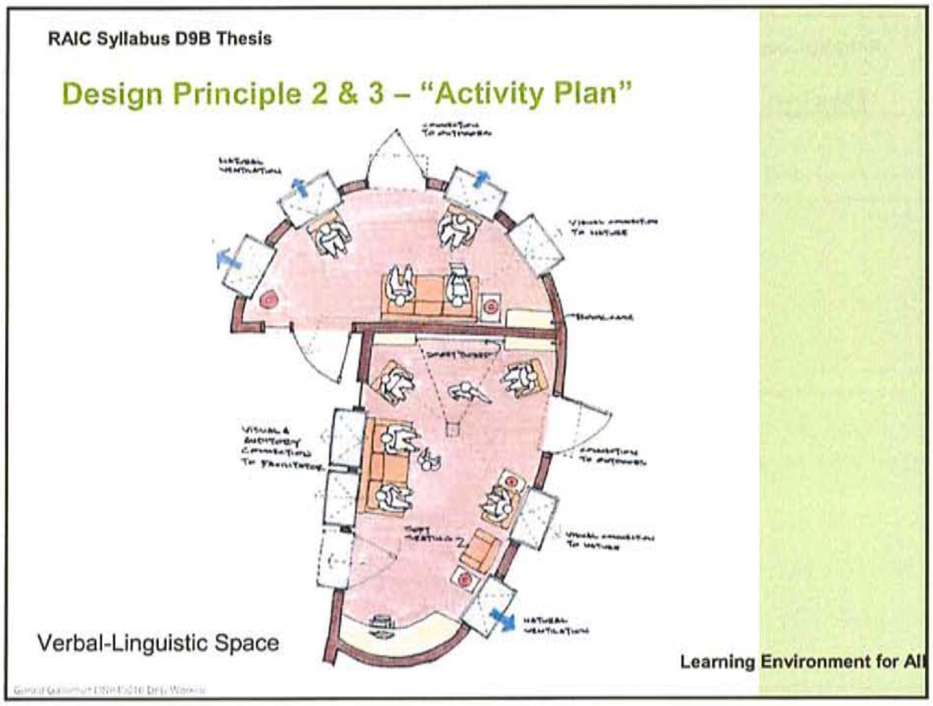

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Design Principle 2 & 3 – "Activity Plan"

Verbal-Linguistic Space

Learning Environment for All

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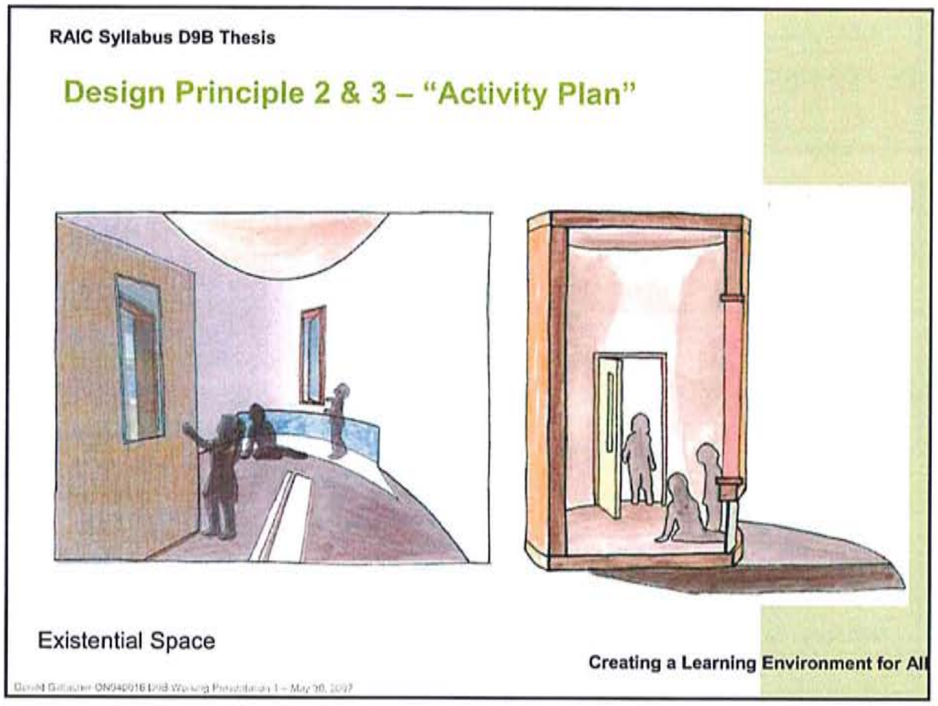

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Design Principle 2 & 3 – "Activity Plan"

Existential Space

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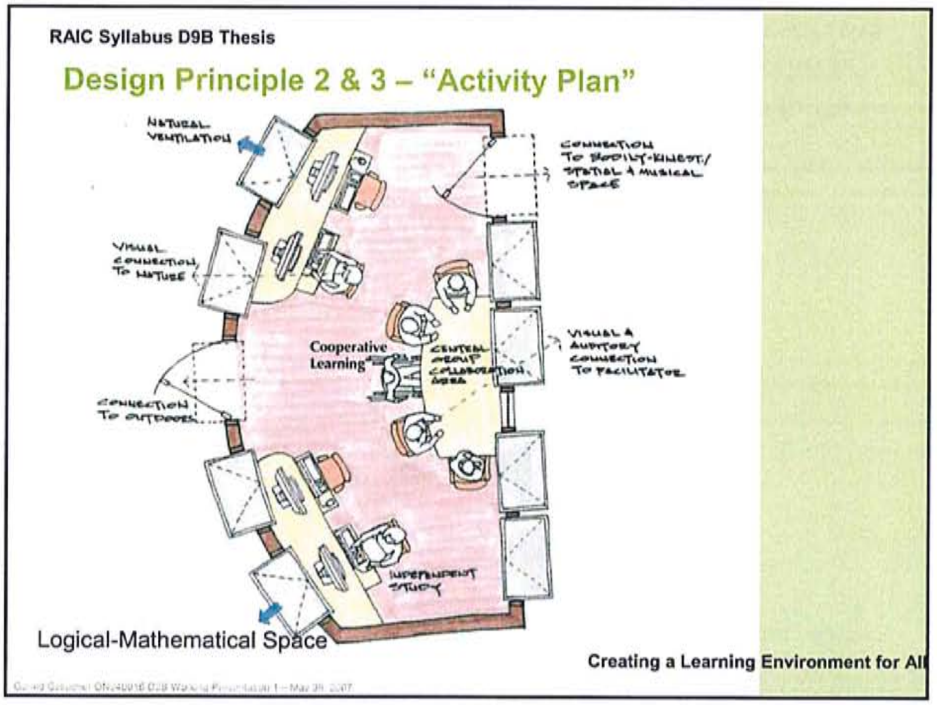

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Design Principle 2 & 3 – "Activity Plan"

NATURAL VENTILATION
CONNECTION TO BODILY-KINEST./ SPATIAL & MUSICAL SPACE
VISUAL CONNECTION TO NATURE
Cooperative Learning
CENTRAL GROUP COLLABORATION AREA
VISUAL & AUDITORY CONNECTION TO FACILITATOR
CONNECTION TO OUTDOORS
INDEPENDENT STUDY

Logical-Mathematical Space

Creating a Learning Environment for Al

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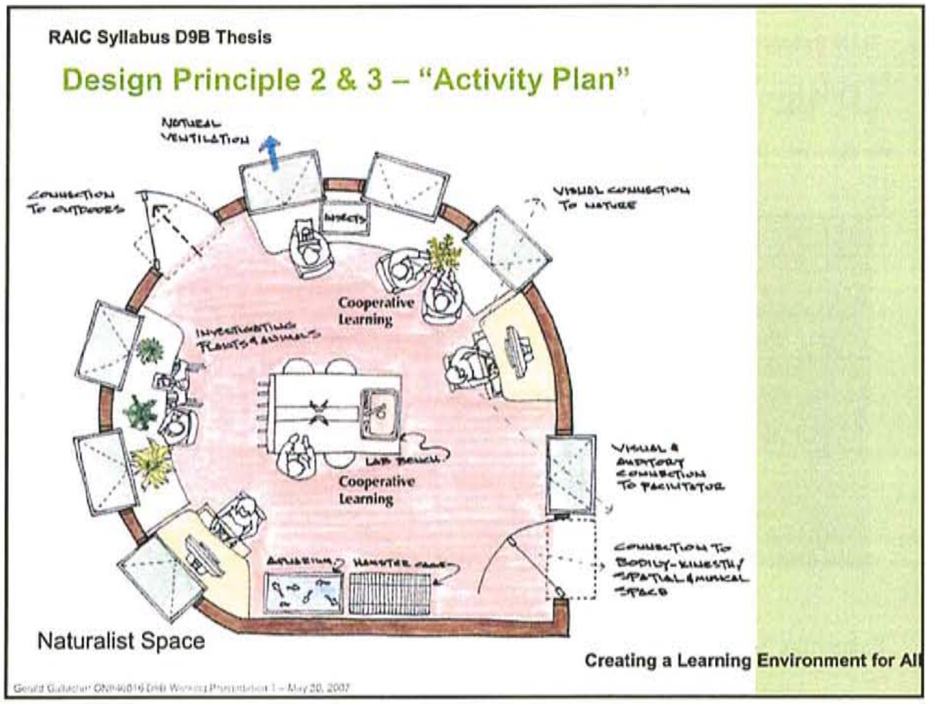

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Design Principle 2 & 3 – "Activity Plan"

NATURAL VENTILATION
CONNECTION TO OUTDOORS
INSECTS
VISUAL CONNECTION TO NATURE
Cooperative Learning
INVESTIGATING PLANTS & ANIMALS
LAB BENCH
Cooperative Learning
VISUAL & AUDITORY CONNECTION TO FACILITATOR
CONNECTION TO BODILY-KINESTH/ SPATIAL & MUSICAL SPACE
AQUARIUM
HAMSTER CAGE

Naturalist Space

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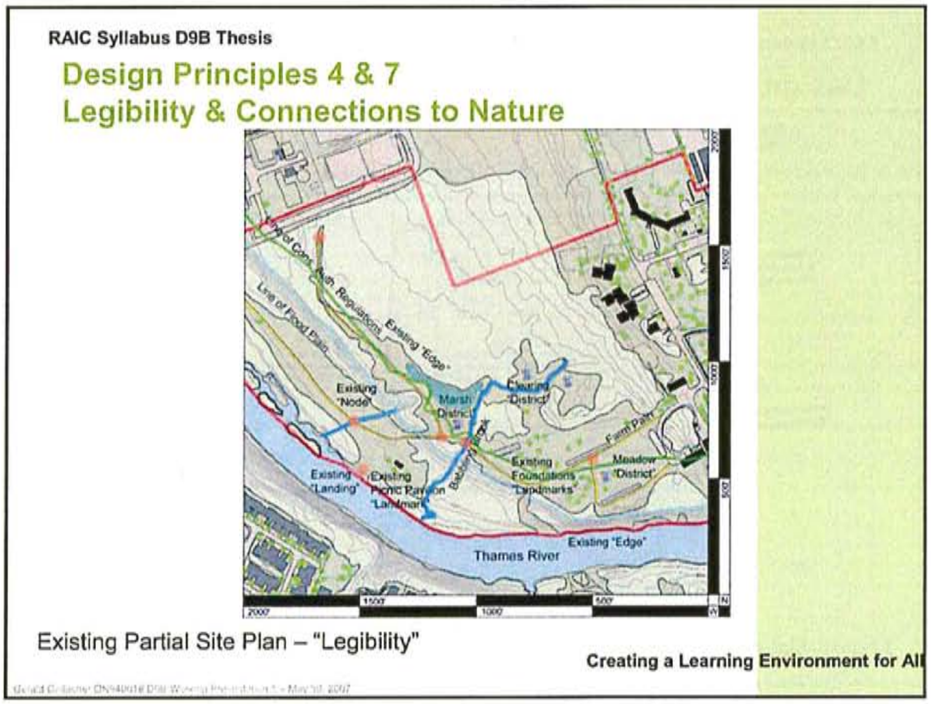

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Design Principles 4 & 7
Legibility & Connections to Nature

Existing Partial Site Plan – "Legibility"

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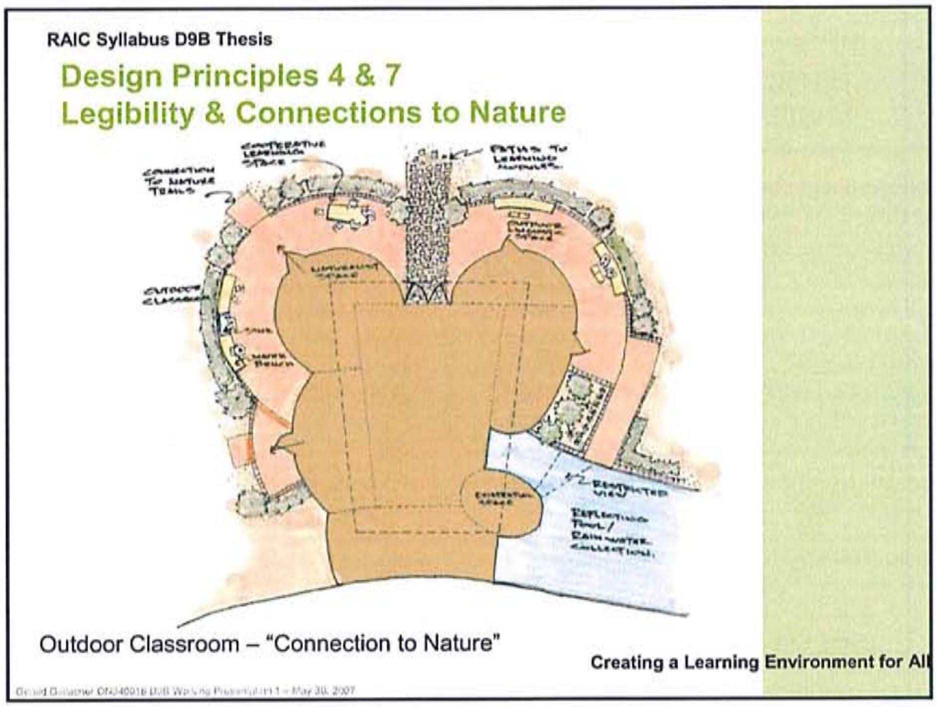

COOPERATIVE LEARNING SPACE
CONNECTION TO NATURE TRAILS
PATHS TO LEARNING NEIGHBOURHOODS
OUTDOOR CLASSROOM
RESTRICTED VIEW
REFLECTING POOL / RAINWATER COLLECTION

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Design Principles 4 & 7
Legibility & Connections to Nature

Outdoor Classroom – "Connection to Nature"

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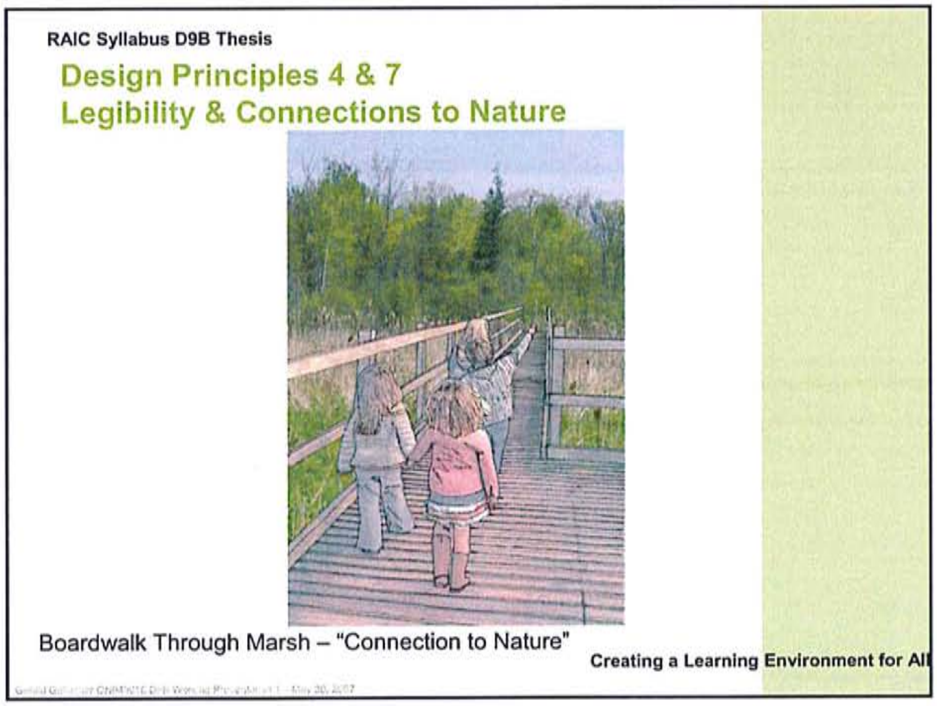

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Design Principles 4 & 7
Legibility & Connections to Nature

Boardwalk Through Marsh – "Connection to Nature"

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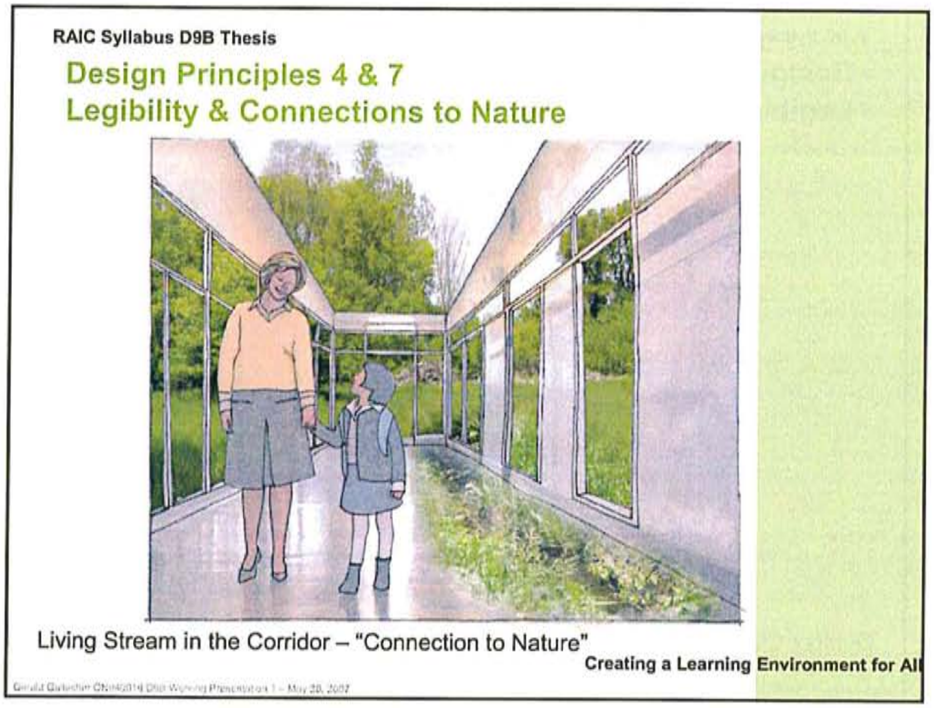

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Design Principles 4 & 7
Legibility & Connections to Nature

Living Stream in the Corridor – "Connection to Nature"

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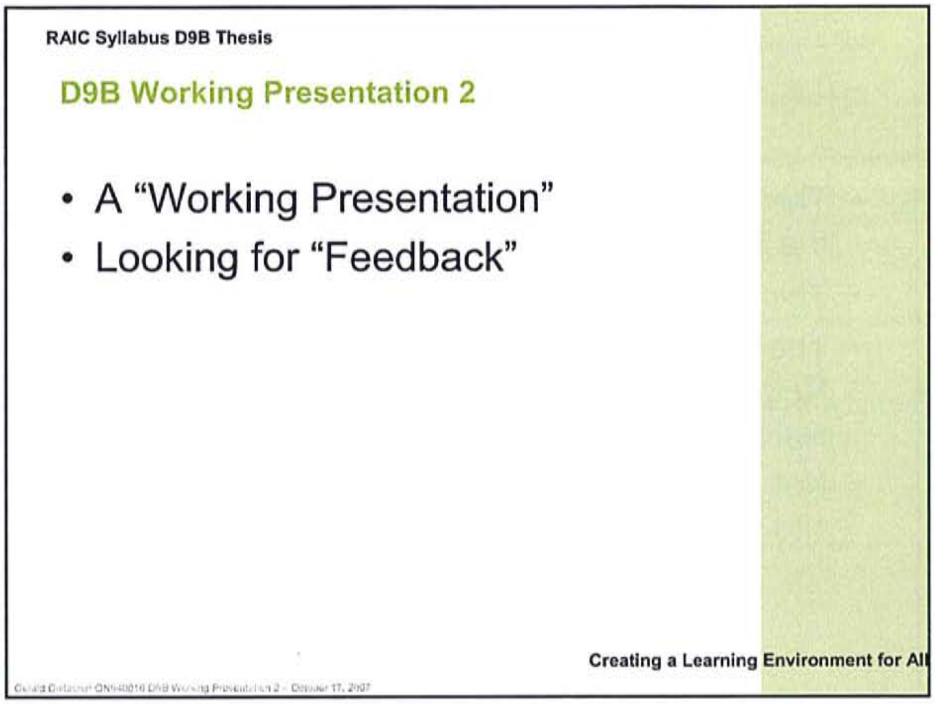
Working Presentation 2 – October 17, 2007



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D9B Working Presentation 2

- A "Working Presentation"
- Looking for "Feedback"

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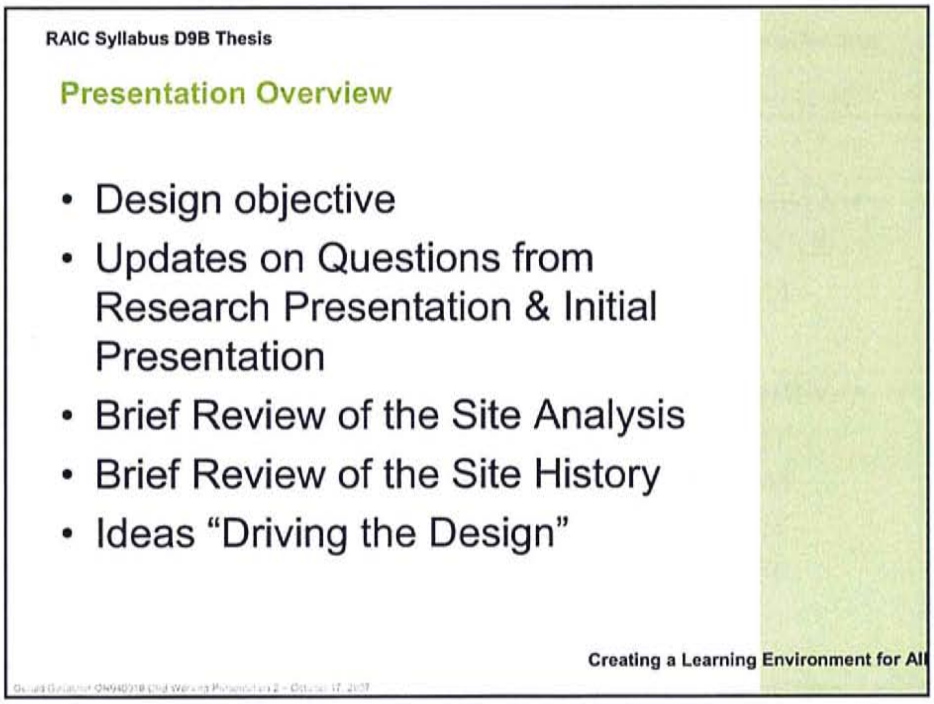

RAIC Syllabus D9B Thesis

Presentation Overview

- Design objective
- Updates on Questions from Research Presentation & Initial Presentation
- Brief Review of the Site Analysis
- Brief Review of the Site History
- Ideas "Driving the Design"

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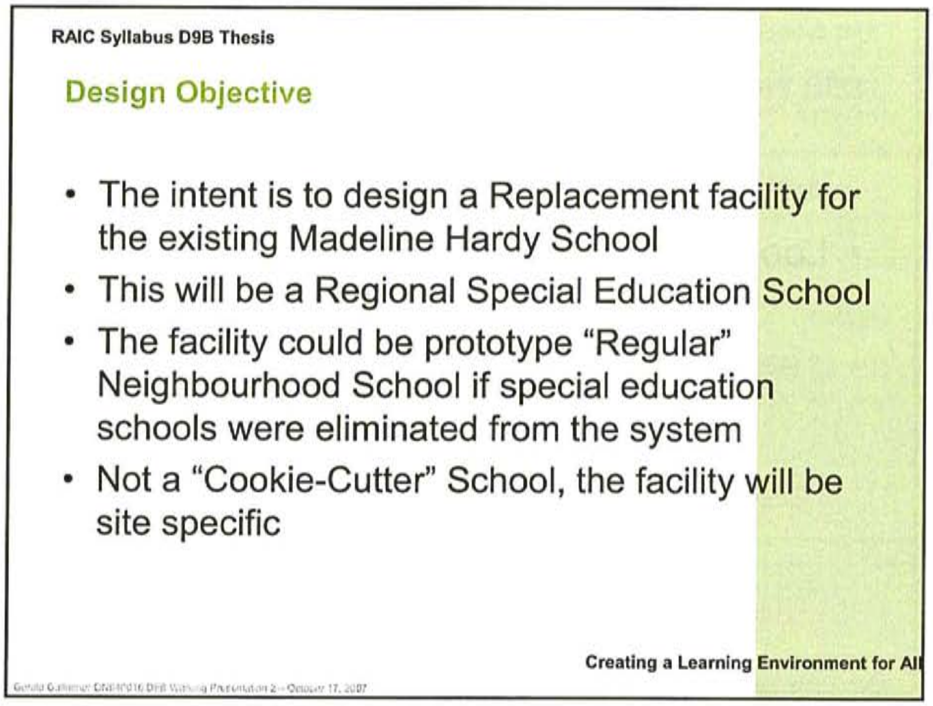

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Design Objective

- The intent is to design a Replacement facility for the existing Madeline Hardy School
- This will be a Regional Special Education School
- The facility could be prototype "Regular" Neighbourhood School if special education schools were eliminated from the system
- Not a "Cookie-Cutter" School, the facility will be site specific

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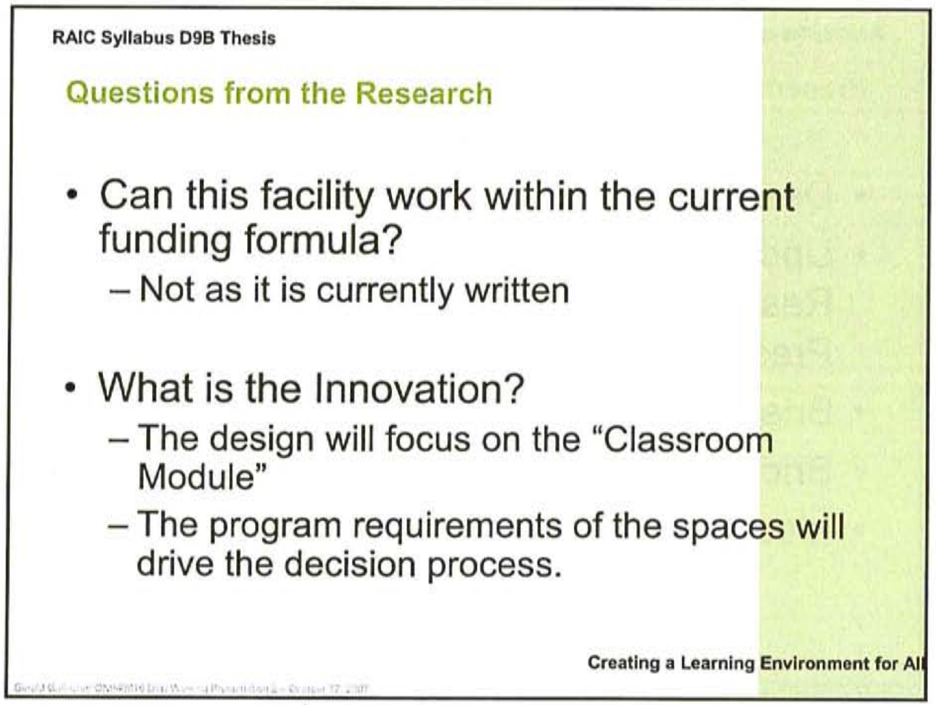

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Questions from the Research

- Can this facility work within the current funding formula?
  - Not as it is currently written
- What is the Innovation?
  - The design will focus on the "Classroom Module"
  - The program requirements of the spaces will drive the decision process.

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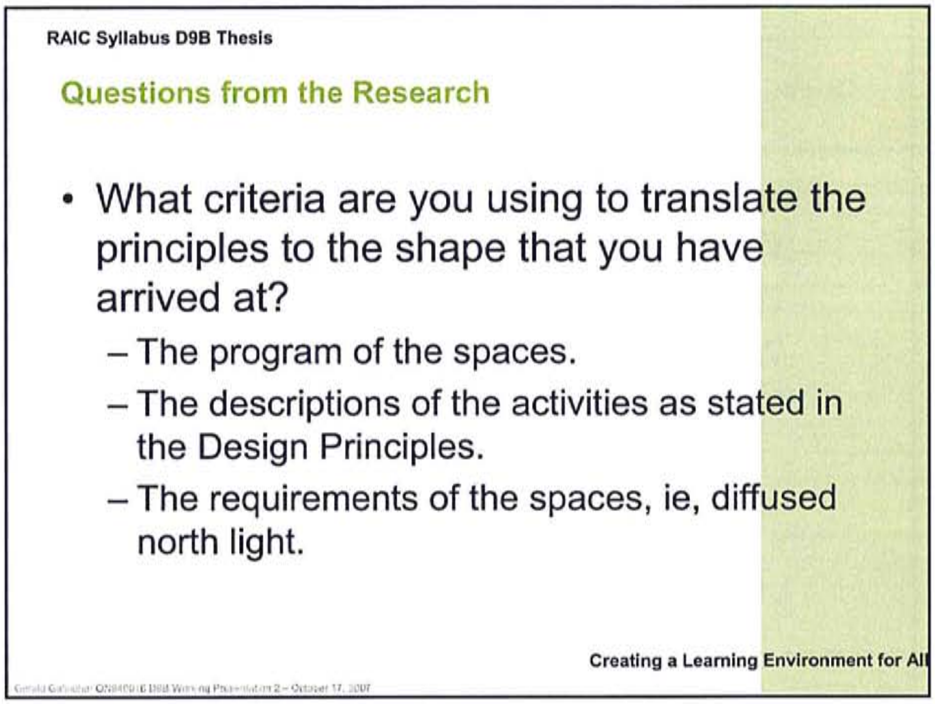

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Questions from the Research

- What criteria are you using to translate the principles to the shape that you have arrived at?
  - The program of the spaces.
  - The descriptions of the activities as stated in the Design Principles.
  - The requirements of the spaces, ie, diffused north light.

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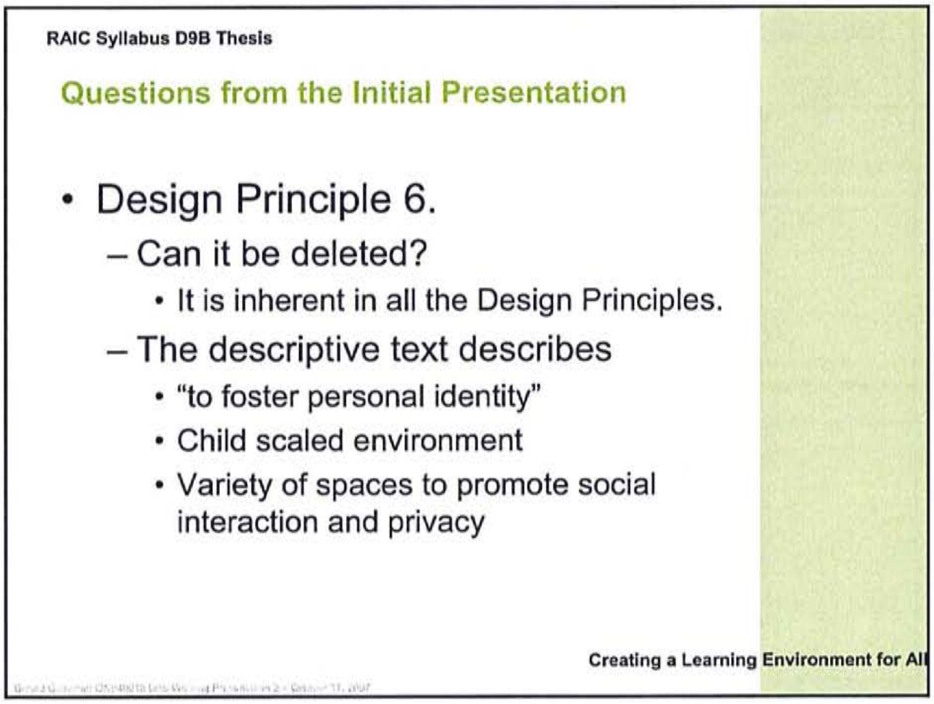

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Questions from the Initial Presentation

- Design Principle 6.
  - Can it be deleted?
    - It is inherent in all the Design Principles.
  - The descriptive text describes
    - "to foster personal identity"
    - Child scaled environment
    - Variety of spaces to promote social interaction and privacy

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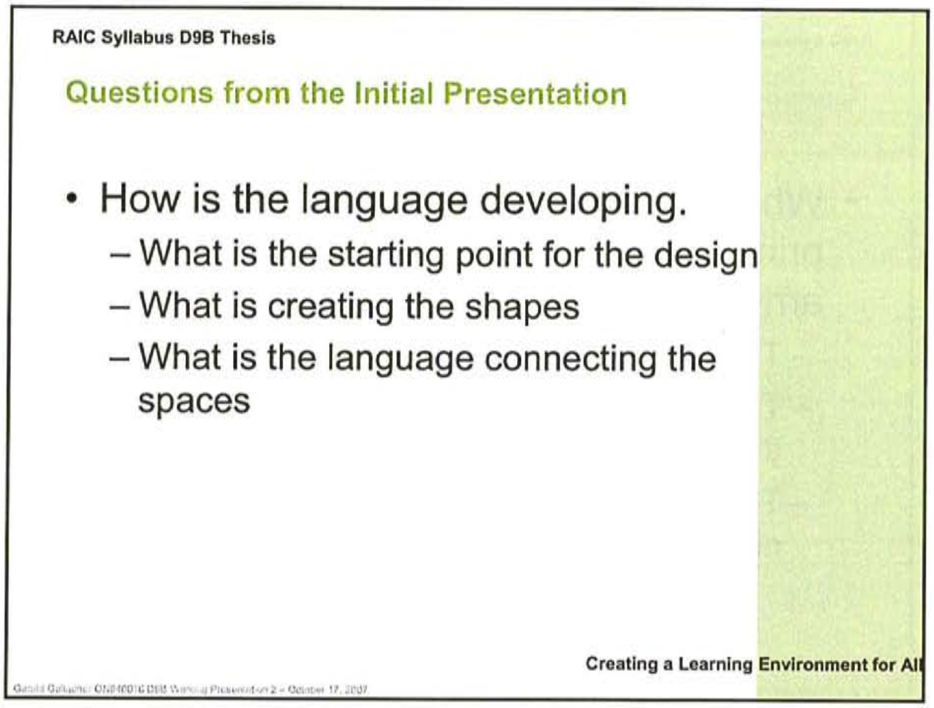

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Questions from the Initial Presentation

- How is the language developing.
  - What is the starting point for the design
  - What is creating the shapes
  - What is the language connecting the spaces

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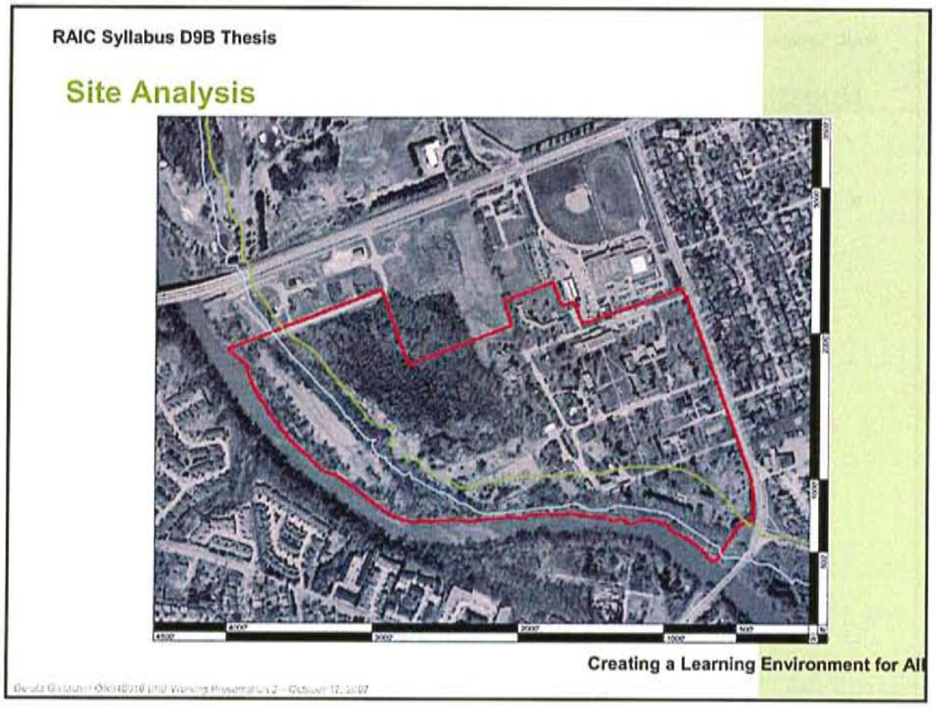

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Site Analysis

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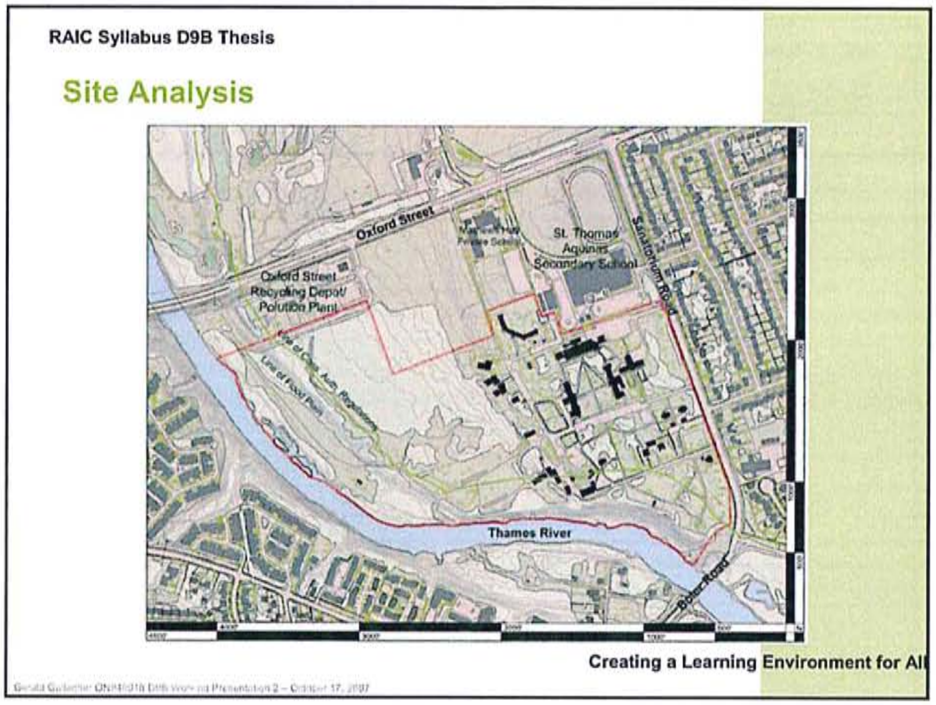

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Site Analysis

Oxford Street
St. Thomas Aquinas Secondary School
Sanatorium Road
Oxford Street Recycling Depot/ Pollution Plant
Line of Cons. Auth. Regulation
Line of Flood Plain
Thames River
Boler Road

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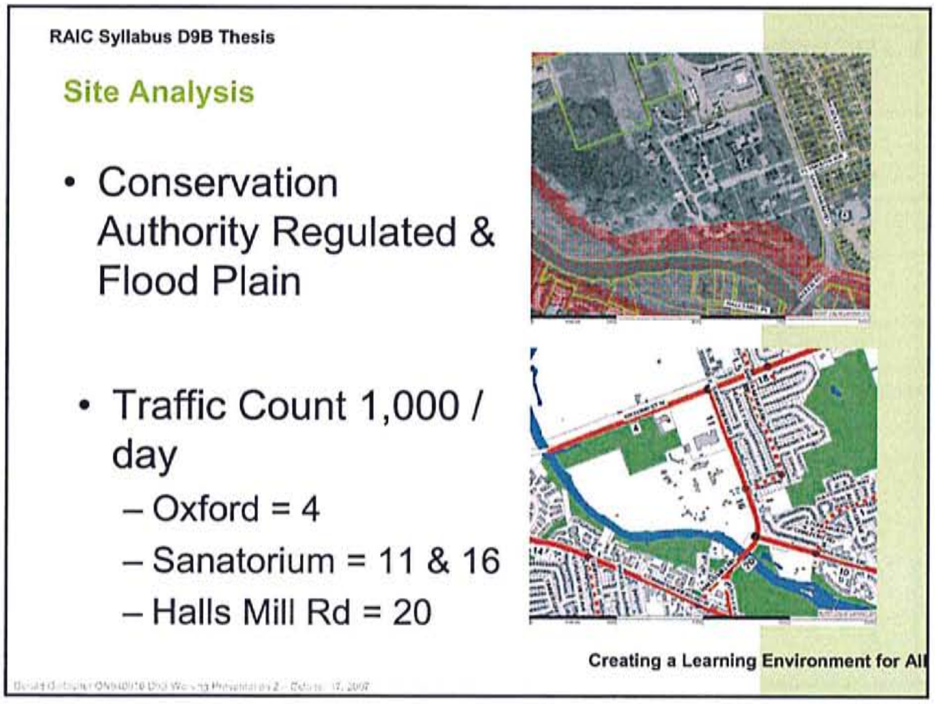

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Site Analysis

- Conservation Authority Regulated & Flood Plain
- Traffic Count 1,000 / day
  - Oxford = 4
  - Sanatorium = 11 & 16
  - Halls Mill Rd = 20

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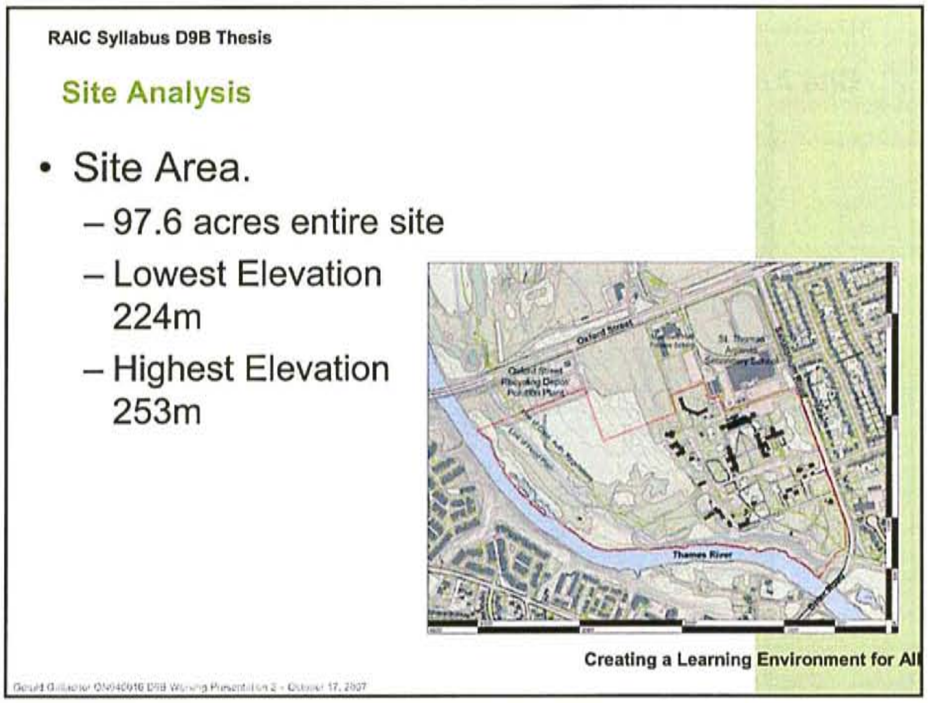

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Site Analysis

- Site Area.
  - 97.6 acres entire site
  - Lowest Elevation 224m
  - Highest Elevation 253m

Oxford Street
Thames River

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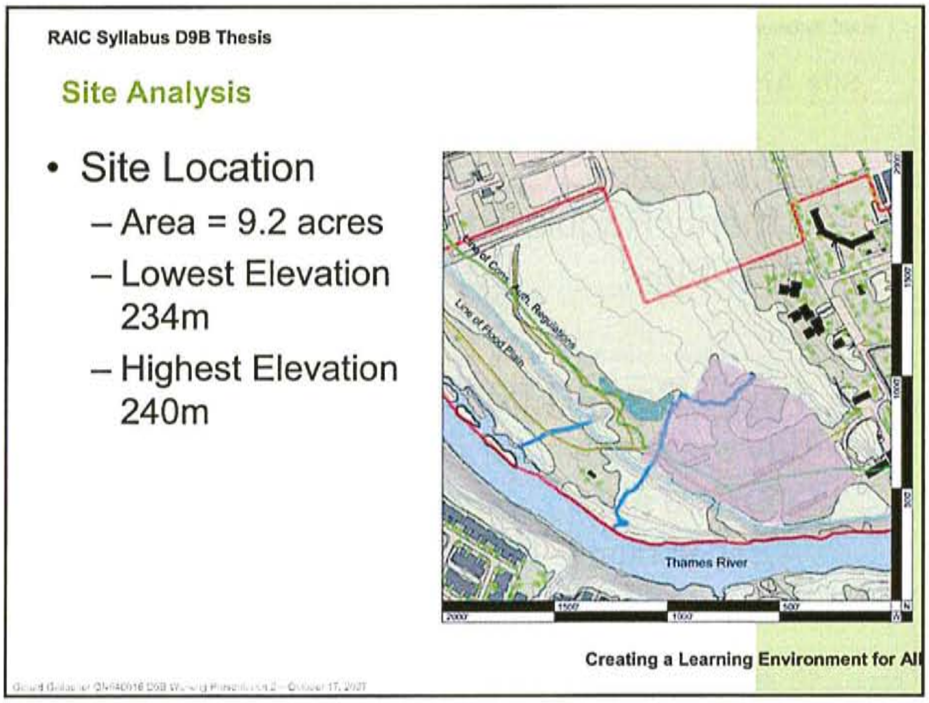

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Site Analysis

- Site Location
  - Area = 9.2 acres
  - Lowest Elevation 234m
  - Highest Elevation 240m

Line of Cons. Auth. Regulations
Line of Flood Plain
Thames River
2000
1500
1000
500

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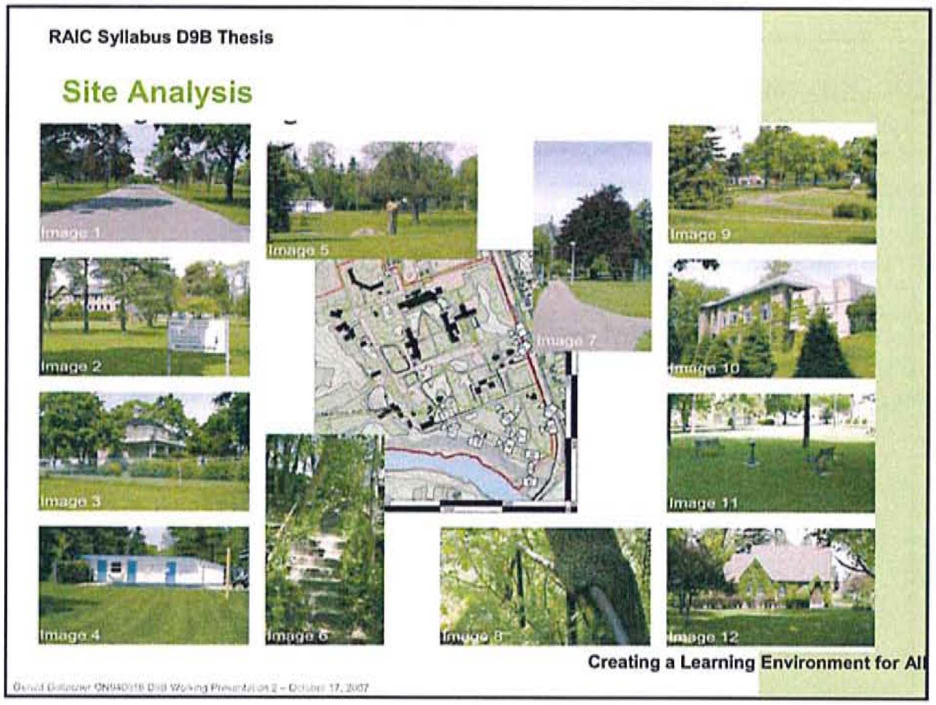

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Site Analysis

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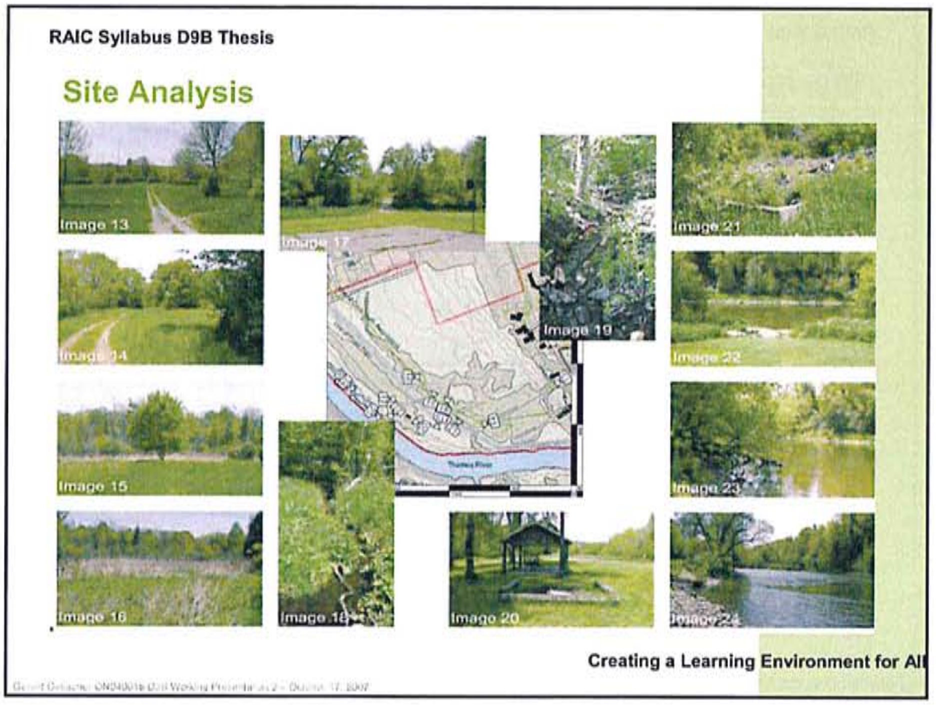

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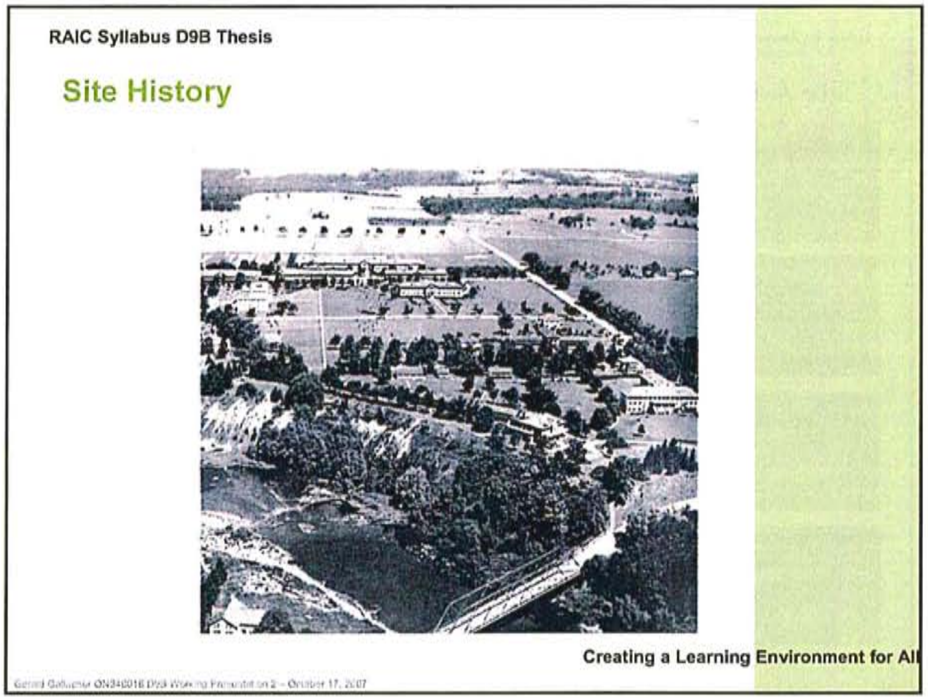

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Site History

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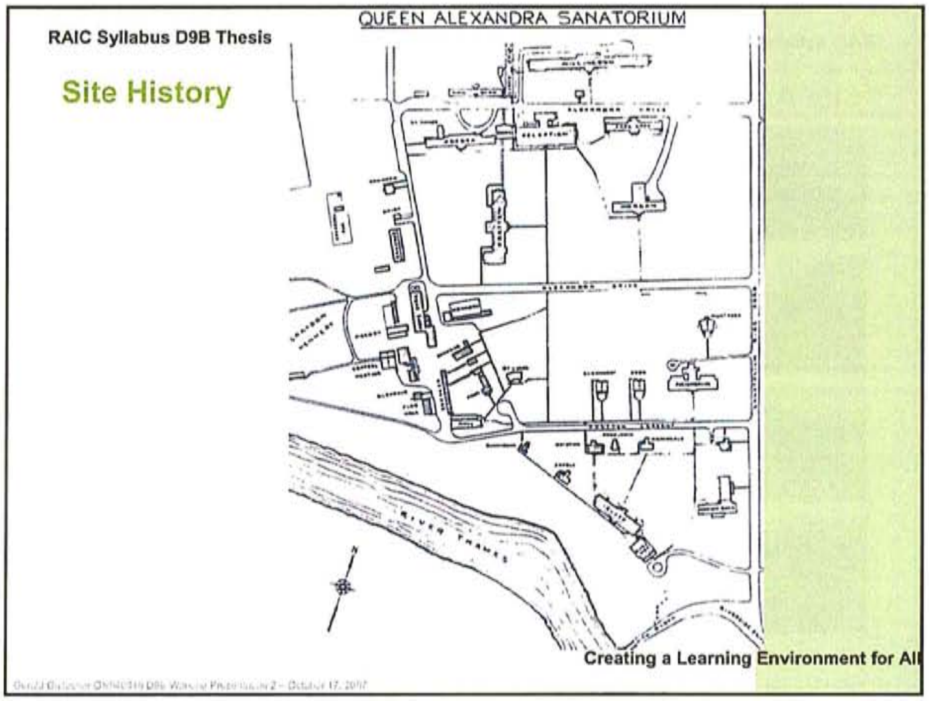

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QUEEN ALEXANDRA SANATORIUM

Site History

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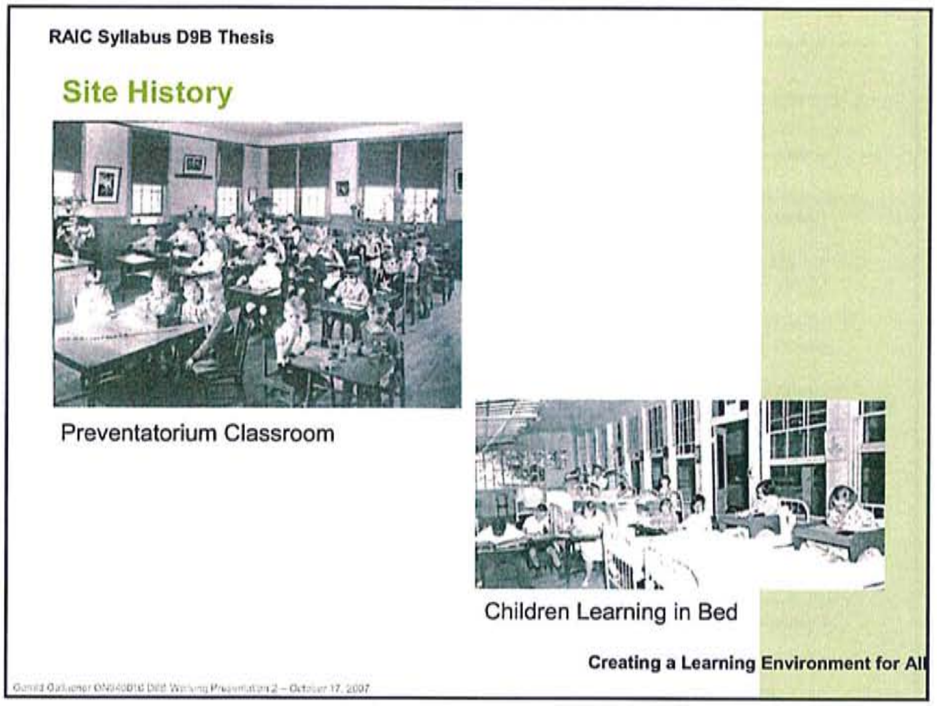

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Site History

Preventatorium Classroom

Children Learning in Bed

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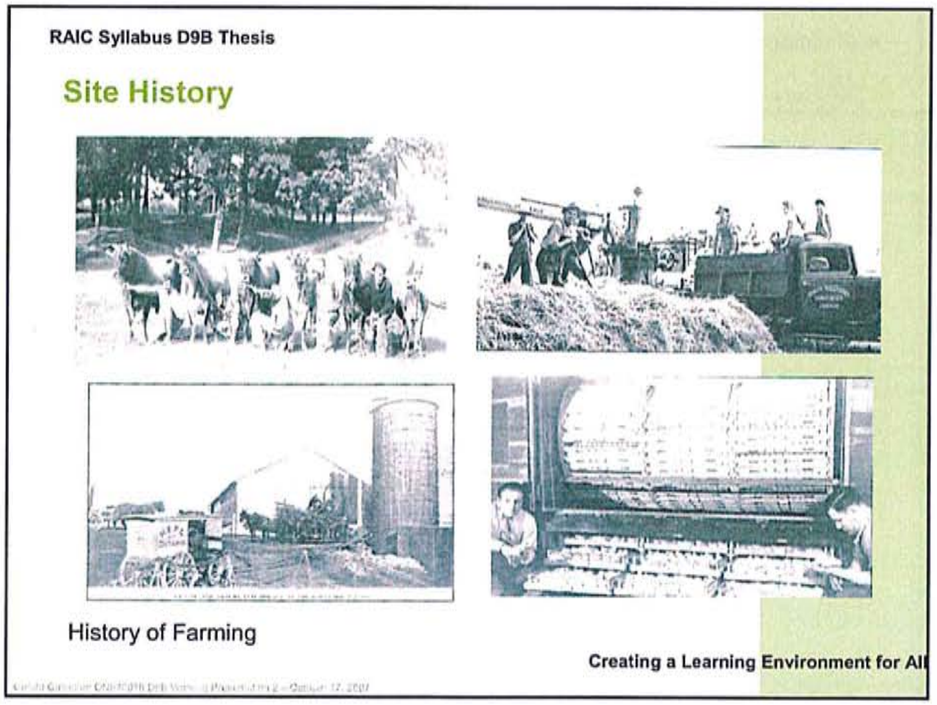

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Site History

History of Farming

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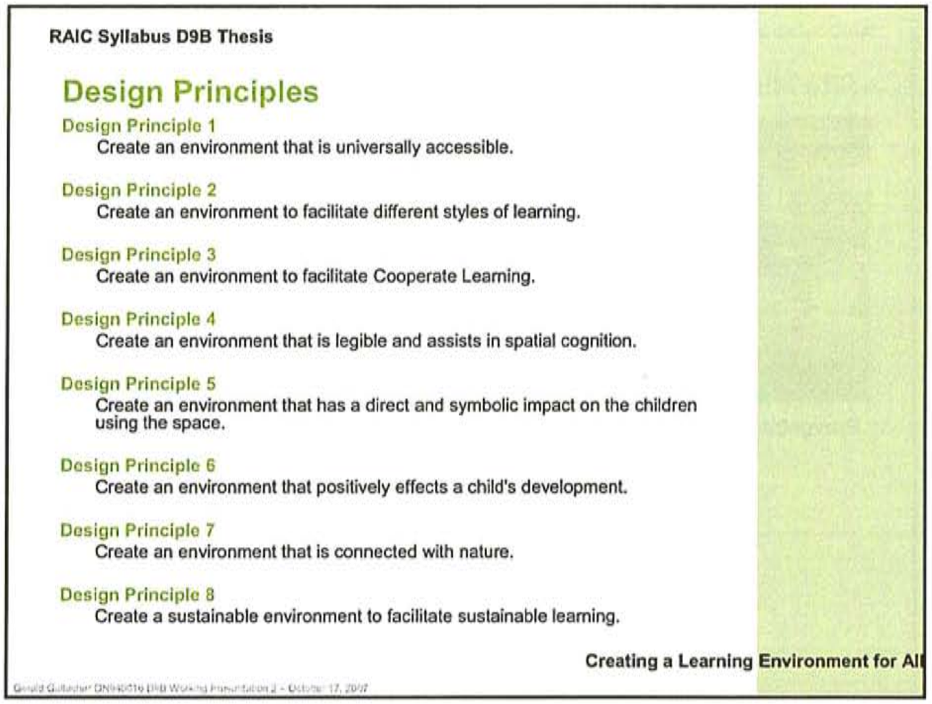

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Design Principles

Design Principle 1
Create an environment that is universally accessible.

Design Principle 2
Create an environment to facilitate different styles of learning.

Design Principle 3
Create an environment to facilitate Cooperate Learning.

Design Principle 4
Create an environment that is legible and assists in spatial cognition.

Design Principle 5
Create an environment that has a direct and symbolic impact on the children using the space.

Design Principle 6
Create an environment that positively effects a child's development.

Design Principle 7
Create an environment that is connected with nature.

Design Principle 8
Create a sustainable environment to facilitate sustainable learning.

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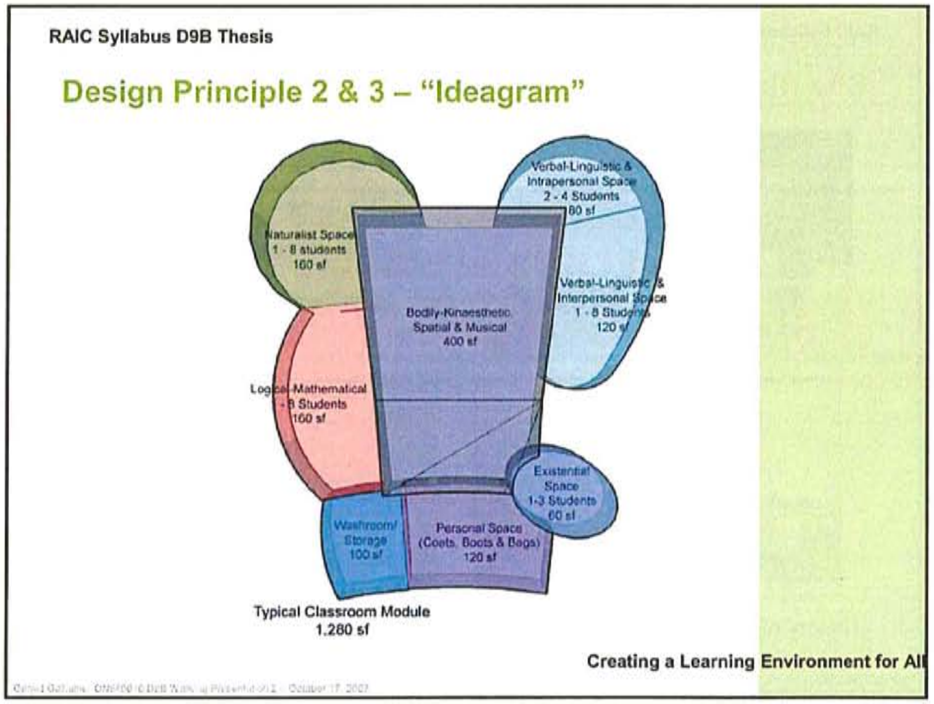

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Design Principle 2 & 3 – "Ideagram"

Typical Classroom Module
1,280 sf

Creating a Learning Environment for Al

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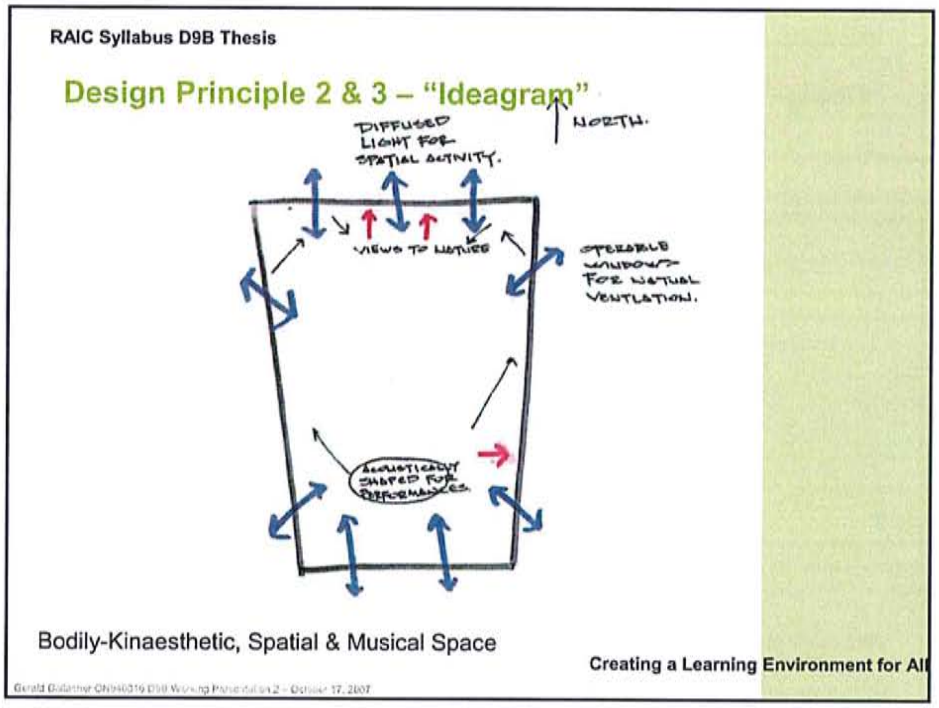

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Design Principle 2 & 3 – "Ideagram"

DIFFUSED LIGHT FOR SPATIAL ACTIVITY.
NORTH.
VIEWS TO NATURE
OPERABLE WINDOWS FOR NATURAL VENTILATION.
ACOUSTICALLY SHAPED FOR PERFORMANCES.

Bodily-Kinaesthetic, Spatial & Musical Space

Creating a Learning Environment for All

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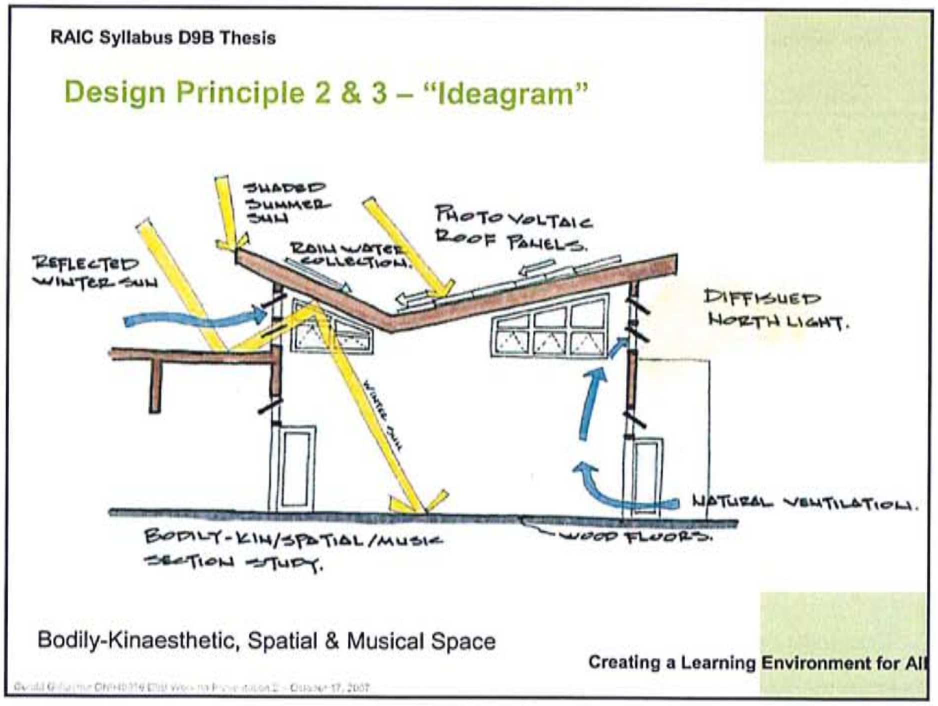

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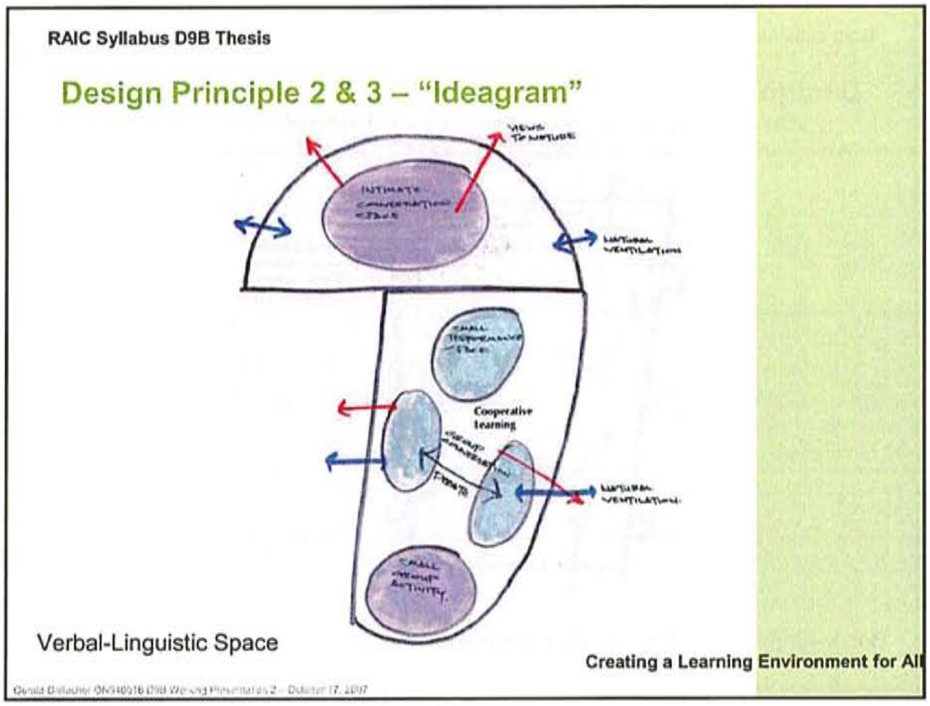

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Design Principle 2 & 3 – "Ideagram"

Verbal-Linguistic Space

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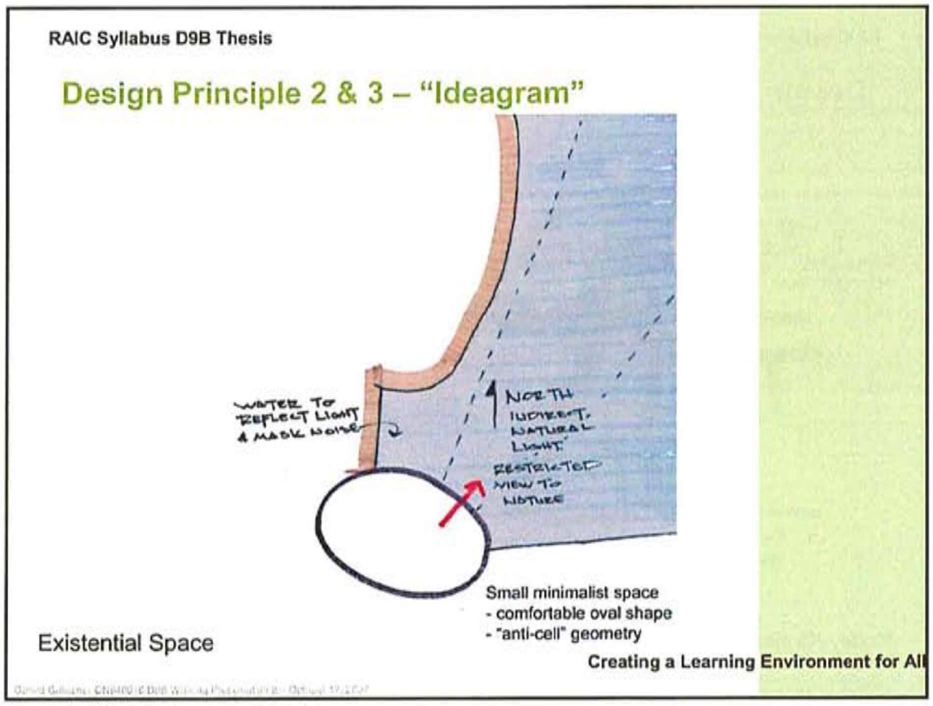

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Design Principle 2 & 3 – "Ideagram"

WATER TO REFLECT LIGHT & MASK NOISE
NORTH INDIRECT NATURAL LIGHT
RESTRICTED VIEW TO NATURE

Small minimalist space
- comfortable oval shape
- "anti-cell" geometry

Existential Space

Creating a Learning Environment for All

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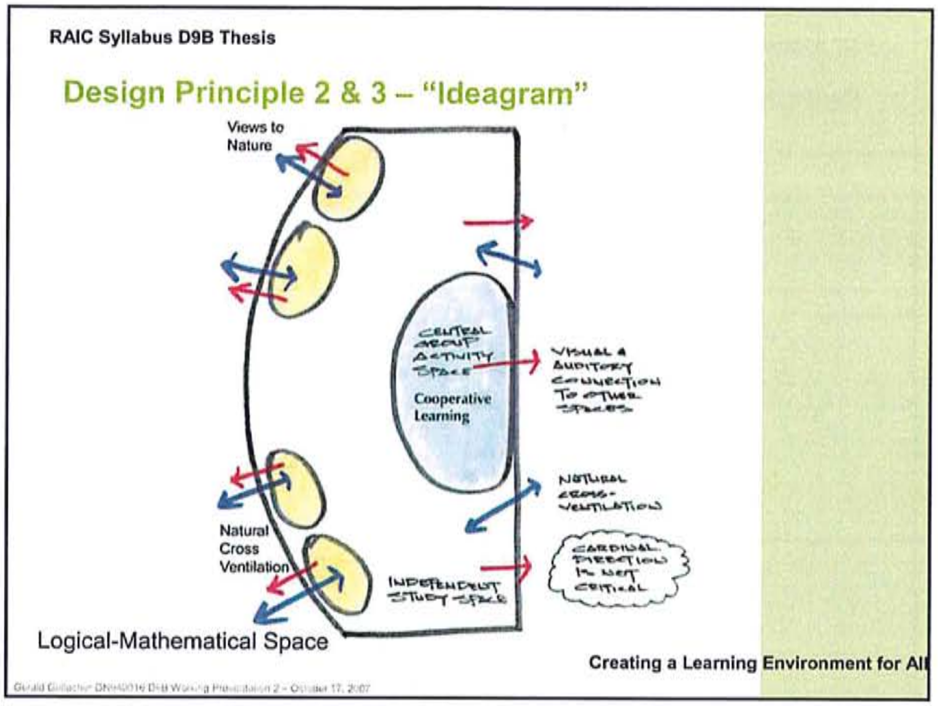

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Design Principle 2 & 3 – "Ideagram"

Views to Nature
CENTRAL GROUP ACTIVITY SPACE
Cooperative Learning
VISUAL & AUDITORY CONNECTION TO OTHER SPACES
NATURAL CROSS-VENTILATION
Natural Cross Ventilation
CARDINAL DIRECTION IS NOT CRITICAL
INDEPENDENT STUDY SPACE

Logical-Mathematical Space

Creating a Learning Environment for All

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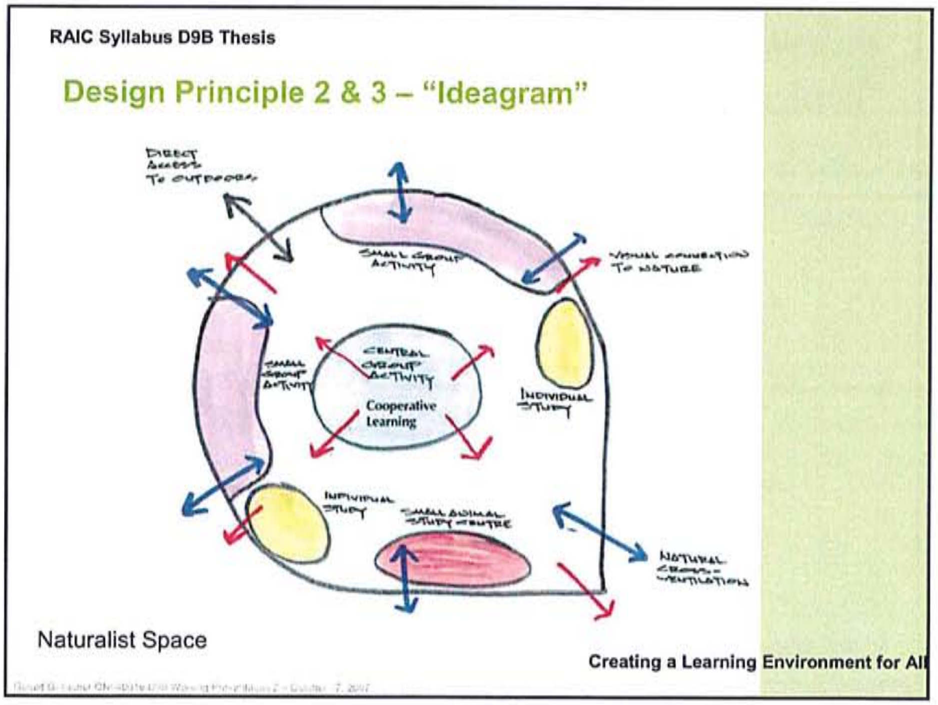

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Design Principle 2 & 3 – "Ideagram"

Naturalist Space

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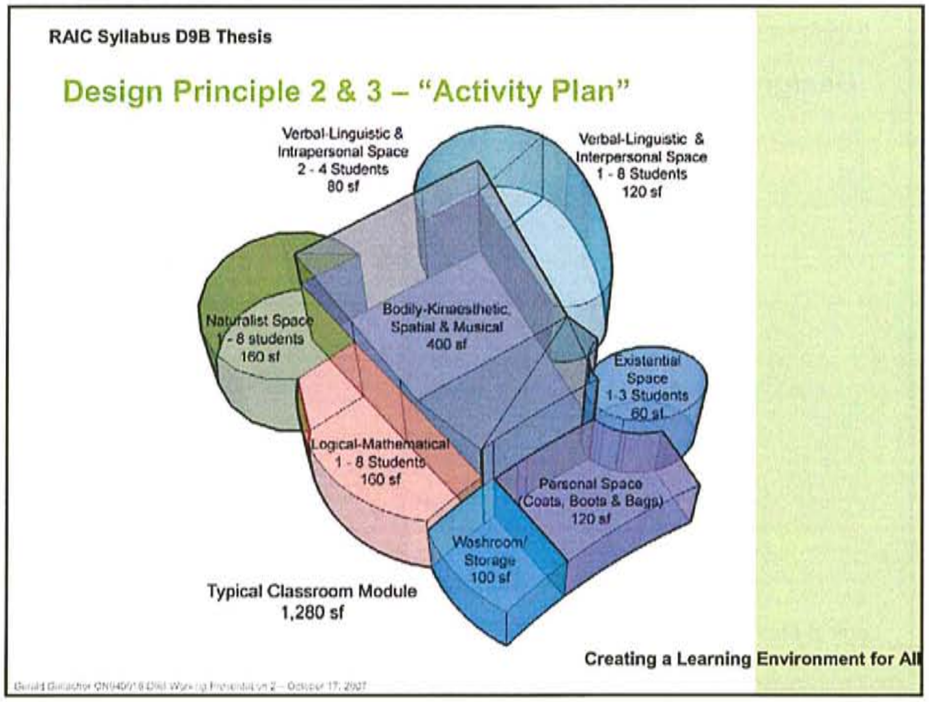

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Design Principle 2 & 3 – "Activity Plan"

Typical Classroom Module
1,280 sf

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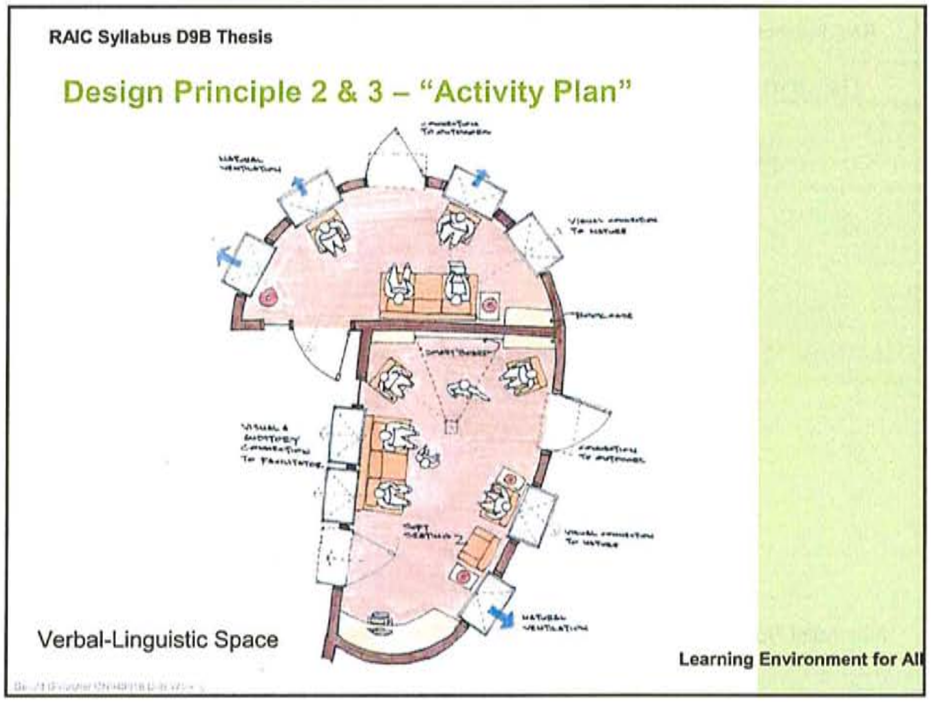

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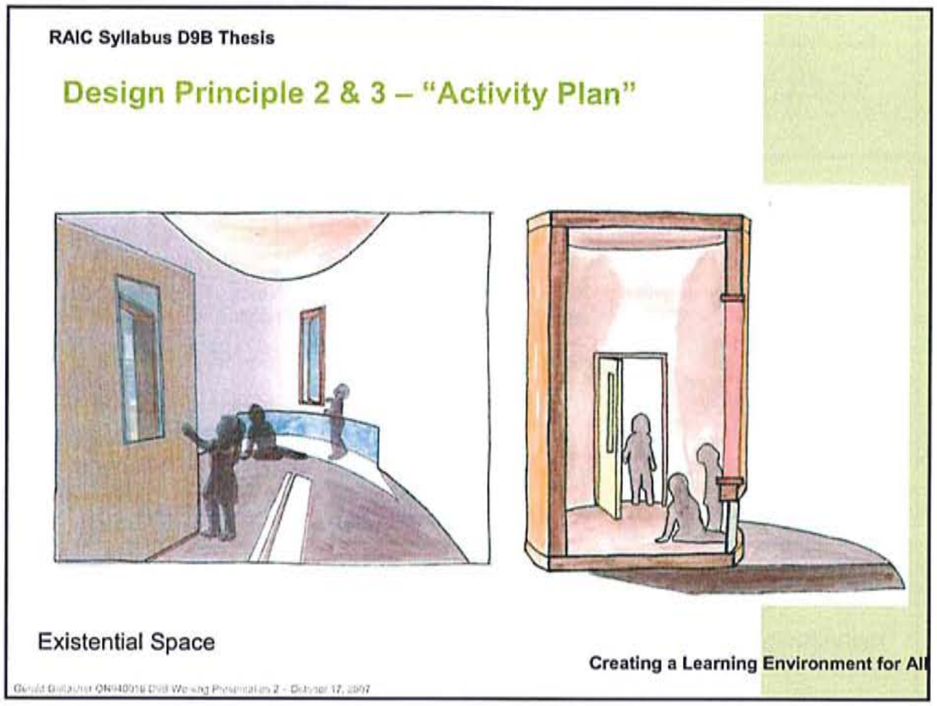
Design Principle 2 & 3 – "Activity Plan"

Verbal-Linguistic Space

Learning Environment for All



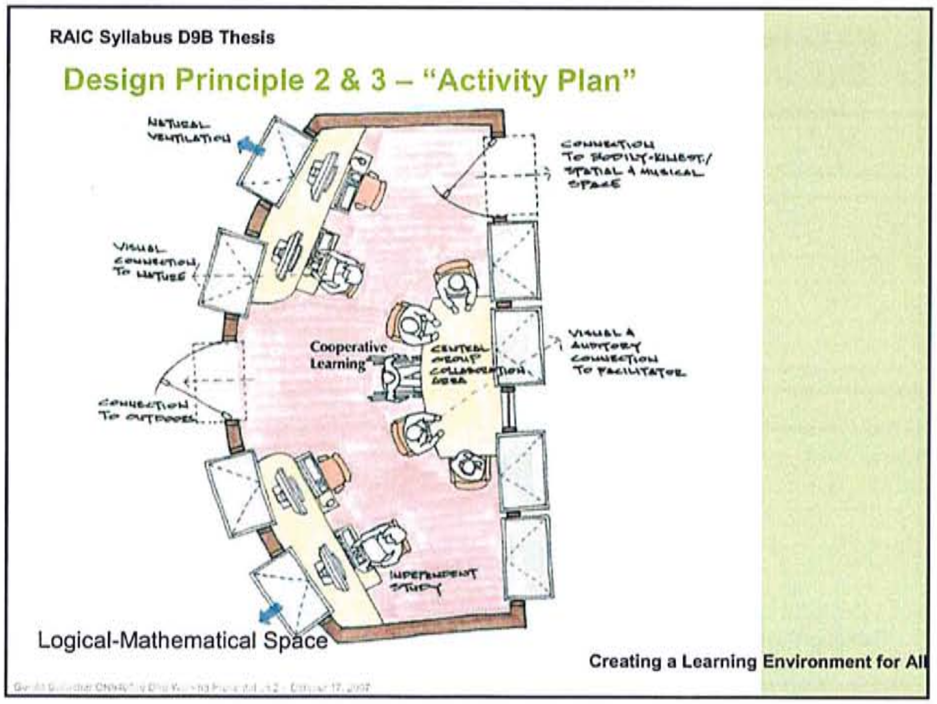
RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Activity Plan"

Existential Space

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 - October 17, 2007



RAIC Syllabus D9B Thesis

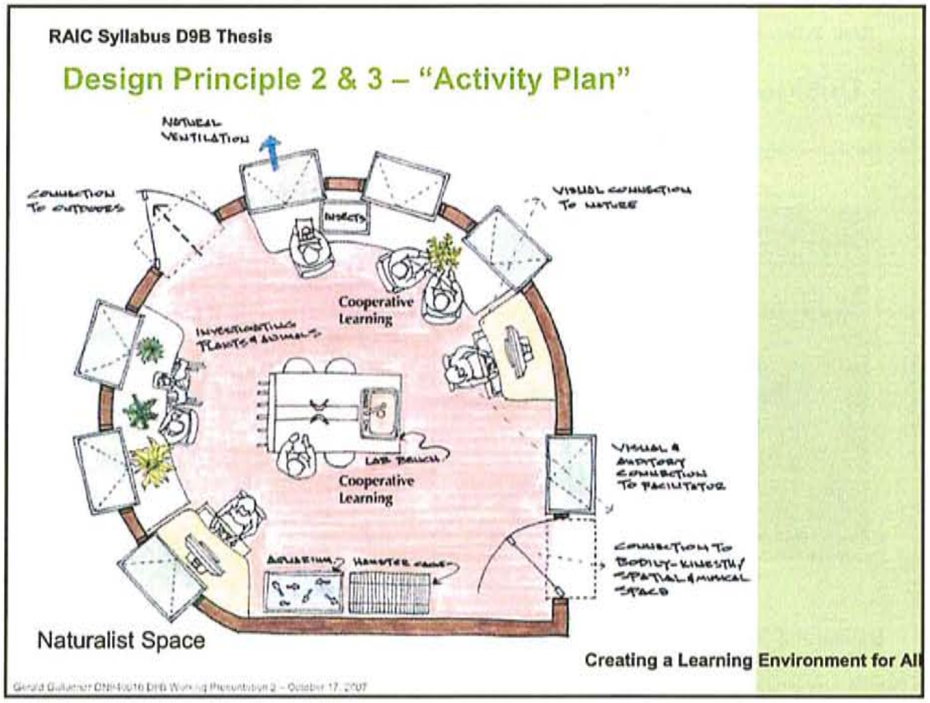
Design Principle 2 & 3 – "Activity Plan"

NATURAL VENTILATION
CONNECTION TO BODILY-KINEST./ SPATIAL & MUSICAL SPACE
VISUAL CONNECTION TO NATURE
Cooperative Learning
CENTRAL GROUP COLLABORATION AREA
VISUAL & AUDITORY CONNECTION TO FACILITATOR
CONNECTION TO OUTDOORS
INDEPENDENT STUDY

Logical-Mathematical Space

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 - October 17, 2007



RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Activity Plan"

NATURAL VENTILATION
CONNECTION TO OUTDOORS
INSECTS
VISUAL CONNECTION TO NATURE
Cooperative Learning
INVESTIGATING PLANTS & ANIMALS
LAB BENCH
Cooperative Learning
VISUAL & AUDITORY CONNECTION TO FACILITATOR
AQUARIUM
HAMSTER CAGE
CONNECTION TO BODILY-KINESTH/ SPATIAL & MUSICAL SPACE

Naturalist Space

Creating a Learning Environment for All

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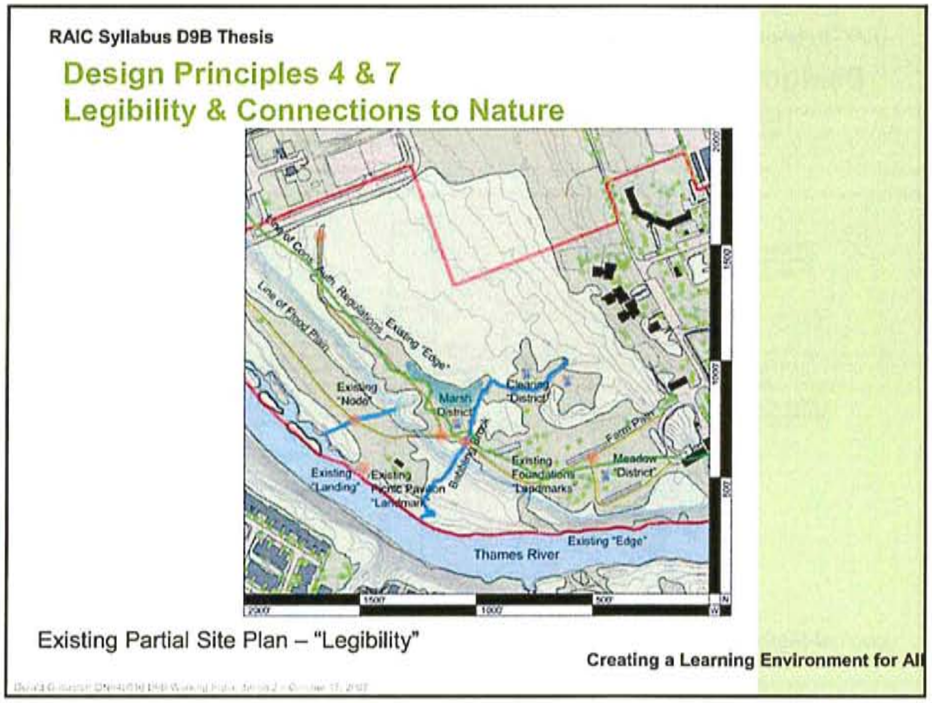

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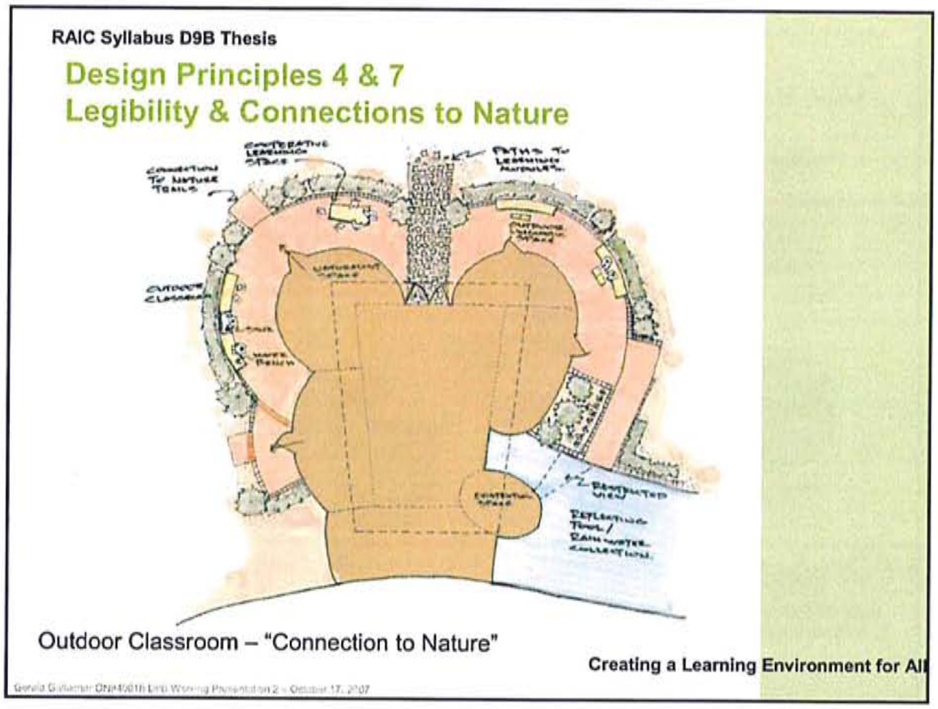
Design Principles 4 & 7
Legibility & Connections to Nature

Existing Partial Site Plan – "Legibility"

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



RAIC Syllabus D9B Thesis

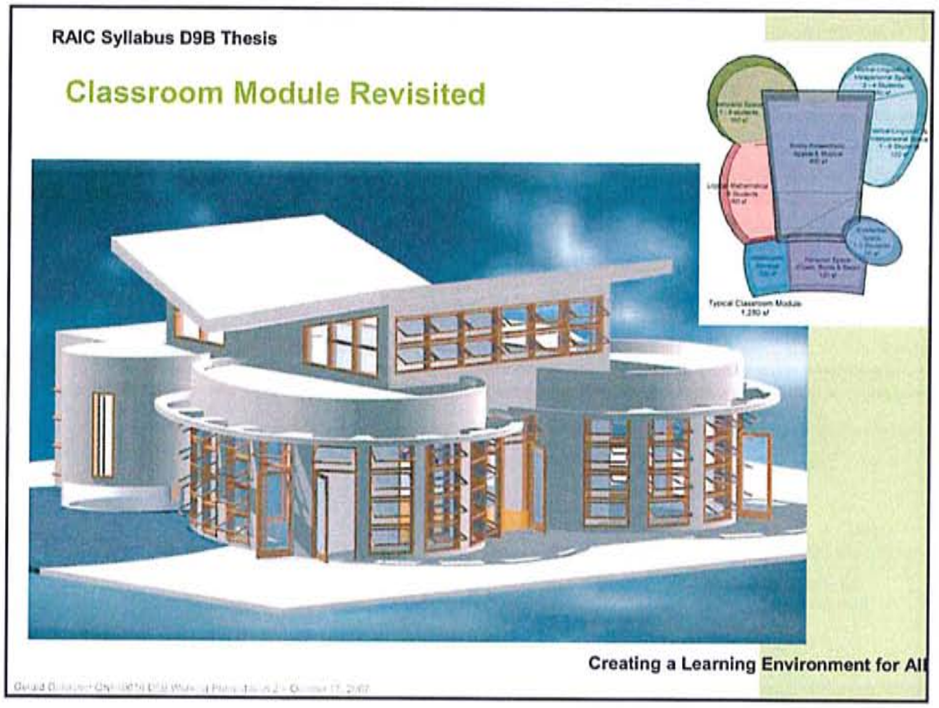
Design Principles 4 & 7
Legibility & Connections to Nature

COOPERATIVE LEARNING SPACE
CONNECTION TO NATURE TRAILS
PATHS TO LEARNING MATERIALS
OUTDOOR CLASSROOM
RESTRICTED VIEW
REFLECTING POOL / RAIN WATER COLLECTION

Outdoor Classroom – "Connection to Nature"

Creating a Learning Environment for All

Gerald Gollacher ON940016 D9B Working Presentation 2 – October 17, 2007

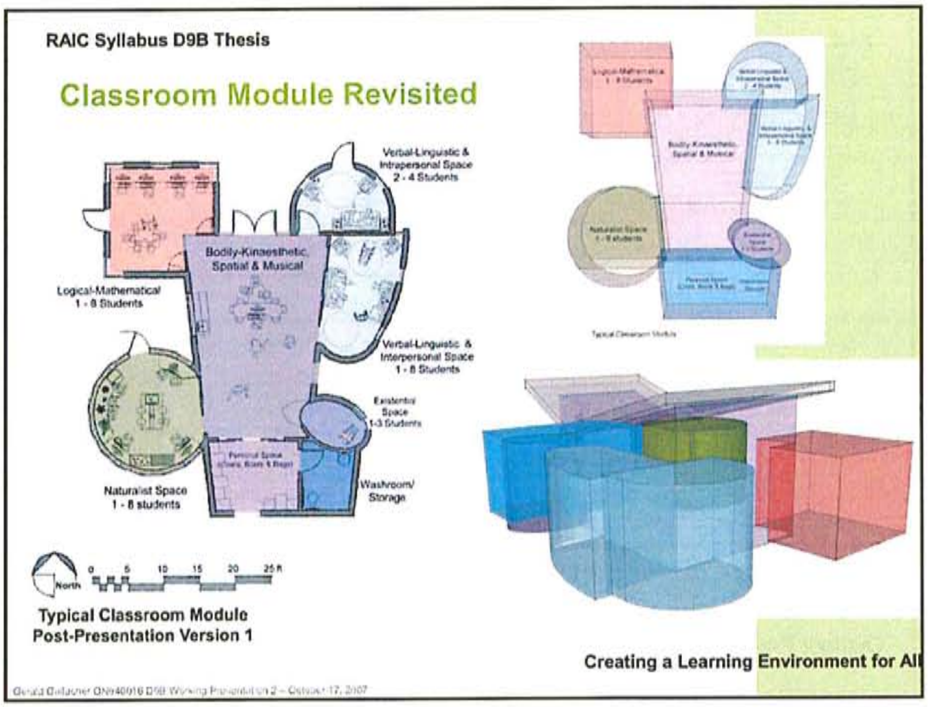


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for All

Gerald Gollacher ON940016 D9B Working Presentation 2 – October 17, 2007



RAIC Syllabus D9B Thesis

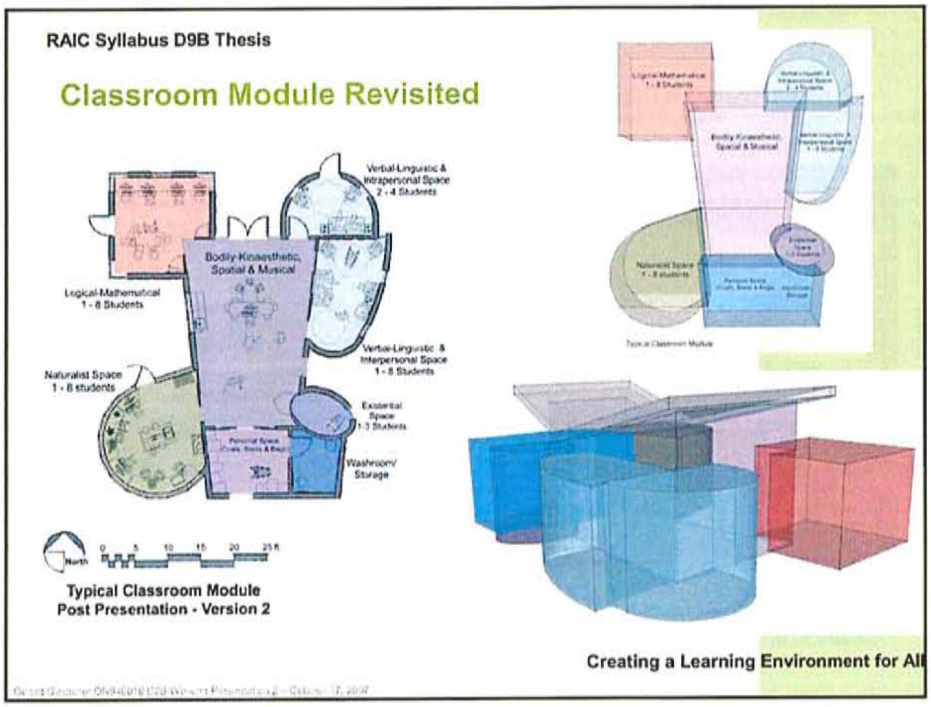
Classroom Module Revisited

Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic, Spatial & Musical
Logical-Mathematical 1 - 8 Students
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Existential Space 1-3 Students
Naturalist Space 1 - 8 students
Washroom/ Storage
North
0 5 10 15 20 25 ft

Typical Classroom Module
Post-Presentation Version 1

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



RAIC Syllabus D9B Thesis

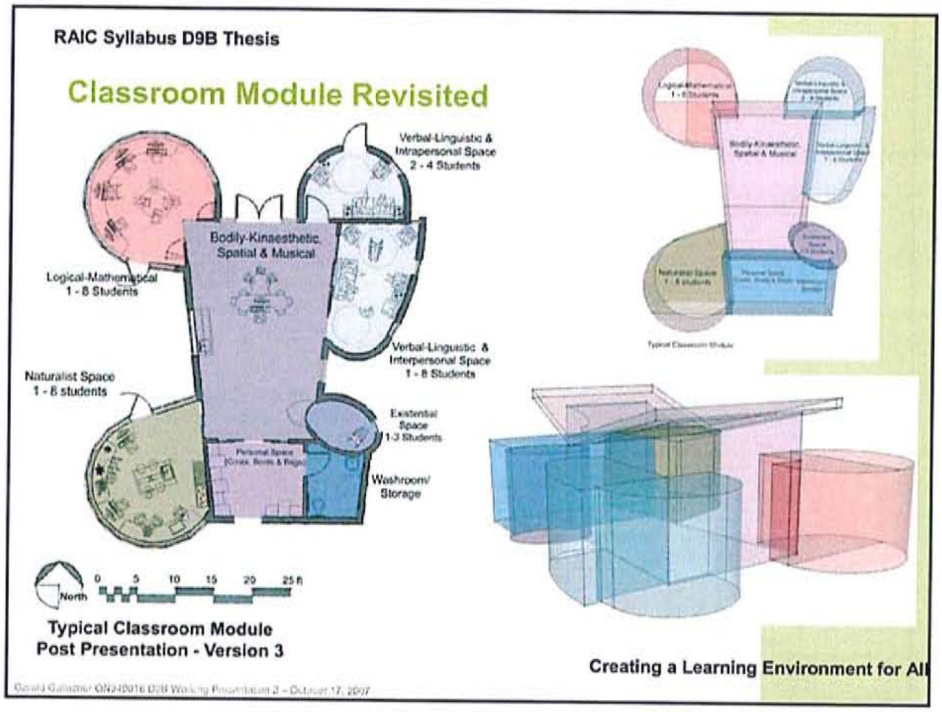
Classroom Module Revisited

Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic, Spatial & Musical
Logical-Mathematical 1 - 8 Students
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Naturalist Space 1 - 8 students
Existential Space 1-3 Students
Washroom/ Storage
North
0 5 10 15 20 25 ft

Typical Classroom Module
Post Presentation - Version 2

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



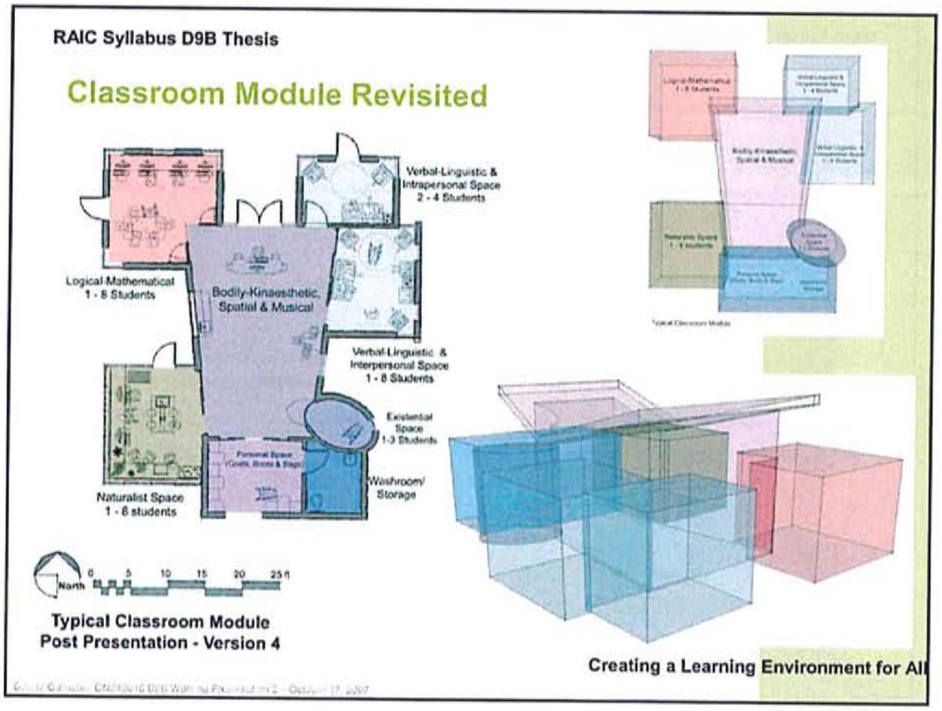
RAIC Syllabus D9B Thesis

Classroom Module Revisited

Typical Classroom Module
Post Presentation - Version 3

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



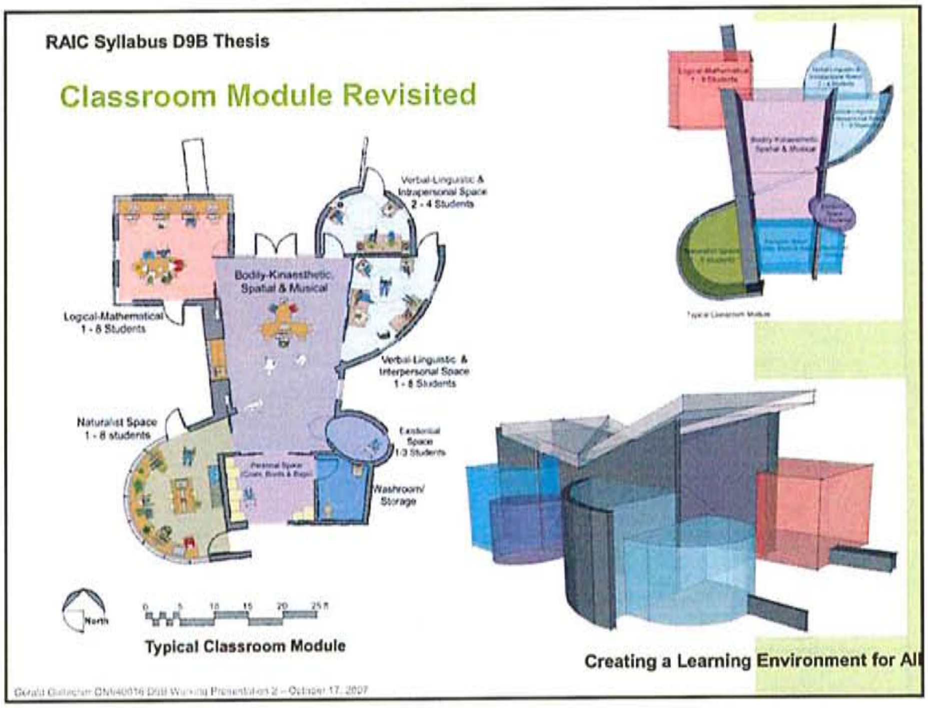
RAIC Syllabus D9B Thesis

Classroom Module Revisited

Typical Classroom Module
Post Presentation - Version 4

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



RAIC Syllabus D9B Thesis

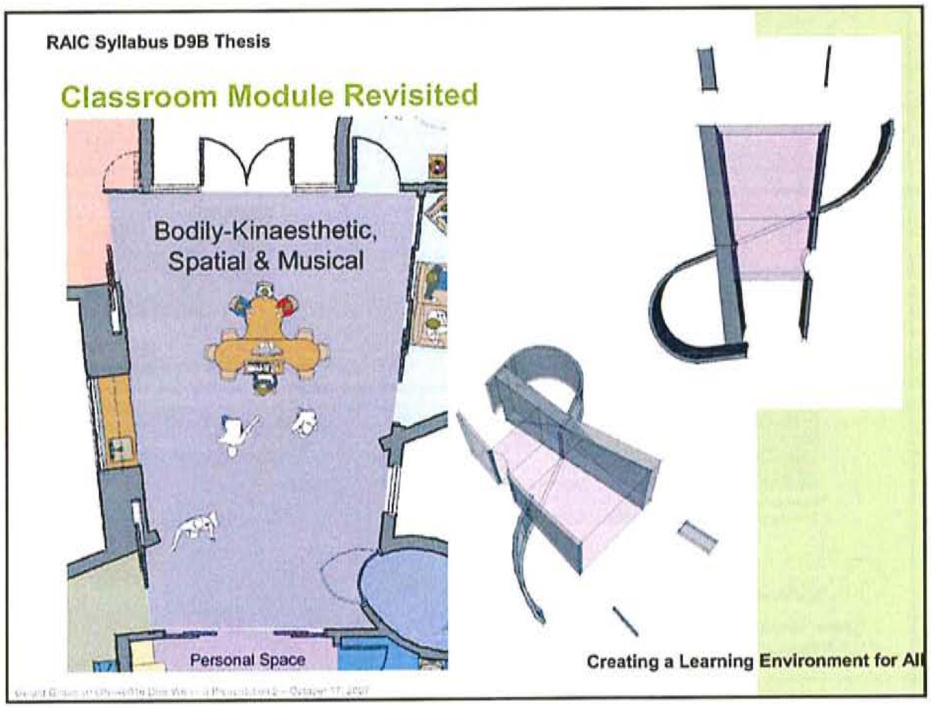
Classroom Module Revisited

Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic, Spatial & Musical
Logical-Mathematical 1 - 8 Students
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Naturalist Space 1 - 8 students
Existential Space 1-3 Students
Personal Space (Coats, Boots & Bags)
Washroom/ Storage
North
0 5 10 15 20 25 ft
Typical Classroom Module

Typical Classroom Module

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007

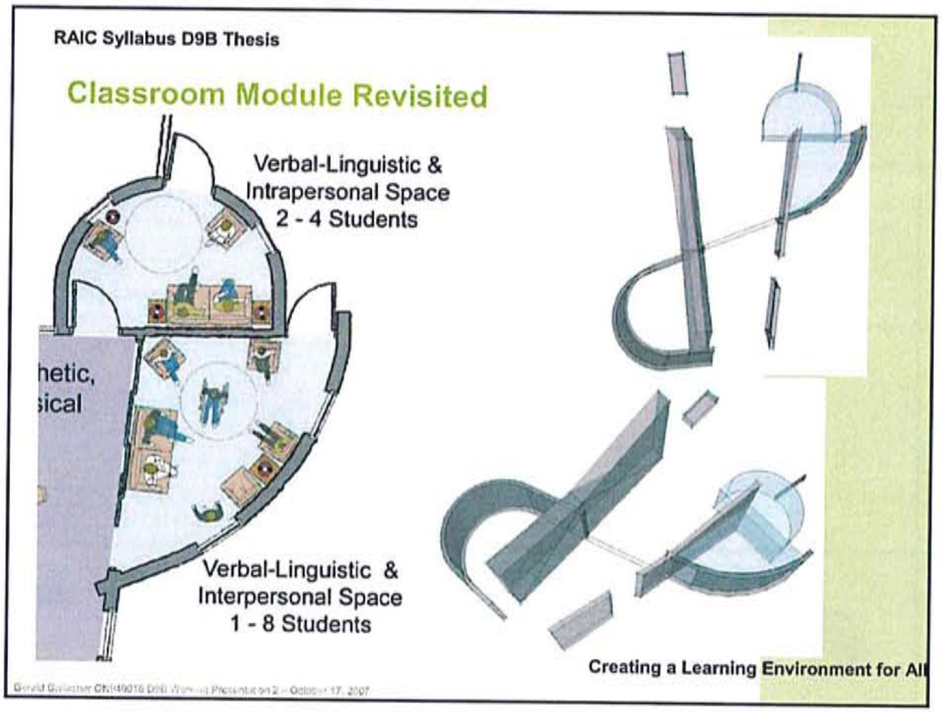


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



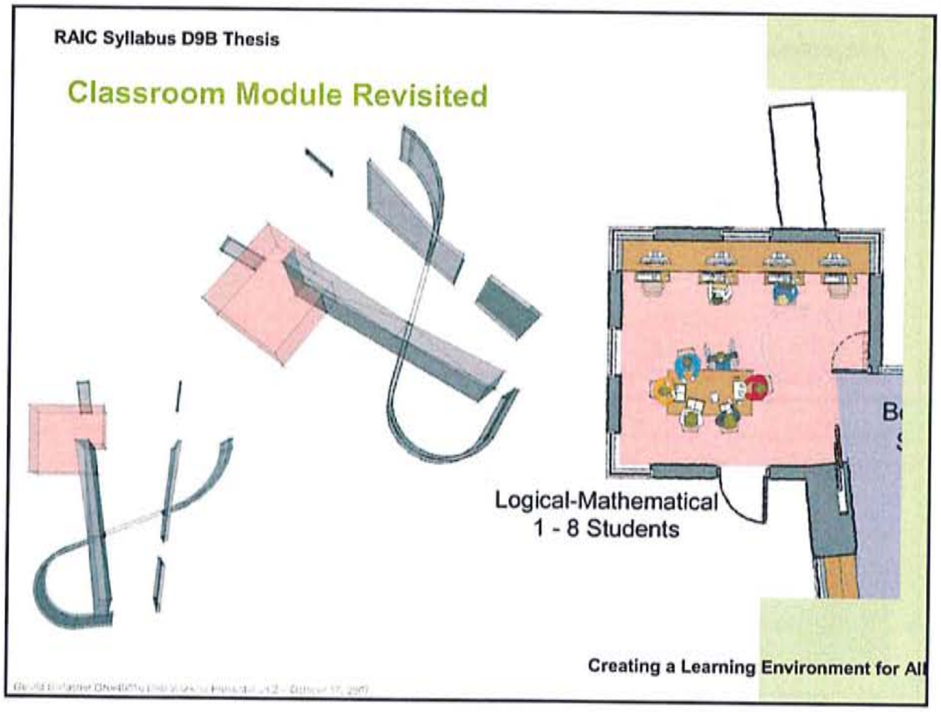
RAIC Syllabus D9B Thesis

Classroom Module Revisited

Verbal-Linguistic &
Intrapersonal Space
2 - 4 Students

Verbal-Linguistic &
Interpersonal Space
1 - 8 Students

Creating a Learning Environment for All



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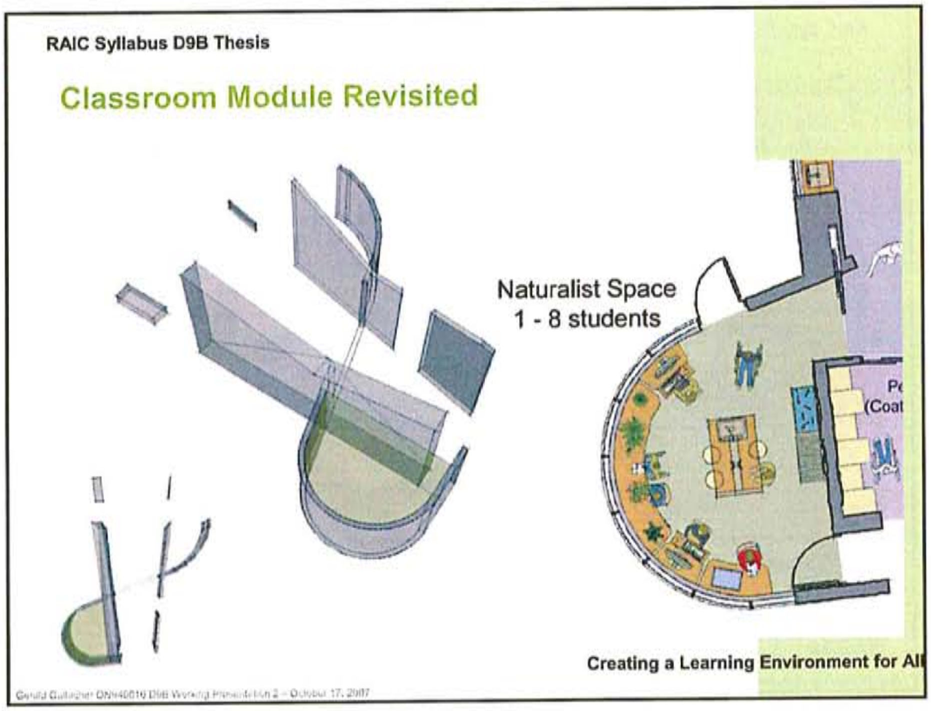
Classroom Module Revisited

Logical-Mathematical
1 - 8 Students

Creating a Learning Environment for All



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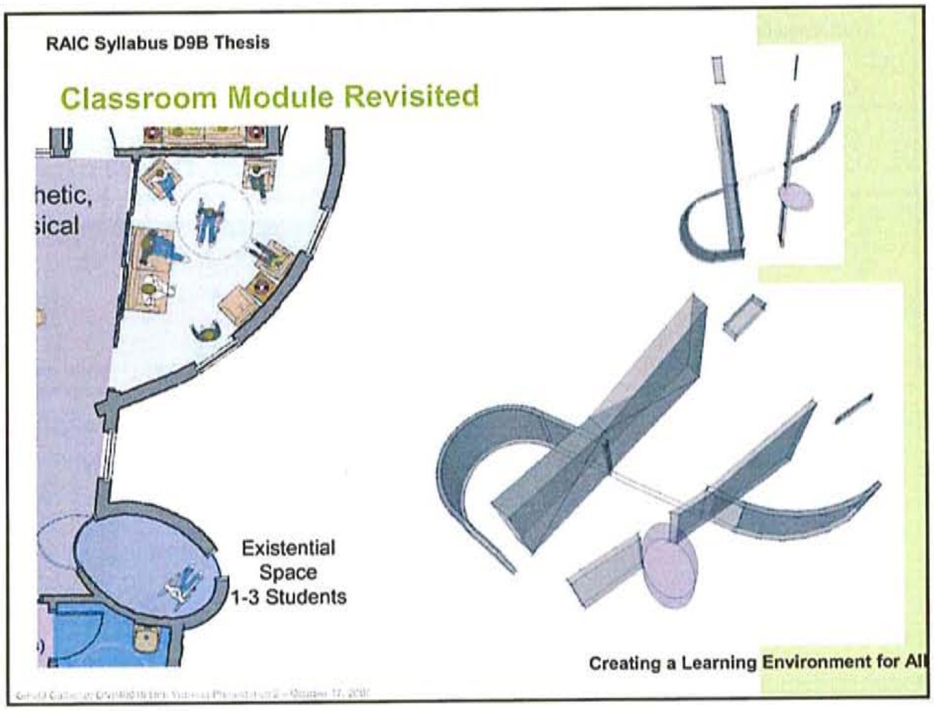
Classroom Module Revisited

Naturalist Space
1 - 8 students

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



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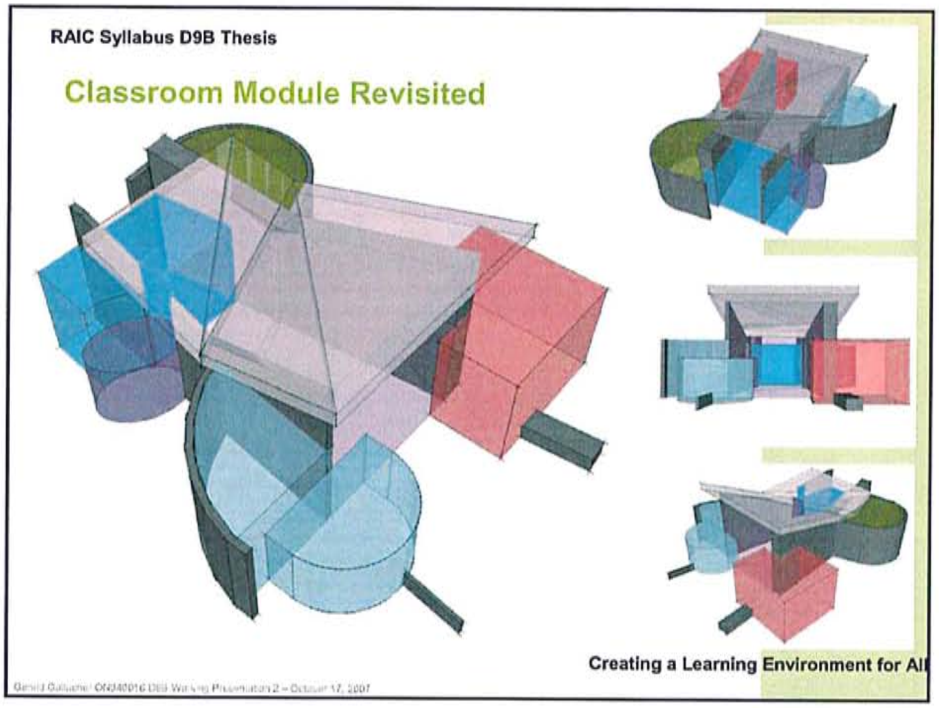
Classroom Module Revisited

Existential
Space
1-3 Students

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007

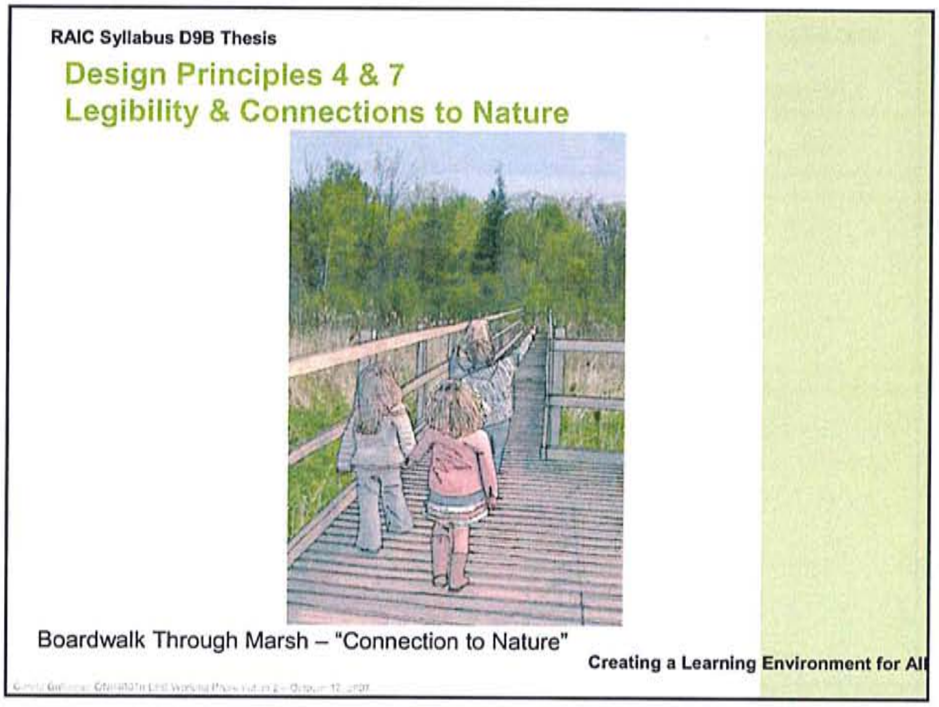


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



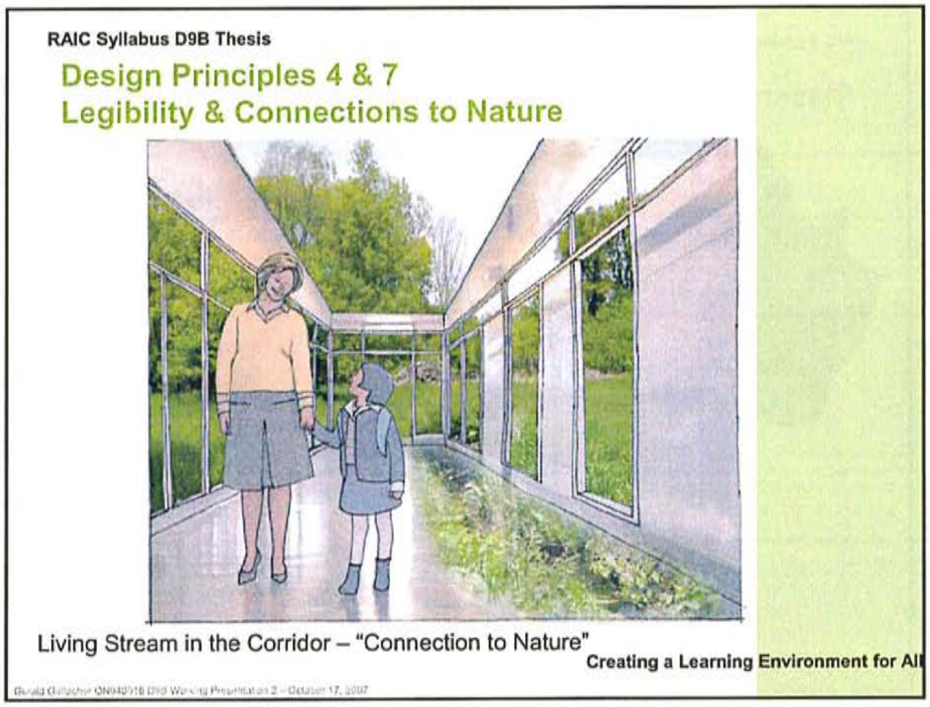
RAIC Syllabus D9B Thesis

Design Principles 4 & 7
Legibility & Connections to Nature

Boardwalk Through Marsh – "Connection to Nature"

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



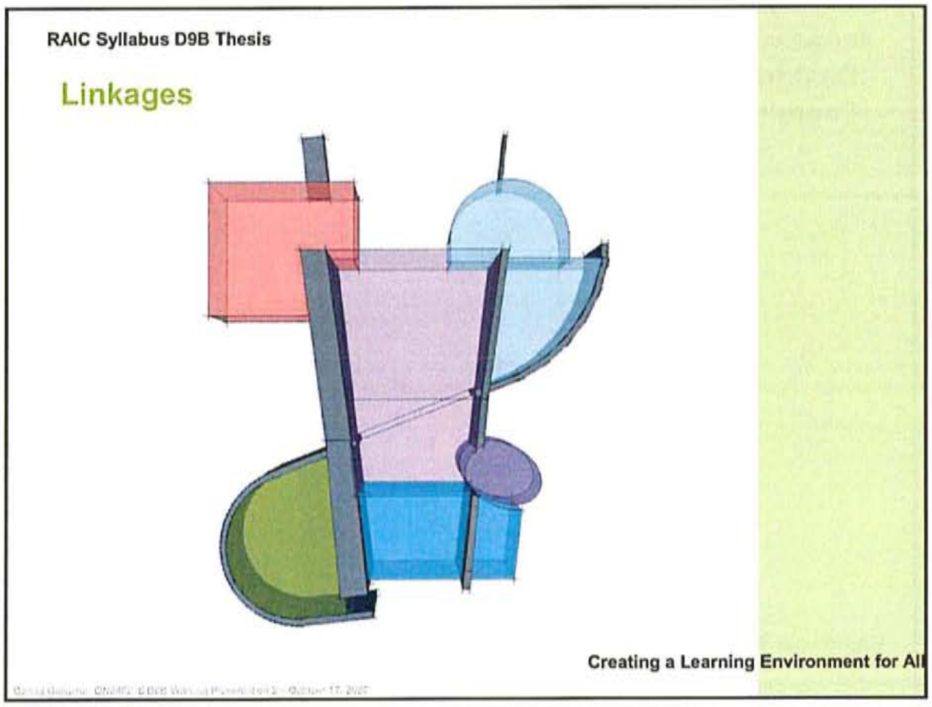
RAIC Syllabus D9B Thesis

Design Principles 4 & 7
Legibility & Connections to Nature

Living Stream in the Corridor – "Connection to Nature"

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007

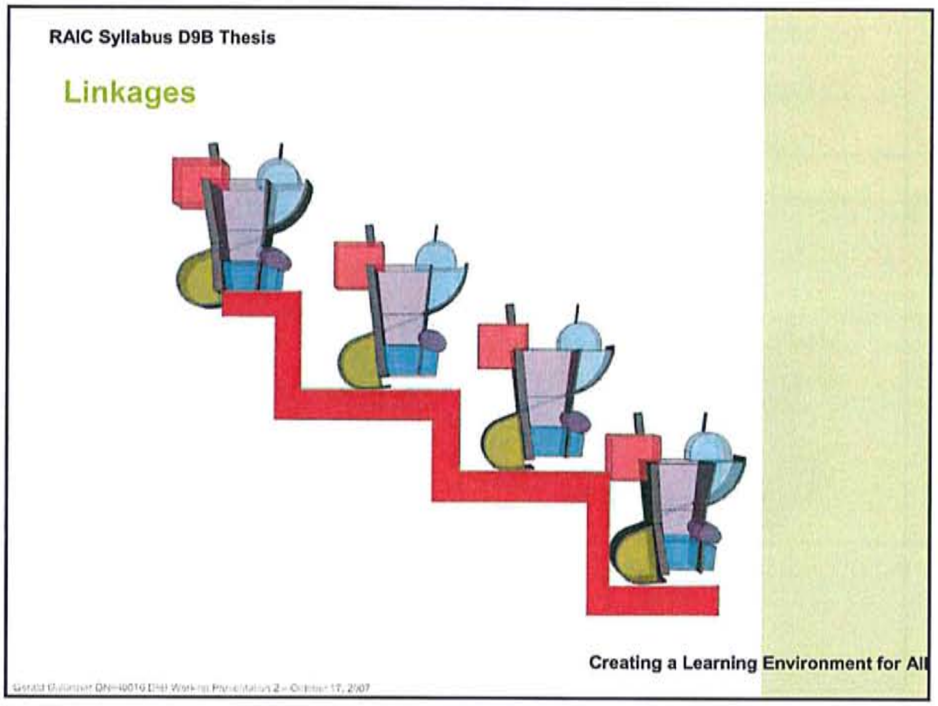


RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

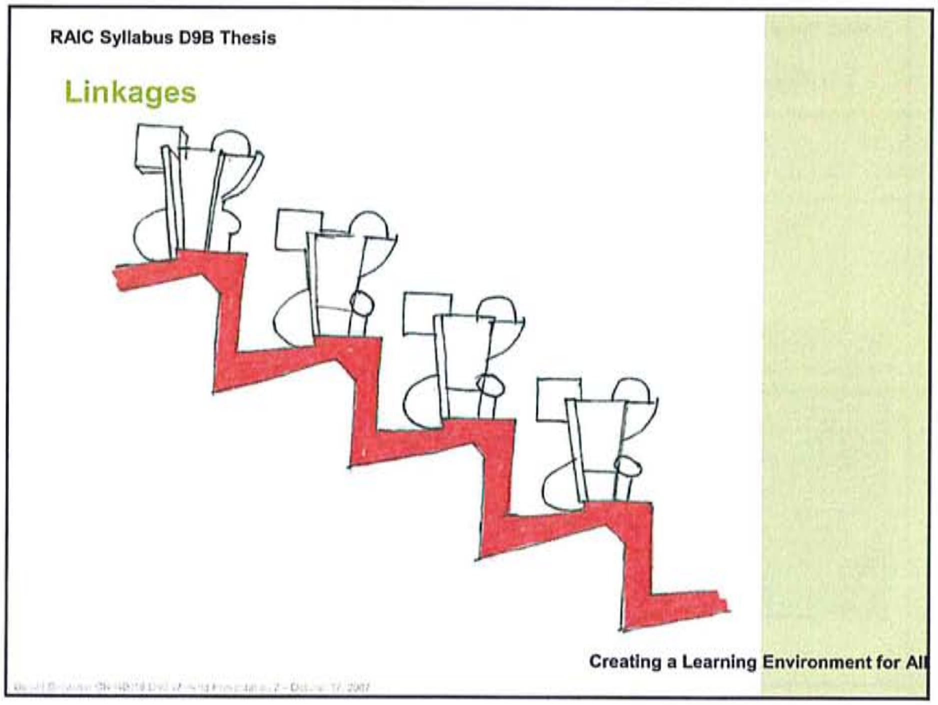
Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



RAIC Syllabus D9B Thesis

Linkages

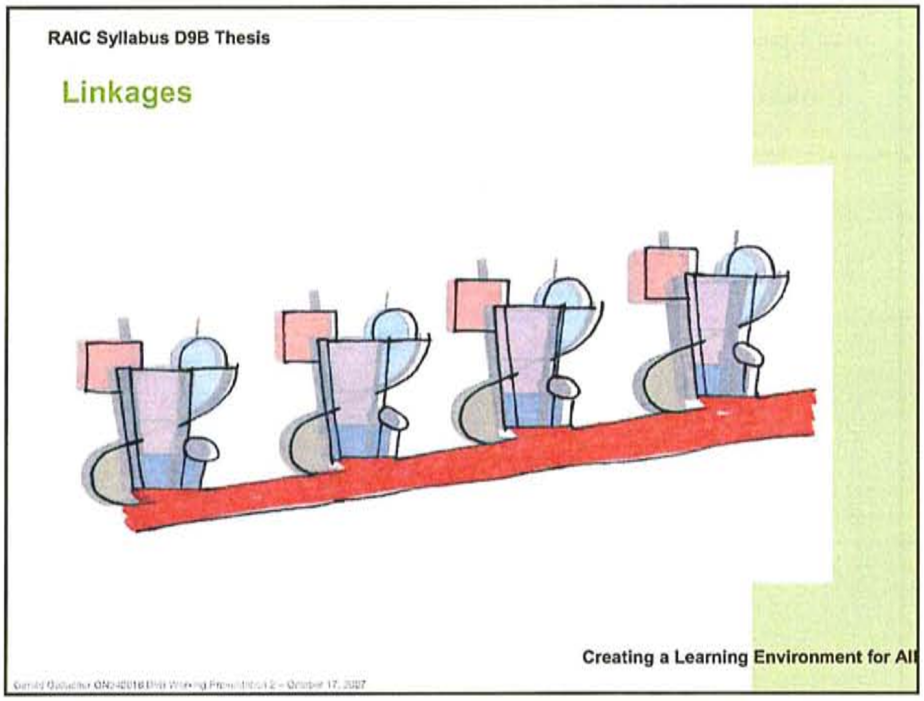
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

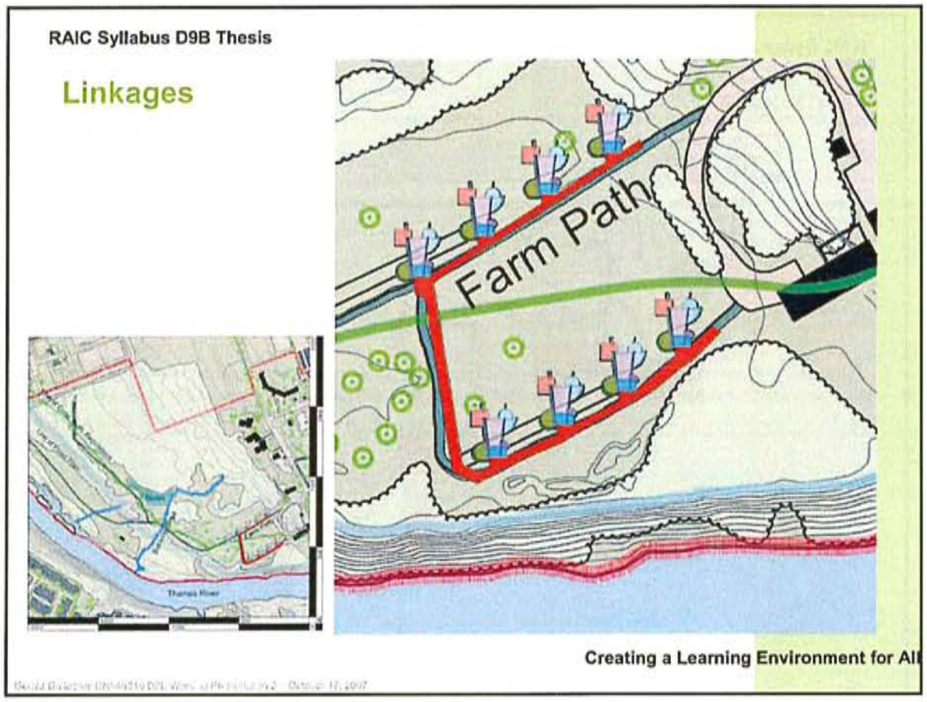


RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007

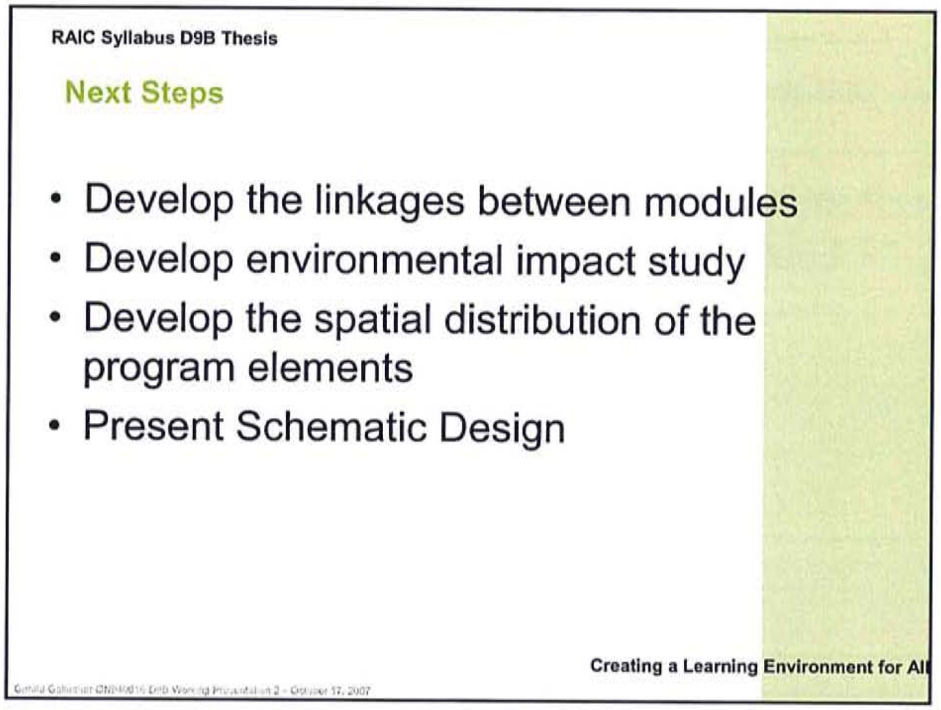


RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 2 – October 17, 2007



RAIC Syllabus D9B Thesis

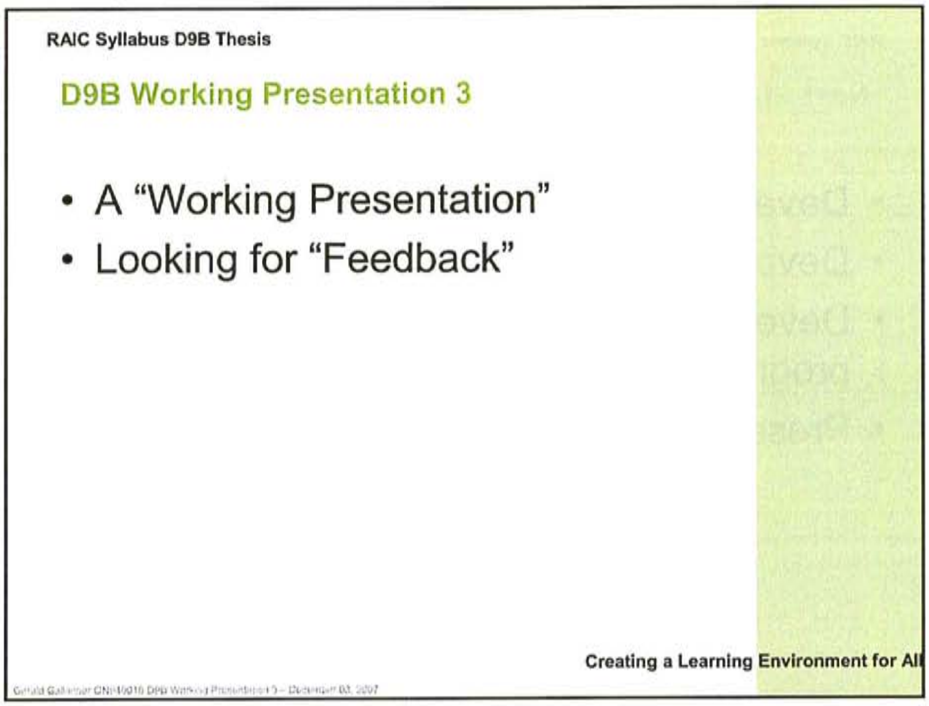
Next Steps

- Develop the linkages between modules
- Develop environmental impact study
- Develop the spatial distribution of the program elements
- Present Schematic Design

Gerald Gallacher ON940016 D9B Working Presentation 2 - October 17, 2007

Creating a Learning Environment for All

Working Presentation 3 – December 05, 2007

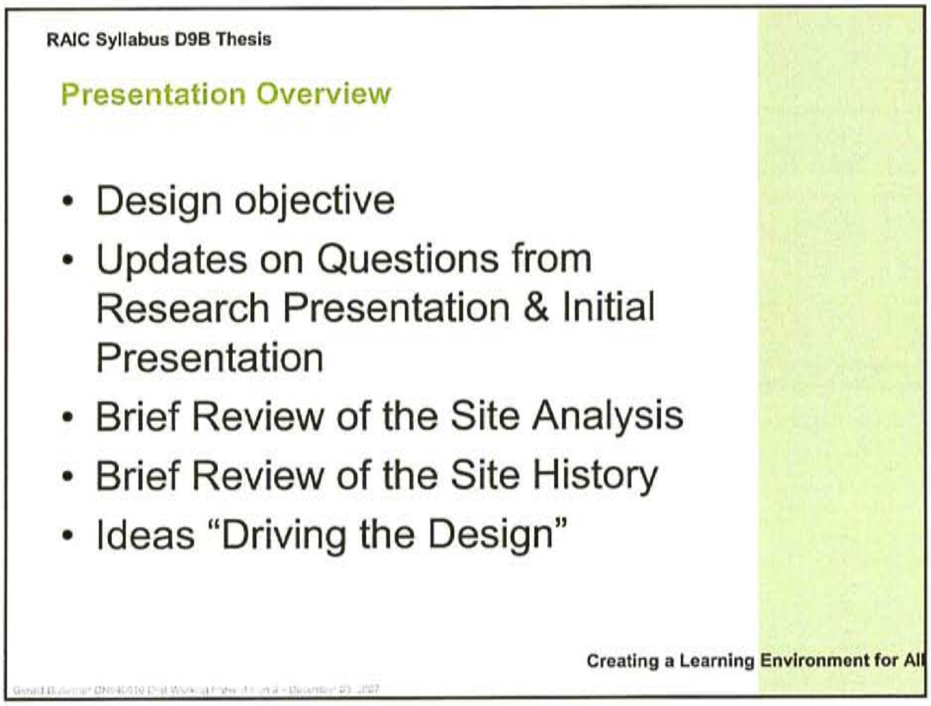


RAIC Syllabus D9B Thesis

D9B Working Presentation 3

- A “Working Presentation”
- Looking for “Feedback”

Creating a Learning Environment for All

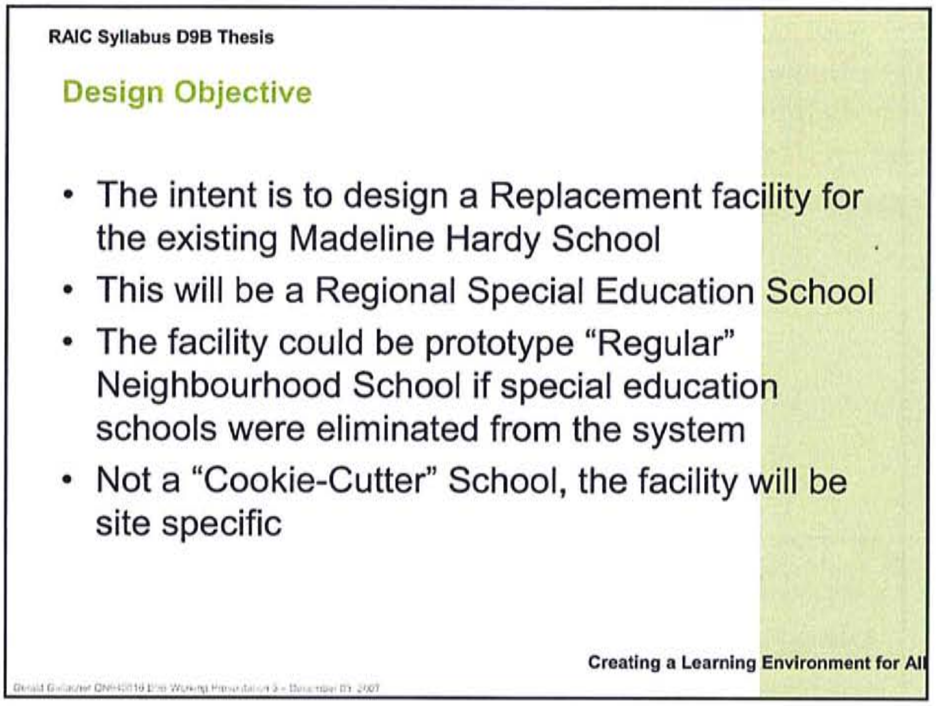


RAIC Syllabus D9B Thesis

Presentation Overview

- Design objective
- Updates on Questions from Research Presentation & Initial Presentation
- Brief Review of the Site Analysis
- Brief Review of the Site History
- Ideas “Driving the Design”

Creating a Learning Environment for All

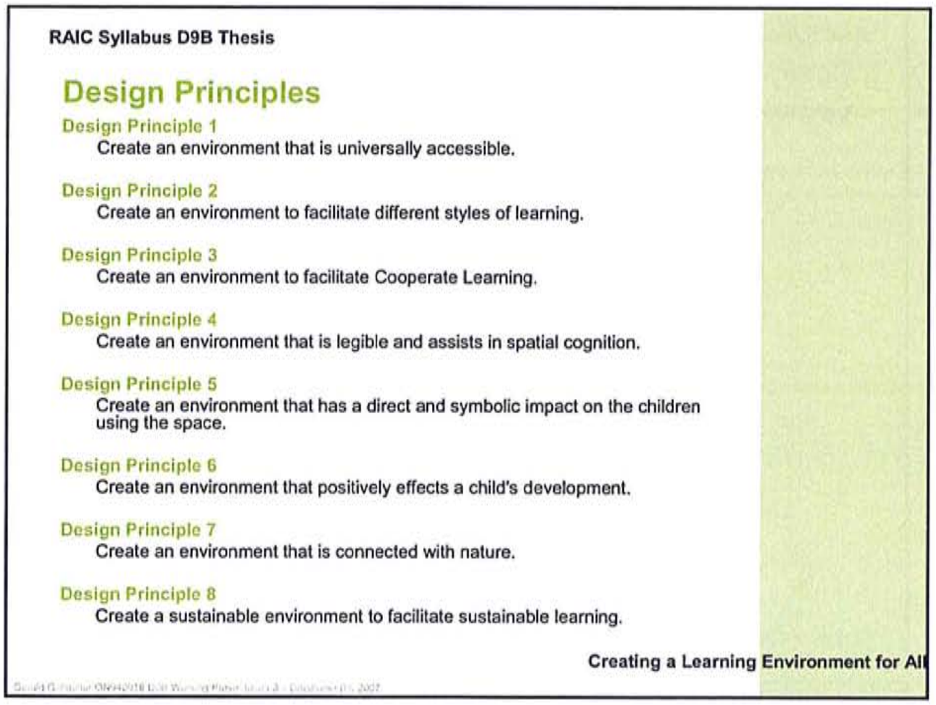


RAIC Syllabus D9B Thesis

Design Objective

- The intent is to design a Replacement facility for the existing Madeline Hardy School
- This will be a Regional Special Education School
- The facility could be prototype "Regular" Neighbourhood School if special education schools were eliminated from the system
- Not a "Cookie-Cutter" School, the facility will be site specific

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Principles

Design Principle 1
Create an environment that is universally accessible.

Design Principle 2
Create an environment to facilitate different styles of learning.

Design Principle 3
Create an environment to facilitate Cooperate Learning.

Design Principle 4
Create an environment that is legible and assists in spatial cognition.

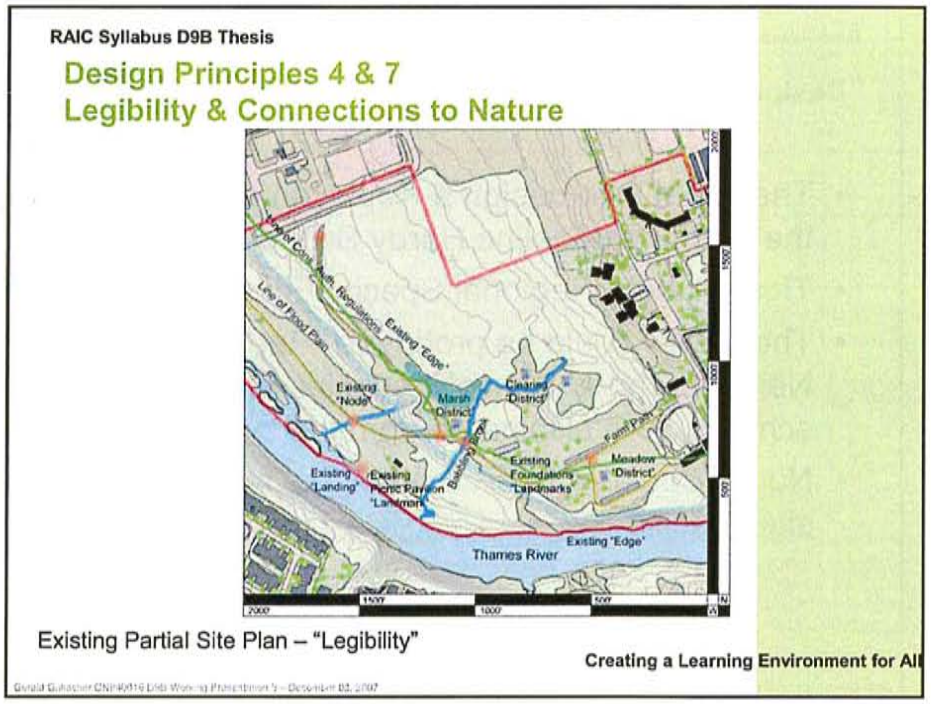
Design Principle 5
Create an environment that has a direct and symbolic impact on the children using the space.

Design Principle 6
Create an environment that positively effects a child's development.

Design Principle 7
Create an environment that is connected with nature.

Design Principle 8
Create a sustainable environment to facilitate sustainable learning.

Creating a Learning Environment for All

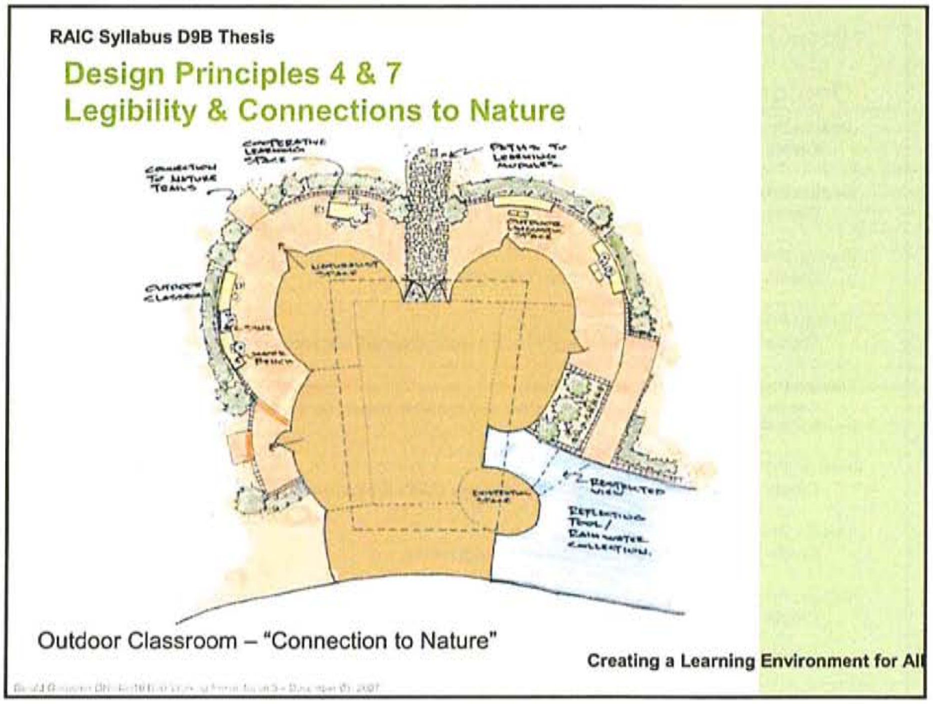


RAIC Syllabus D9B Thesis

Design Principles 4 & 7
Legibility & Connections to Nature

Existing Partial Site Plan – "Legibility"

Creating a Learning Environment for All



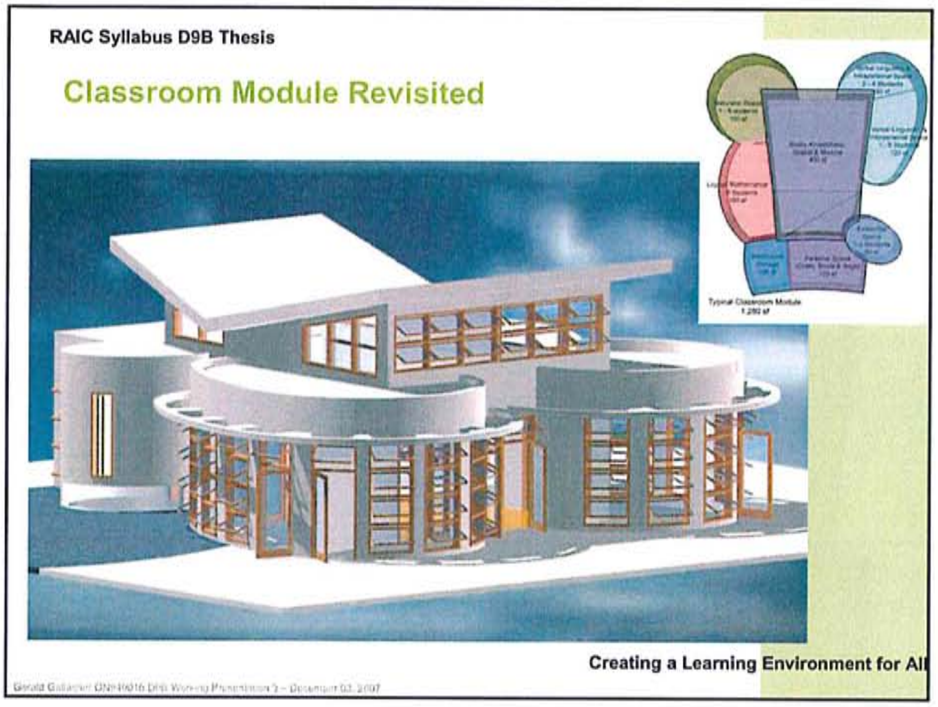
RAIC Syllabus D9B Thesis

Design Principles 4 & 7
Legibility & Connections to Nature

COOPERATIVE LEARNING SPACE
PATHS TO LEARNING MODULES
CONNECTION TO NATURE TRAILS
OUTDOOR CLASSROOM
REFLECTING POOL / RAIN WATER COLLECTION.

Outdoor Classroom – "Connection to Nature"

Creating a Learning Environment for All

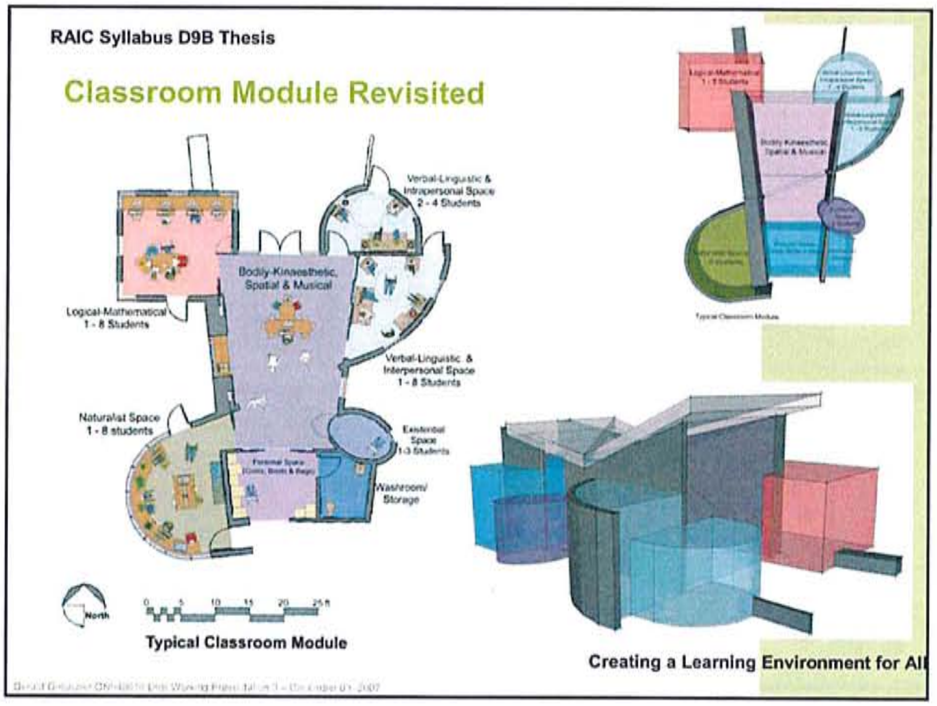


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 3 – December 03, 2007

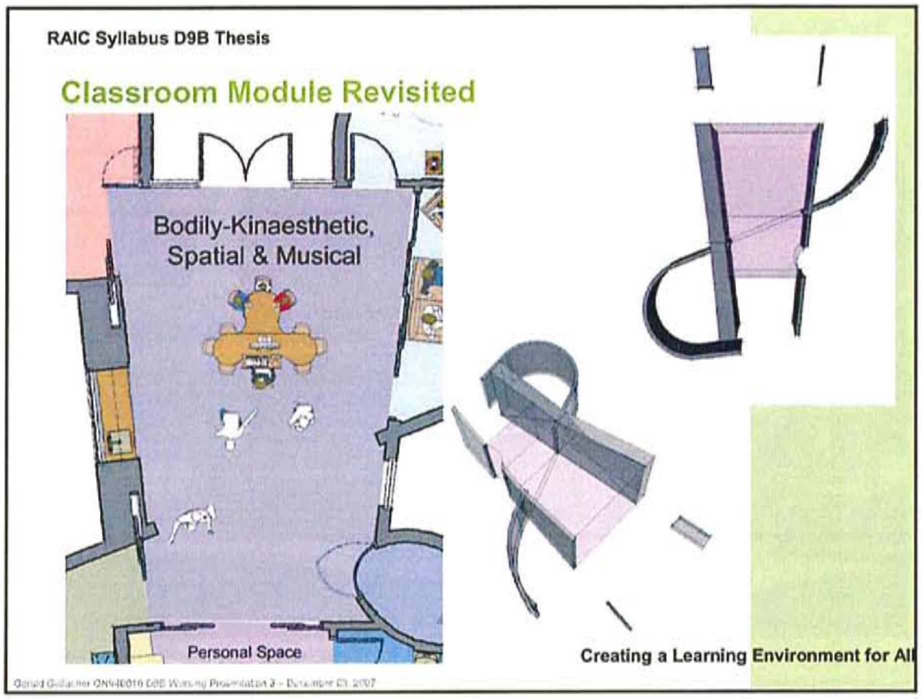


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Typical Classroom Module

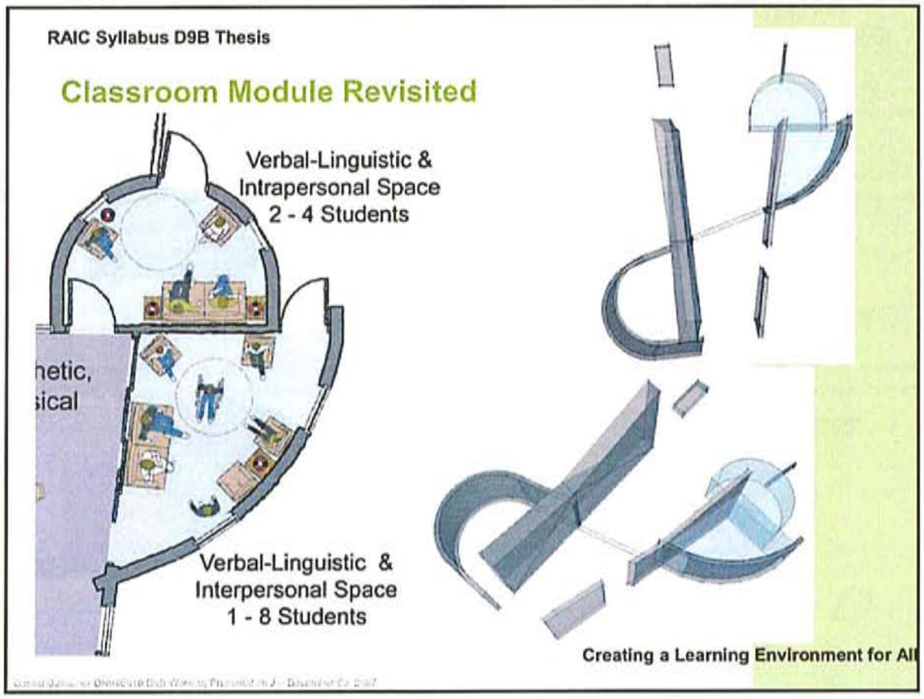
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Revisited

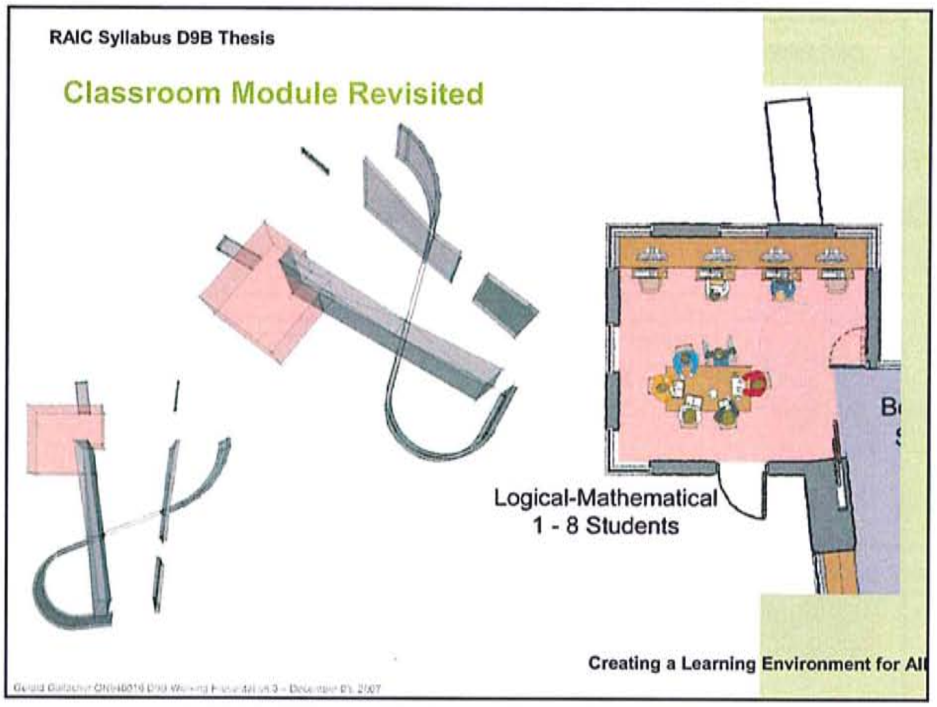
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for All

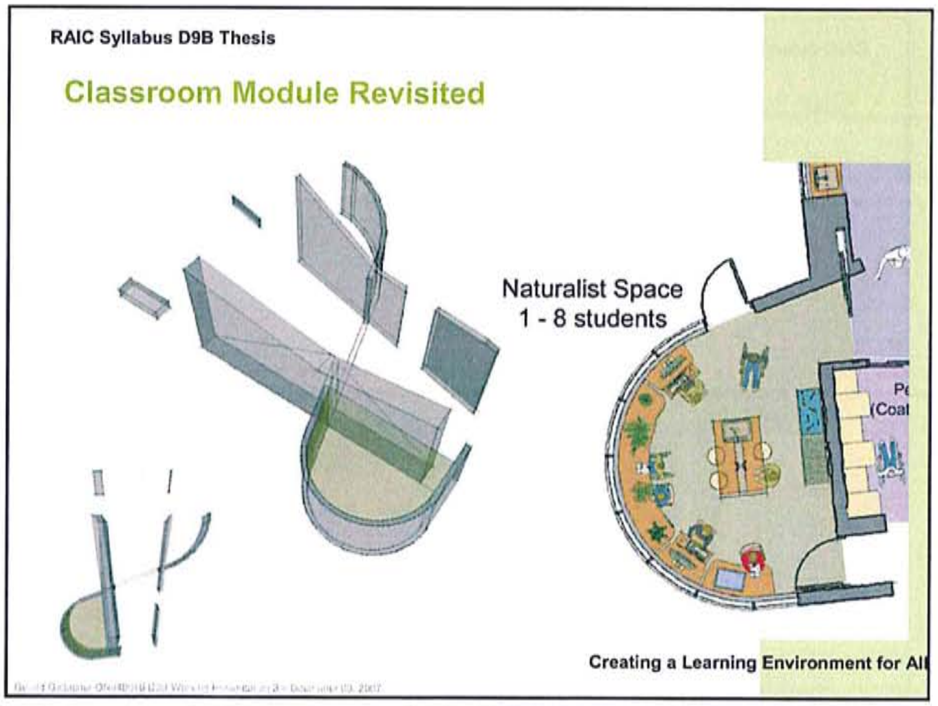


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Logical-Mathematical
1 - 8 Students

Creating a Learning Environment for Al

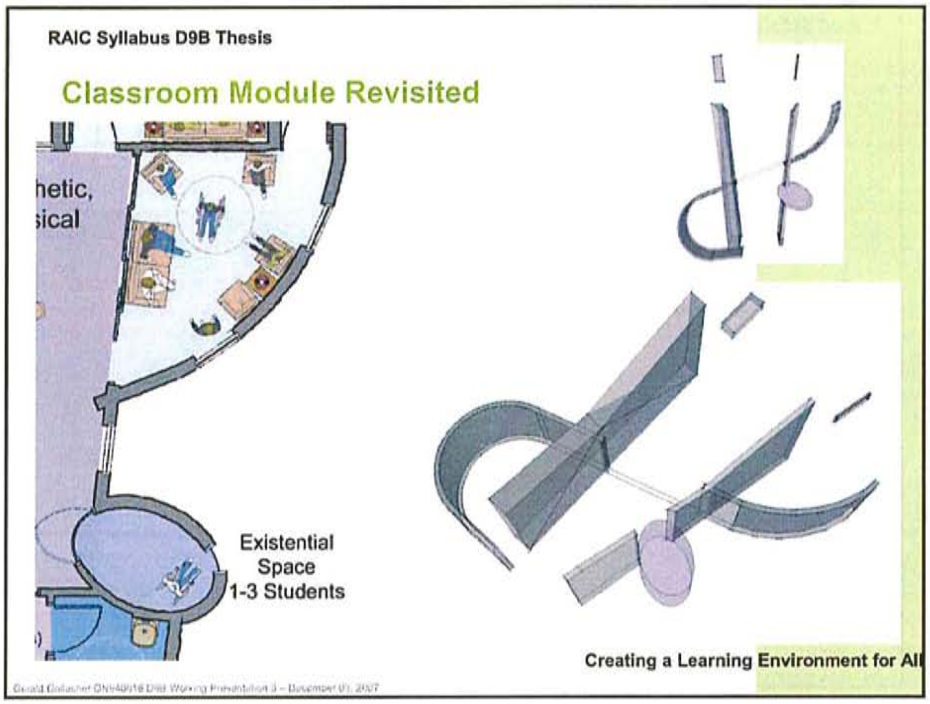


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Naturalist Space
1 - 8 students

Creating a Learning Environment for Al

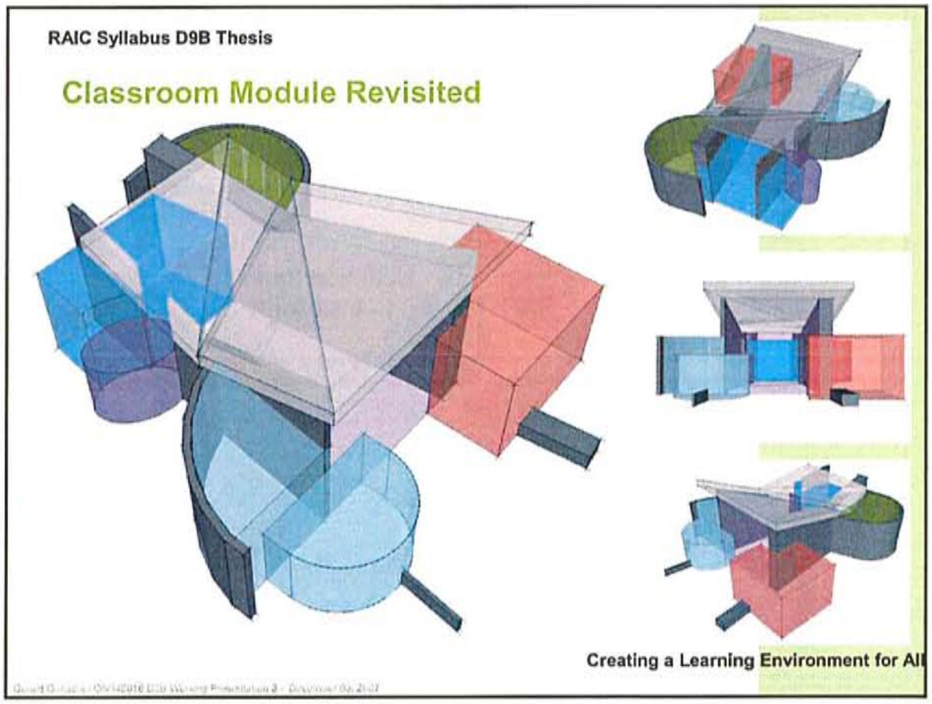


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for Al

Gerald Gallacher ON940016 D9B Working Presentation 3 – December 01, 2007

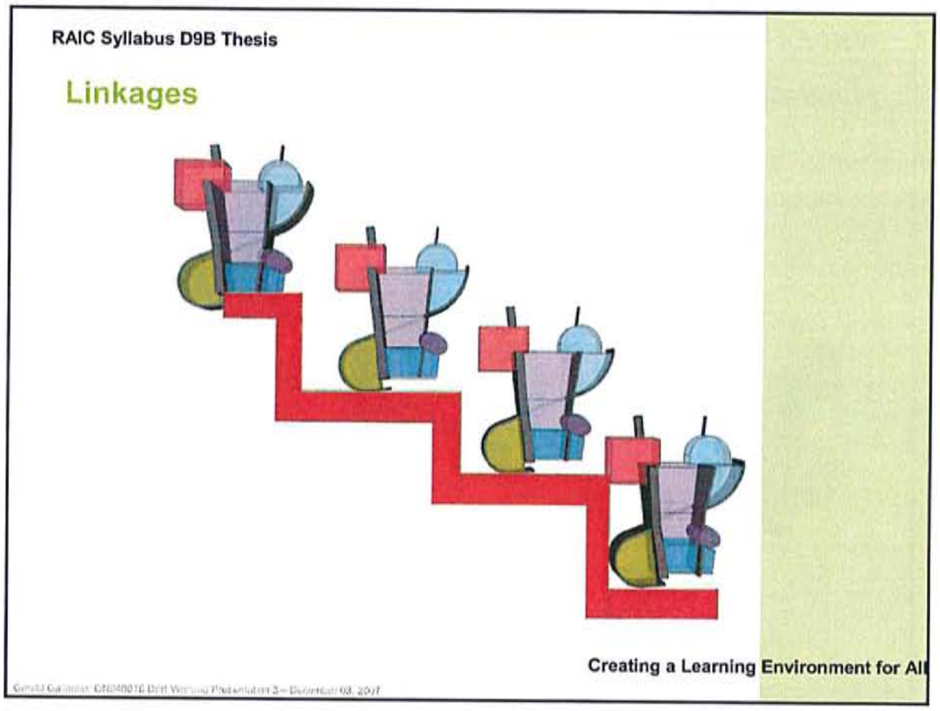


RAIC Syllabus D9B Thesis

Classroom Module Revisited

Creating a Learning Environment for Al

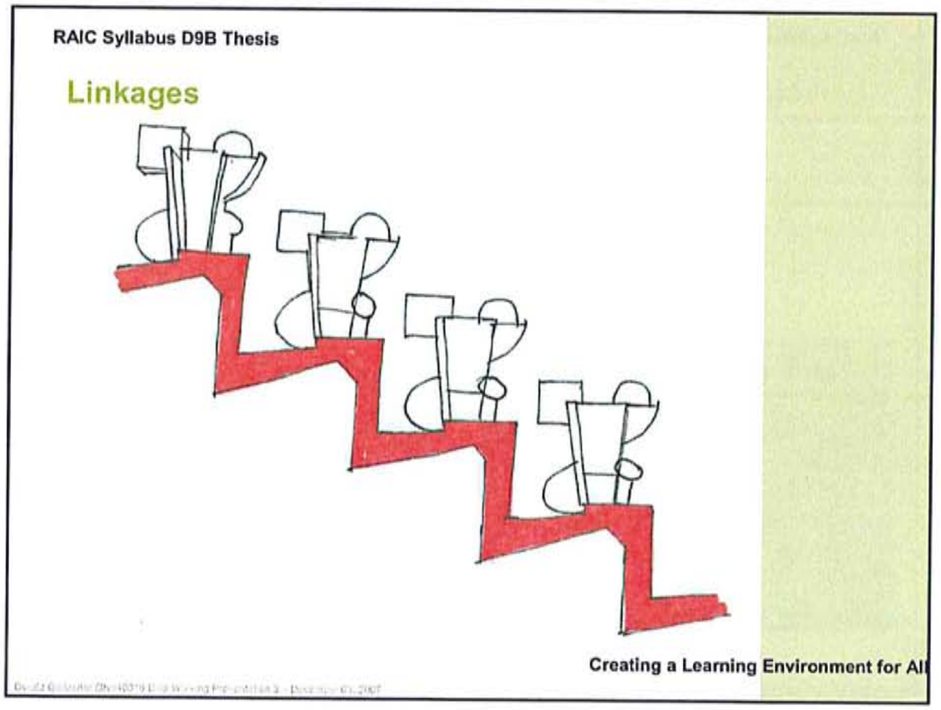
Gerald Gallacher ON940016 D9B Working Presentation 3 – December 01, 2007



RAIC Syllabus D9B Thesis

Linkages

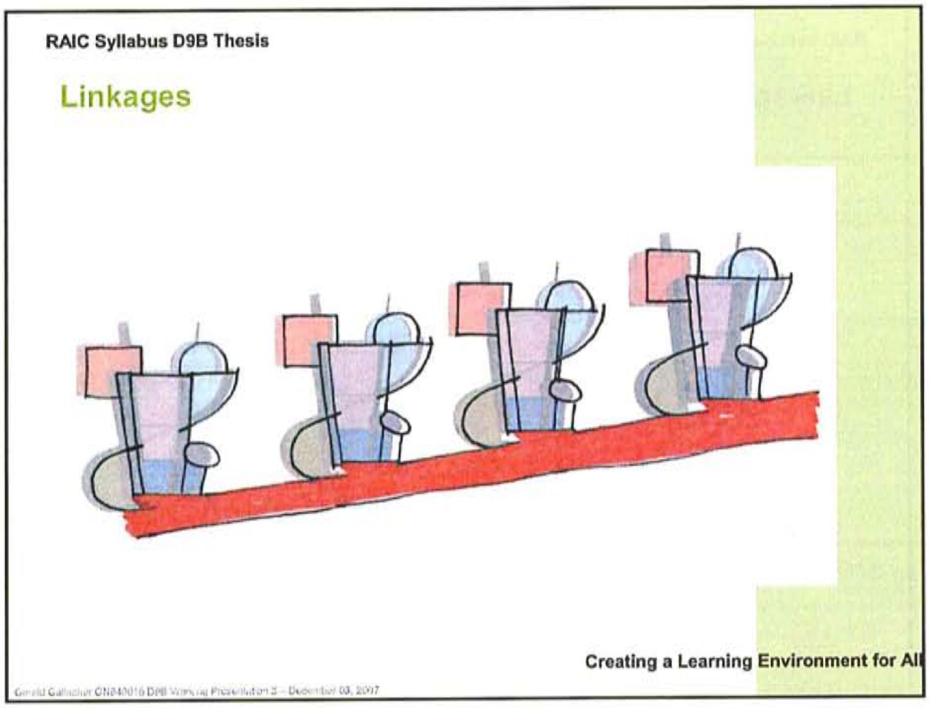
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

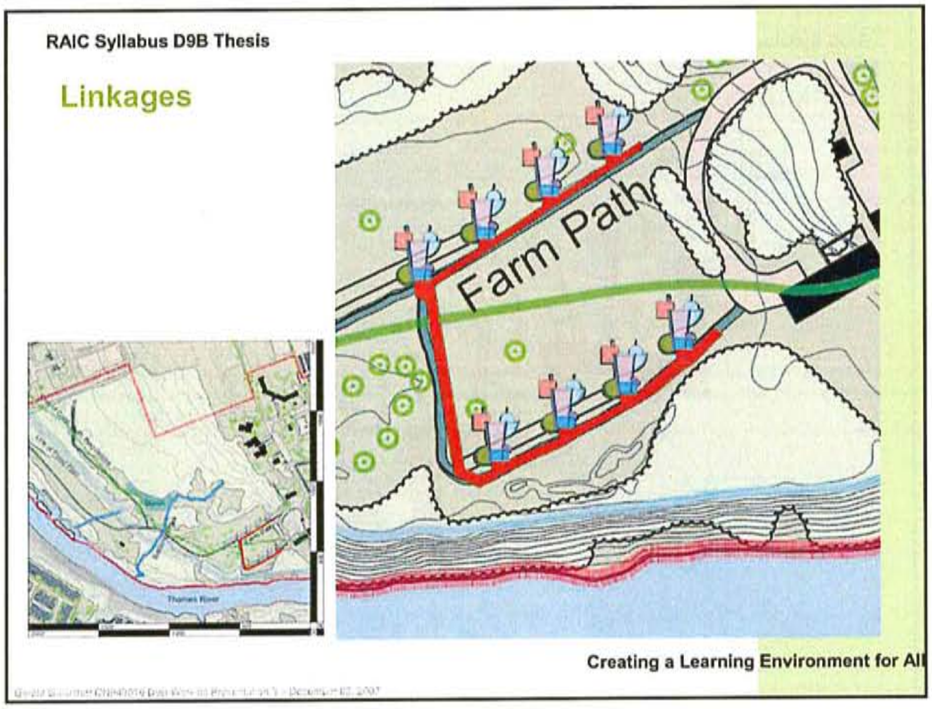


RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 3 – December 03, 2007

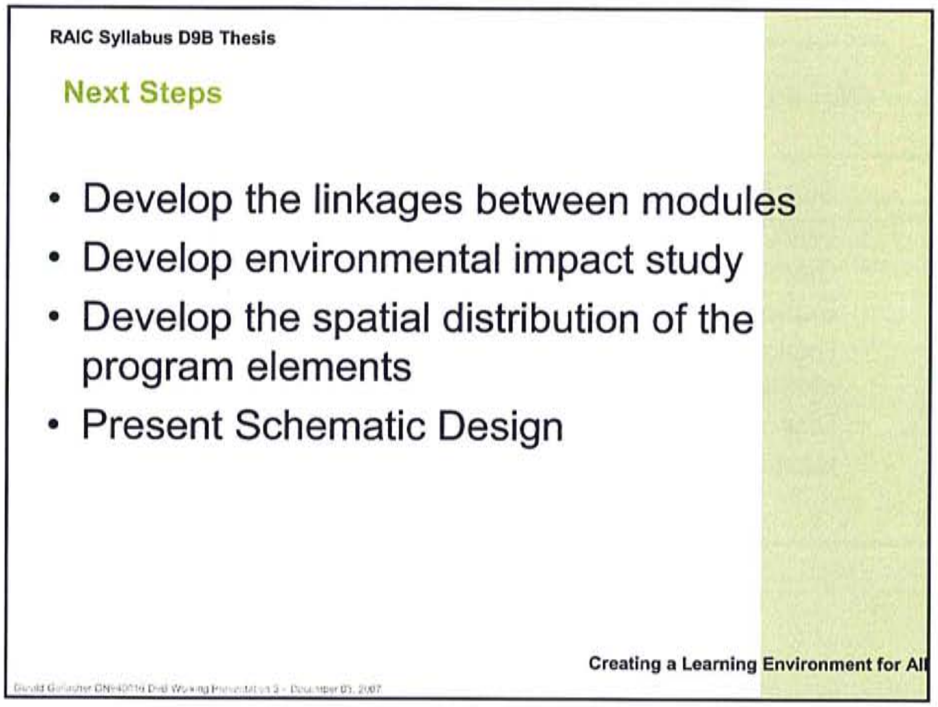


RAIC Syllabus D9B Thesis

Linkages

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Working Presentation 3 – December 03, 2007



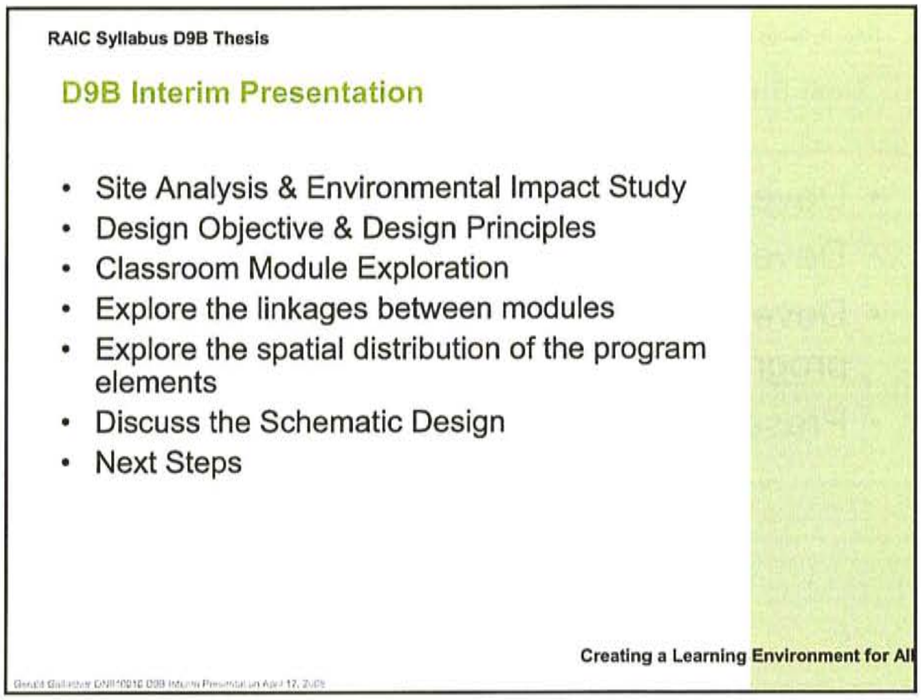
RAIC Syllabus D9B Thesis

Next Steps

- Develop the linkages between modules
- Develop environmental impact study
- Develop the spatial distribution of the program elements
- Present Schematic Design

Creating a Learning Environment for All

Interim Presentation – April 17, 2008

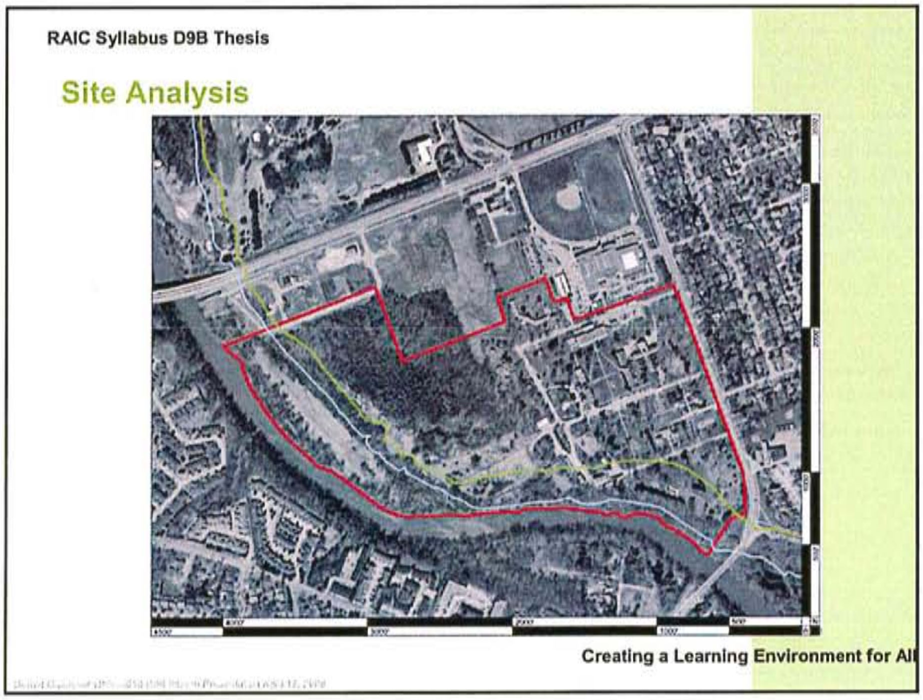


RAIC Syllabus D9B Thesis

D9B Interim Presentation

- Site Analysis & Environmental Impact Study
- Design Objective & Design Principles
- Classroom Module Exploration
- Explore the linkages between modules
- Explore the spatial distribution of the program elements
- Discuss the Schematic Design
- Next Steps

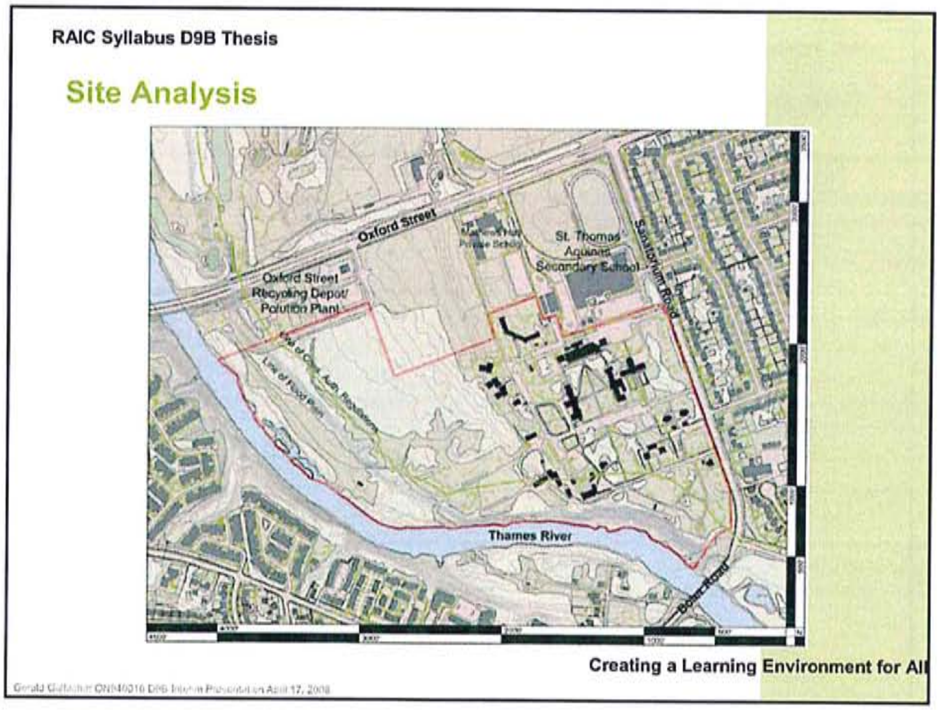
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Site Analysis

Creating a Learning Environment for All



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Site Analysis

Oxford Street
St. Thomas Aquinas Secondary School
Sanatorium Road
Oxford Street Recycling Depot/ Pollution Plant
Line of Cons. Auth. Regulations
Line of Flood Plain
Thames River
Boler Road

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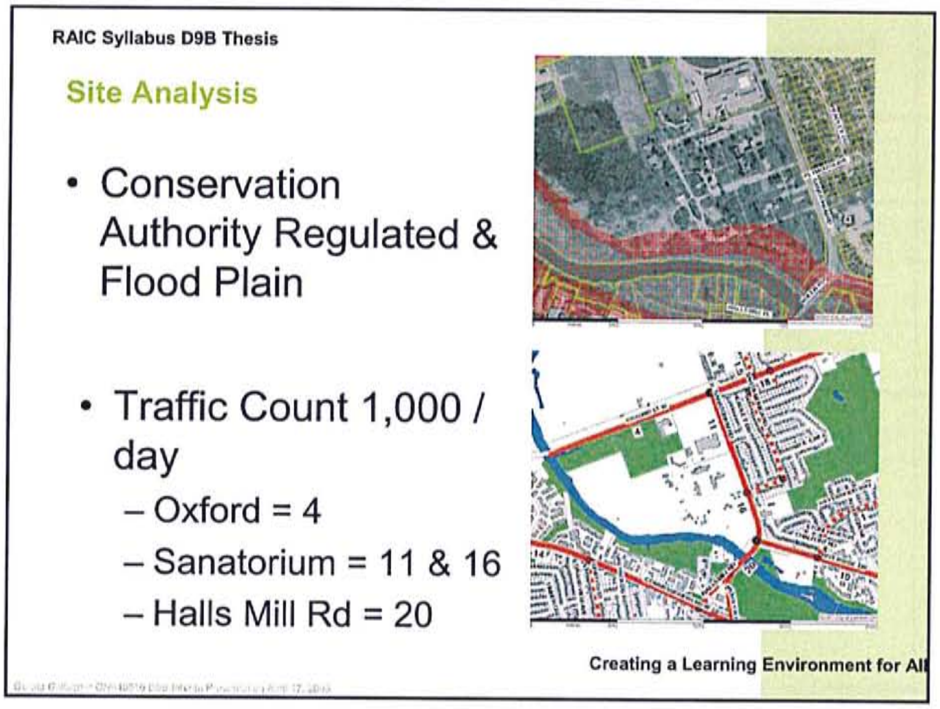

RAIC Syllabus D9B Thesis

Site Analysis

- Conservation Authority Regulated & Flood Plain
- Traffic Count 1,000 / day
  - Oxford = 4
  - Sanatorium = 11 & 16
  - Halls Mill Rd = 20

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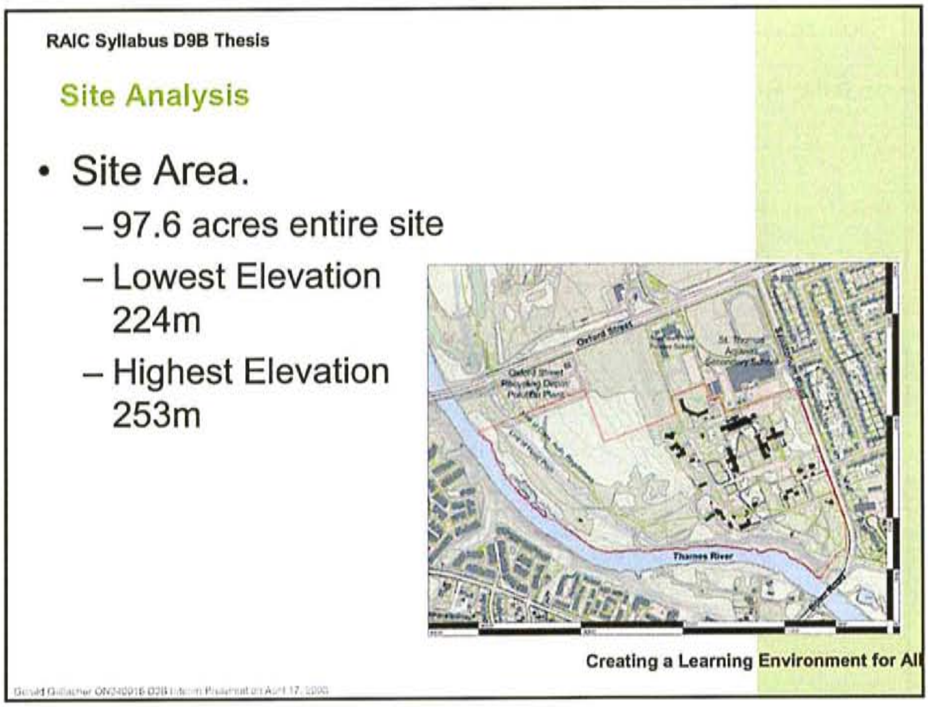

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Site Analysis

- Site Area.
  - 97.6 acres entire site
  - Lowest Elevation 224m
  - Highest Elevation 253m

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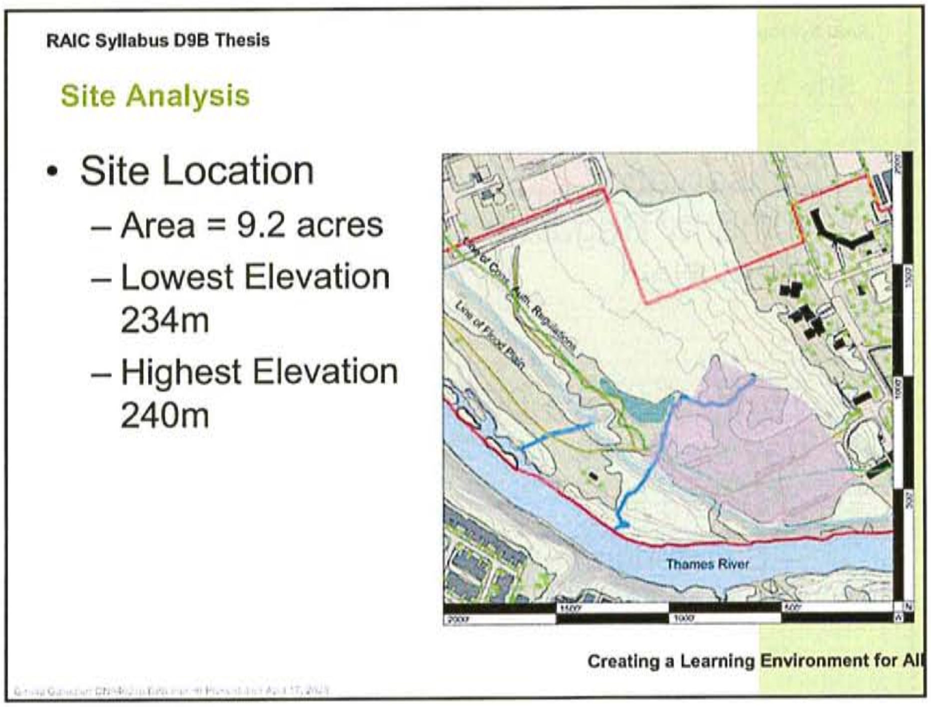

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Site Analysis

- Site Location
  - Area = 9.2 acres
  - Lowest Elevation 234m
  - Highest Elevation 240m

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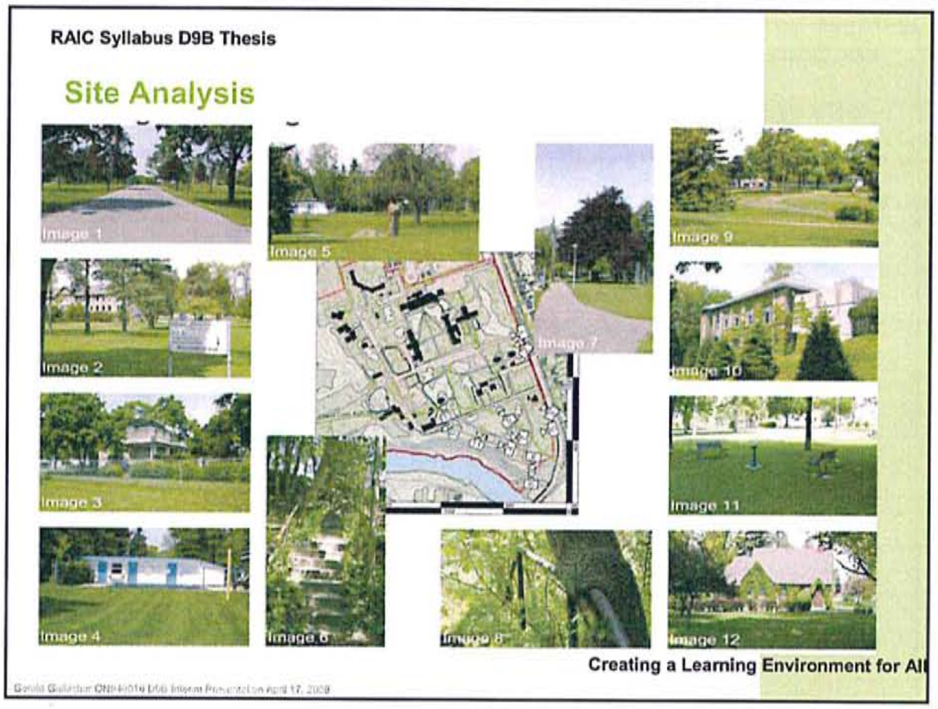

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Site Analysis

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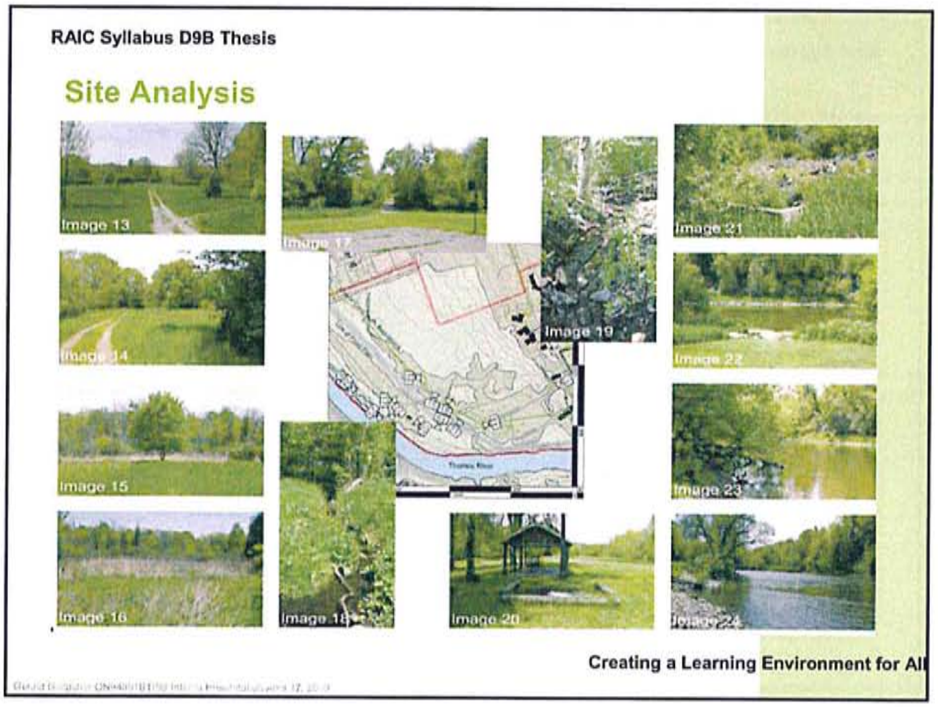

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Site Analysis

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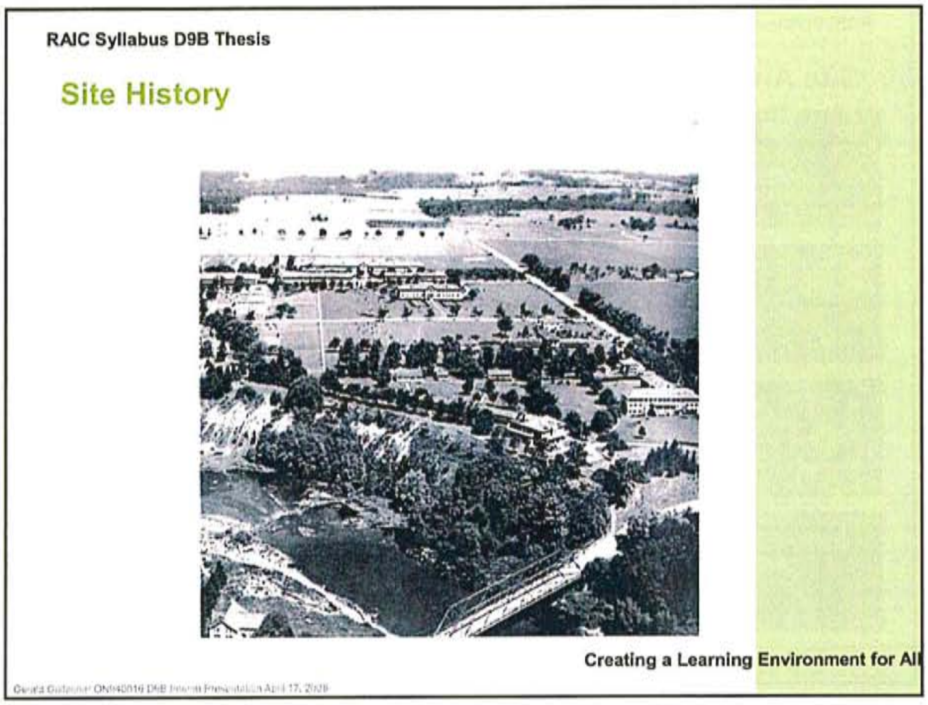

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Site History

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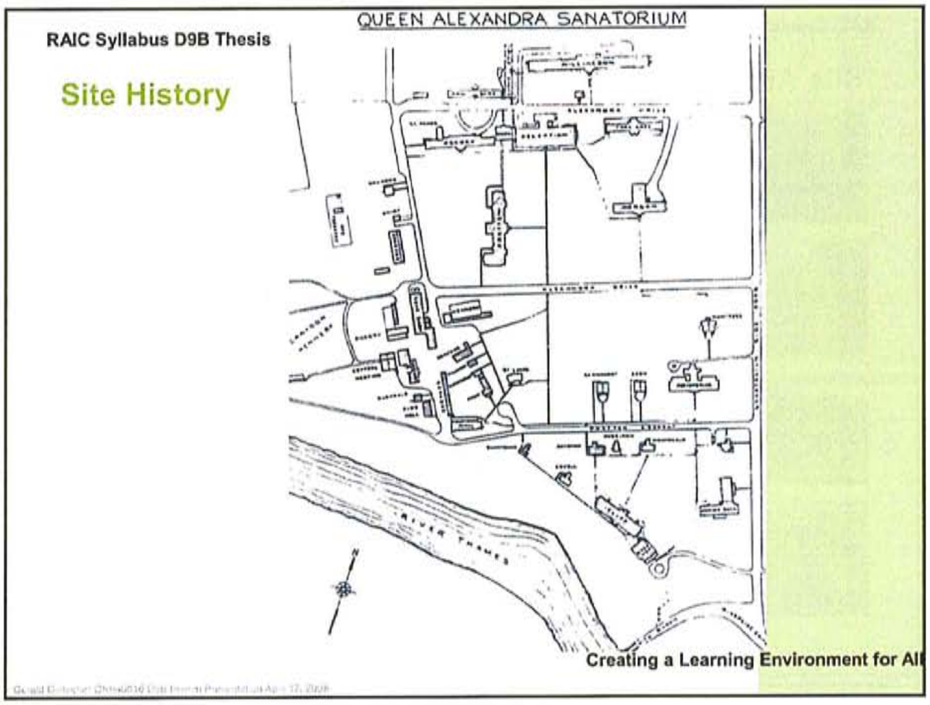

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Site History

QUEEN ALEXANDRA SANATORIUM

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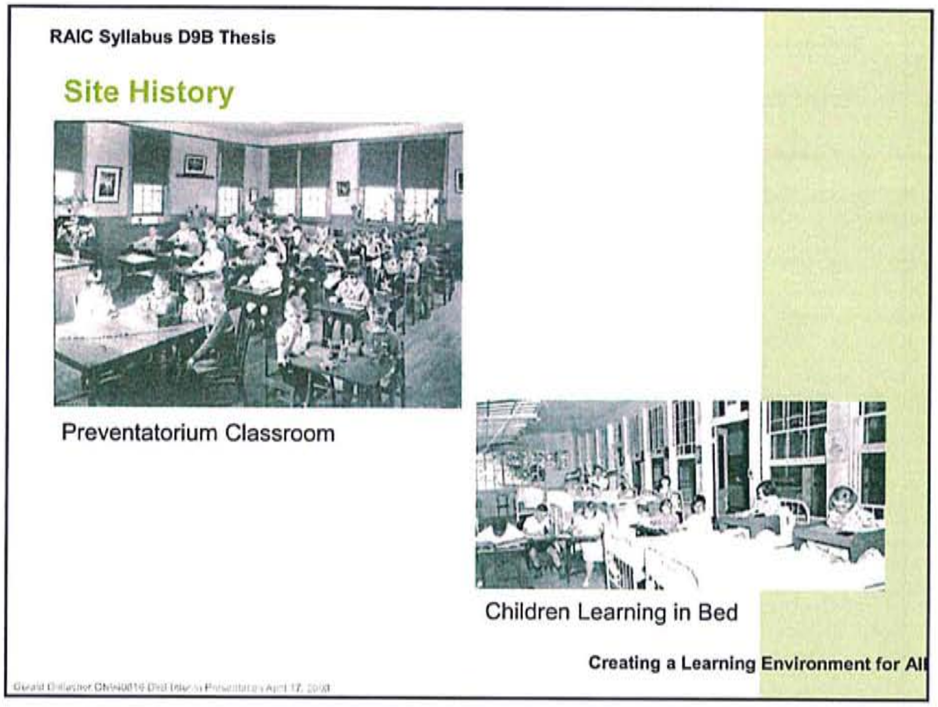

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Site History

Preventatorium Classroom

Children Learning in Bed

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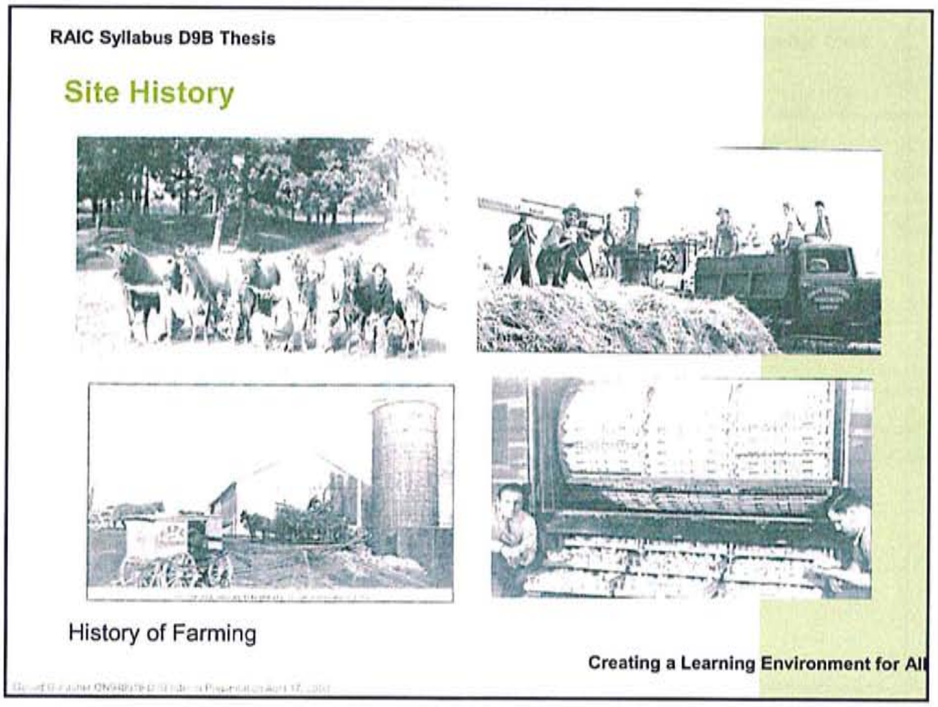

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Site History

History of Farming

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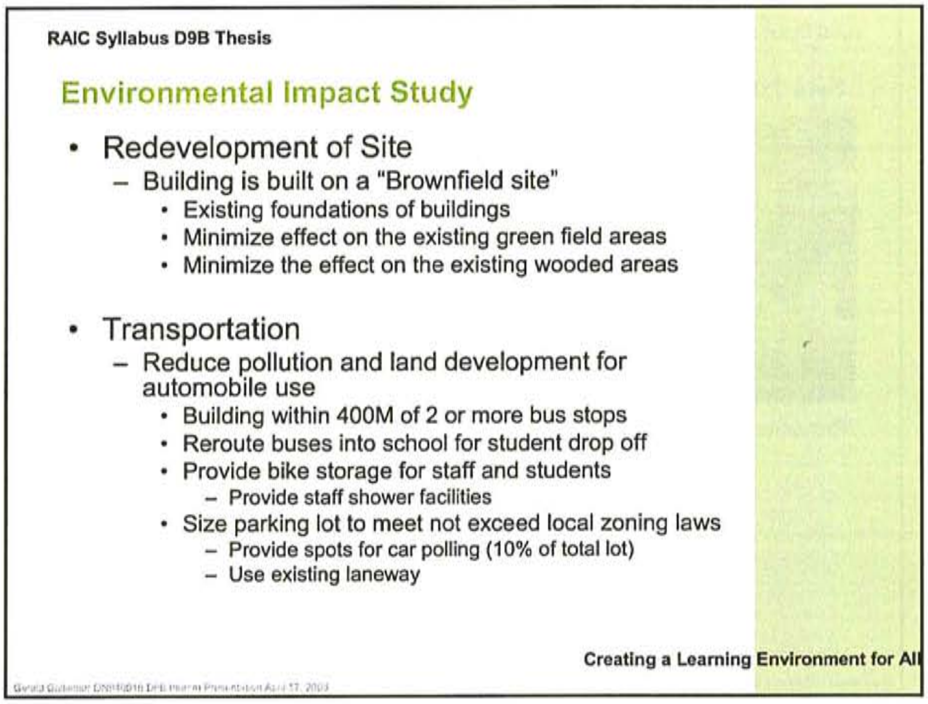

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Environmental Impact Study

- Redevelopment of Site
  - Building is built on a "Brownfield site"
    - Existing foundations of buildings
    - Minimize effect on the existing green field areas
    - Minimize the effect on the existing wooded areas
- Transportation
  - Reduce pollution and land development for automobile use
    - Building within 400M of 2 or more bus stops
    - Reroute buses into school for student drop off
    - Provide bike storage for staff and students
      - Provide staff shower facilities
    - Size parking lot to meet not exceed local zoning laws
      - Provide spots for car polling (10% of total lot)
      - Use existing laneway

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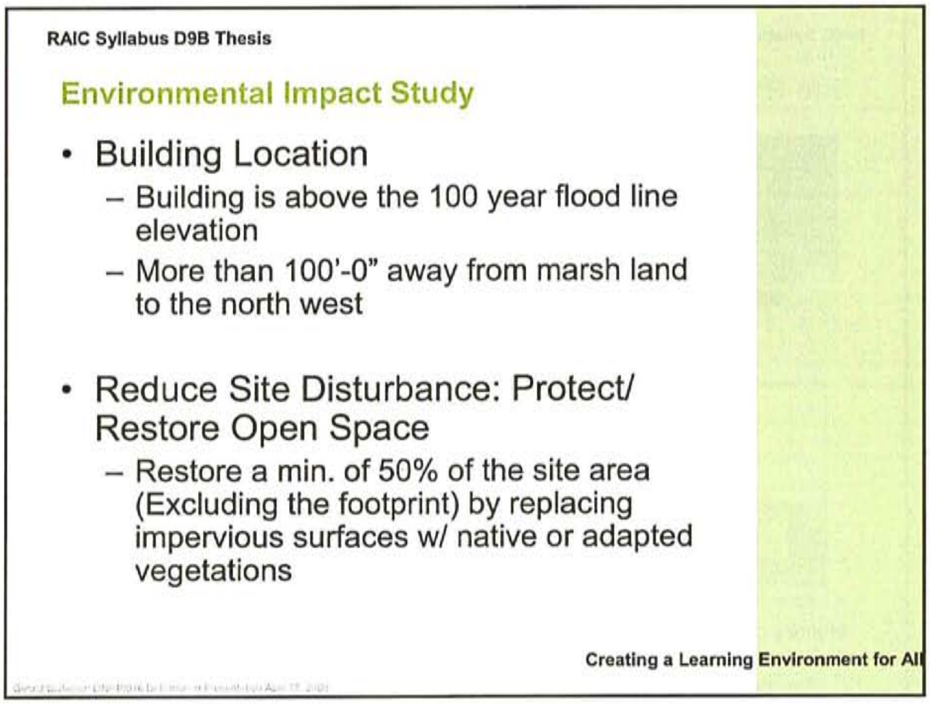

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Environmental Impact Study

- Building Location
  - Building is above the 100 year flood line elevation
  - More than 100'-0" away from marsh land to the north west
- Reduce Site Disturbance: Protect/ Restore Open Space
  - Restore a min. of 50% of the site area (Excluding the footprint) by replacing impervious surfaces w/ native or adapted vegetations

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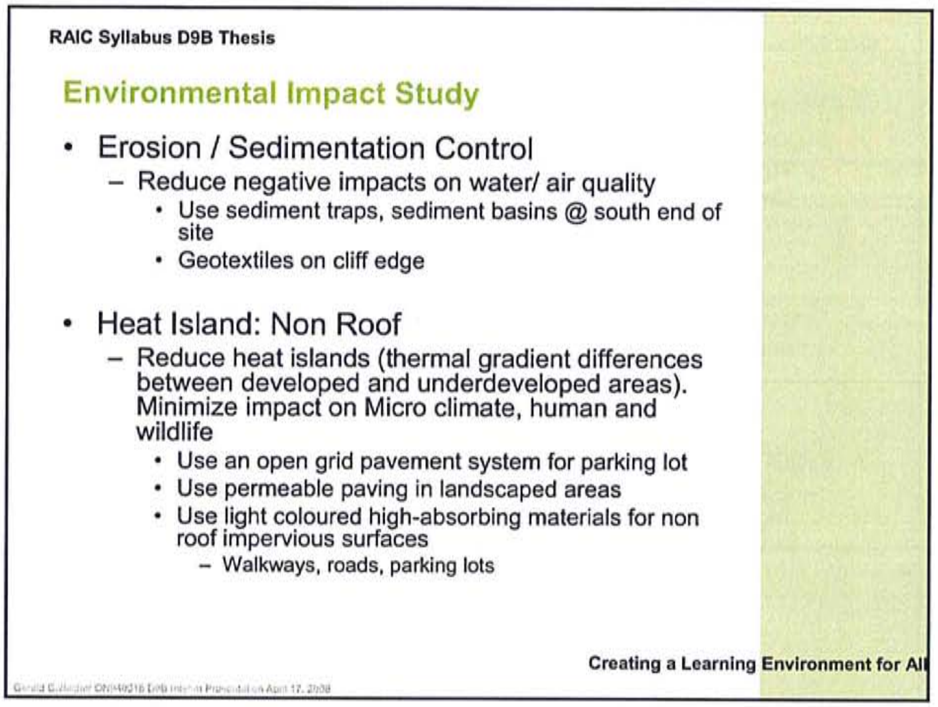

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Environmental Impact Study

- Erosion / Sedimentation Control
  - Reduce negative impacts on water/ air quality
    - Use sediment traps, sediment basins @ south end of site
    - Geotextiles on cliff edge
- Heat Island: Non Roof
  - Reduce heat islands (thermal gradient differences between developed and underdeveloped areas). Minimize impact on Micro climate, human and wildlife
    - Use an open grid pavement system for parking lot
    - Use permeable paving in landscaped areas
    - Use light coloured high-absorbing materials for non roof impervious surfaces
      - Walkways, roads, parking lots

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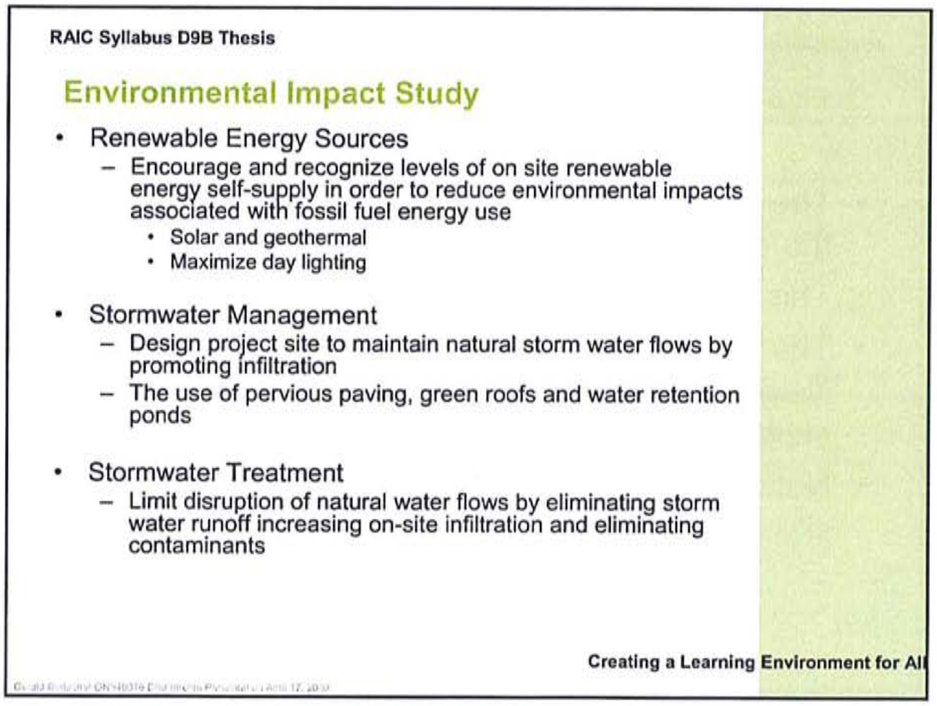

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Environmental Impact Study

- Renewable Energy Sources
  - Encourage and recognize levels of on site renewable energy self-supply in order to reduce environmental impacts associated with fossil fuel energy use
    - Solar and geothermal
    - Maximize day lighting
- Stormwater Management
  - Design project site to maintain natural storm water flows by promoting infiltration
  - The use of pervious paving, green roofs and water retention ponds
- Stormwater Treatment
  - Limit disruption of natural water flows by eliminating storm water runoff increasing on-site infiltration and eliminating contaminants

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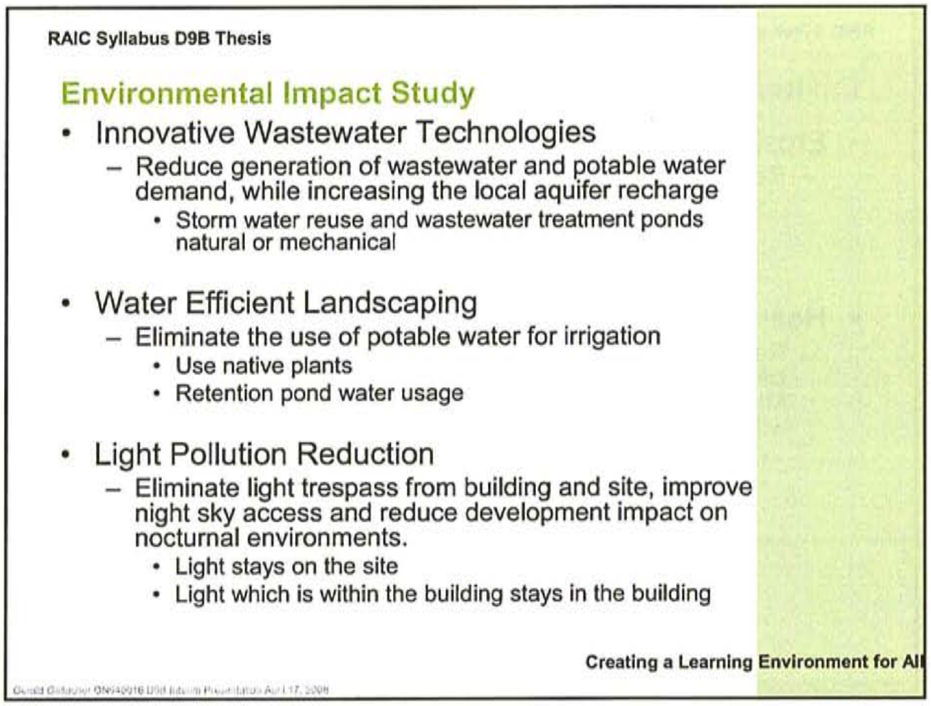

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Environmental Impact Study

- Innovative Wastewater Technologies
  - Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge
    - Storm water reuse and wastewater treatment ponds natural or mechanical
- Water Efficient Landscaping
  - Eliminate the use of potable water for irrigation
    - Use native plants
    - Retention pond water usage
- Light Pollution Reduction
  - Eliminate light trespass from building and site, improve night sky access and reduce development impact on nocturnal environments.
    - Light stays on the site
    - Light which is within the building stays in the building

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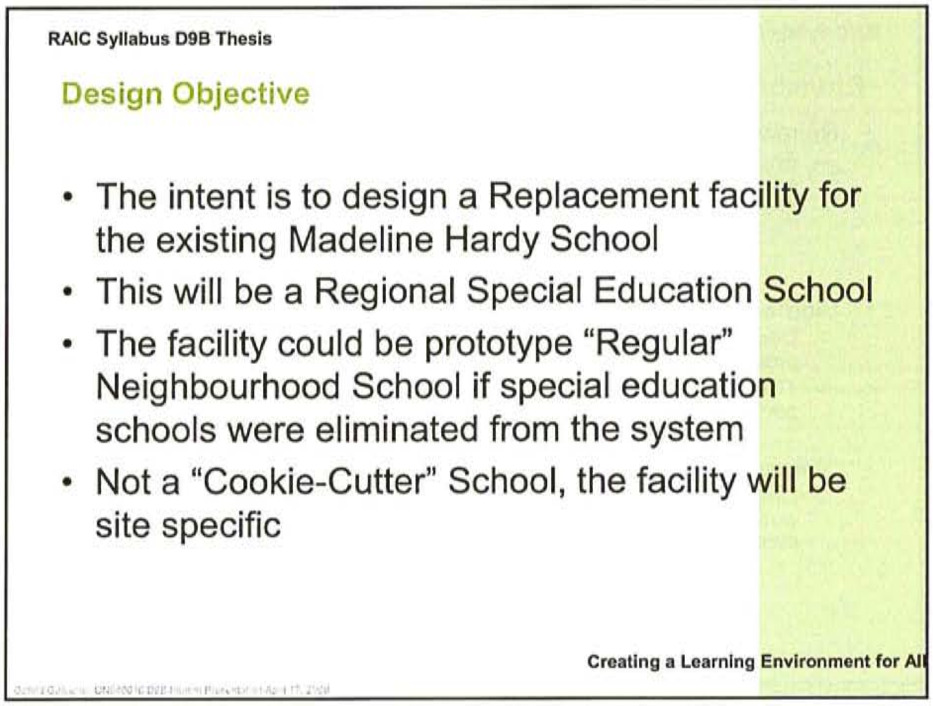

RAIC Syllabus D9B Thesis

Design Objective

- The intent is to design a Replacement facility for the existing Madeline Hardy School
- This will be a Regional Special Education School
- The facility could be prototype "Regular" Neighbourhood School if special education schools were eliminated from the system
- Not a "Cookie-Cutter" School, the facility will be site specific

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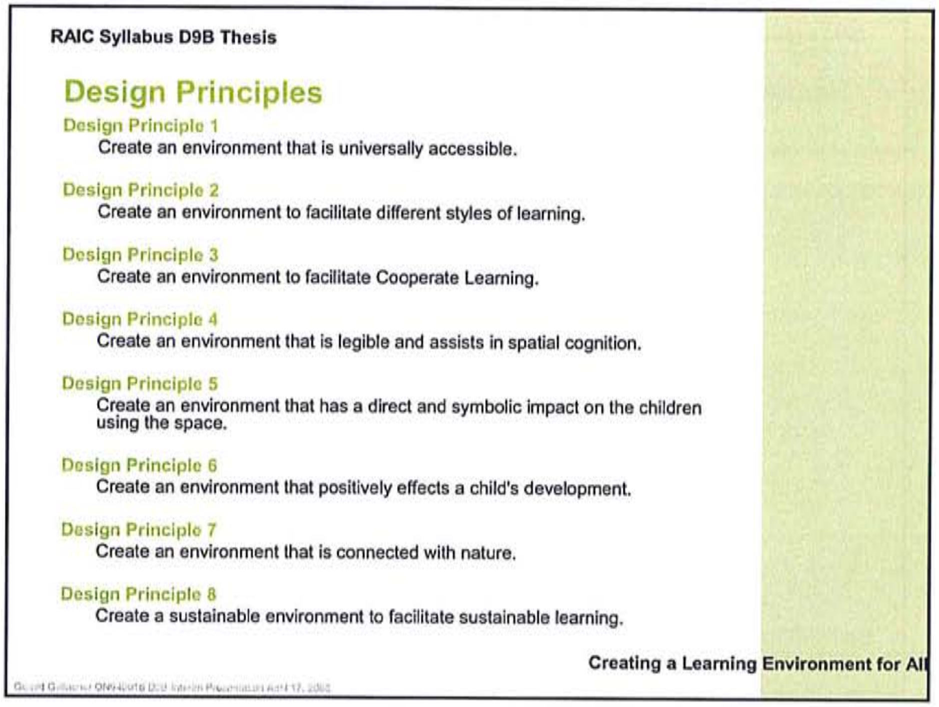

RAIC Syllabus D9B Thesis

Design Principles

Design Principle 1
Create an environment that is universally accessible.

Design Principle 2
Create an environment to facilitate different styles of learning.

Design Principle 3
Create an environment to facilitate Cooperate Learning.

Design Principle 4
Create an environment that is legible and assists in spatial cognition.

Design Principle 5
Create an environment that has a direct and symbolic impact on the children using the space.

Design Principle 6
Create an environment that positively effects a child's development.

Design Principle 7
Create an environment that is connected with nature.

Design Principle 8
Create a sustainable environment to facilitate sustainable learning.

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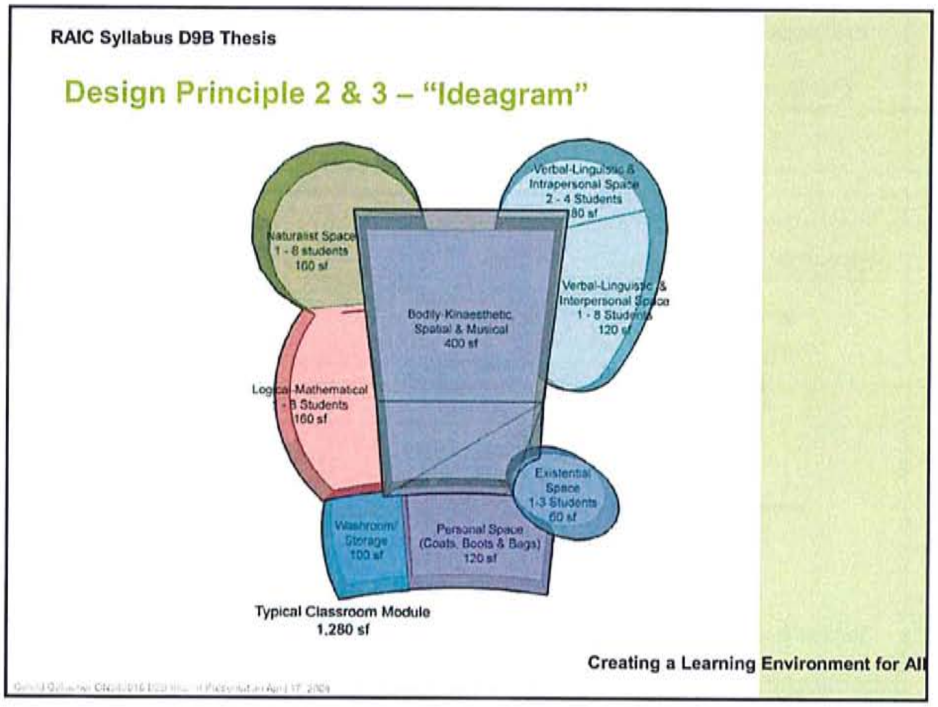
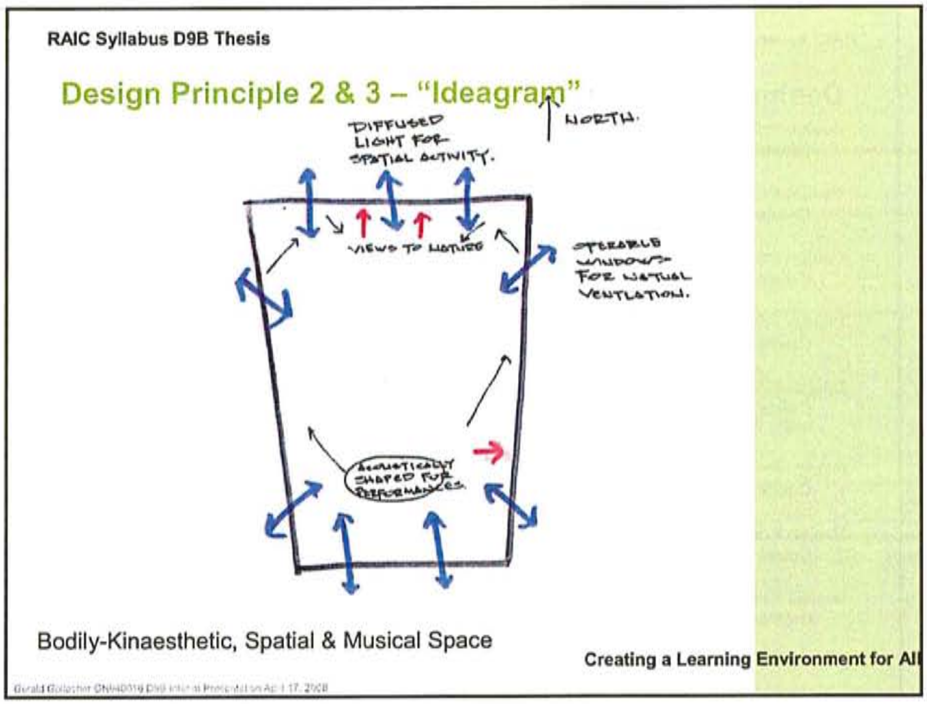


RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Ideagram"

Typical Classroom Module
1,280 sf

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Ideagram"

NORTH.
DIFFUSED LIGHT FOR SPATIAL ACTIVITY.
VIEWS TO NATURE
OPERABLE WINDOWS FOR NATURAL VENTILATION.
ACOUSTICALLY SHAPED FOR PERFORMANCES.

Bodily-Kinaesthetic, Spatial & Musical Space

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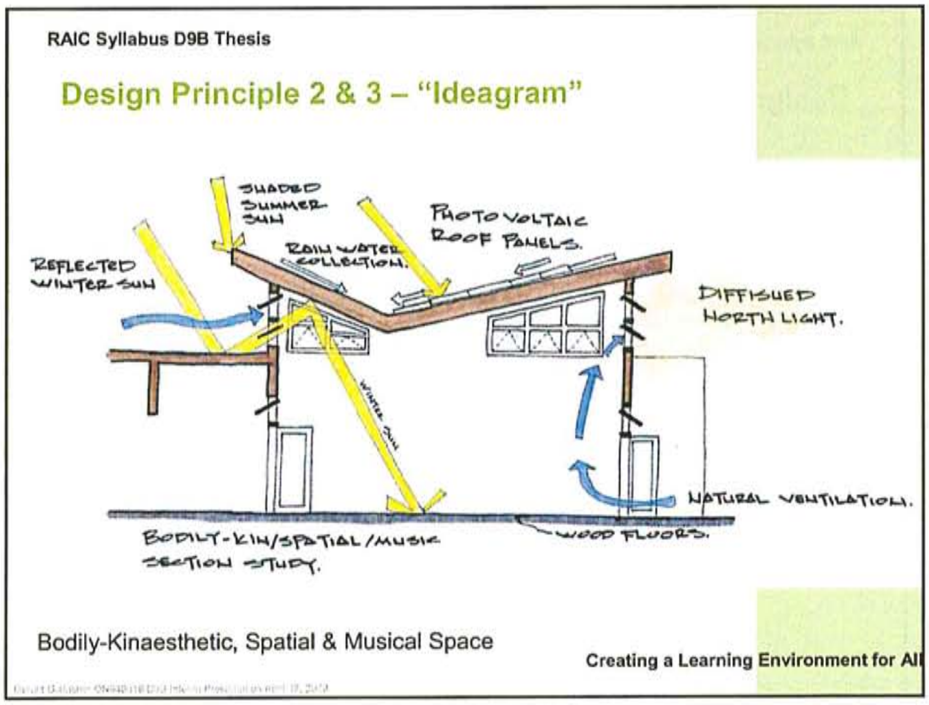
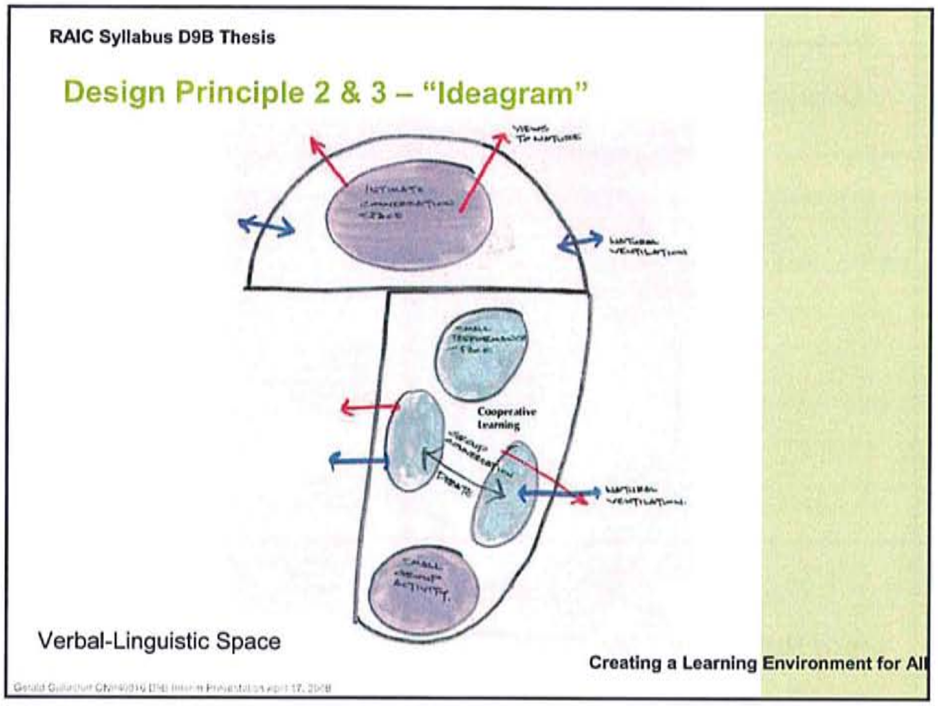


RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Ideagram"

Bodily-Kinaesthetic, Spatial & Musical Space

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Ideagram"

Verbal-Linguistic Space

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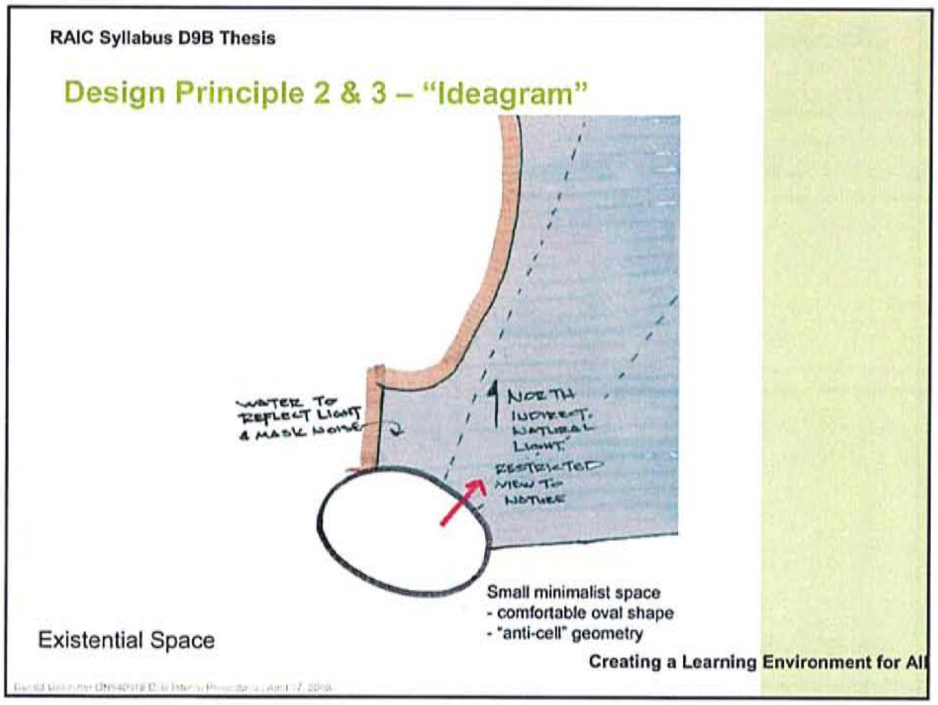
WATER TO REFLECT LIGHT & MASK NOISE
NORTH
INDIRECT. NATURAL LIGHT
RESTRICTED VIEW TO NATURE

RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Ideagram"

Small minimalist space
- comfortable oval shape
- "anti-cell" geometry

Existential Space

Creating a Learning Environment for All

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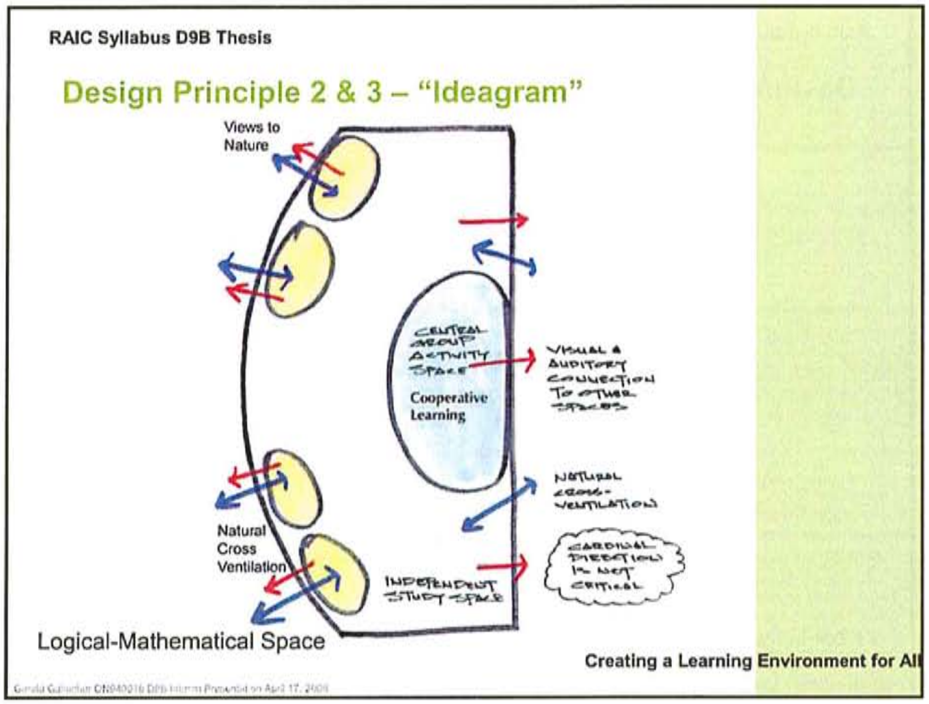

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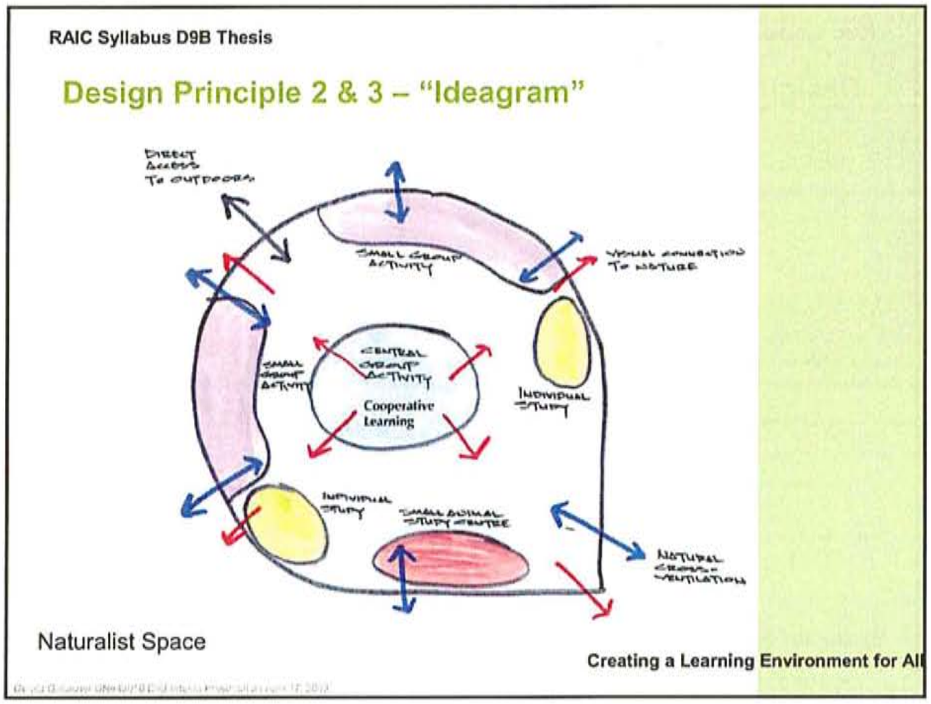
Design Principle 2 & 3 – "Ideagram"

Views to Nature
CENTRAL GROUP ACTIVITY SPACE
Cooperative Learning
VISUAL & AUDITORY CONNECTION TO OTHER SPACES
NATURAL CROSS-VENTILATION
Natural Cross Ventilation
INDEPENDENT STUDY SPACE
CARDINAL DIRECTION IS NOT CRITICAL

Logical-Mathematical Space

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Interim Presented on April 17, 2009



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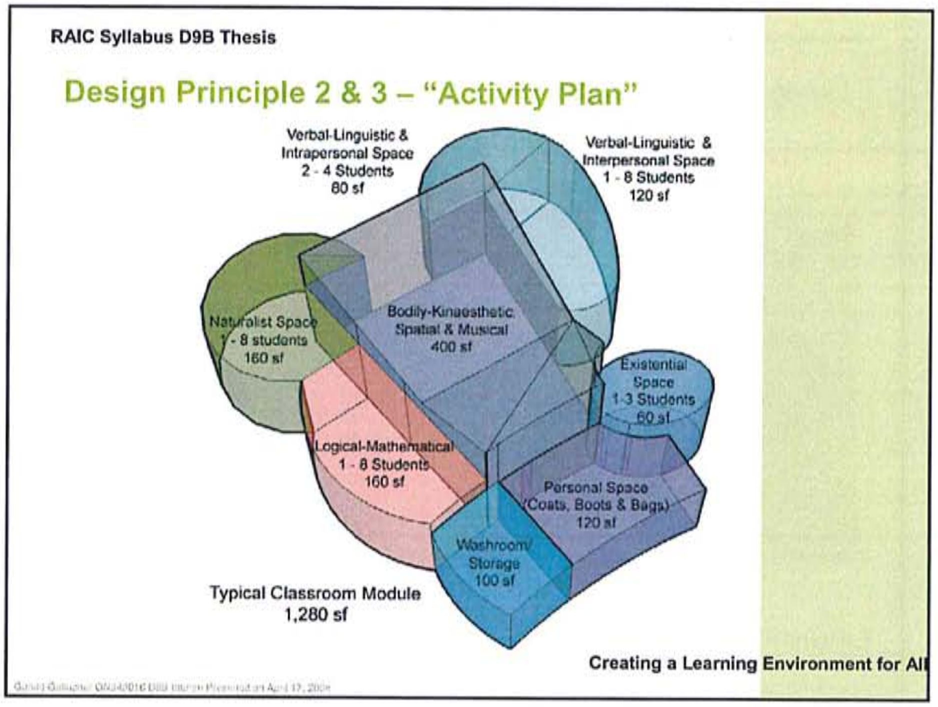
Design Principle 2 & 3 – "Ideagram"

Naturalist Space

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Activity Plan"

Verbal-Linguistic & Intrapersonal Space
2 - 4 Students
80 sf

Verbal-Linguistic & Interpersonal Space
1 - 8 Students
120 sf

Naturalist Space
1 - 8 students
160 sf

Bodily-Kinaesthetic, Spatial & Musical
400 sf

Existential Space
1-3 Students
60 sf

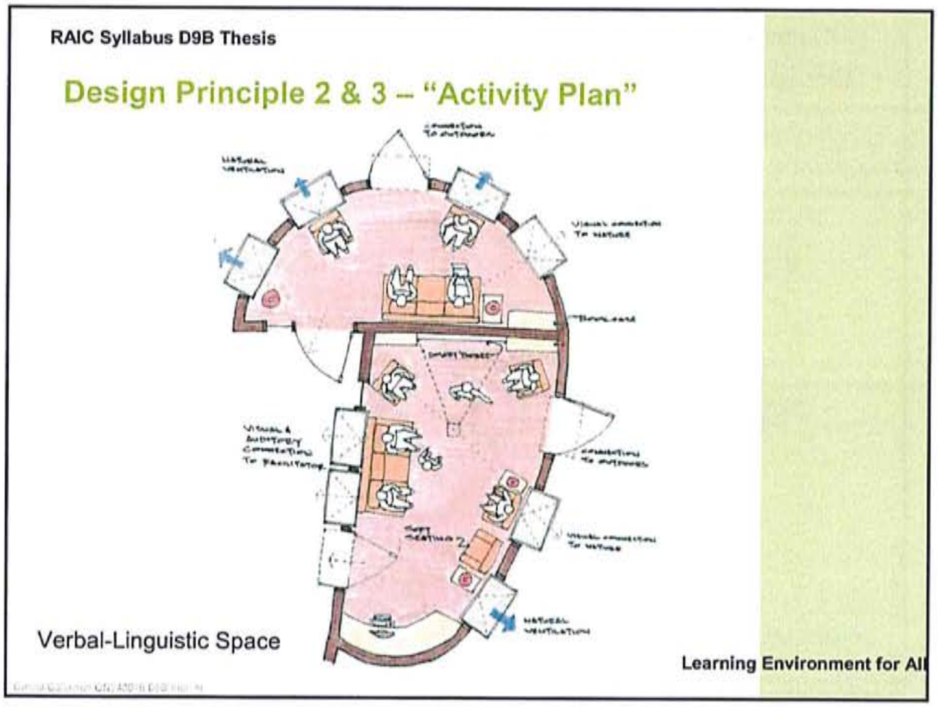
Logical-Mathematical
1 - 8 Students
160 sf

Personal Space
(Coats, Boots & Bags)
120 sf

Washroom/ Storage
100 sf

Typical Classroom Module
1,280 sf

Creating a Learning Environment for Al

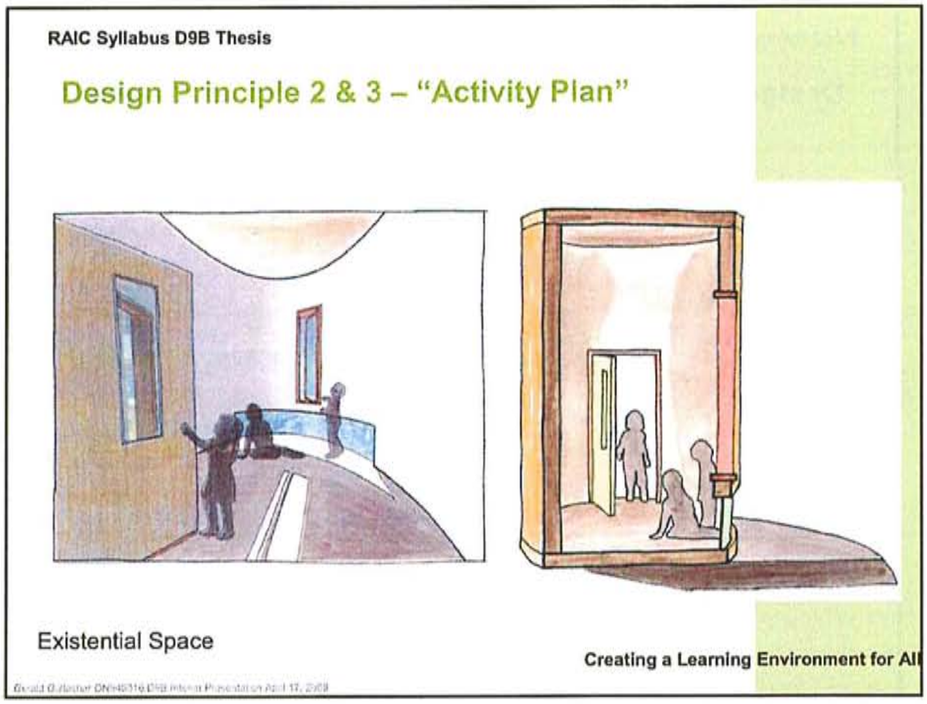


RAIC Syllabus D9B Thesis

Design Principle 2 & 3 – "Activity Plan"

Verbal-Linguistic Space

Learning Environment for Al



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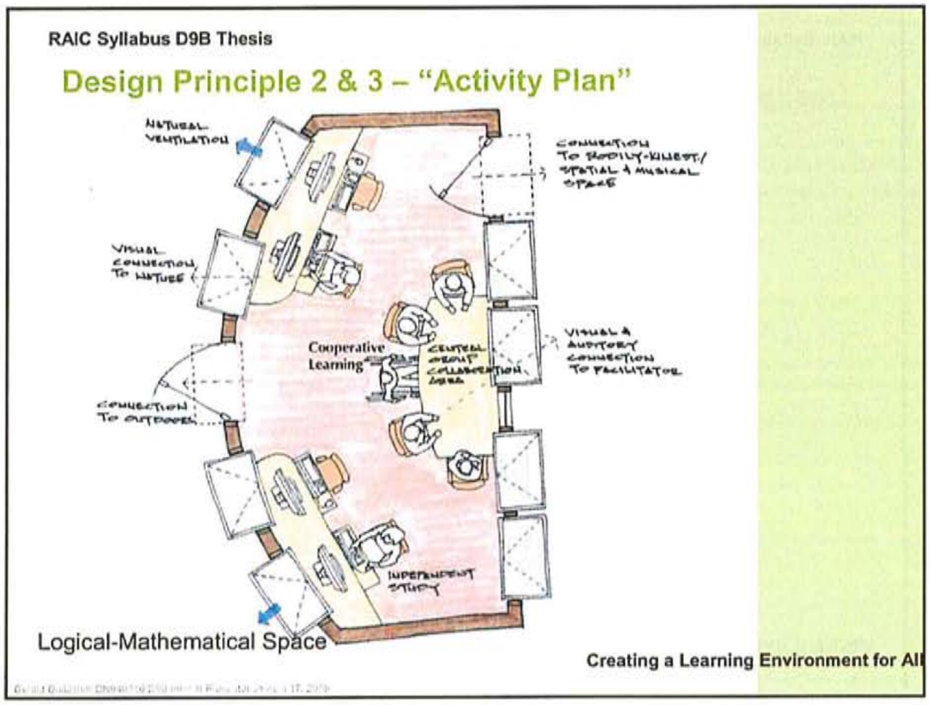
Design Principle 2 & 3 – "Activity Plan"

Existential Space

Creating a Learning Environment for All



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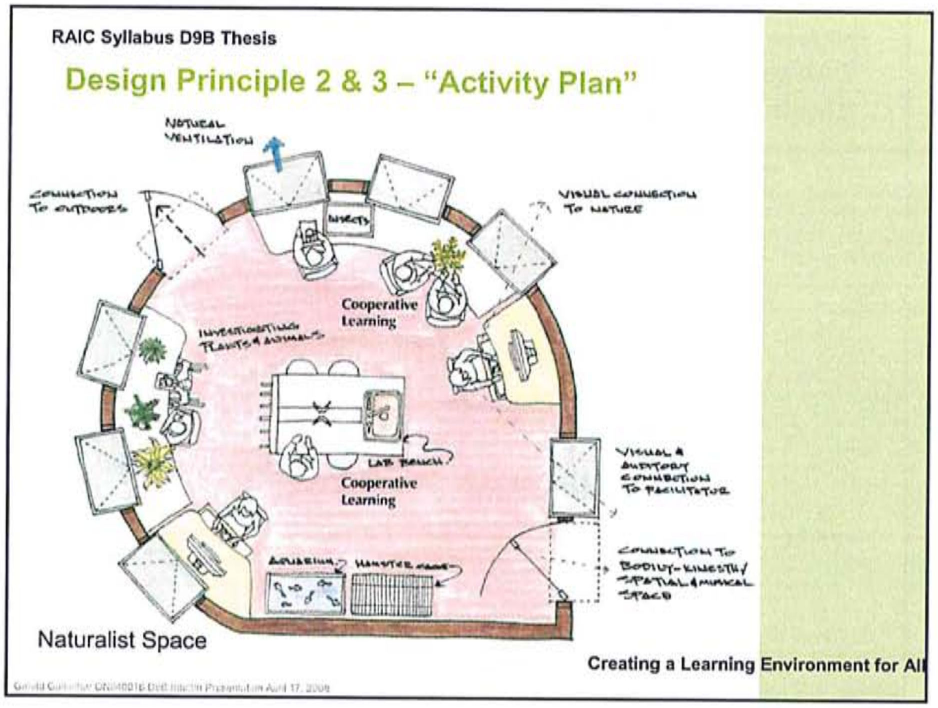
Design Principle 2 & 3 – "Activity Plan"

NATURAL VENTILATION
CONNECTION TO BODILY-KINEST./ SPATIAL & MUSICAL SPACE
VISUAL CONNECTION TO NATURE
Cooperative Learning
CENTRAL GROUP COLLABORATION AREA
VISUAL & AUDITORY CONNECTION TO FACILITATOR
CONNECTION TO OUTDOORS
INDEPENDENT STUDY

Logical-Mathematical Space

Creating a Learning Environment for All



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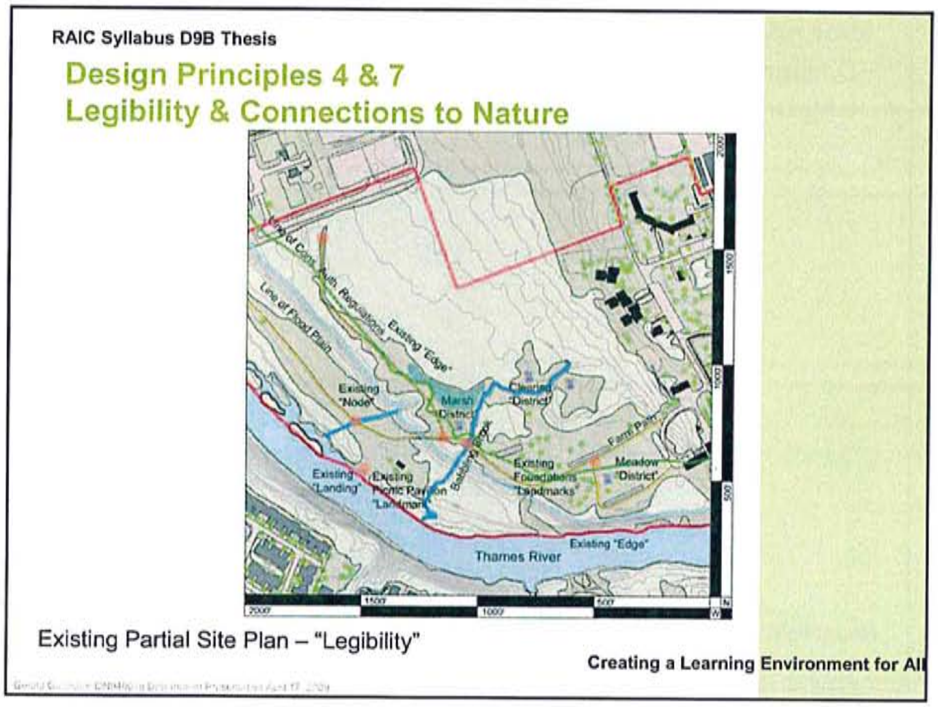
Design Principle 2 & 3 – "Activity Plan"

NATURAL VENTILATION
CONNECTION TO OUTDOORS
INSECTS
VISUAL CONNECTION TO NATURE
Cooperative Learning
INVESTIGATING PLANTS & ANIMALS
LAB BENCH
Cooperative Learning
VISUAL & AUDITORY CONNECTION TO FACILITATOR
AQUARIUM
HAMSTER CAGE
CONNECTION TO BODILY-KINESTH/ SPATIAL & MUSICAL SPACE

Naturalist Space

Creating a Learning Environment for All



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Design Principles 4 & 7
Legibility & Connections to Nature

Existing Partial Site Plan – "Legibility"

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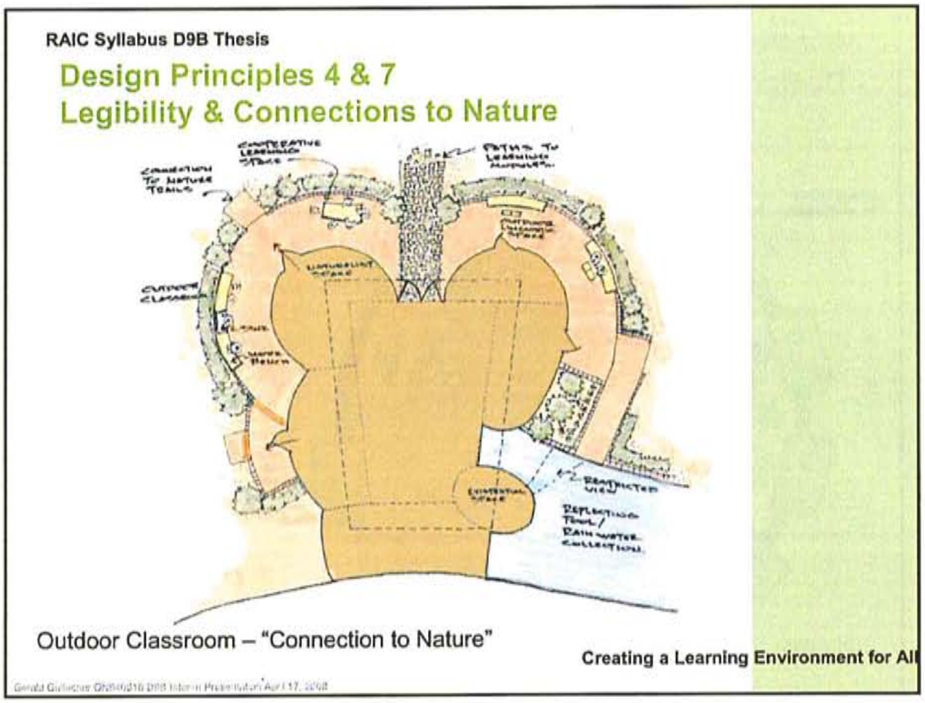

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Design Principles 4 & 7
Legibility & Connections to Nature

COOPERATIVE LEARNING SPACE
PATHS TO LEARNING MODULES
CONNECTION TO NATURE TRAILS
OUTDOOR CLASSROOM
RESTRICTED VIEW
REFLECTING POOL / RAIN WATER COLLECTION

Outdoor Classroom – "Connection to Nature"

Creating a Learning Environment for All

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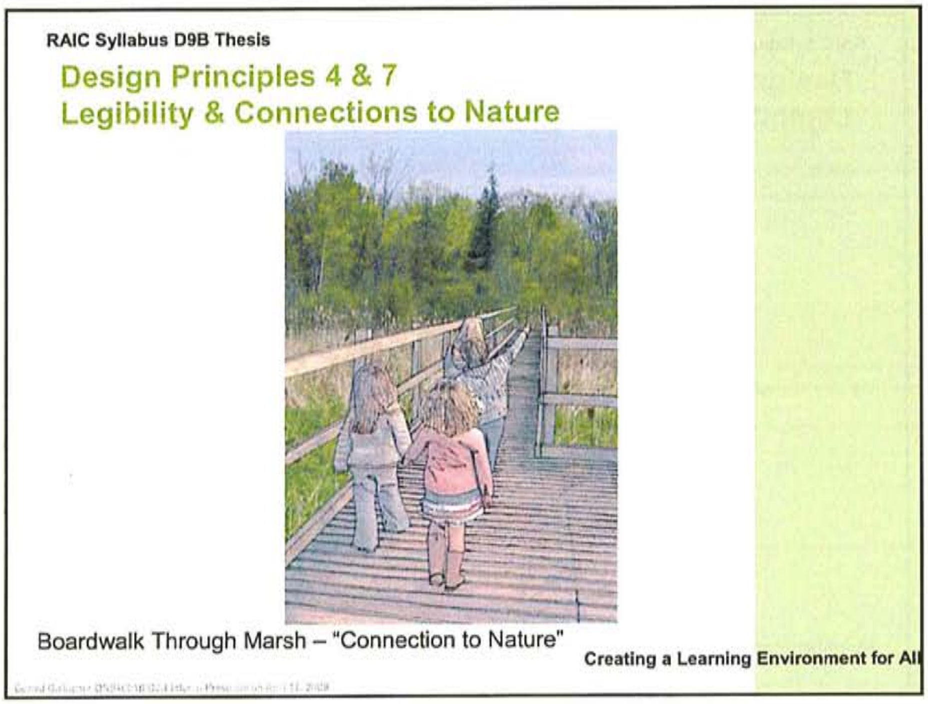

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Design Principles 4 & 7
Legibility & Connections to Nature

Boardwalk Through Marsh – "Connection to Nature"

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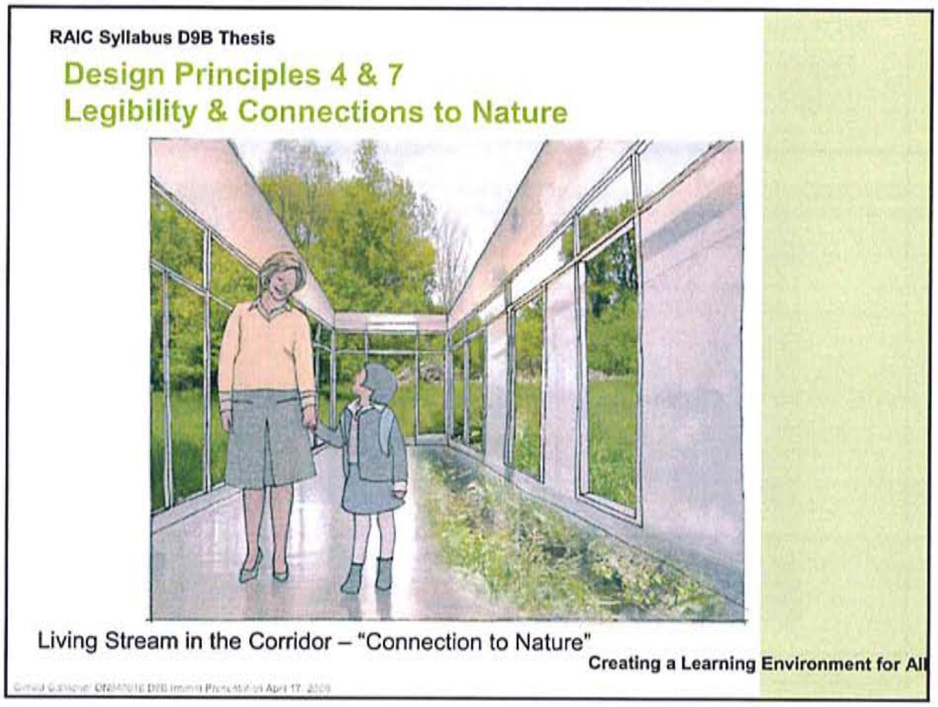

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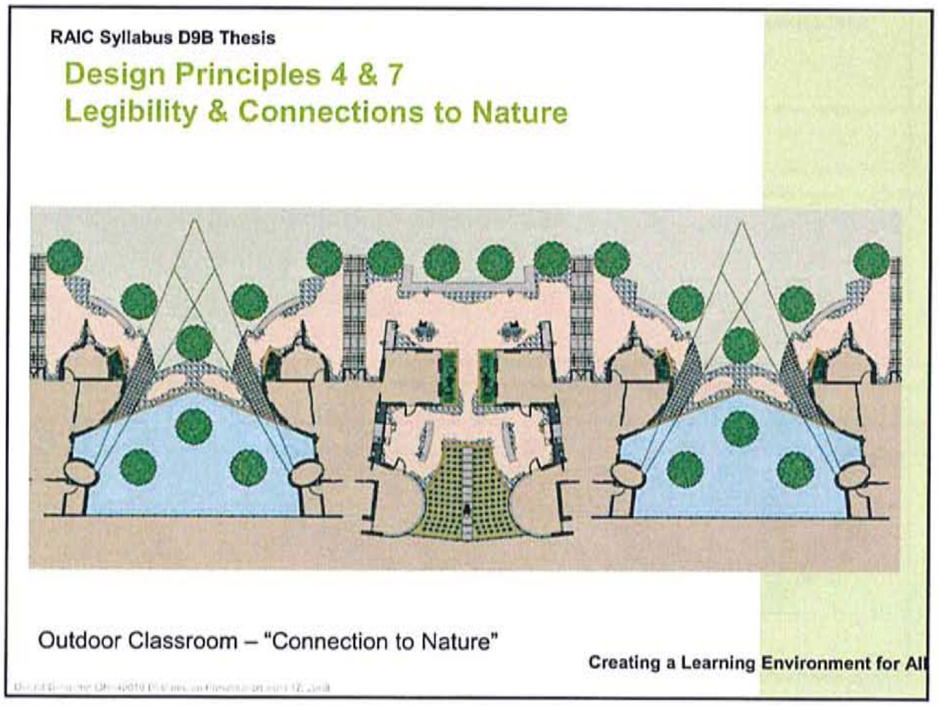
Design Principles 4 & 7
Legibility & Connections to Nature

Living Stream in the Corridor – "Connection to Nature"

Creating a Learning Environment for All



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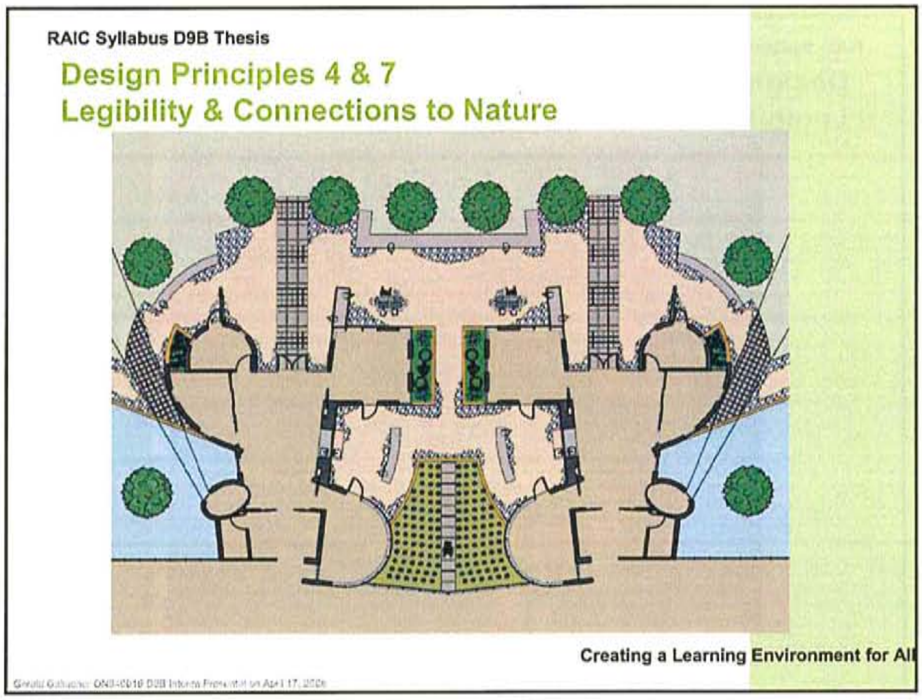
Design Principles 4 & 7
Legibility & Connections to Nature

Outdoor Classroom – "Connection to Nature"

Creating a Learning Environment for All



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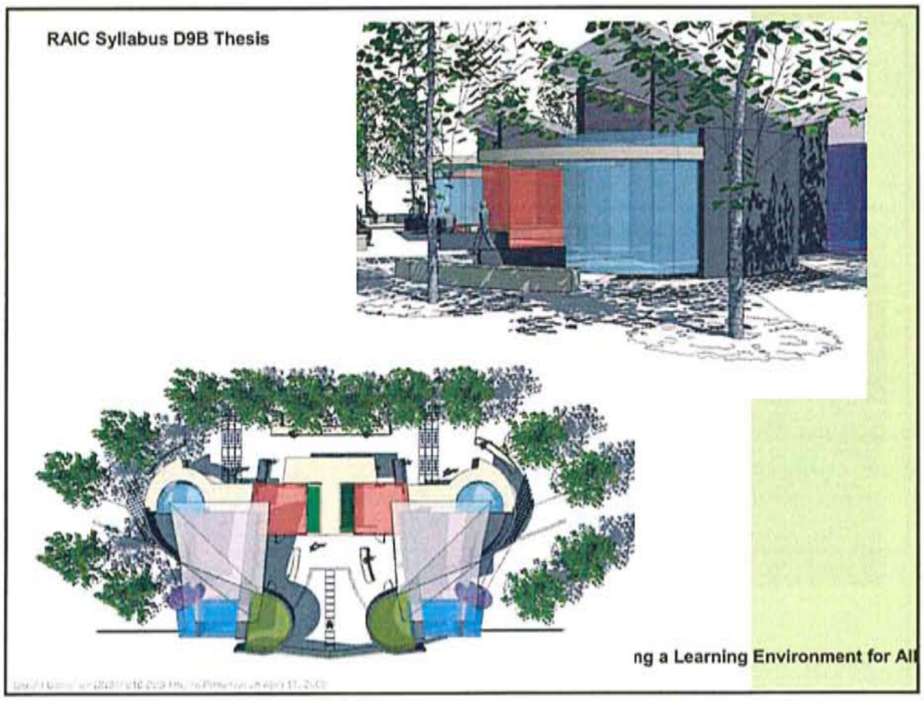
Design Principles 4 & 7
Legibility & Connections to Nature

Creating a Learning Environment for All



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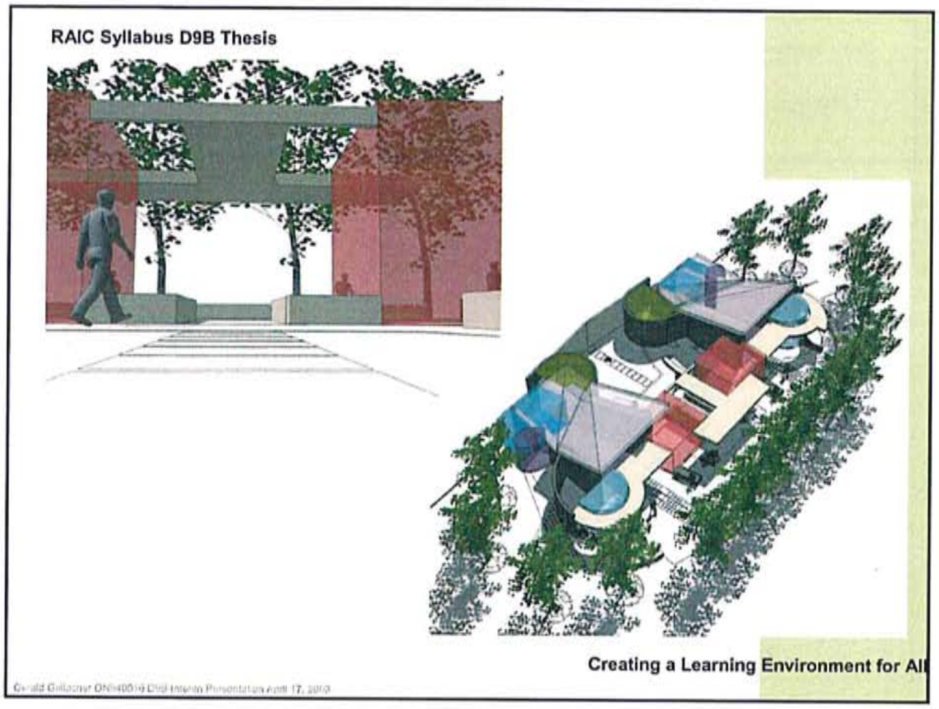

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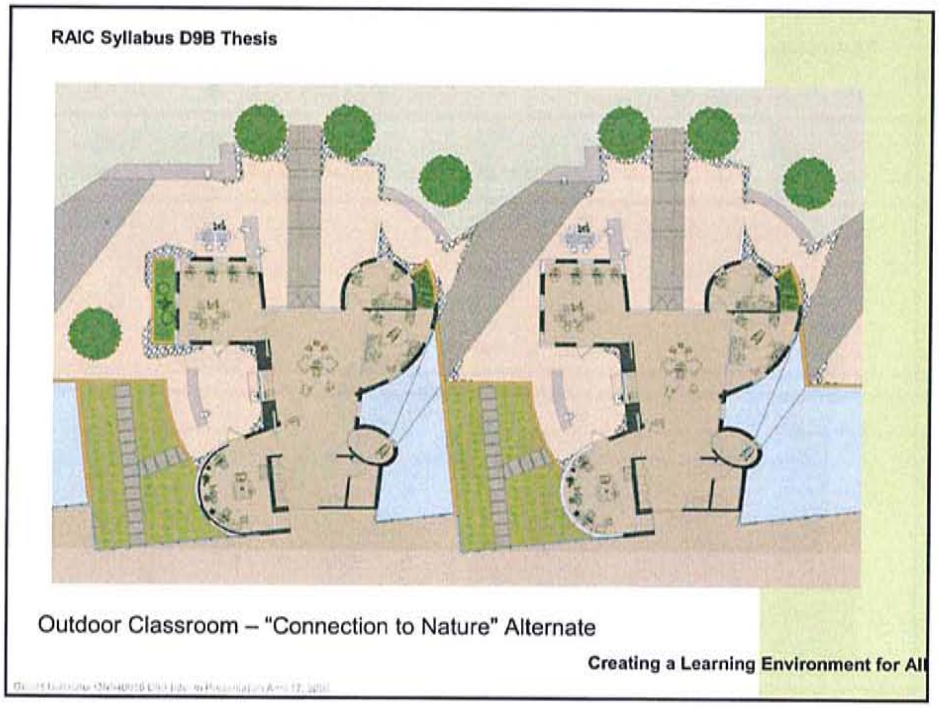

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Outdoor Classroom – "Connection to Nature" Alternate

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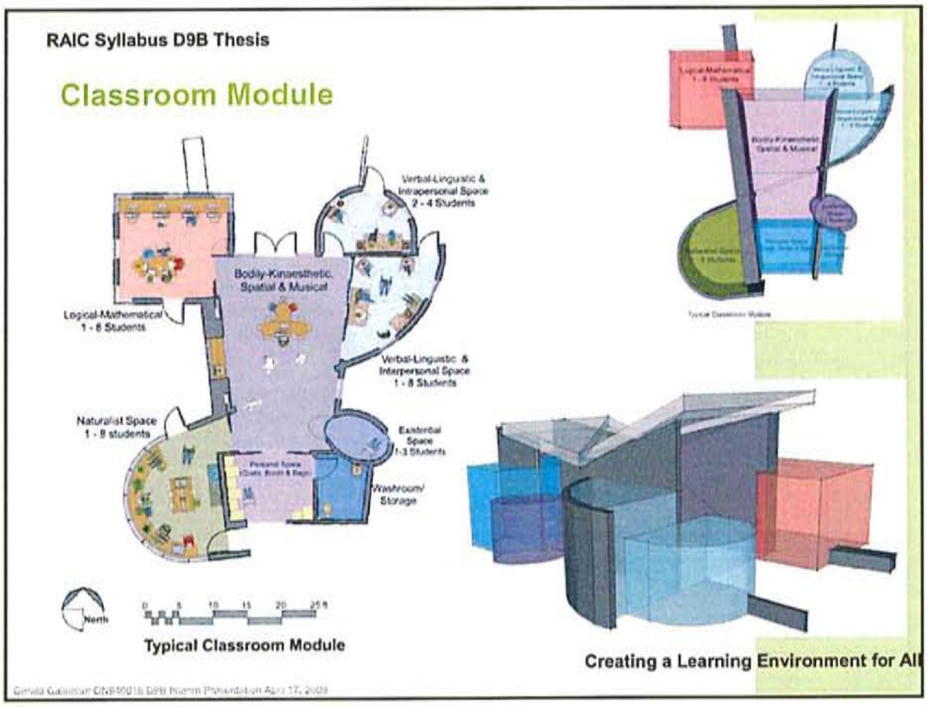

RAIC Syllabus D9B Thesis

Classroom Module

Typical Classroom Module

Creating a Learning Environment for All

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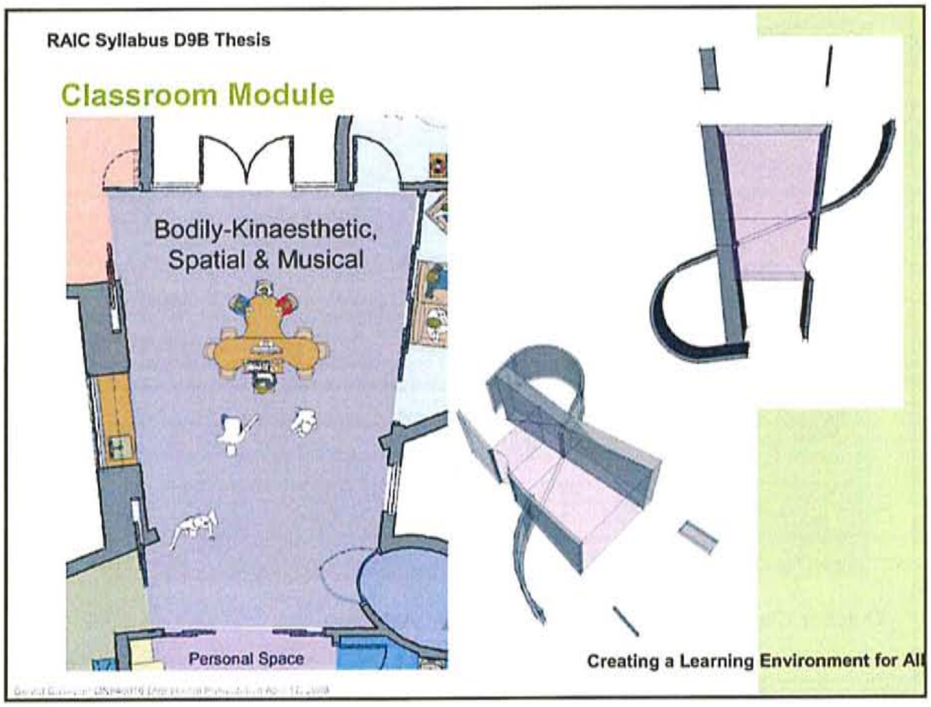

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Classroom Module

Creating a Learning Environment for All

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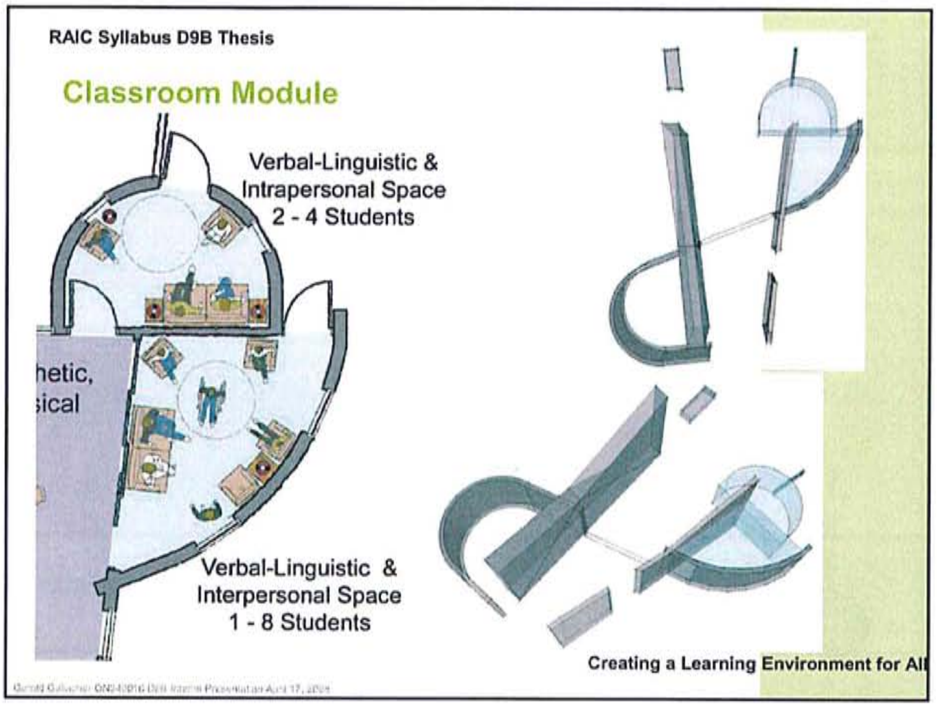

RAIC Syllabus D9B Thesis

Classroom Module

Verbal-Linguistic &
Intrapersonal Space
2 - 4 Students

Verbal-Linguistic &
Interpersonal Space
1 - 8 Students

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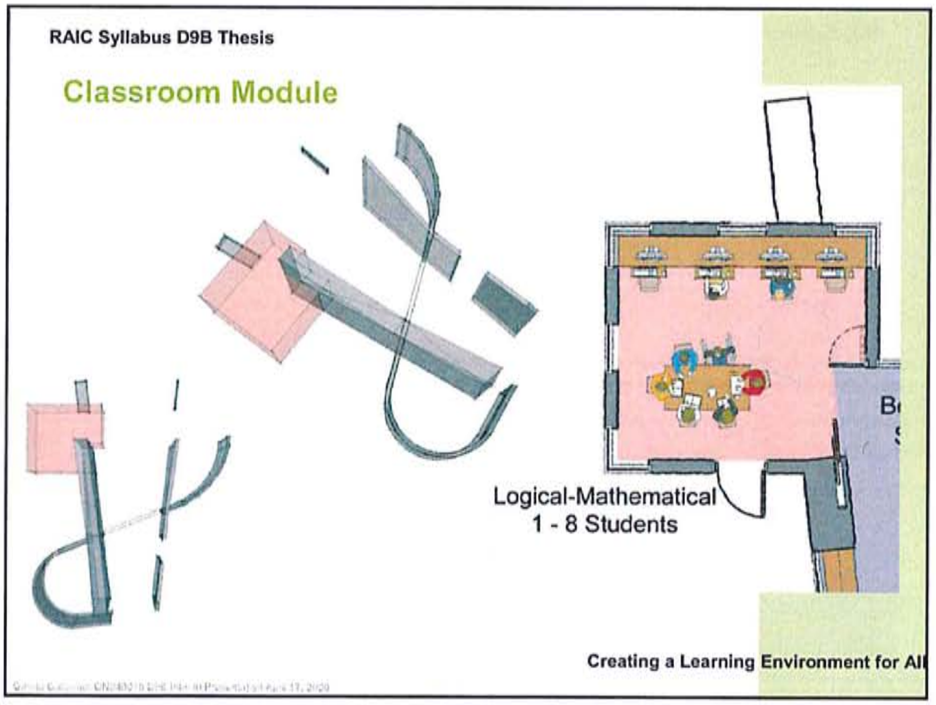
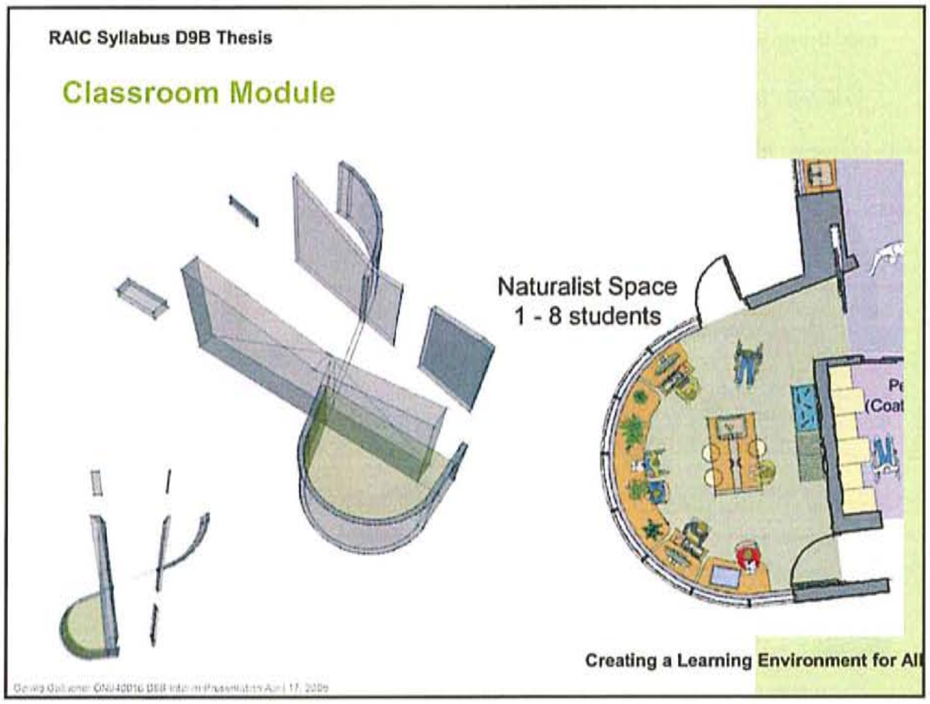


RAIC Syllabus D9B Thesis

Classroom Module

Logical-Mathematical
1 - 8 Students

Creating a Learning Environment for All



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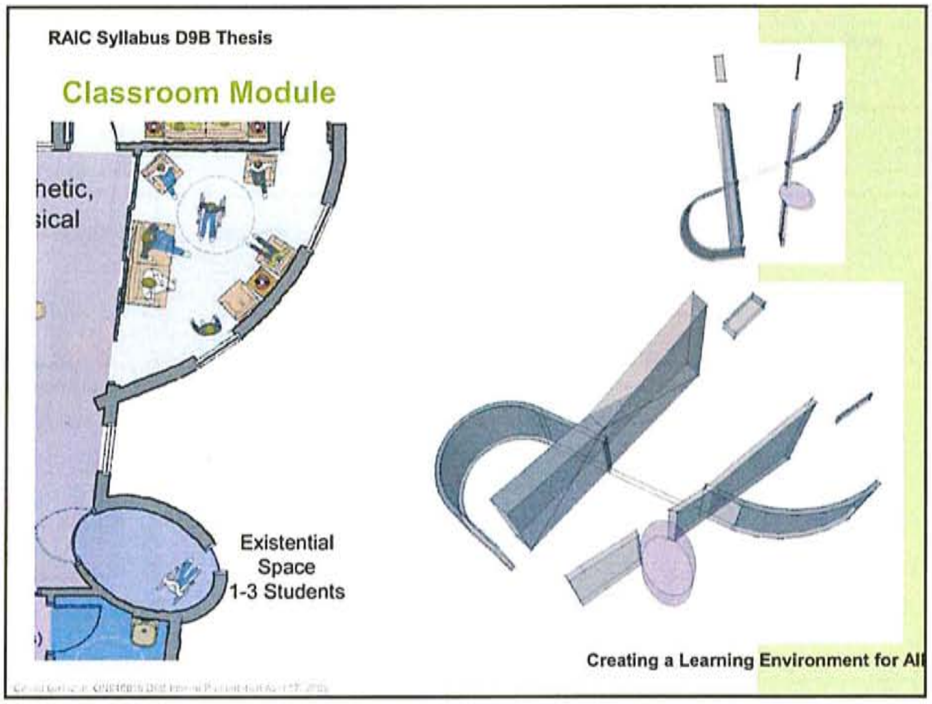
Classroom Module

Creating a Learning Environment for All



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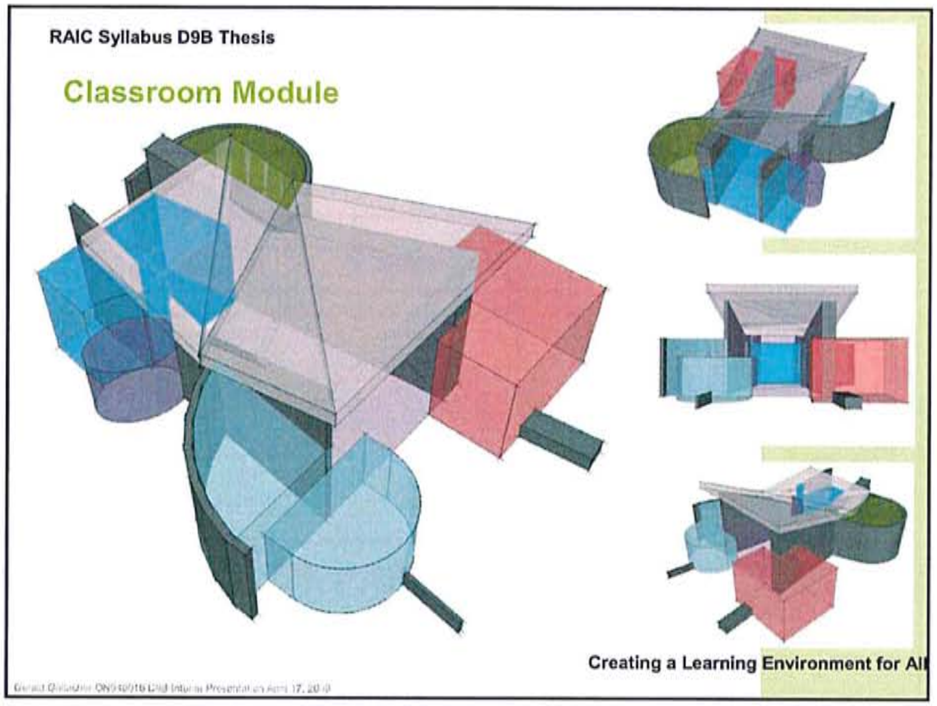
Classroom Module

Creating a Learning Environment for All



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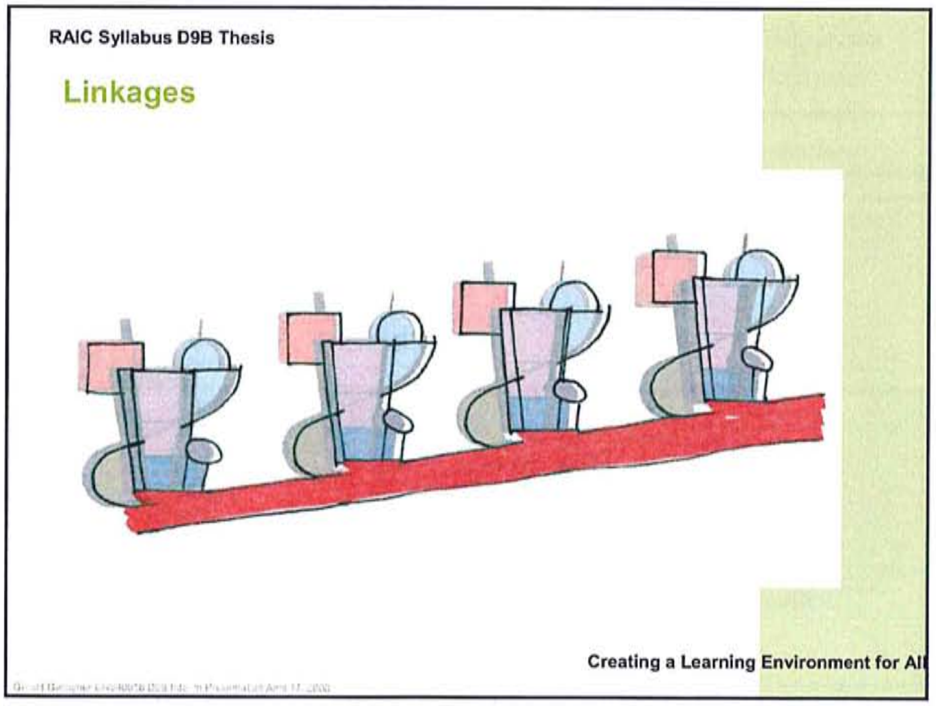
Classroom Module

Creating a Learning Environment for All



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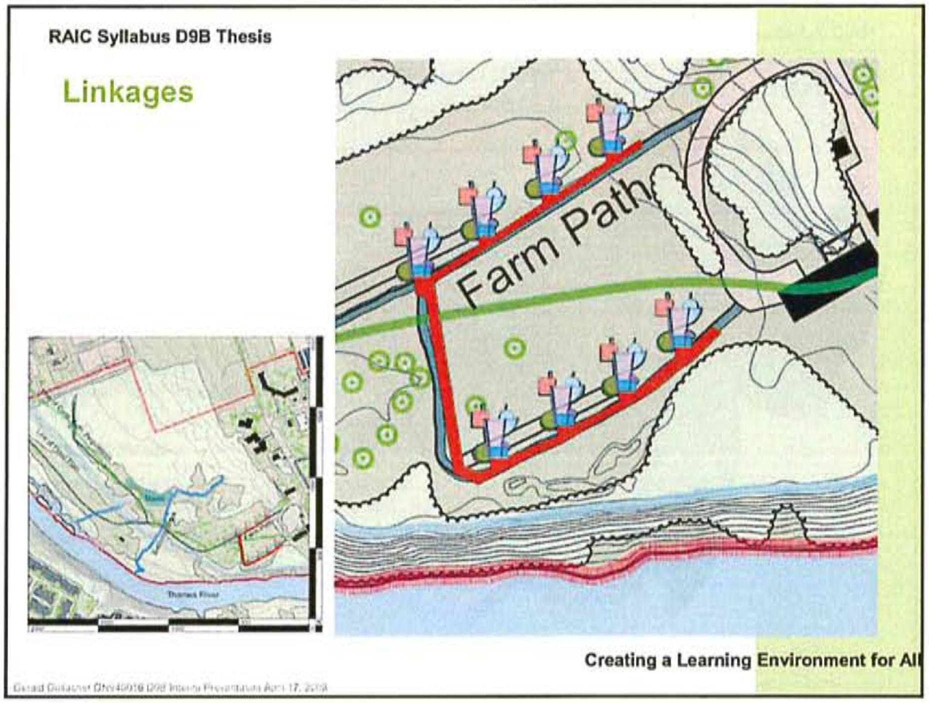
Linkages

Creating a Learning Environment for All



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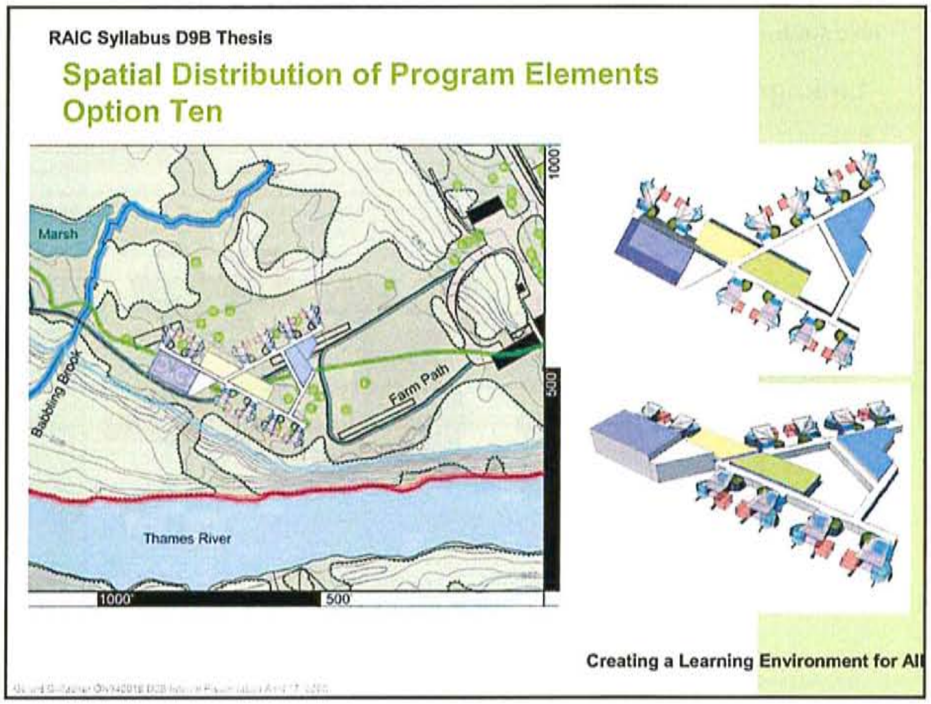
Linkages

Creating a Learning Environment for All



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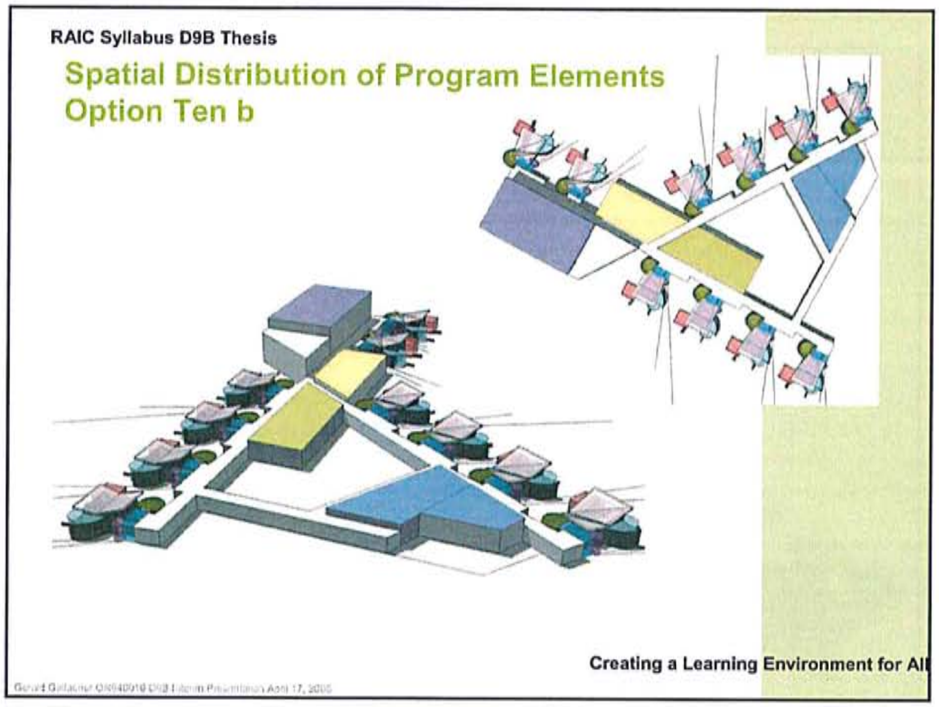
Spatial Distribution of Program Elements Option Ten

Creating a Learning Environment for All



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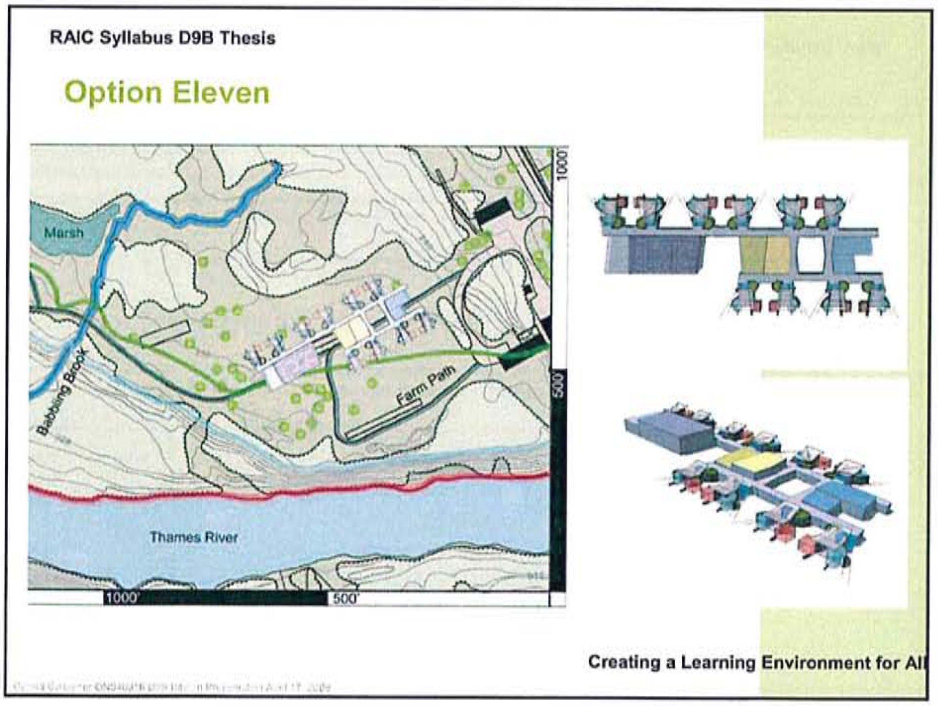
Spatial Distribution of Program Elements
Option Ten b

Creating a Learning Environment for All



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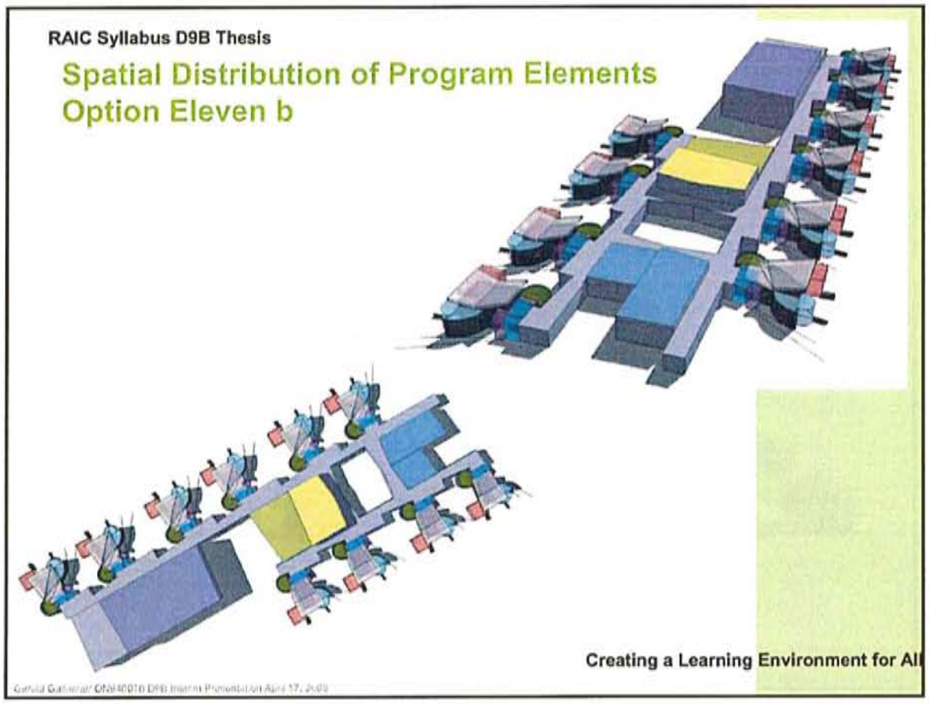
Option Eleven

Creating a Learning Environment for All



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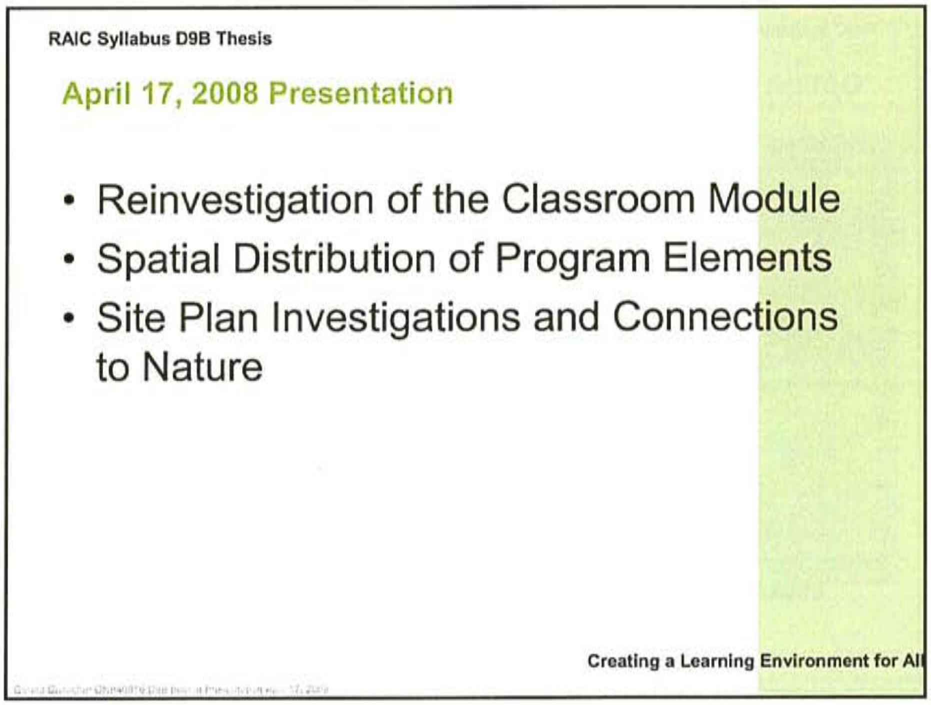
Spatial Distribution of Program Elements
Option Eleven b

Creating a Learning Environment for All



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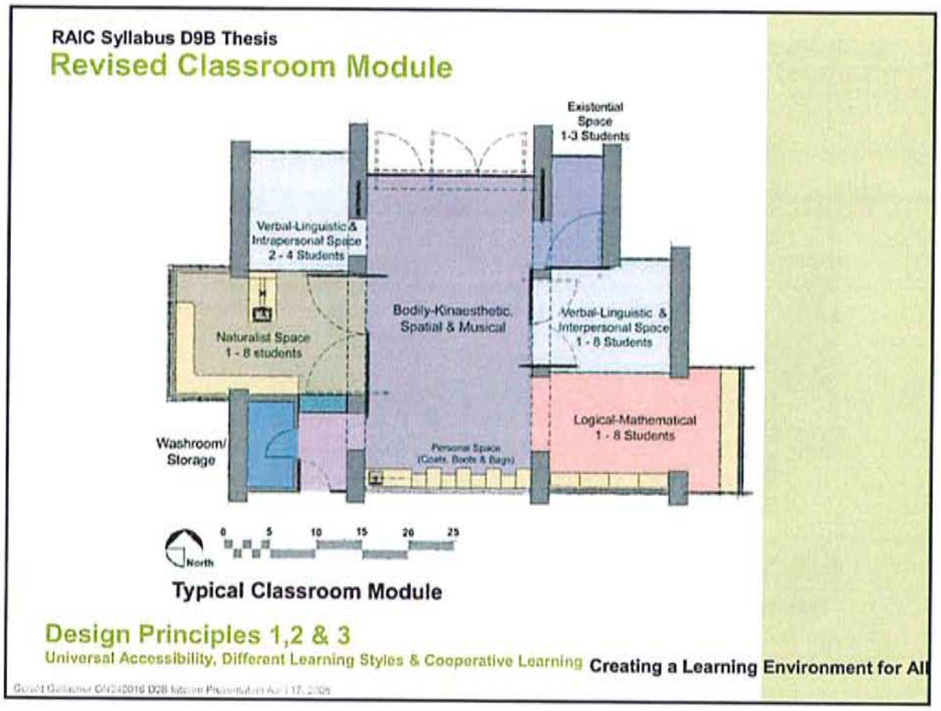
April 17, 2008 Presentation

- Reinvestigation of the Classroom Module
- Spatial Distribution of Program Elements
- Site Plan Investigations and Connections to Nature

Creating a Learning Environment for All



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Revised Classroom Module

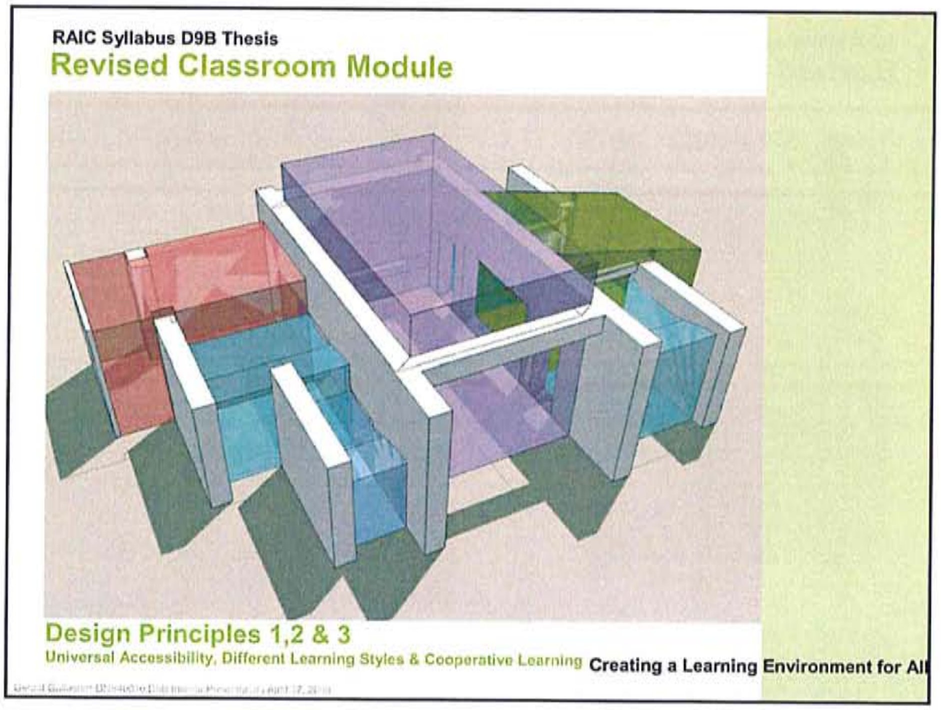
Typical Classroom Module

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning

Creating a Learning Environment for All

Gerald Gallacher ON940016 D9B Interim Presentation April 17, 2006



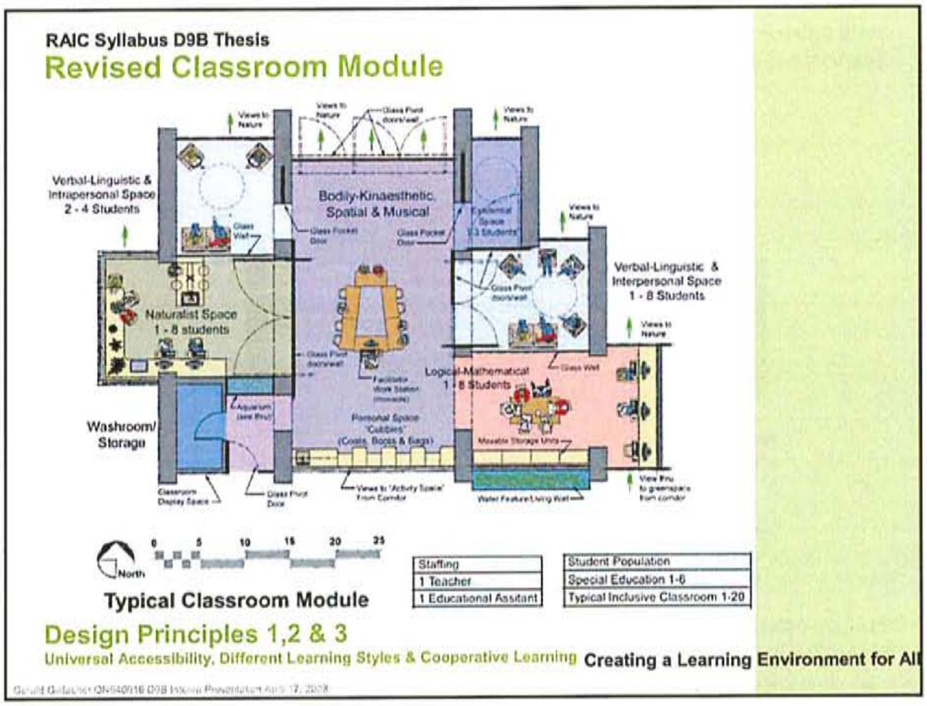
RAIC Syllabus D9B Thesis

Revised Classroom Module

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Revised Classroom Module

Views to Nature
Views to Nature
Glass Pivot doors/wall
Views to Nature
Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic, Spatial & Musical
Glass Wall
Glass Pocket Door
Glass Pocket Door
Existential Space 1-3 Students
Views to Nature
Naturalist Space 1 - 8 students
Glass Pivot doors/wall
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Views to Nature
Glass Pivot doors/wall
Facilitator Work Station (movable)
Logical-Mathematical 1 - 8 Students
Glass Wall
Aquarium (see thru)
Washroom/ Storage
Personal Space "Cubbies" (Coats, Boots & Bags)
Movable Storage Units
Classroom Display Space
Glass Pivot Door
Views to "Activity Space" From Corridor
Water Feature/Living Wall
View thru to greenspace from corridor
North
0
5
10
15
20
25

Typical Classroom Module

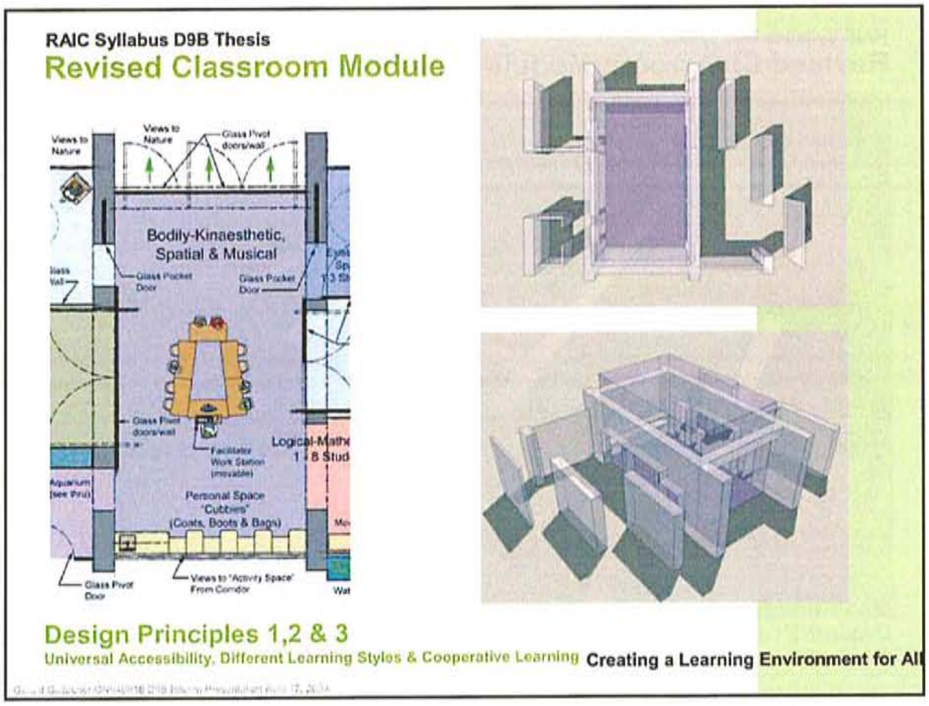
Staffing
1 Teacher
1 Educational Assitant

Student Population
Special Education 1-6
Typical Inclusive Classroom 1-20

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning **Creating a Learning Environment for All**

Gerald Gallacher ON940016 D9B Interim Presentation April 17, 2008



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Revised Classroom Module

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning **Creating a Learning Environment for All**

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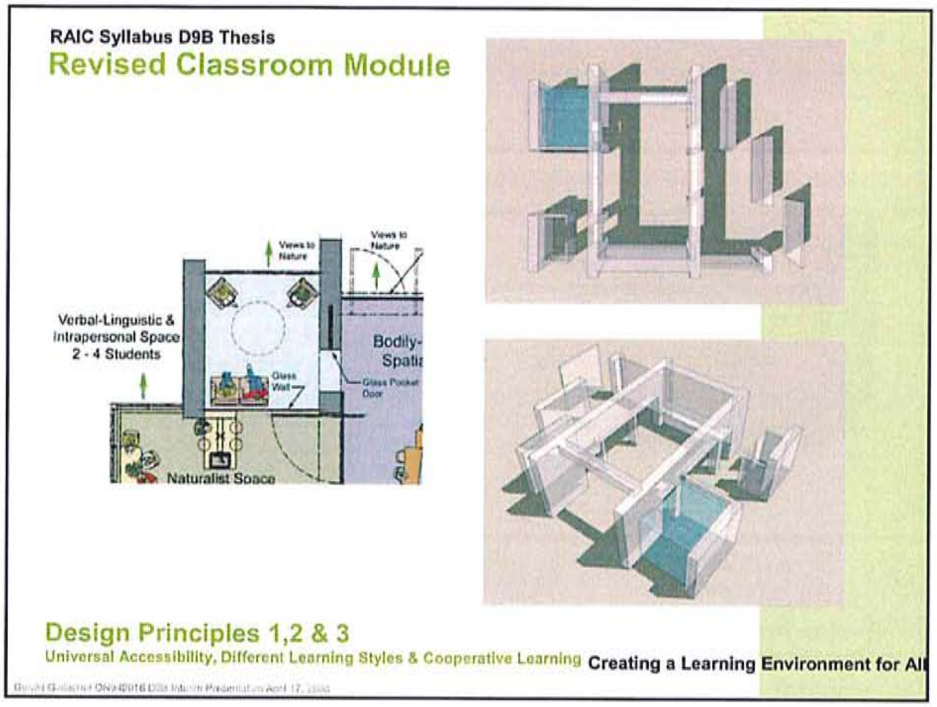

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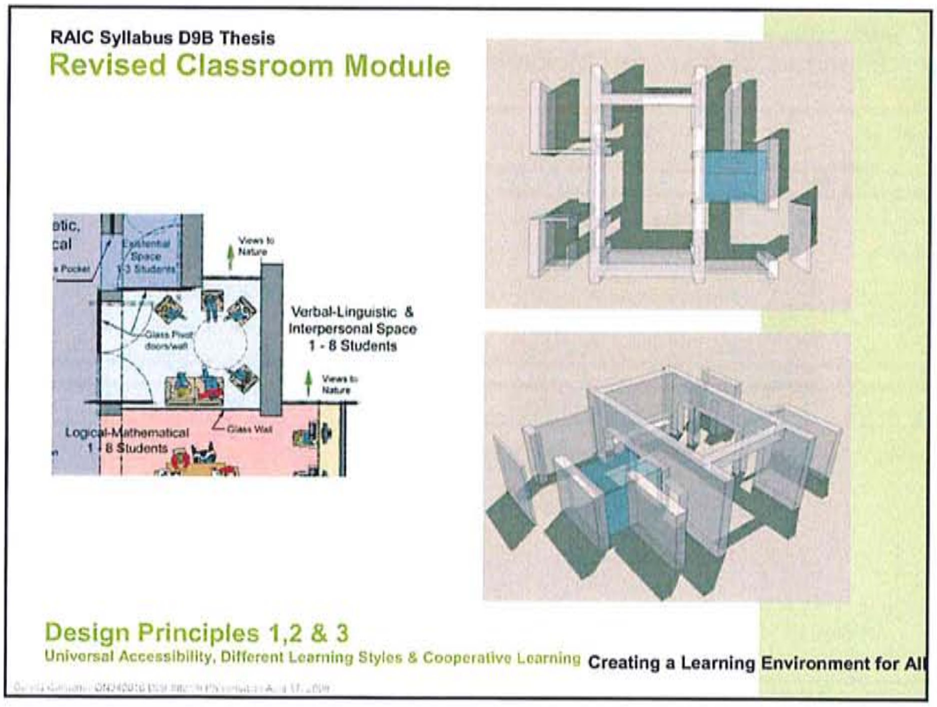
Revised Classroom Module

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning

Creating a Learning Environment for All



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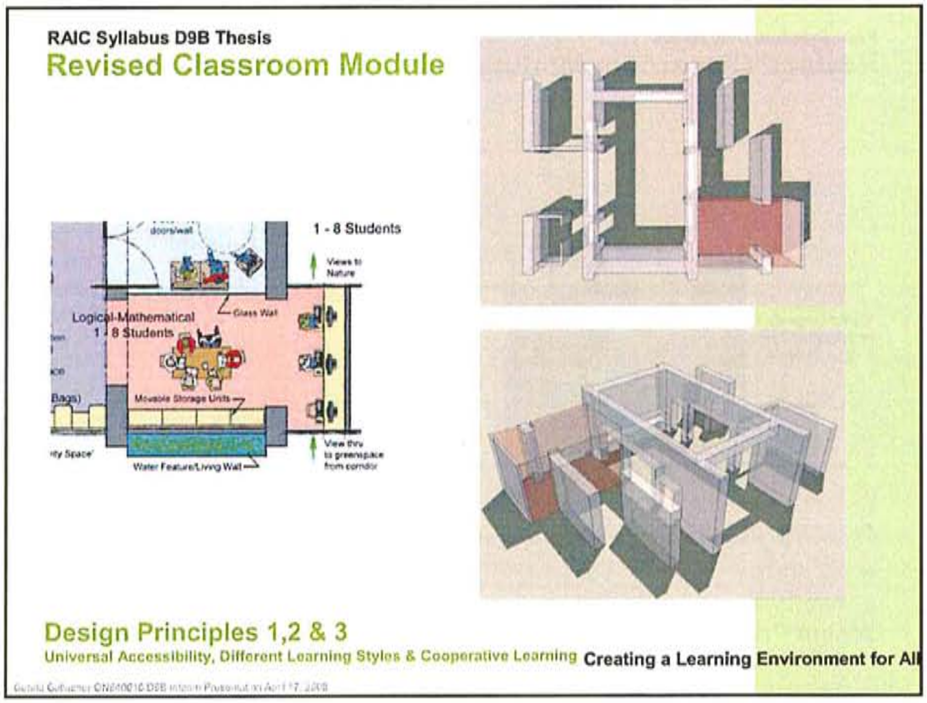
Revised Classroom Module

etic,
cal
Pocket
Existential Space 1-3 Students
Views to Nature
Glass Pivot doors/wall
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Views to Nature
Glass Wall
Logical-Mathematical 1 - 8 Students

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning

Creating a Learning Environment for All



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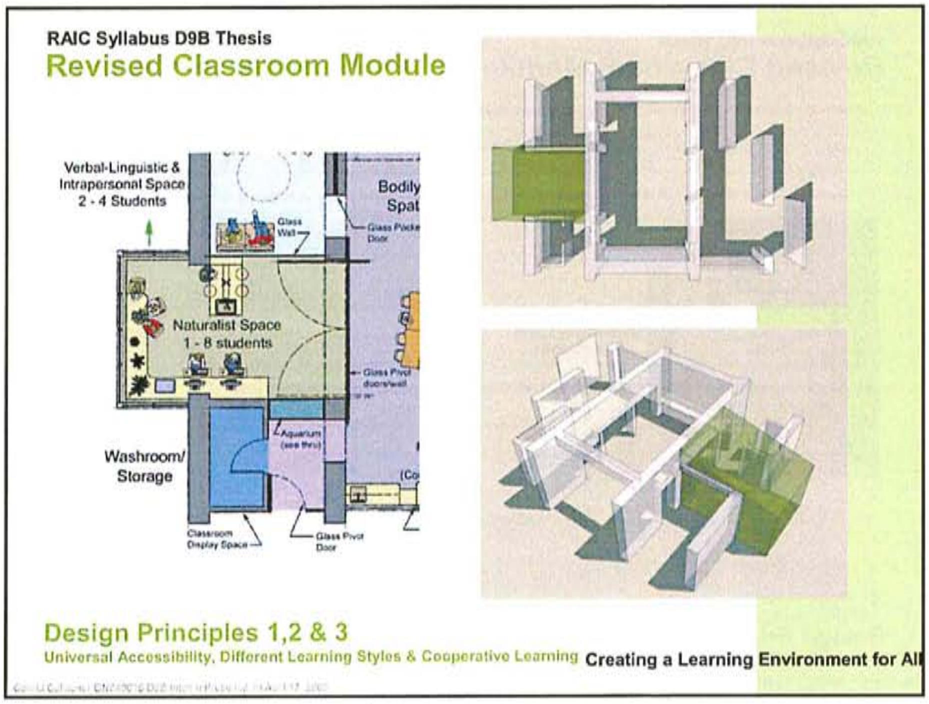
Revised Classroom Module

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning **Creating a Learning Environment for All**



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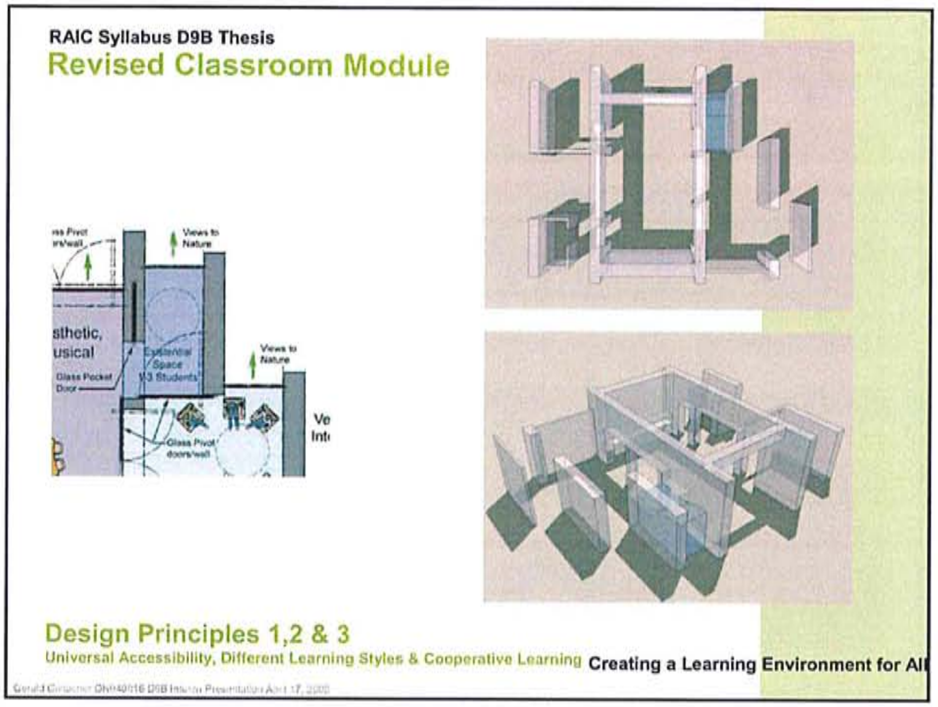
Revised Classroom Module

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning **Creating a Learning Environment for All**



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Revised Classroom Module

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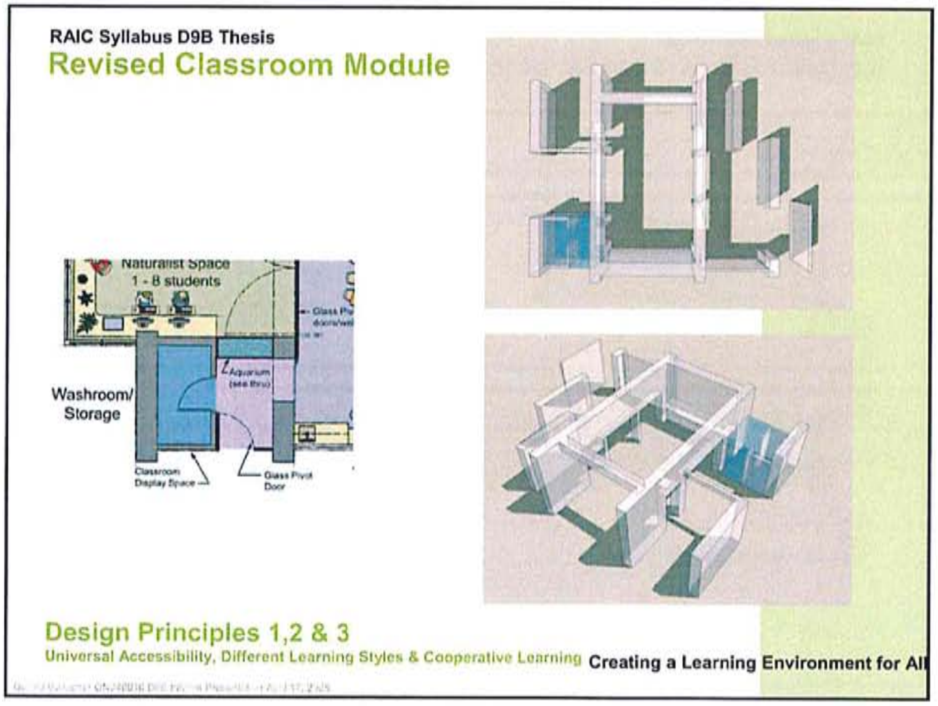

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Revised Classroom Module

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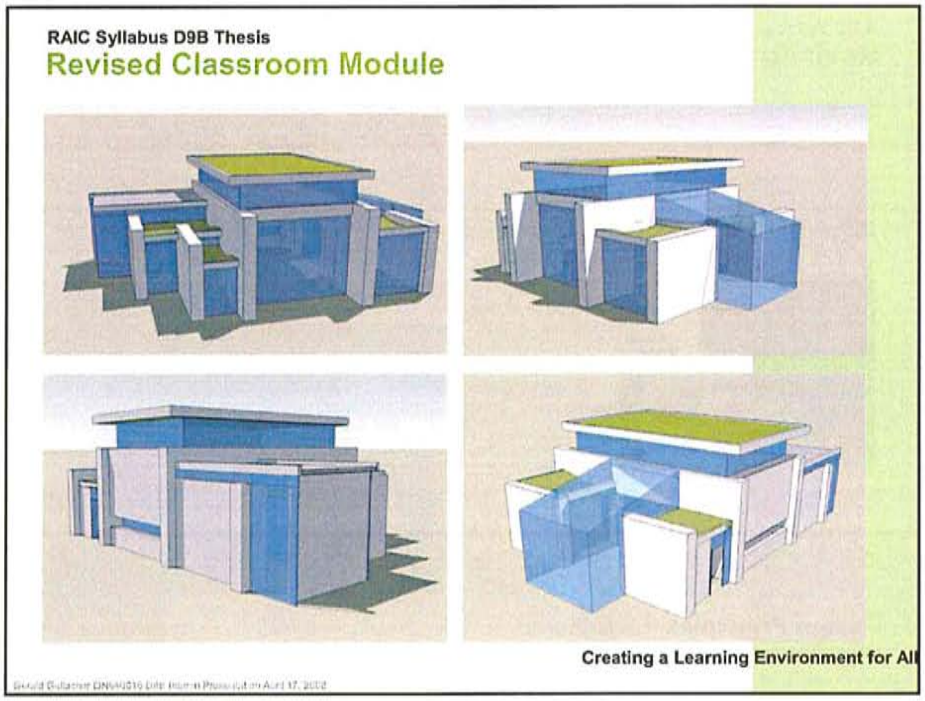

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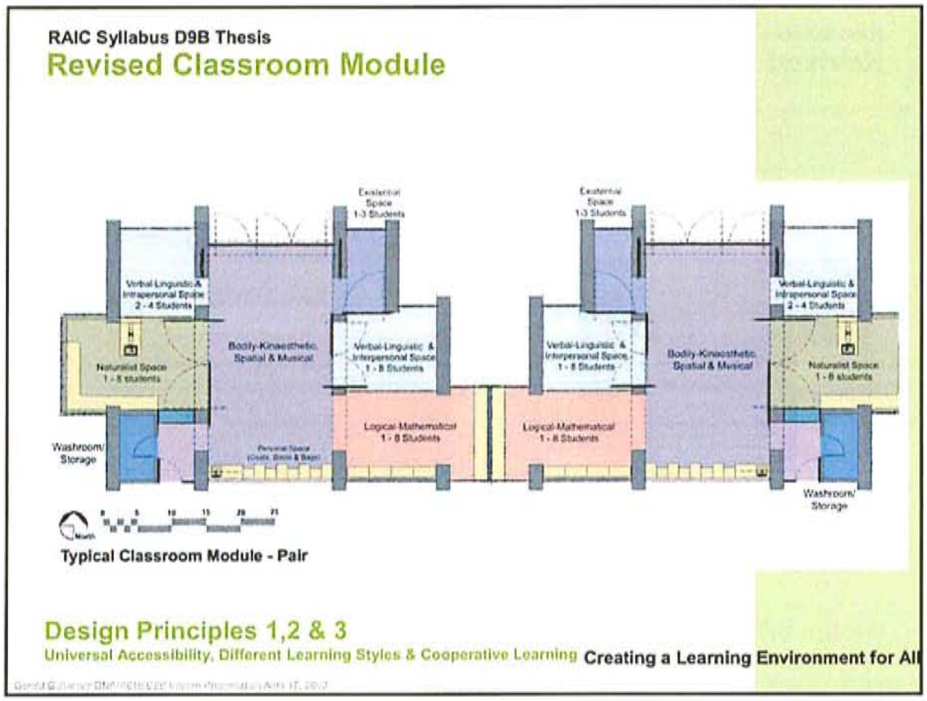
Revised Classroom Module

Creating a Learning Environment for All



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Revised Classroom Module

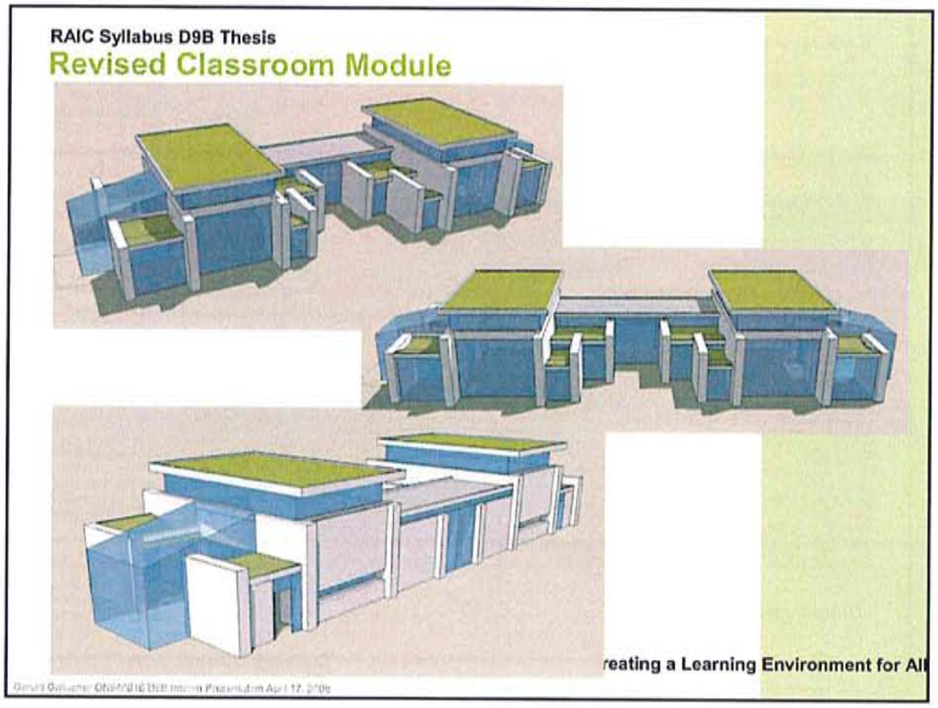
Existential Space 1-3 Students
Verbal Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic Spatial & Musical
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Naturalist Space 1 - 8 students
Logical-Mathematical 1 - 8 Students
Personal Space (Coats, Boots & Bags)
Washroom/ Storage
0 5 10 15 20 25
North
Existential Space 1-3 Students
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Bodily-Kinaesthetic Spatial & Musical
Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Naturalist Space 1 - 8 students
Logical-Mathematical 1 - 8 Students
Washroom/ Storage

Typical Classroom Module - Pair

Design Principles 1,2 & 3

Universal Accessibility, Different Learning Styles & Cooperative Learning

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Revised Classroom Module

Creating a Learning Environment for All

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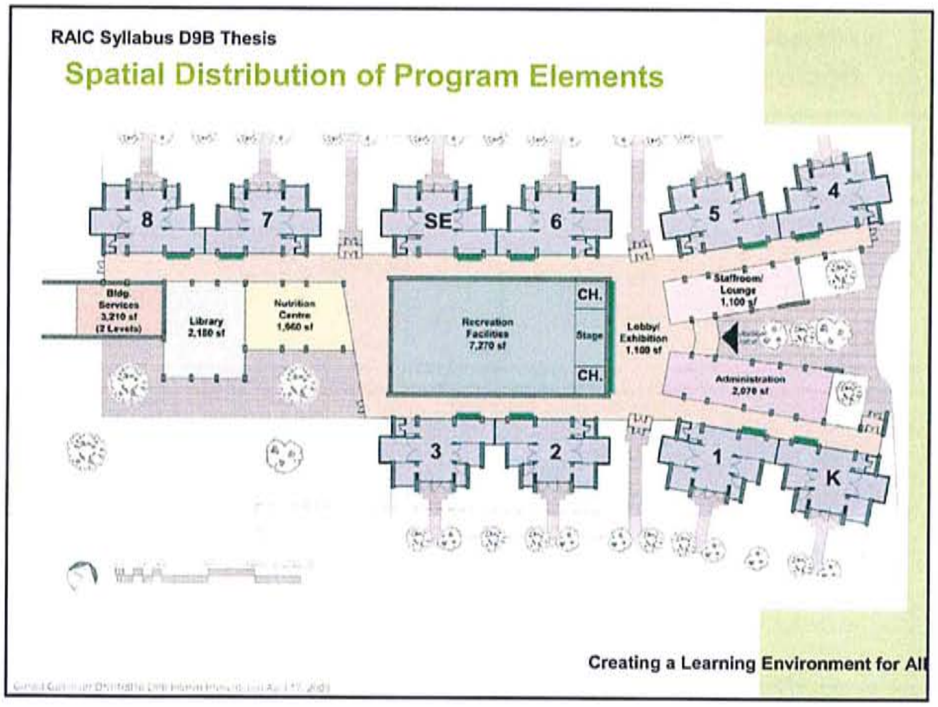

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Spatial Distribution of Program Elements

8
7
SE
6
5
4
Bldg. Services 3,210 sf (2 Levels)
Library 2,180 sf
Nutrition Centre 1,660 sf
Recreation Facilities 7,270 sf
CH.
Stage
CH.
Lobby/ Exhibition 1,100 sf
Staffroom/ Lounge 1,100 sf
Administration 2,070 sf
3
2
1
K

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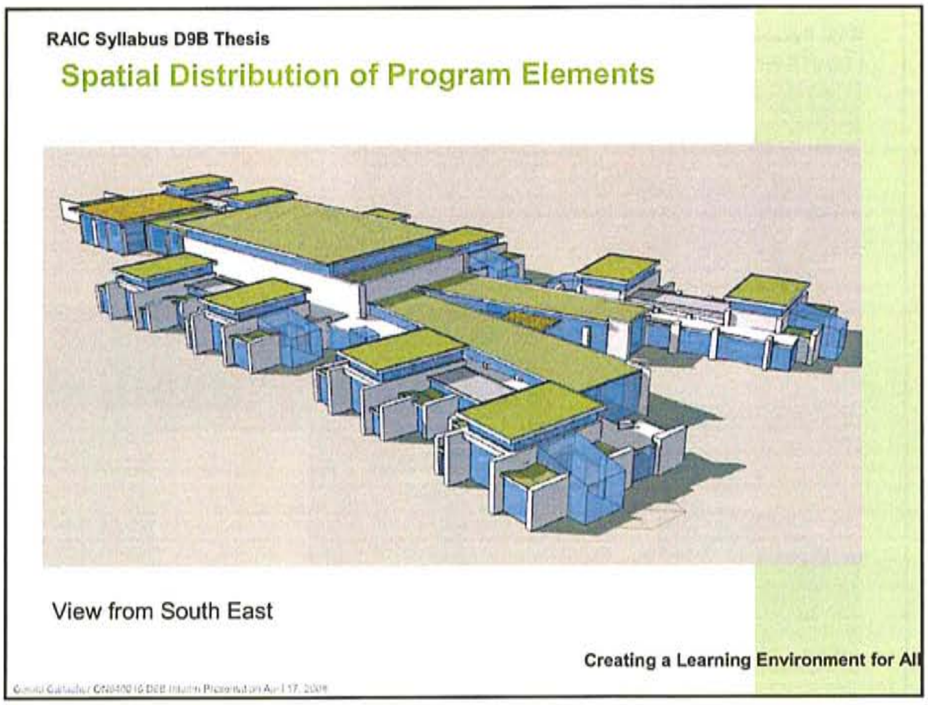

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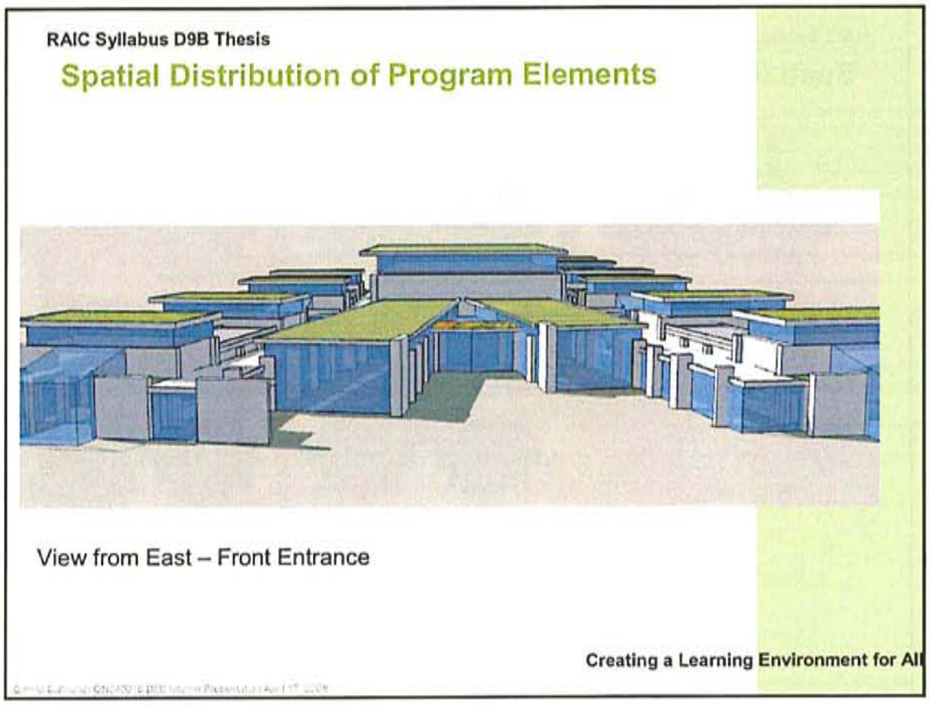
Spatial Distribution of Program Elements

View from South East

Creating a Learning Environment for All



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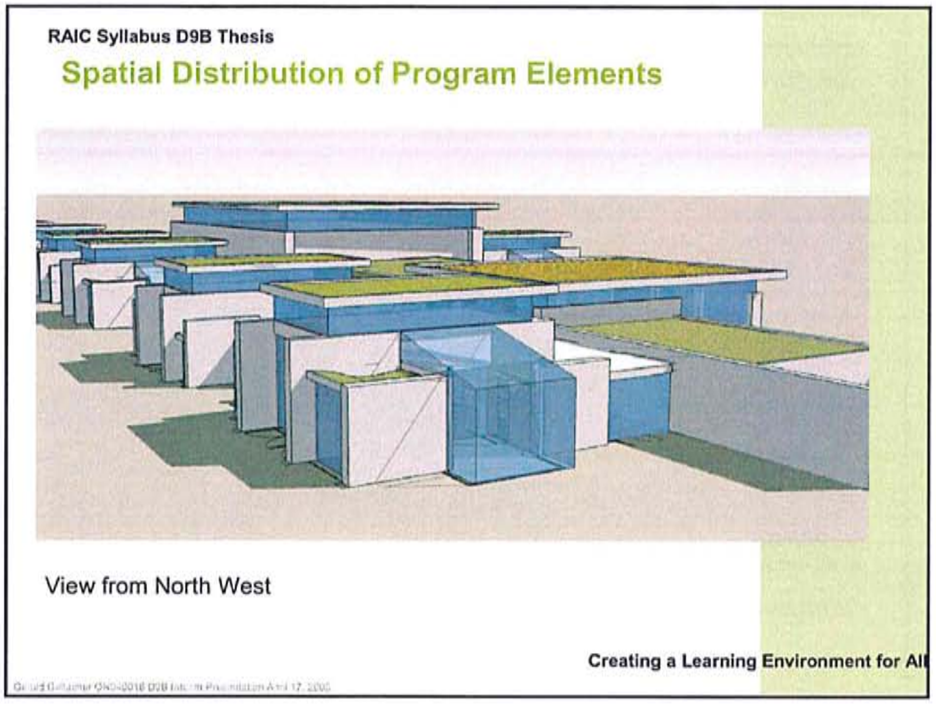
Spatial Distribution of Program Elements

View from East – Front Entrance

Creating a Learning Environment for All



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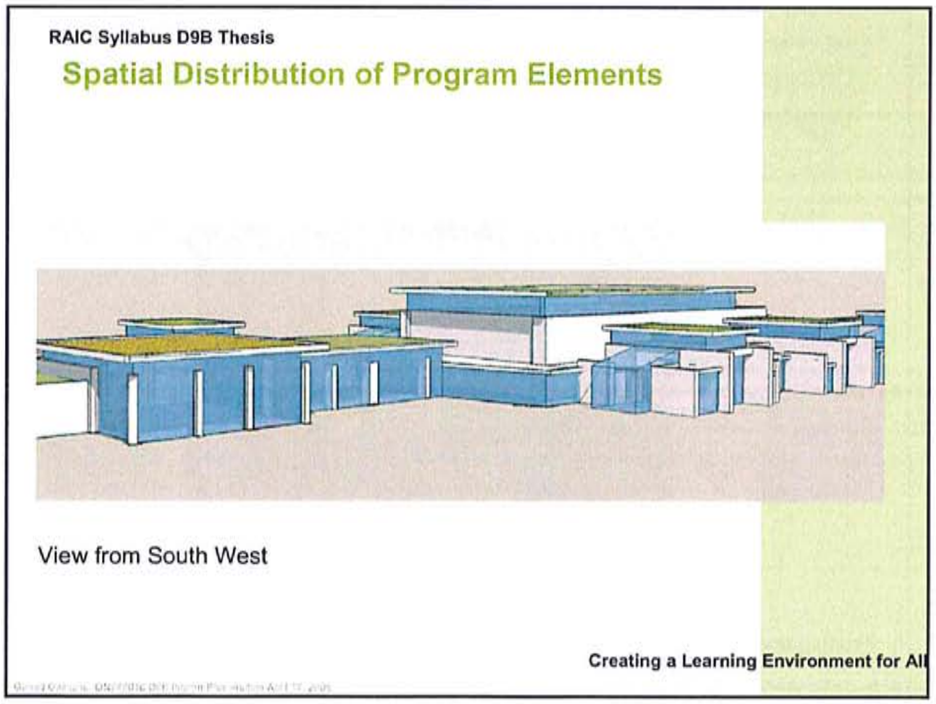
Spatial Distribution of Program Elements

View from North West

Creating a Learning Environment for All



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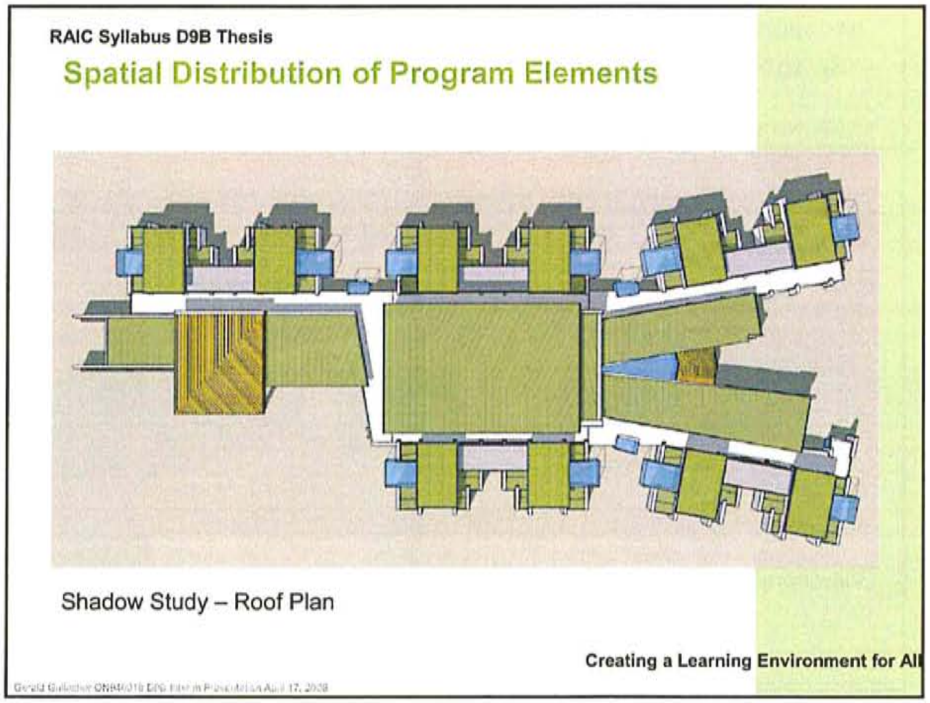
Spatial Distribution of Program Elements

View from South West

Creating a Learning Environment for All



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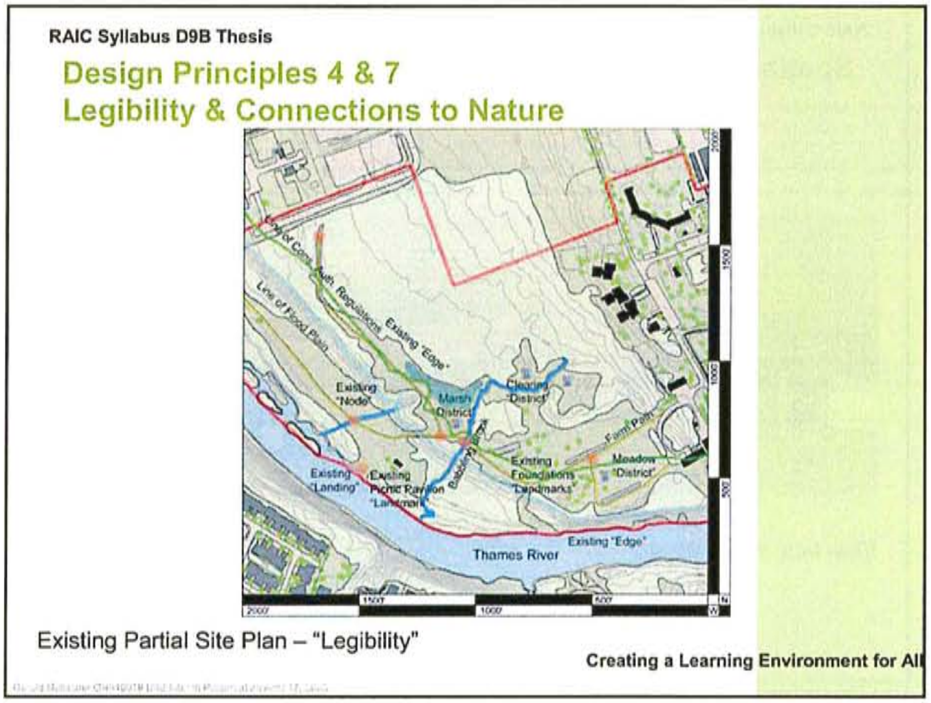
Spatial Distribution of Program Elements

Shadow Study – Roof Plan

Creating a Learning Environment for All



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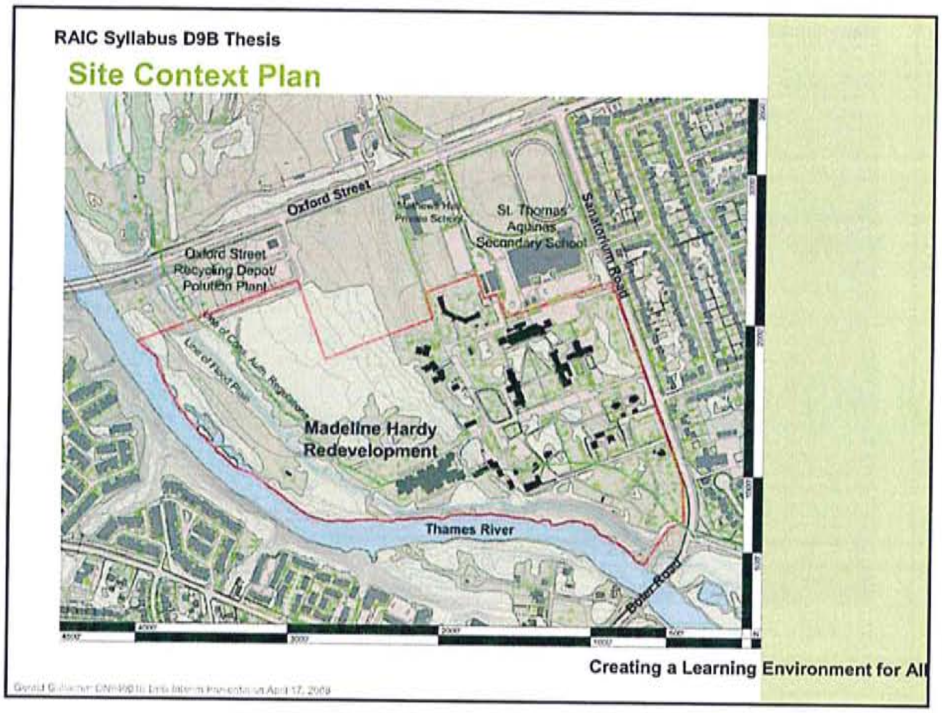
Design Principles 4 & 7
Legibility & Connections to Nature

Existing Partial Site Plan – "Legibility"

Creating a Learning Environment for All



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Site Context Plan

Oxford Street
Oxford Street Recycling Depot/ Polution Plant
St. Thomas Aquinas Secondary School
Sanatorium Road
Line of Cons. Auth. Regulations
Line of Flood Plain
Madeline Hardy Redevelopment
Thames River
Boler Road

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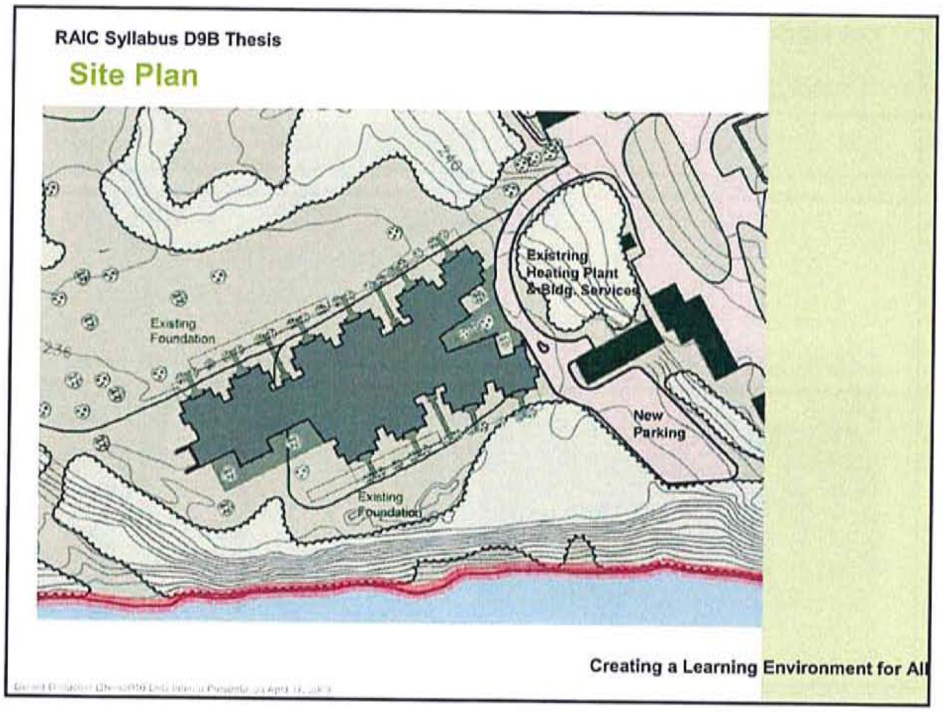

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Site Plan

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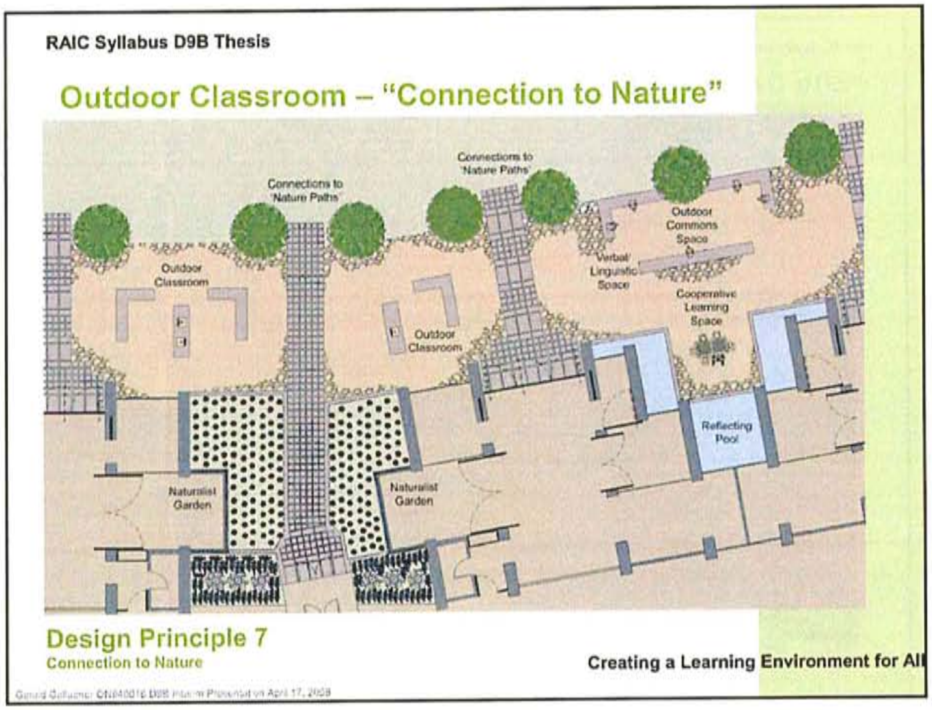

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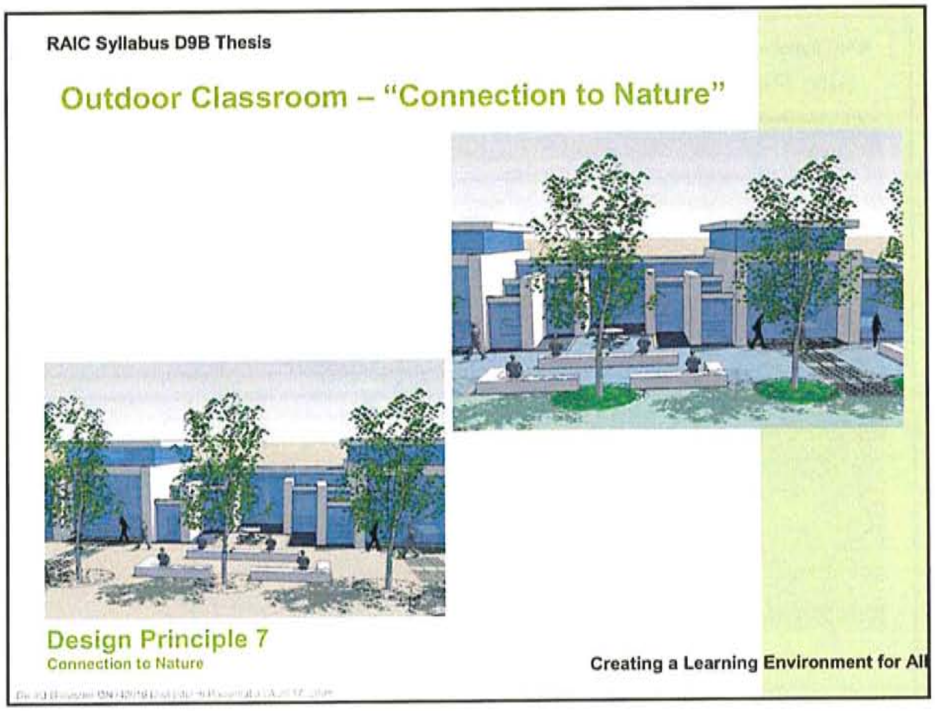
Outdoor Classroom – "Connection to Nature"

Design Principle 7
Connection to Nature

Creating a Learning Environment for Al



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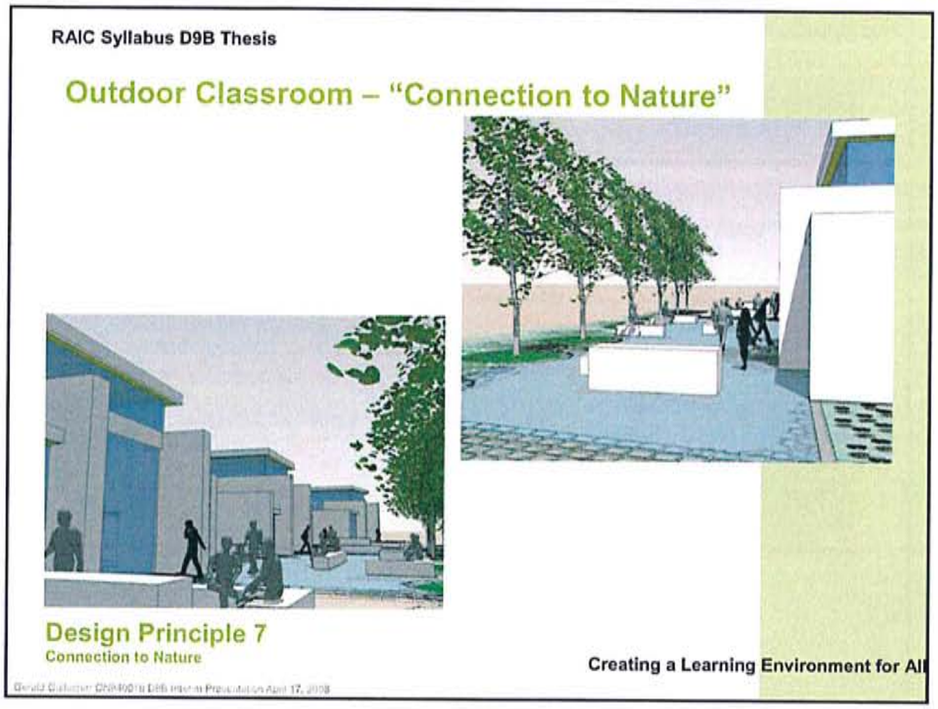
Design Principle 7
Connection to Nature

Creating a Learning Environment for Al



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Design Principle 7

Connection to Nature

Creating a Learning Environment for All

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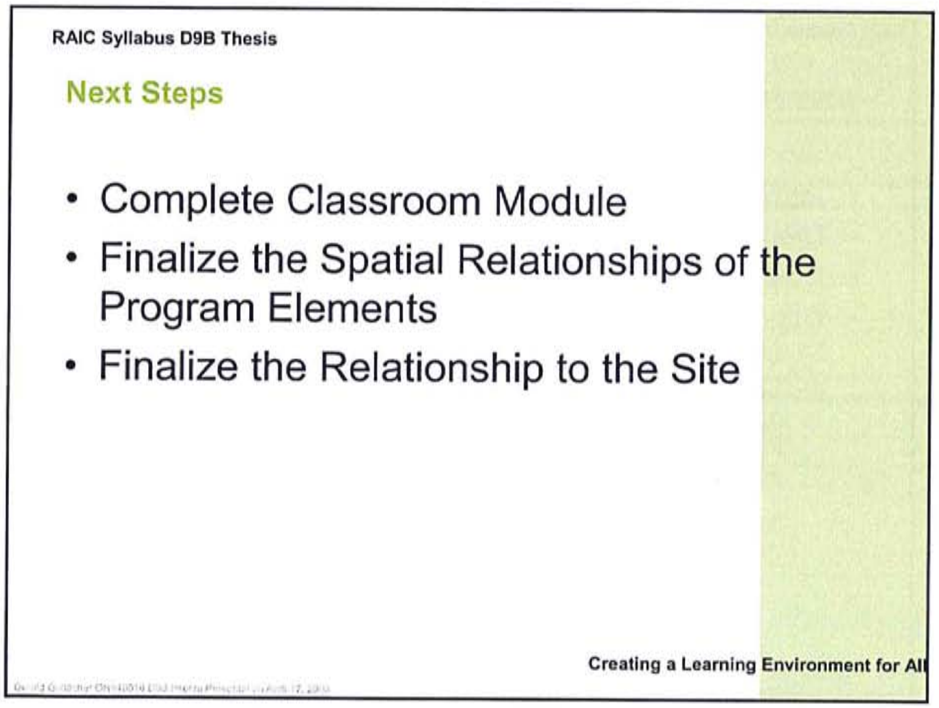

RAIC Syllabus D9B Thesis

Next Steps

- Complete Classroom Module
- Finalize the Spatial Relationships of the Program Elements
- Finalize the Relationship to the Site

Creating a Learning Environment for All

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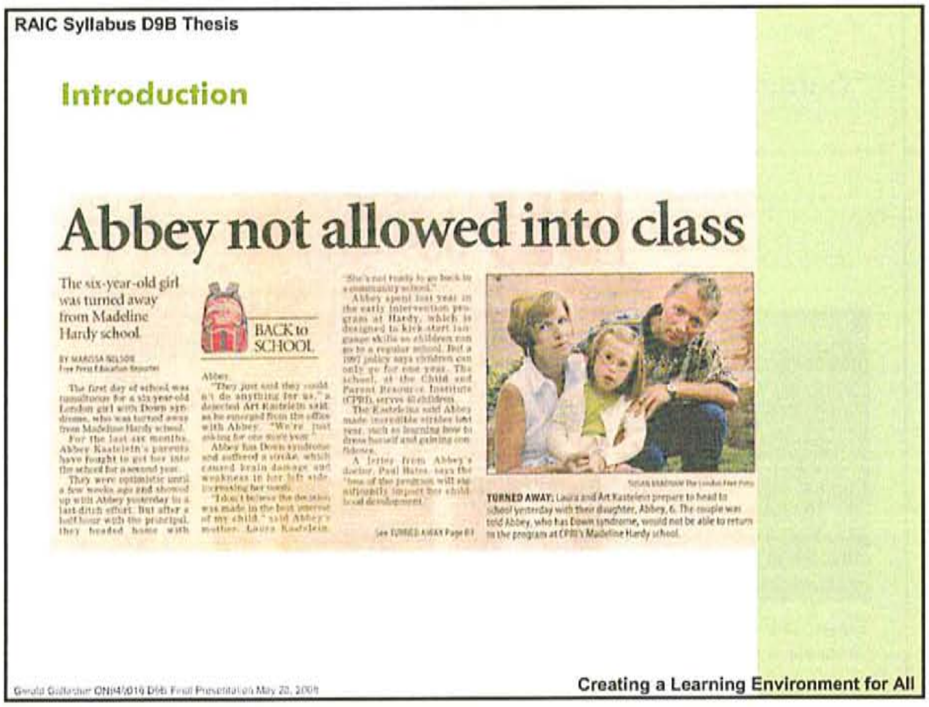
Final Presentation – May 28, 2008



RAIC Syllabus D9B Thesis

Introduction

Abbey not allowed into class

The six-year-old girl was turned away from Madeline Hardy school.

BACK to SCHOOL

TURNED AWAY: Laura and Art Kastelein prepare to head to school yesterday with their daughter, Abbey, 6. The couple was told Abbey, who has Down syndrome, would not be able to return to the program at CPRI's Madeline Hardy school.

Gerald Gallacher ON940016 D9b Final Presentation May 28, 2008

Creating a Learning Environment for All

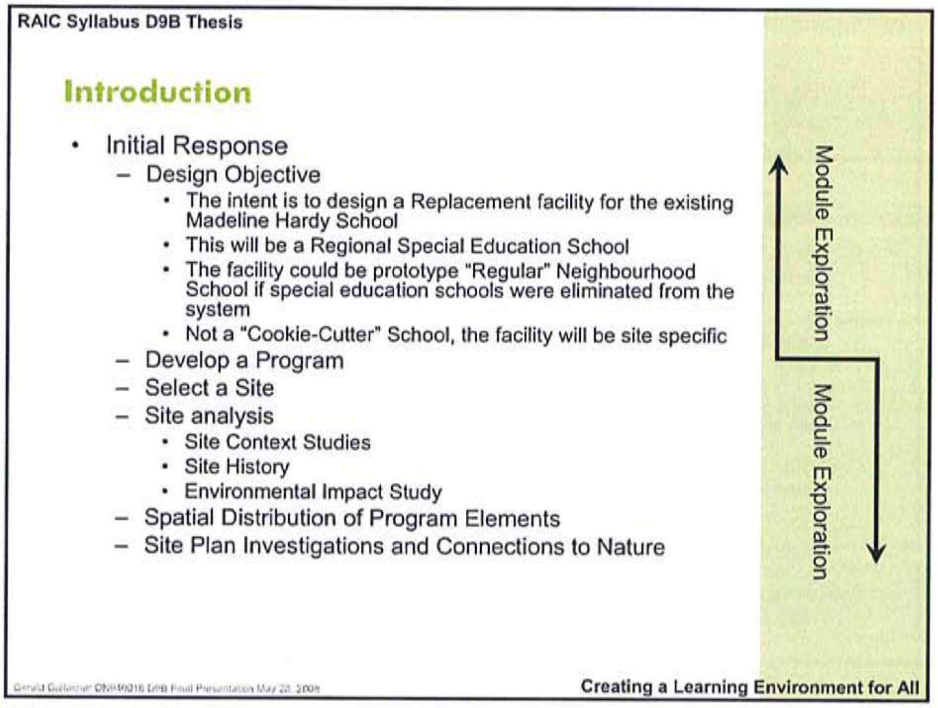
RAIC Syllabus D9B Thesis

D9B Final Presentation Overview

- Introduction
- Design Objective & Design Principles
- Design Guidelines
- Classroom Module
  - Single Module – Senior and Primary
  - Single Module – New Facility
  - Single Module – Renovation\Addition to Existing Facility
  - Four Modules – Addition – Portable Replacement

Gerald Gallacher ON940016 D9b Final Presentation May 28, 2008

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Introduction

- Initial Response
  - Design Objective
    - The intent is to design a Replacement facility for the existing Madeline Hardy School
    - This will be a Regional Special Education School
    - The facility could be prototype "Regular" Neighbourhood School if special education schools were eliminated from the system
    - Not a "Cookie-Cutter" School, the facility will be site specific
  - Develop a Program
  - Select a Site
  - Site analysis
    - Site Context Studies
    - Site History
    - Environmental Impact Study
  - Spatial Distribution of Program Elements
  - Site Plan Investigations and Connections to Nature

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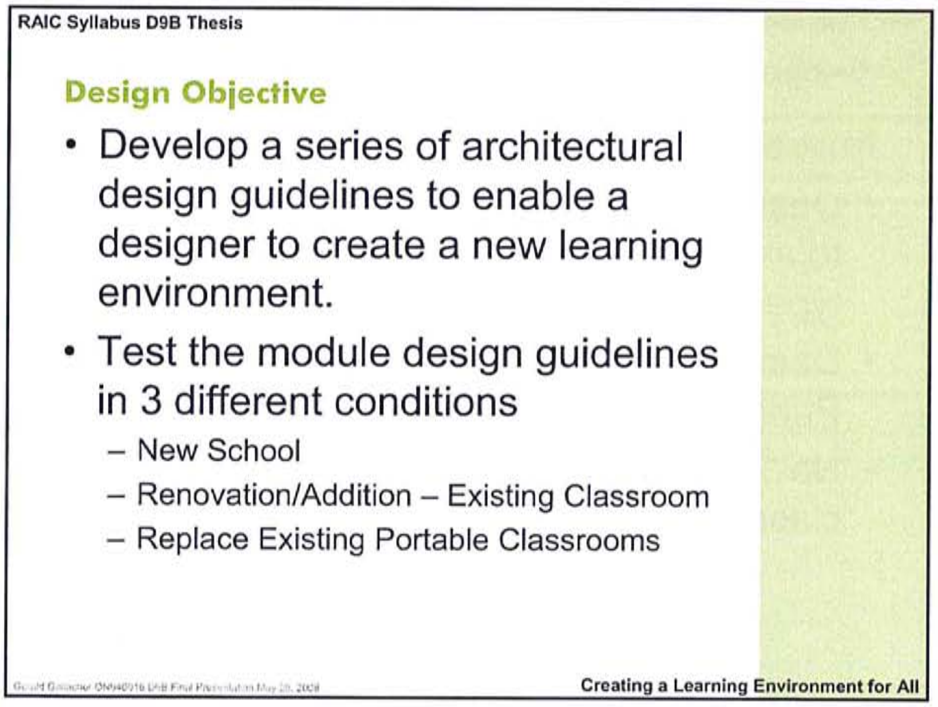

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Design Objective

- Develop a series of architectural design guidelines to enable a designer to create a new learning environment.
- Test the module design guidelines in 3 different conditions
  - New School
  - Renovation/Addition – Existing Classroom
  - Replace Existing Portable Classrooms

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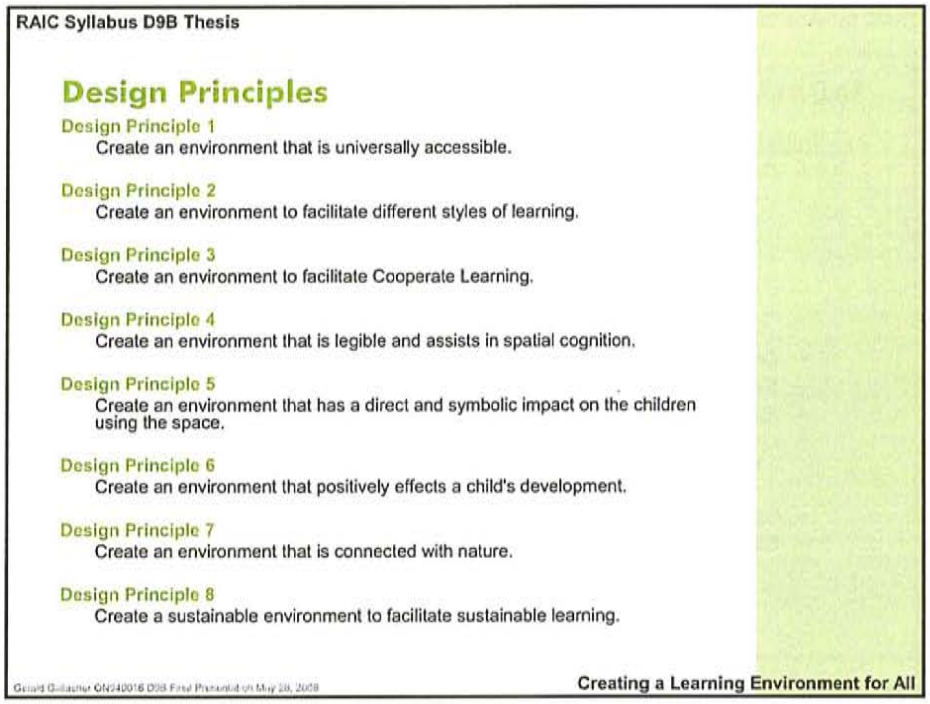
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Principles

Design Principle 1
Create an environment that is universally accessible.

Design Principle 2
Create an environment to facilitate different styles of learning.

Design Principle 3
Create an environment to facilitate Cooperate Learning.

Design Principle 4
Create an environment that is legible and assists in spatial cognition.

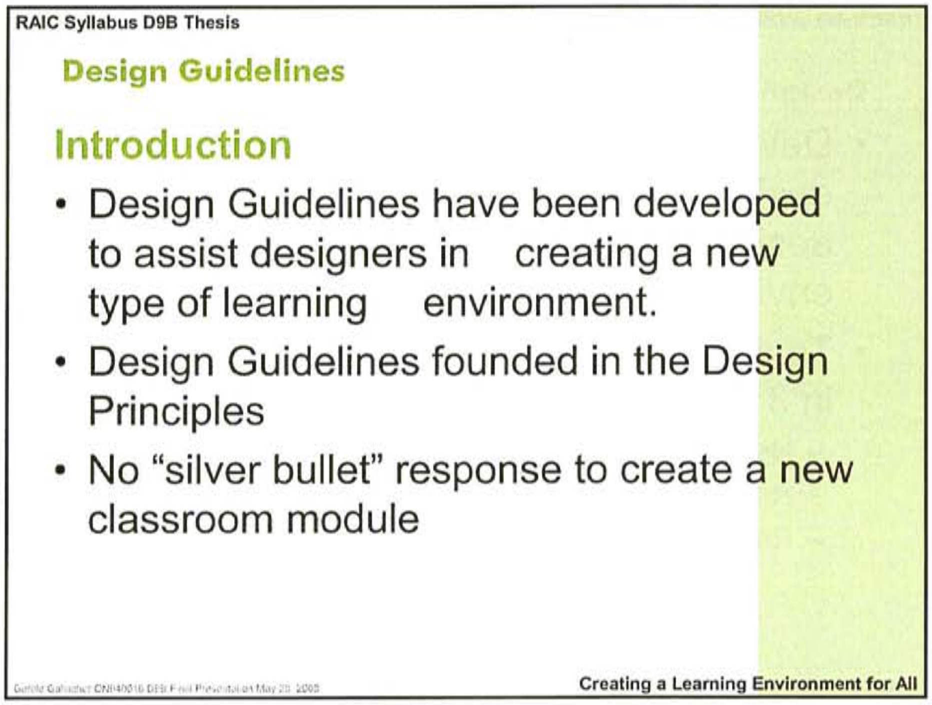
Design Principle 5
Create an environment that has a direct and symbolic impact on the children using the space.

Design Principle 6
Create an environment that positively effects a child's development.

Design Principle 7
Create an environment that is connected with nature.

Design Principle 8
Create a sustainable environment to facilitate sustainable learning.

Creating a Learning Environment for All



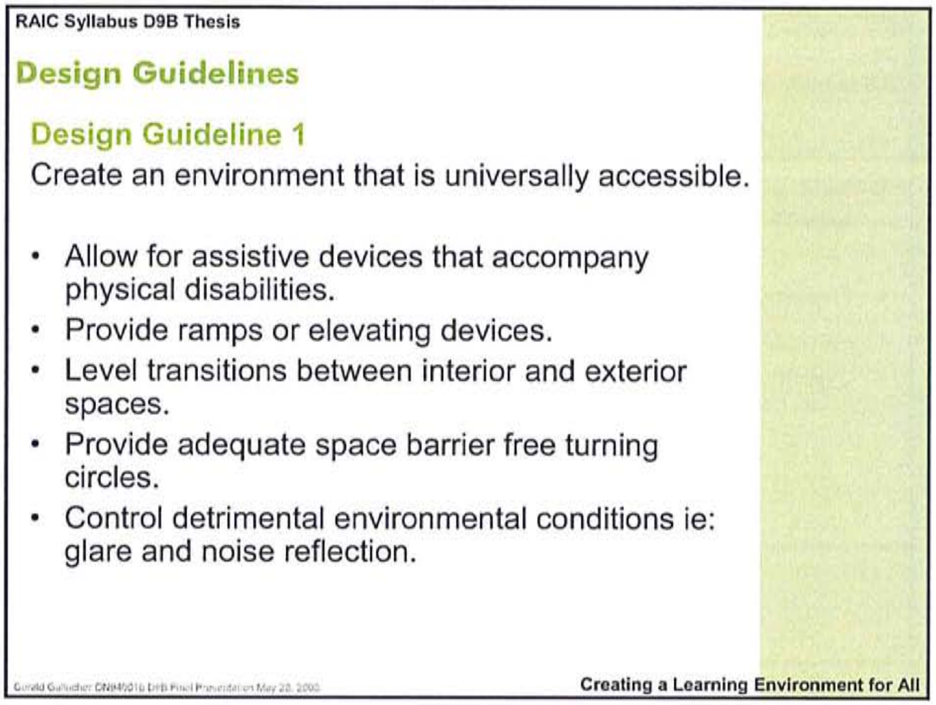
RAIC Syllabus D9B Thesis

Design Guidelines

Introduction

- Design Guidelines have been developed to assist designers in creating a new type of learning environment.
- Design Guidelines founded in the Design Principles
- No “silver bullet” response to create a new classroom module

Creating a Learning Environment for All



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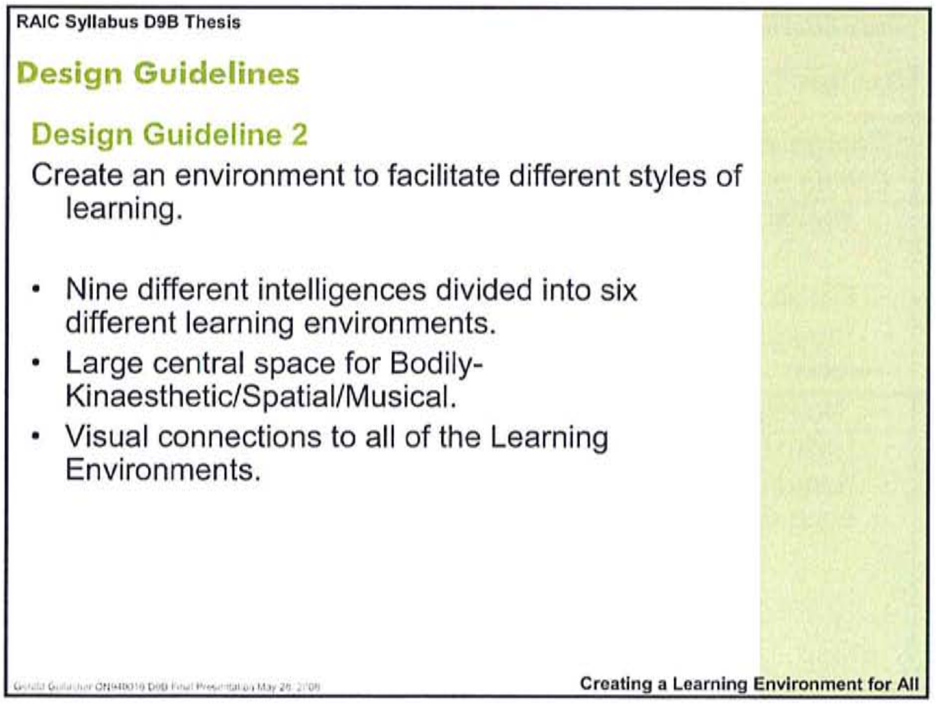
Design Guidelines

Design Guideline 1

Create an environment that is universally accessible.

- Allow for assistive devices that accompany physical disabilities.
- Provide ramps or elevating devices.
- Level transitions between interior and exterior spaces.
- Provide adequate space barrier free turning circles.
- Control detrimental environmental conditions ie: glare and noise reflection.

Creating a Learning Environment for All



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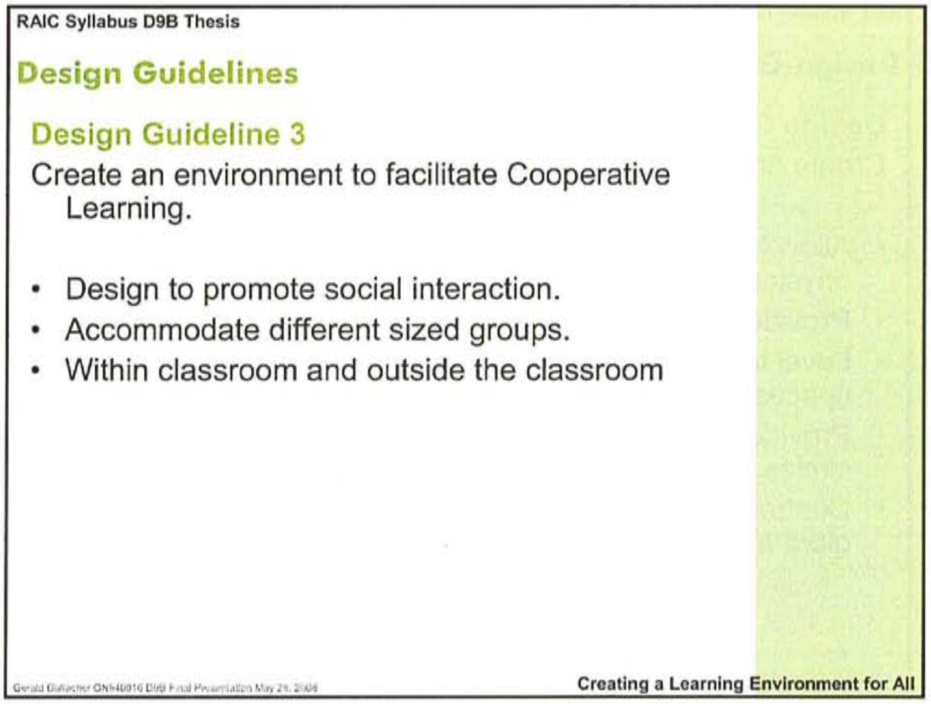
Design Guidelines

Design Guideline 2

Create an environment to facilitate different styles of learning.

- Nine different intelligences divided into six different learning environments.
- Large central space for Bodily-Kinaesthetic/Spatial/Musical.
- Visual connections to all of the Learning Environments.

Creating a Learning Environment for All



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Design Guidelines

Design Guideline 3

Create an environment to facilitate Cooperative Learning.

- Design to promote social interaction.
- Accommodate different sized groups.
- Within classroom and outside the classroom

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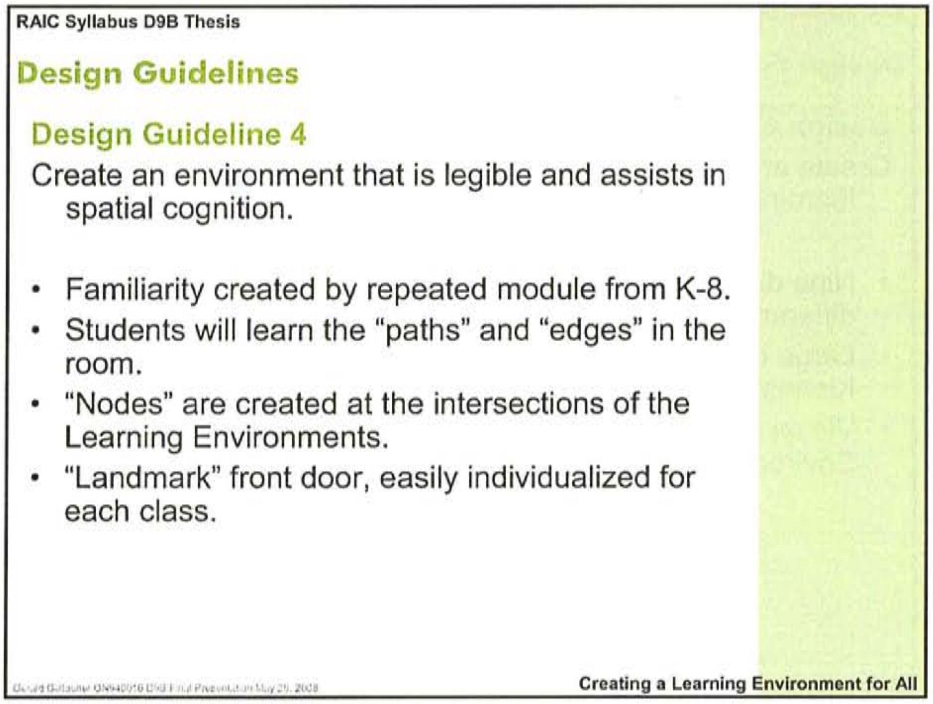
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Guidelines

Design Guideline 4

Create an environment that is legible and assists in spatial cognition.

- Familiarity created by repeated module from K-8.
- Students will learn the "paths" and "edges" in the room.
- "Nodes" are created at the intersections of the Learning Environments.
- "Landmark" front door, easily individualized for each class.

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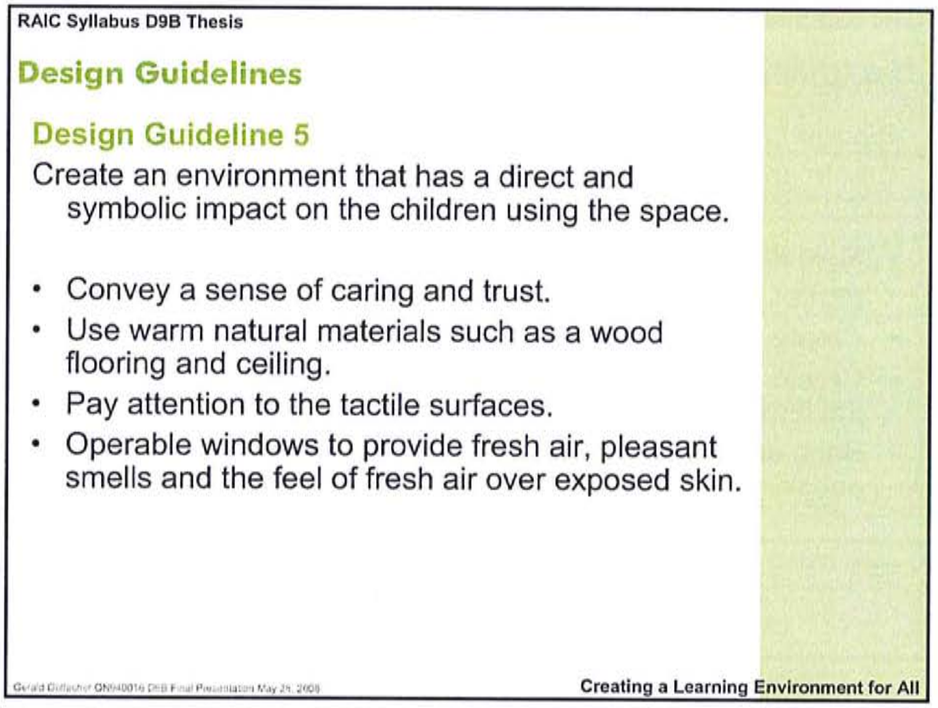
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

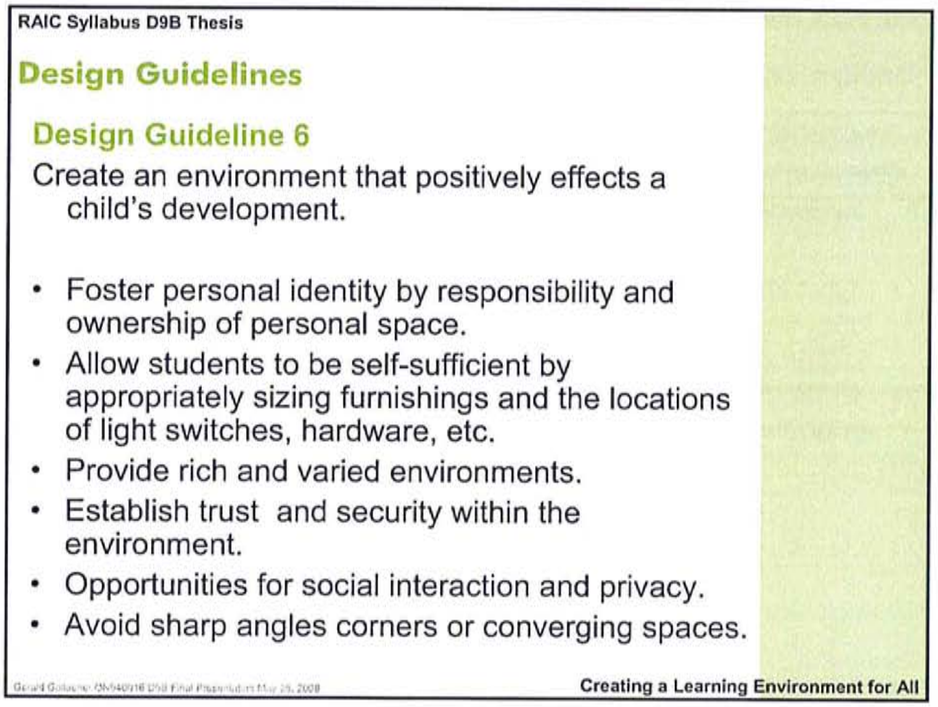
Design Guidelines

Design Guideline 5

Create an environment that has a direct and symbolic impact on the children using the space.

- Convey a sense of caring and trust.
- Use warm natural materials such as a wood flooring and ceiling.
- Pay attention to the tactile surfaces.
- Operable windows to provide fresh air, pleasant smells and the feel of fresh air over exposed skin.

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

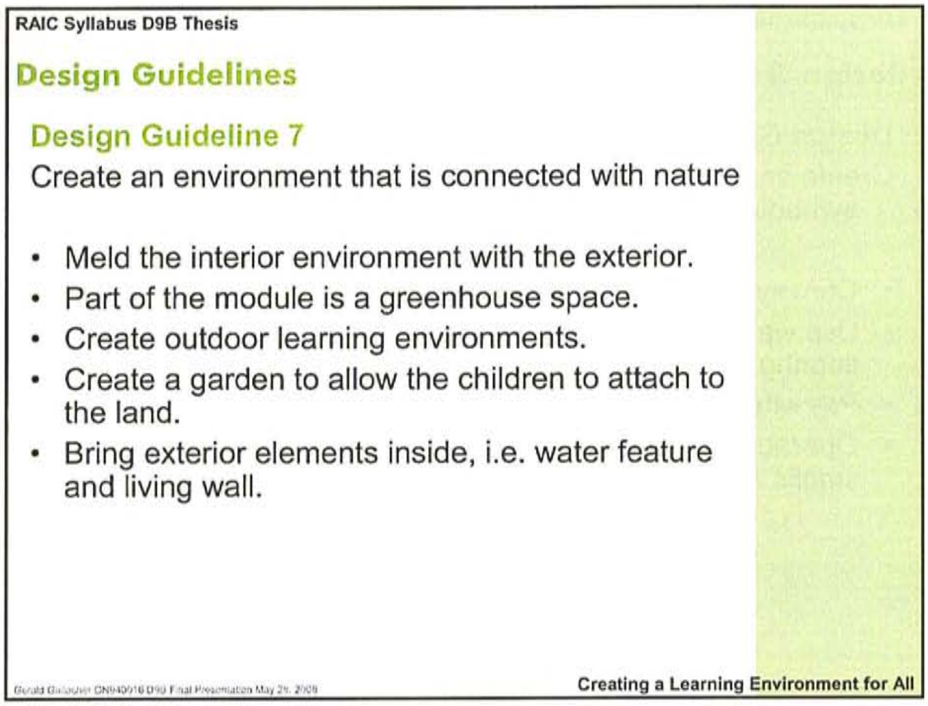
Design Guidelines

Design Guideline 6

Create an environment that positively effects a child's development.

- Foster personal identity by responsibility and ownership of personal space.
- Allow students to be self-sufficient by appropriately sizing furnishings and the locations of light switches, hardware, etc.
- Provide rich and varied environments.
- Establish trust and security within the environment.
- Opportunities for social interaction and privacy.
- Avoid sharp angles corners or converging spaces.

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Design Guidelines

Design Guideline 7

Create an environment that is connected with nature

- Meld the interior environment with the exterior.
- Part of the module is a greenhouse space.
- Create outdoor learning environments.
- Create a garden to allow the children to attach to the land.
- Bring exterior elements inside, i.e. water feature and living wall.

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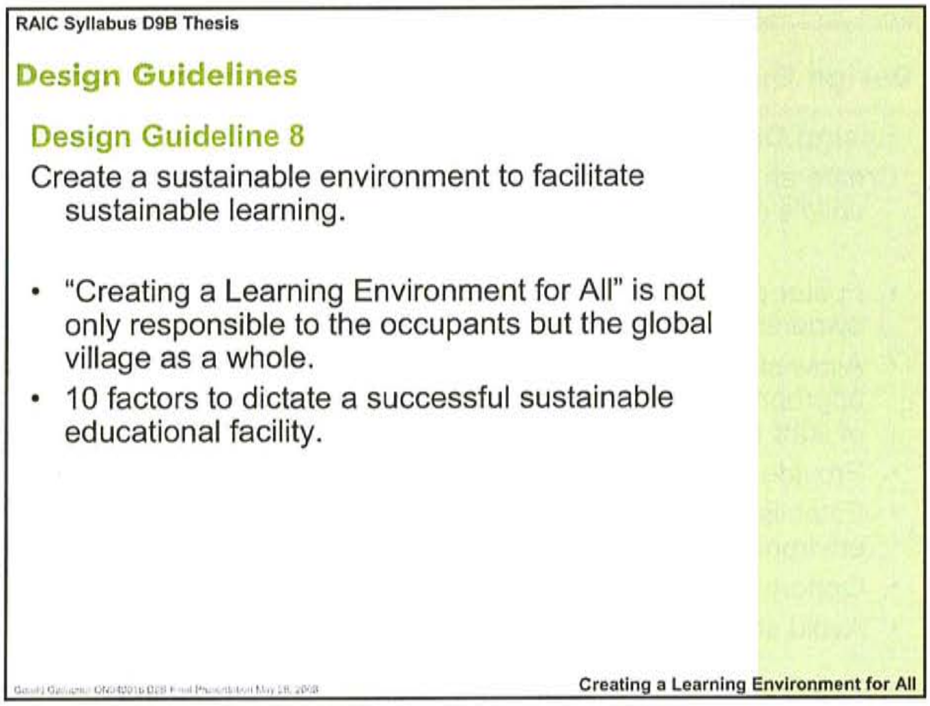
Creating a Learning Environment for All



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Design Guidelines

Design Guideline 8

Create a sustainable environment to facilitate sustainable learning.

- "Creating a Learning Environment for All" is not only responsible to the occupants but the global village as a whole.
- 10 factors to dictate a successful sustainable educational facility.

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Creating a Learning Environment for All

RAIC Syllabus D9B Thesis

Design Guidelines

Design Guideline 8

Create a sustainable environment to facilitate sustainable learning.

1. Health and Indoor air quality
2. Thermal Comfort
3. Visual Comfort
4. Acoustic Comfort
5. Security and Safety
6. Ecosystem Protection
7. Energy Efficiency
8. Water Efficiency
9. Materials Efficiency
10. Building as a Teaching Tool

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Creating a Learning Environment for All

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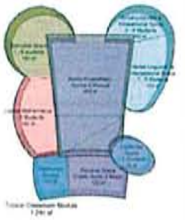
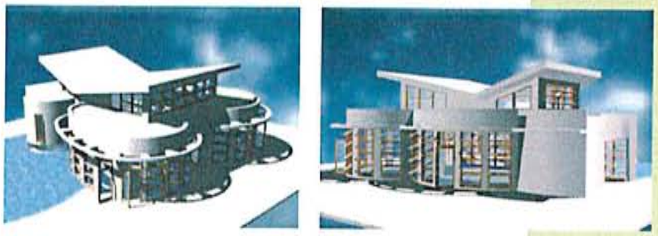
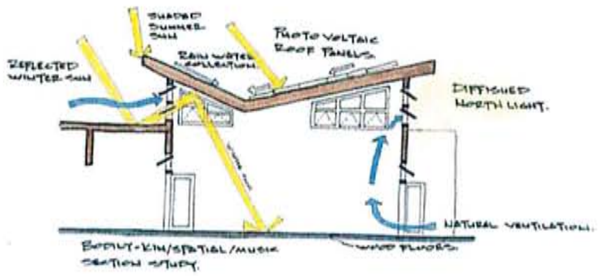
Classroom Module - Exploration







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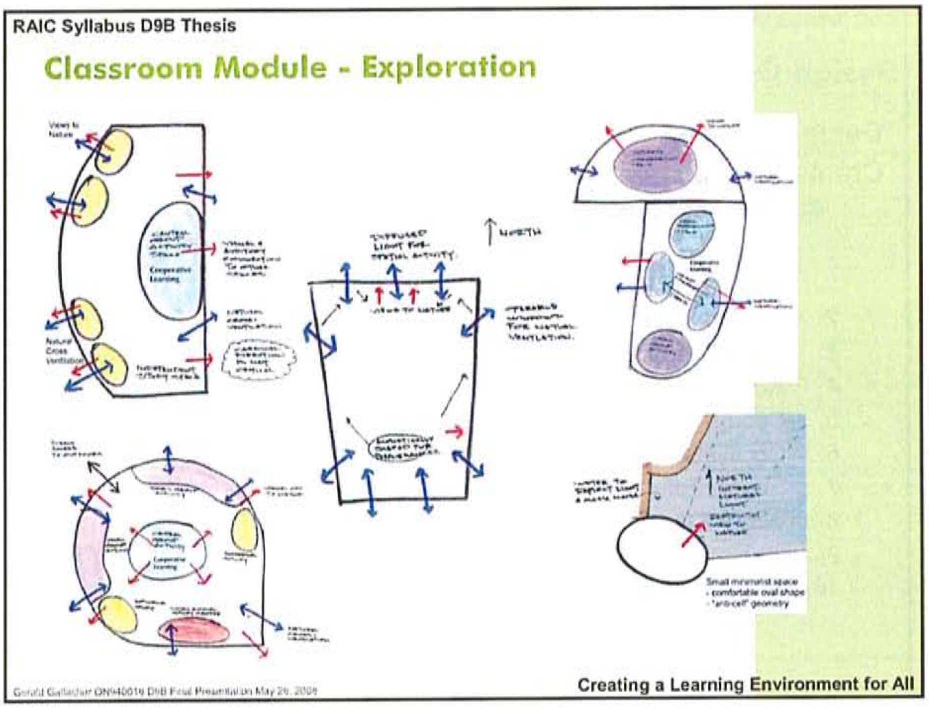
Creating a Learning Environment for All



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Classroom Module - Exploration

Small minimalist space
- comfortable oval shape
- "anti-cell" geometry

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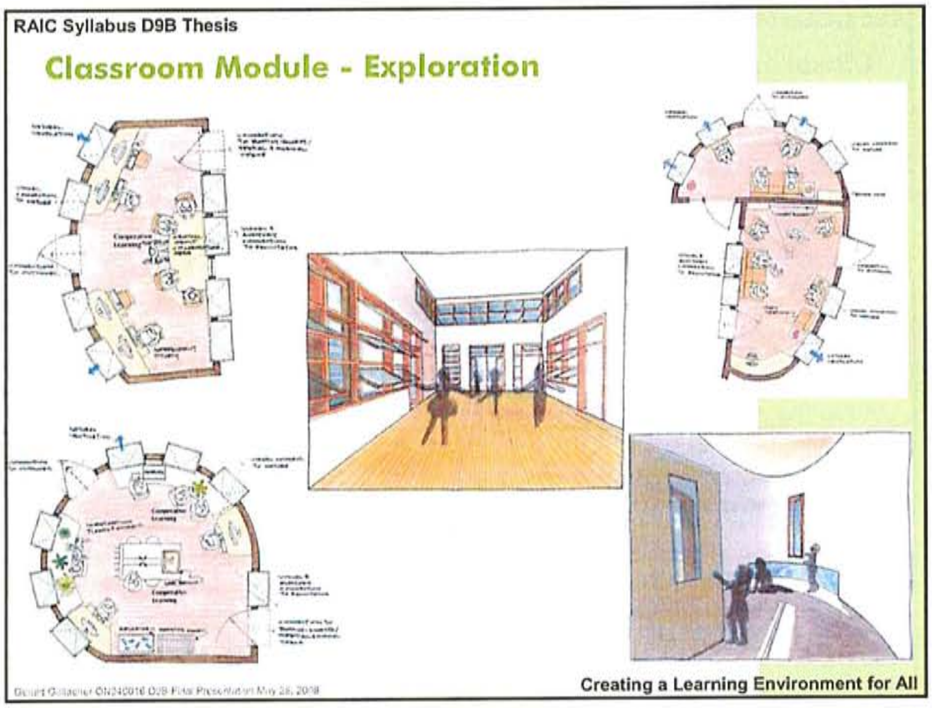
Creating a Learning Environment for All



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Classroom Module - Exploration

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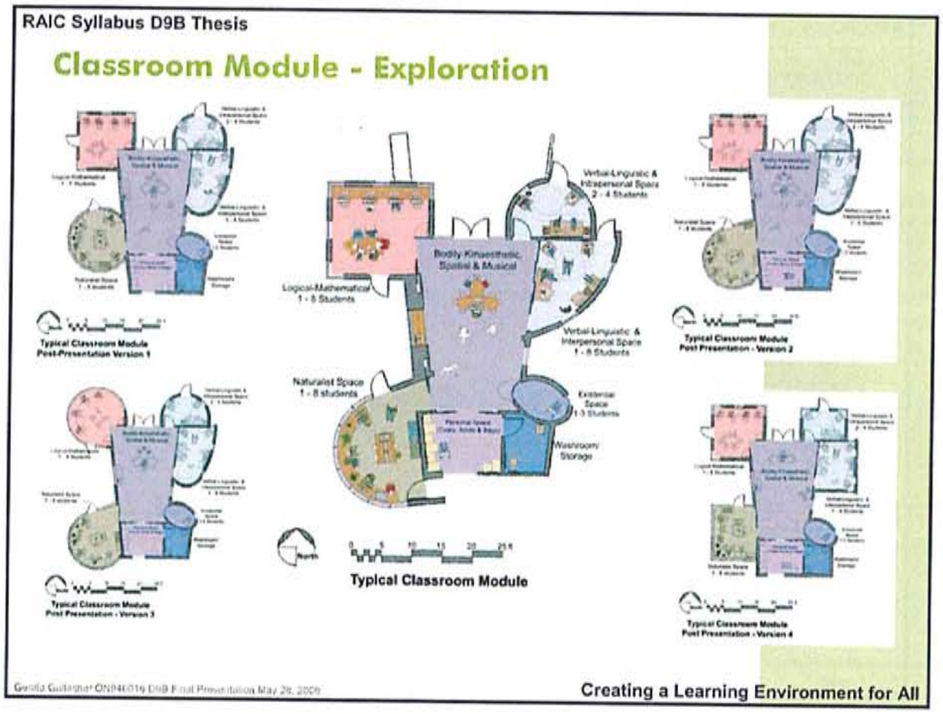

RAIC Syllabus D9B Thesis

Classroom Module - Exploration

Bodily-Kinaesthetic, Spatial & Musical
Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Logical-Mathematical 1 - 8 Students
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Naturalist Space 1 - 8 students
Existential Space 1-3 Students
Personal Space (Coats, Boots & Bags)
Washroom/ Storage
North
0 5 10 15 20 25 ft

Typical Classroom Module Post-Presentation Version 1

Typical Classroom Module Post Presentation - Version 2

Typical Classroom Module Post Presentation - Version 3

Typical Classroom Module Post Presentation - Version 4

Typical Classroom Module

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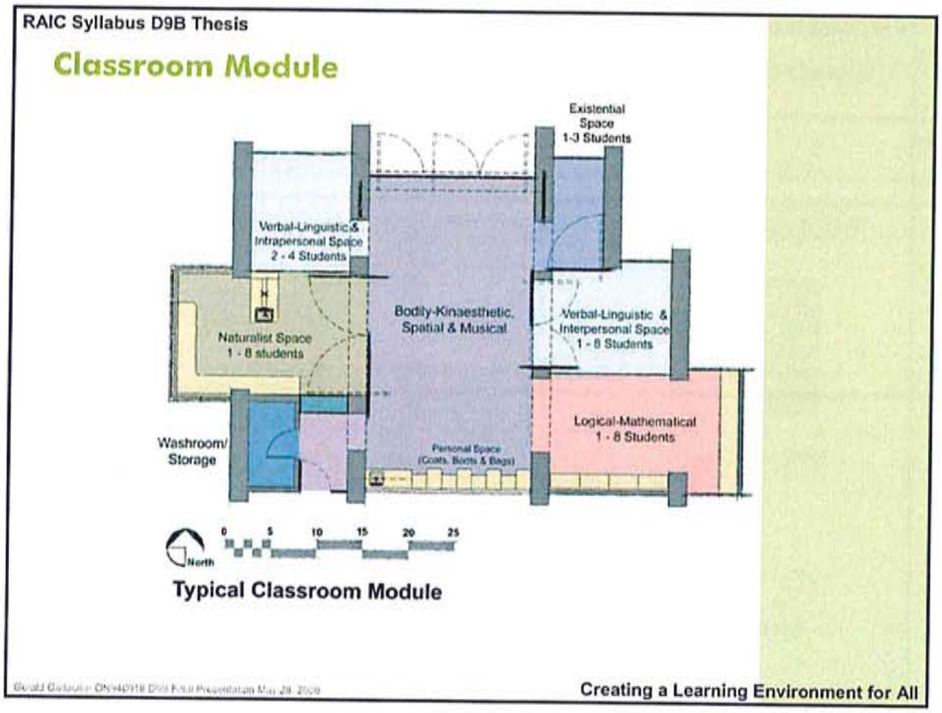
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module

Existential Space 1-3 Students
Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic, Spatial & Musical
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Naturalist Space 1 - 8 students
Logical-Mathematical 1 - 8 Students
Washroom/ Storage
Personal Space (Coats, Boots & Bags)
North
0 5 10 15 20 25

Typical Classroom Module

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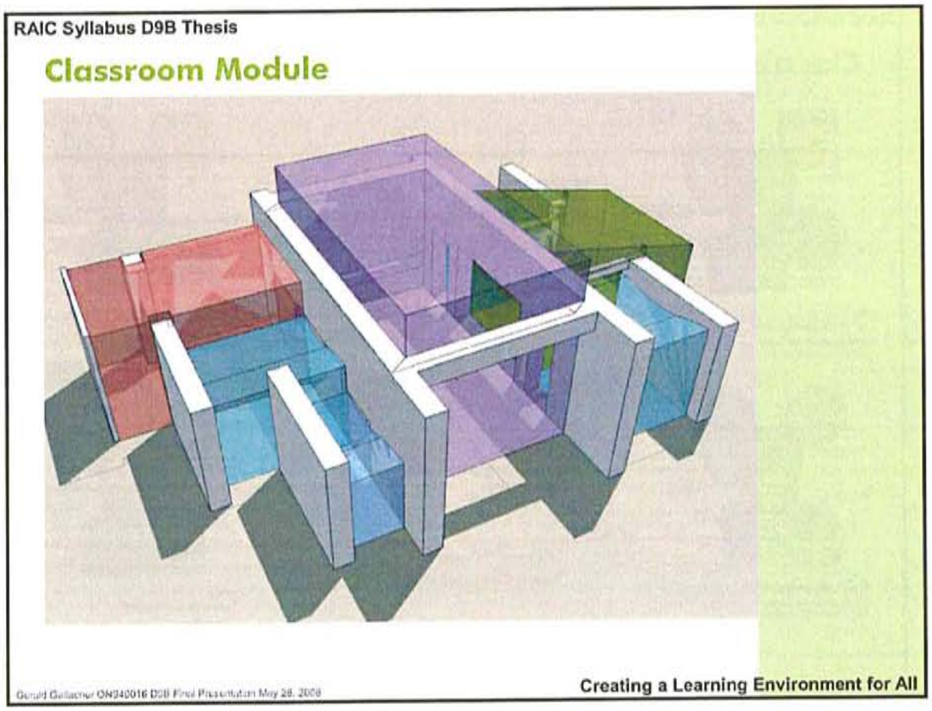
Creating a Learning Environment for All



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Classroom Module

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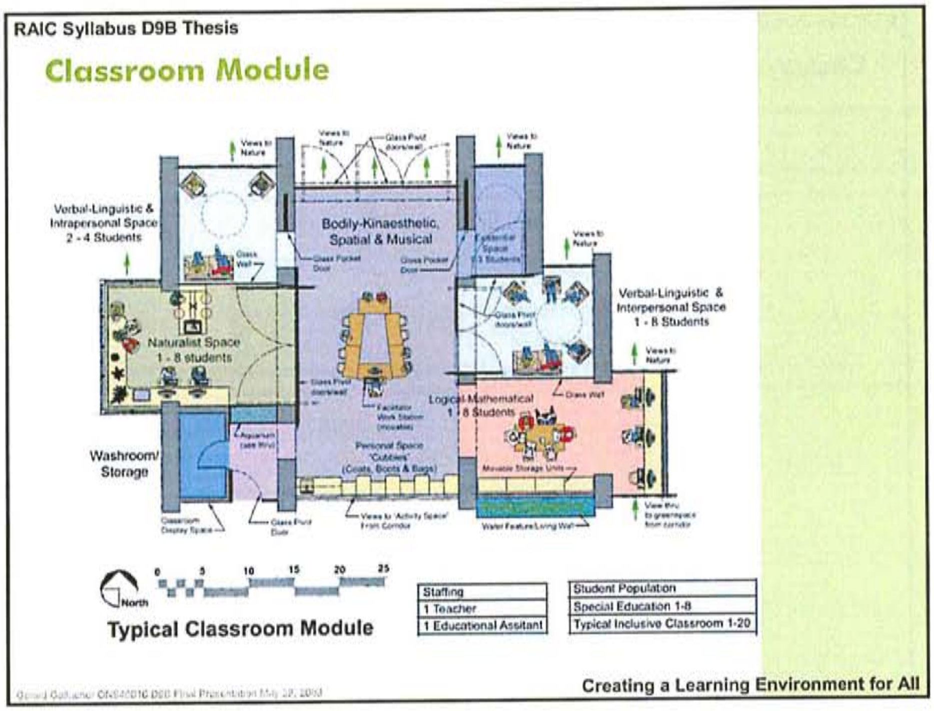
Creating a Learning Environment for All



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Classroom Module

Views to Nature
Views to Nature
Glass Pivot doors/wall
Views to Nature
Verbal-Linguistic & Intrapersonal Space 2 - 4 Students
Bodily-Kinaesthetic, Spatial & Musical
Experiential Space 1-3 Students
Views to Nature
Glass Wall
Glass Pocket Door
Glass Pocket Door
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Glass Pivot doors/wall
Naturalist Space 1 - 8 students
Views to Nature
Glass Pivot doors/wall
Logical-Mathematical 1 - 8 Students
Glass Wall
Facilitator Work Station (movable)
Aquarium (see thru)
Washroom/ Storage
Personal Space "Cubbies" (Coats, Boots & Bags)
Movable Storage Units
Classroom Display Space
Glass Pivot Door
Views to 'Activity Space' From Corridor
Water Feature/Living Wall
View thru to greenspace from corridor
North
0
5
10
15
20
25

Typical Classroom Module

Staffing
1 Teacher
1 Educational Assitant

Student Population
Special Education 1-8
Typical Inclusive Classroom 1-20

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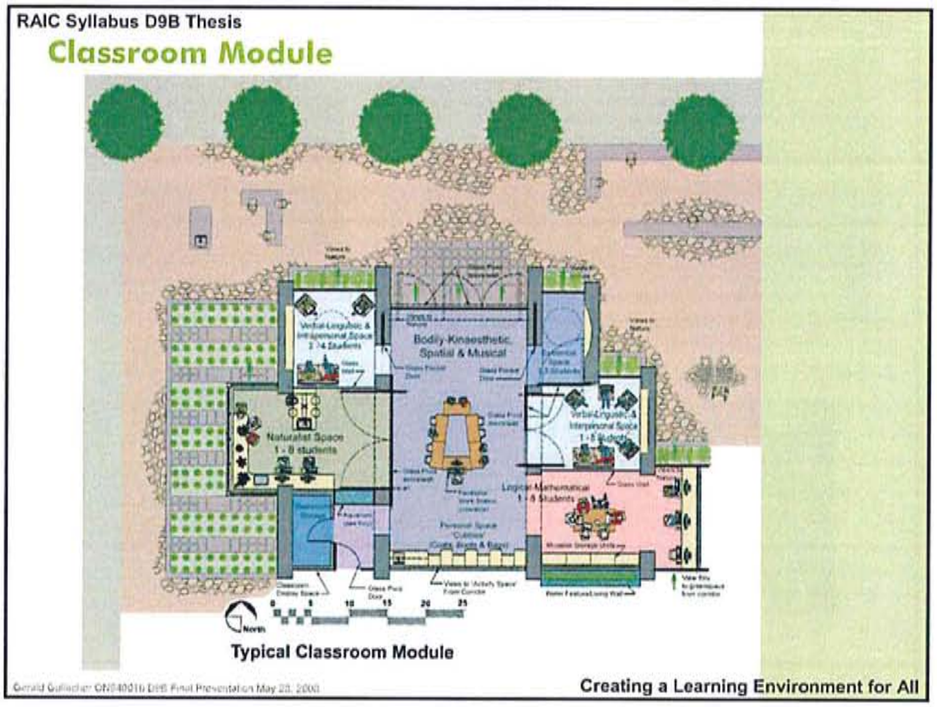
Creating a Learning Environment for All



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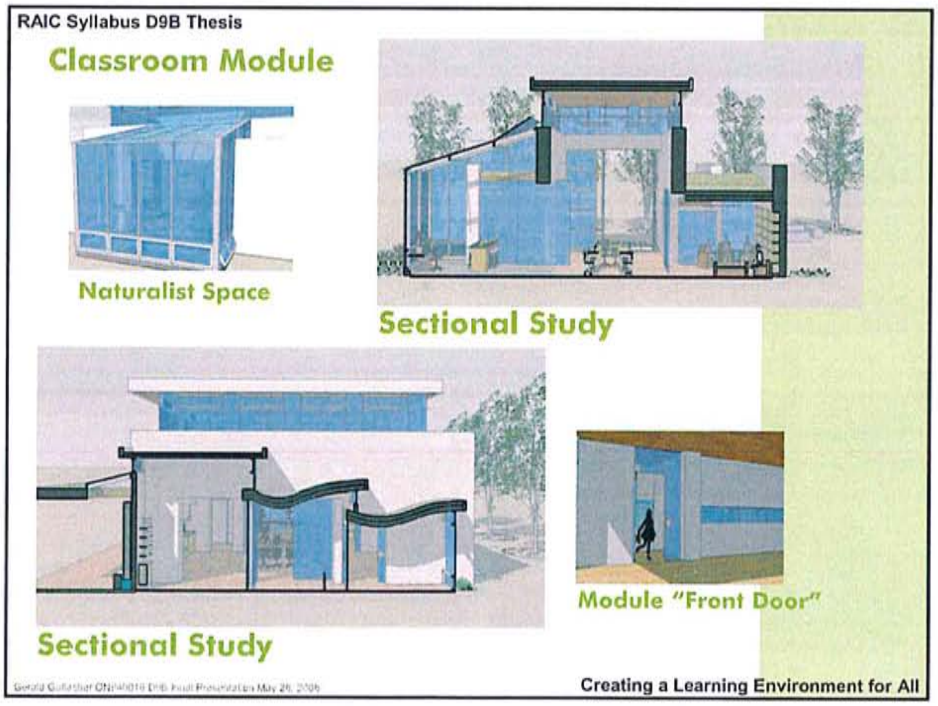
Classroom Module

Verbal-Linguistic & Interpersonal Space 2-4 Students
Bodily-Kinaesthetic, Spatial & Musical
Naturalist Space 1 - 8 students
Verbal-Linguistic & Interpersonal Space 1 - 8 Students
Logical-Mathematical 1 - 8 Students
Views to Nature
Personal Space 'Cubbies' (Coats, Boots & Bags)
Water Feature/Living Wall
Classroom Display Space
Glass Pivot Door
Views to 'Activity Space' From Corridor
0 5 10 15 20 25
North

Typical Classroom Module

Gerald Gallocher ON940016 D9B Final Presentation May 26, 2006

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module

Naturalist Space

Sectional Study

Sectional Study

Module "Front Door"

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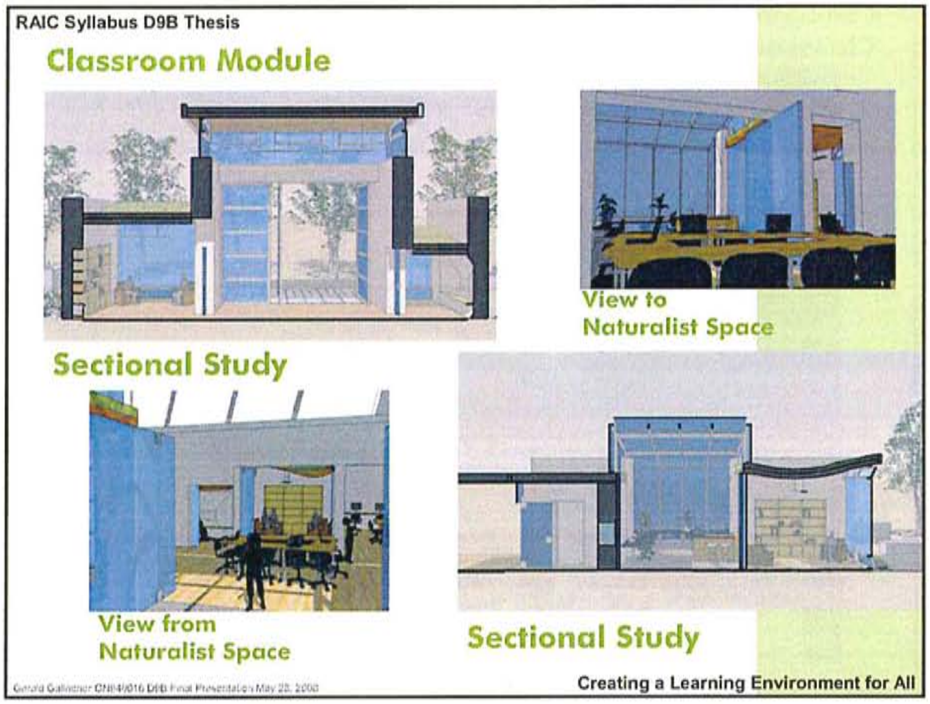
Creating a Learning Environment for All



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Classroom Module

Sectional Study

View to
Naturalist Space

View from
Naturalist Space

Sectional Study

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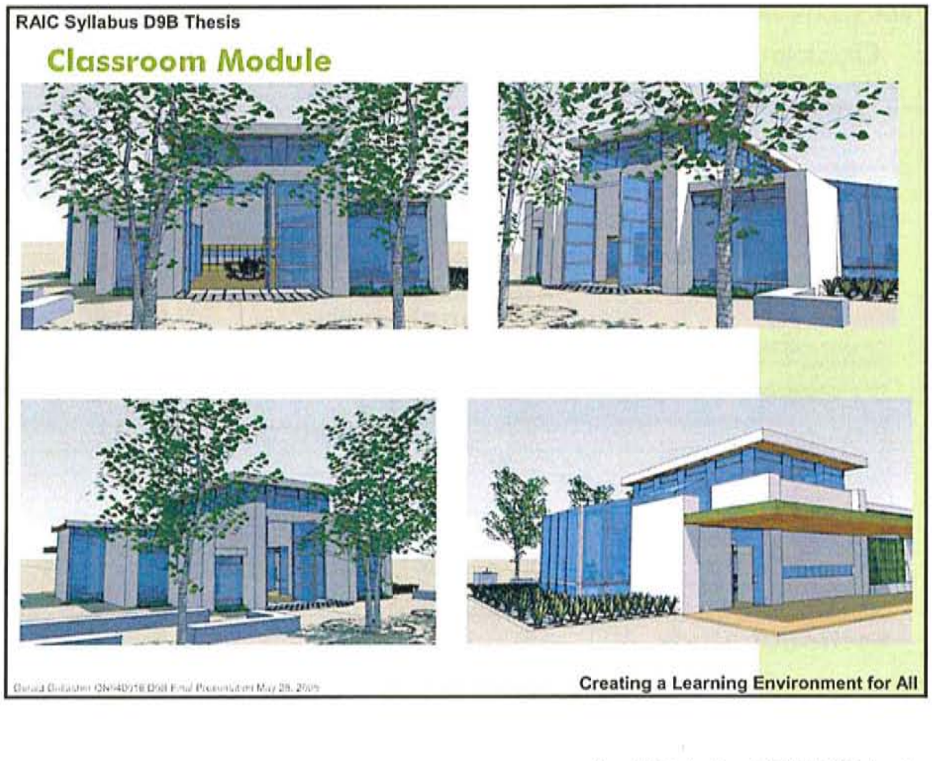

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Classroom Module

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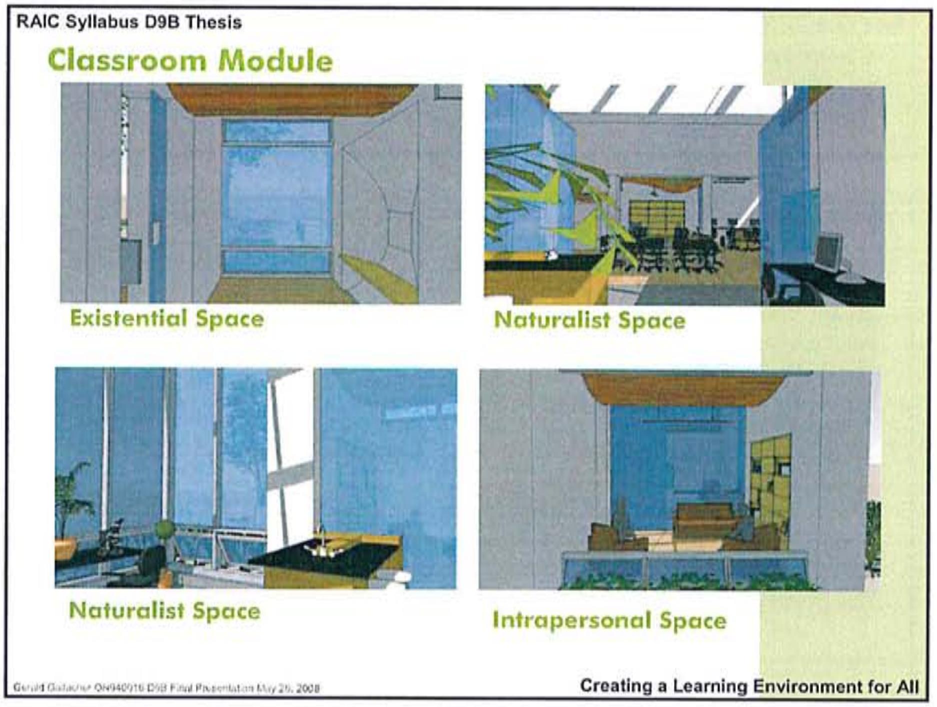

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Classroom Module

Existential Space

Naturalist Space

Naturalist Space

Intrapersonal Space

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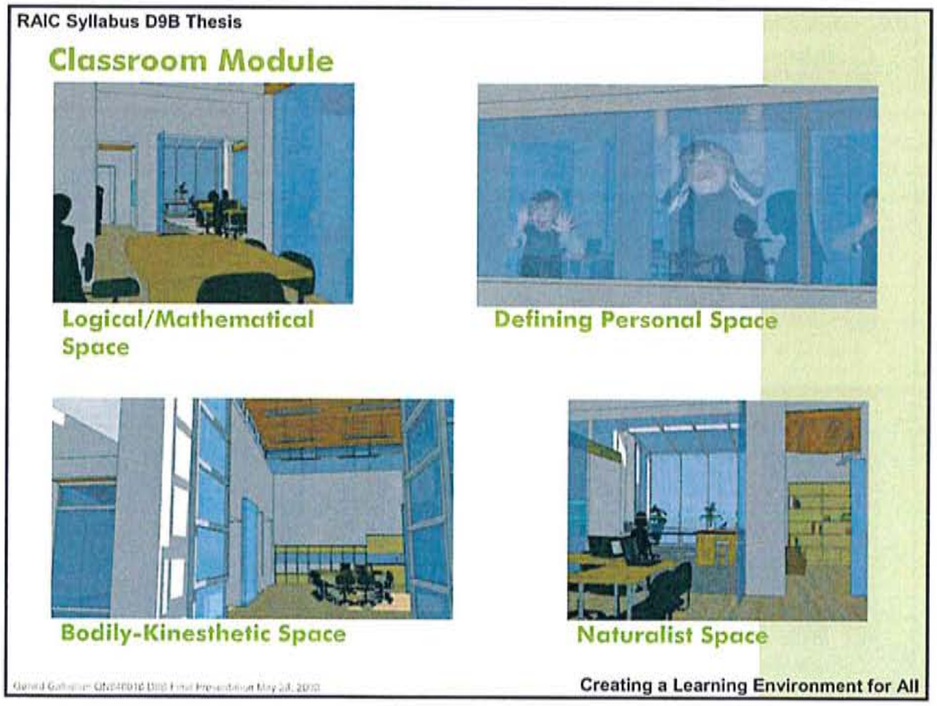

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Classroom Module

Logical/Mathematical Space

Defining Personal Space

Bodily-Kinesthetic Space

Naturalist Space

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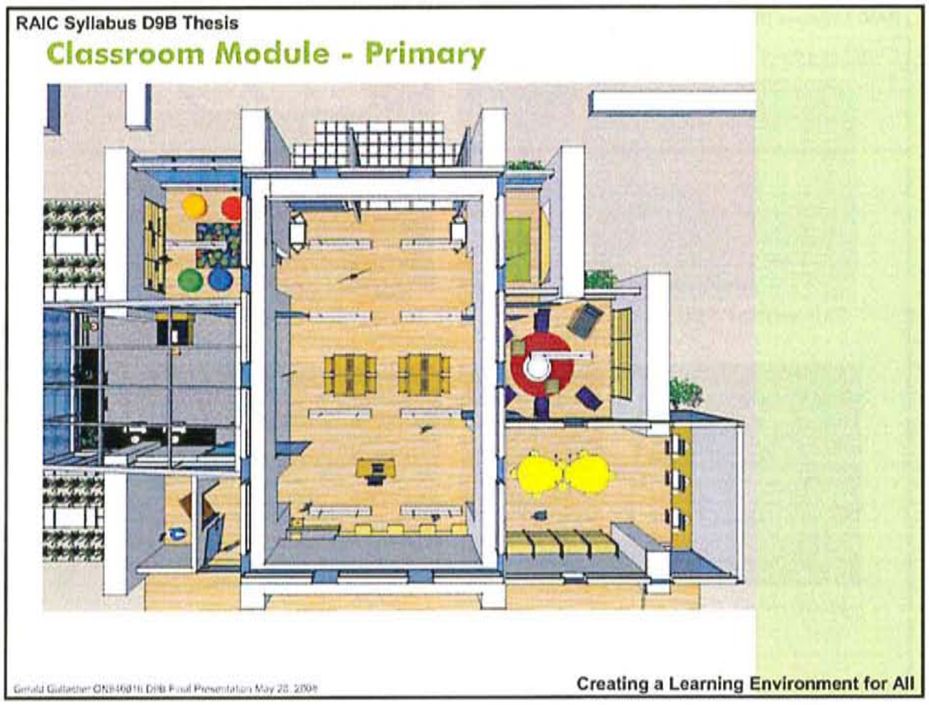

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Classroom Module - Primary

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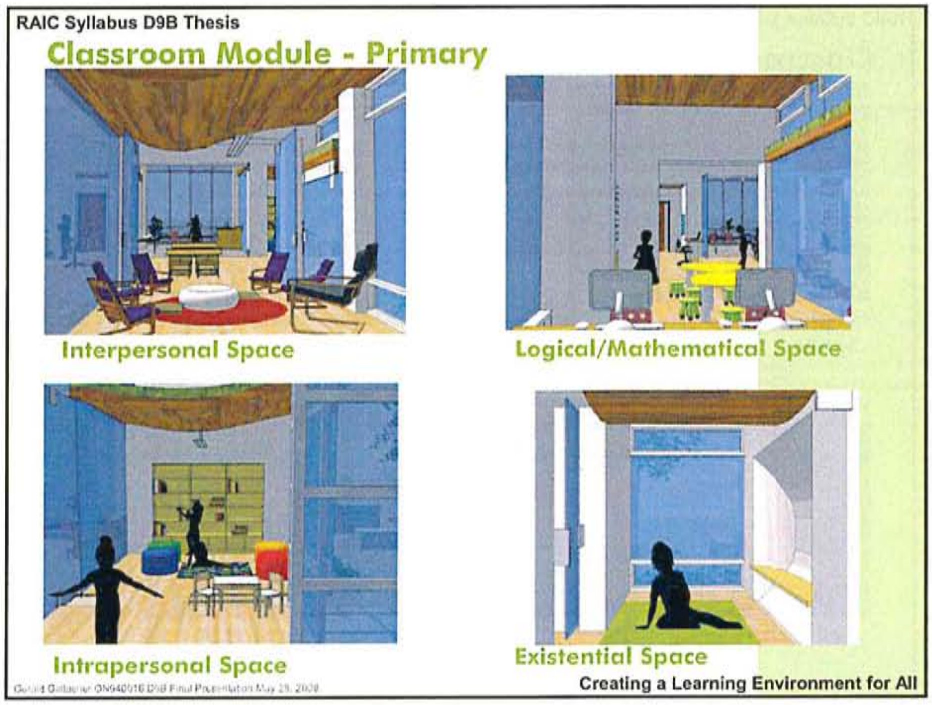

RAIC Syllabus D9B Thesis

Classroom Module - Primary

Interpersonal Space

Logical/Mathematical Space

Intrapersonal Space

Existential Space

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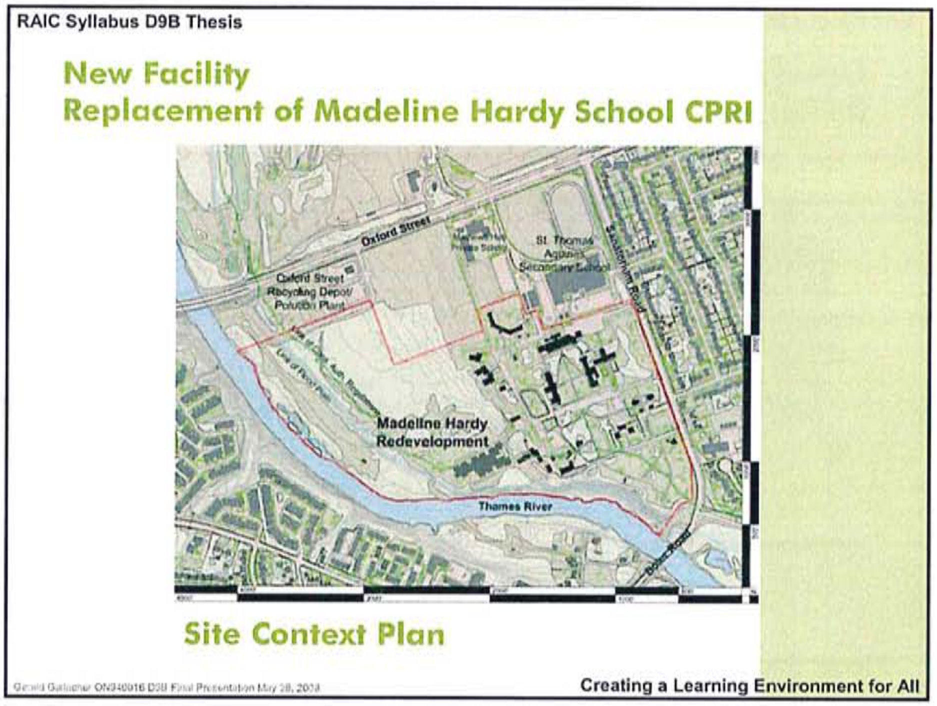


RAIC Syllabus D9B Thesis

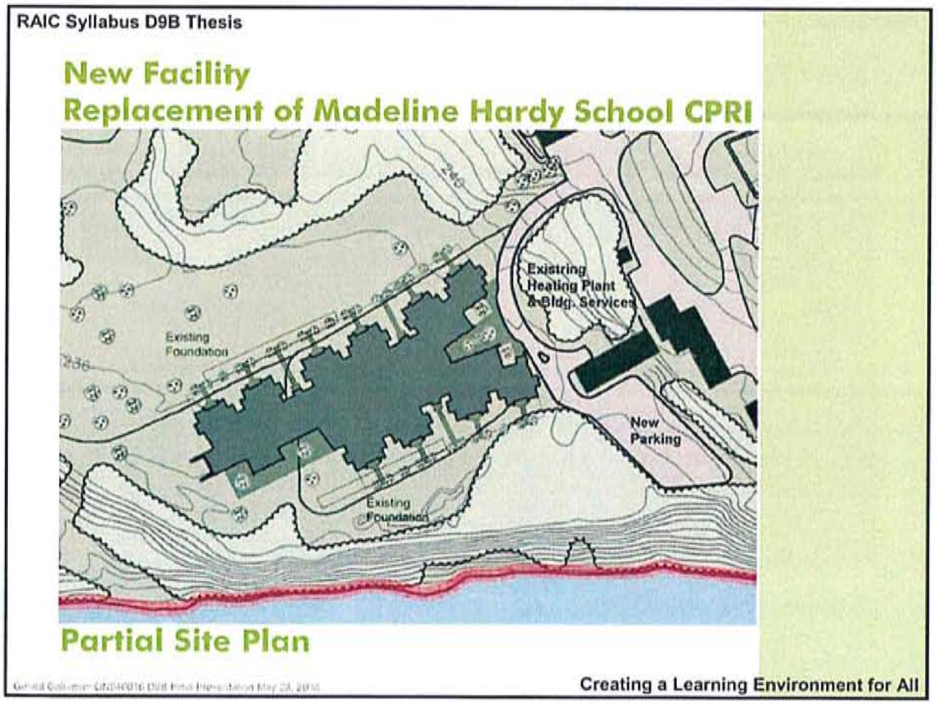
New Facility
Replacement of Madeline Hardy School CPRI

Oxford Street
St. Thomas Aquinas Secondary School
Sarnia Road
Oxford Street Recycling Depot/ Pollution Plant
Madeline Hardy Redevelopment
Thames River

Site Context Plan

Gerald Gallacher ON940016 D9B Final Presentation May 28, 2010

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

New Facility
Replacement of Madeline Hardy School CPRI

Partial Site Plan

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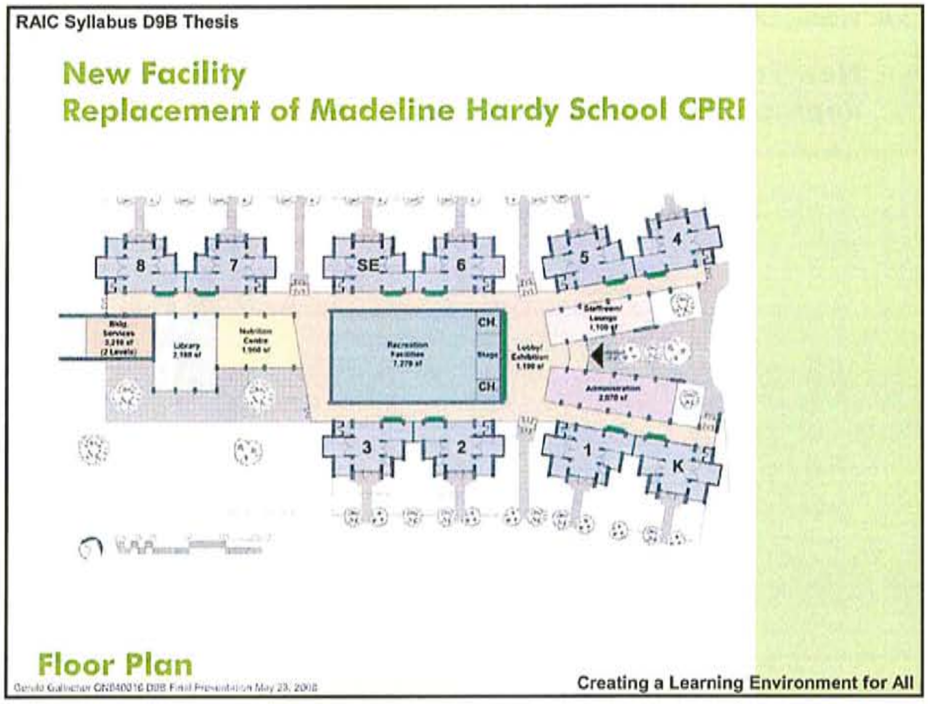
Creating a Learning Environment for All

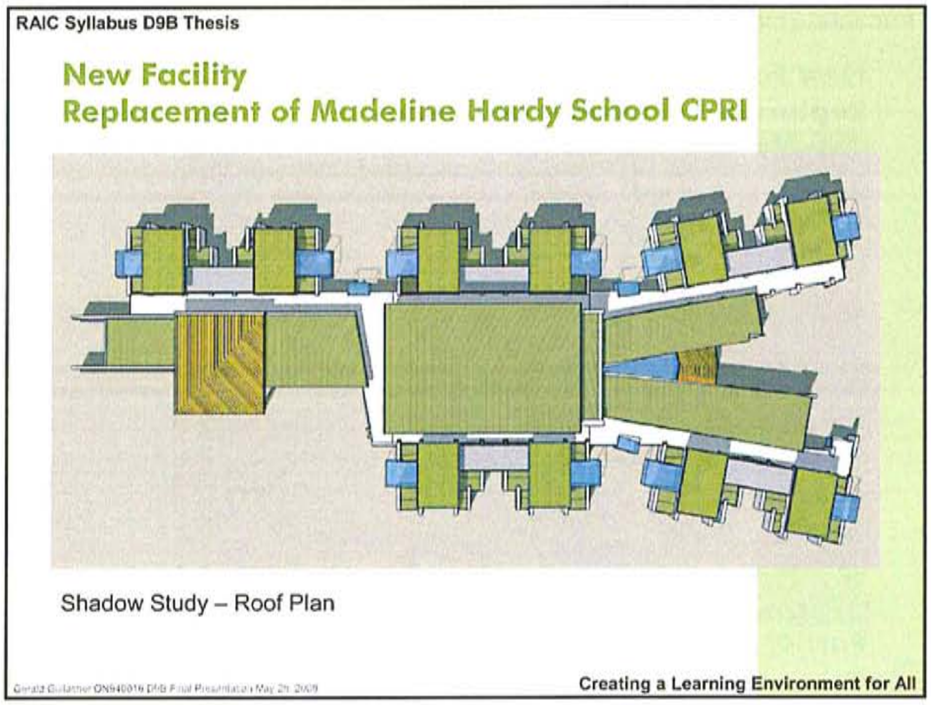


RAIC Syllabus D9B Thesis

New Facility
Replacement of Madeline Hardy School CPRI

Floor Plan

Creating a Learning Environment for All

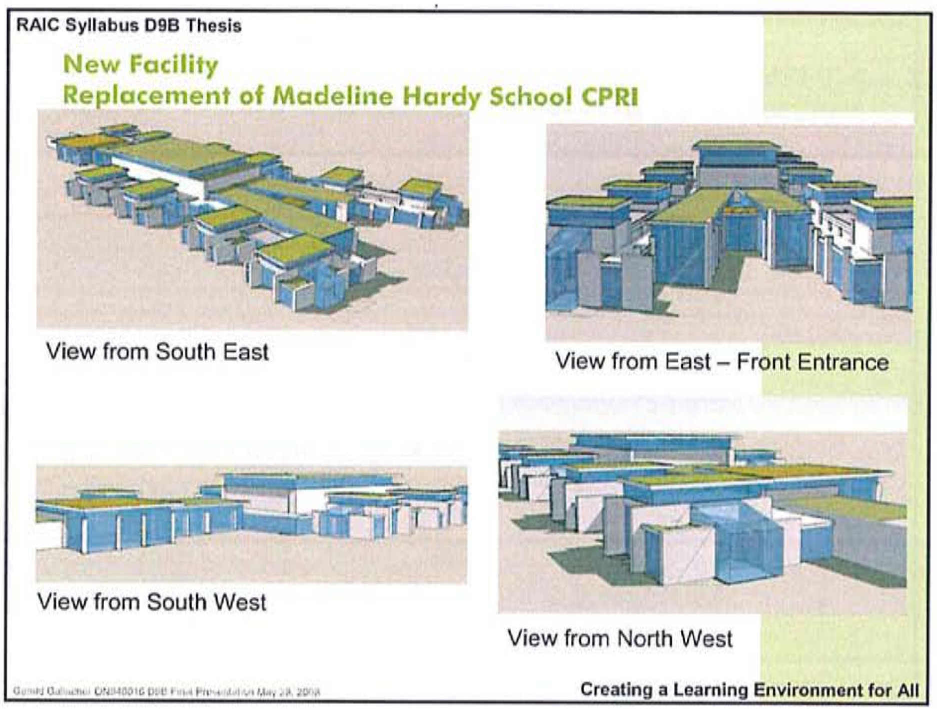


RAIC Syllabus D9B Thesis

New Facility
Replacement of Madeline Hardy School CPRI

Shadow Study – Roof Plan

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

New Facility
Replacement of Madeline Hardy School CPRI

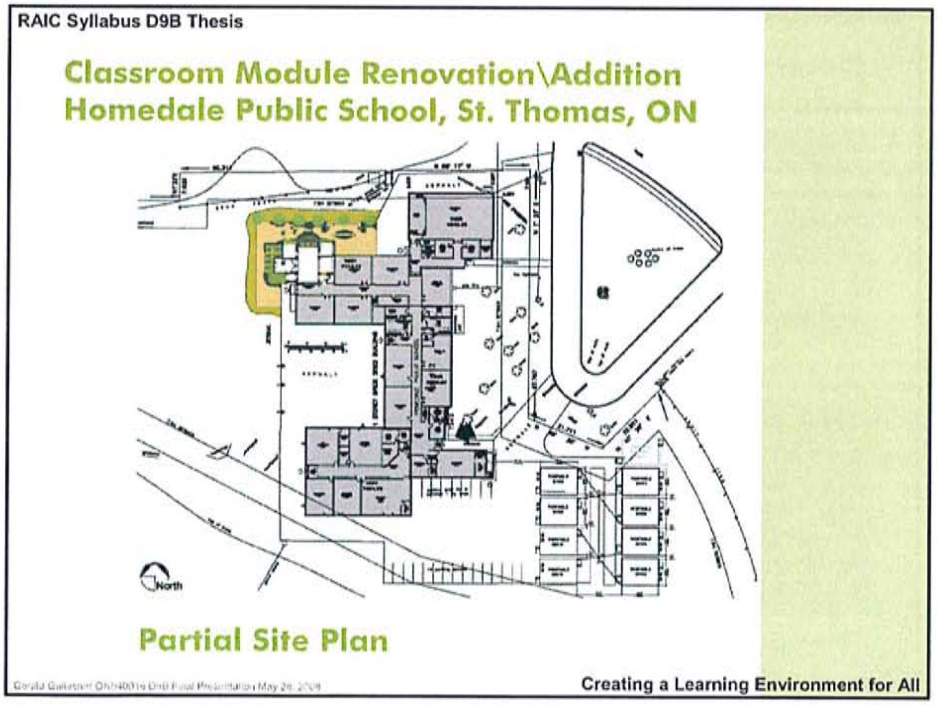
View from South East

View from East – Front Entrance

View from South West

View from North West

Creating a Learning Environment for All

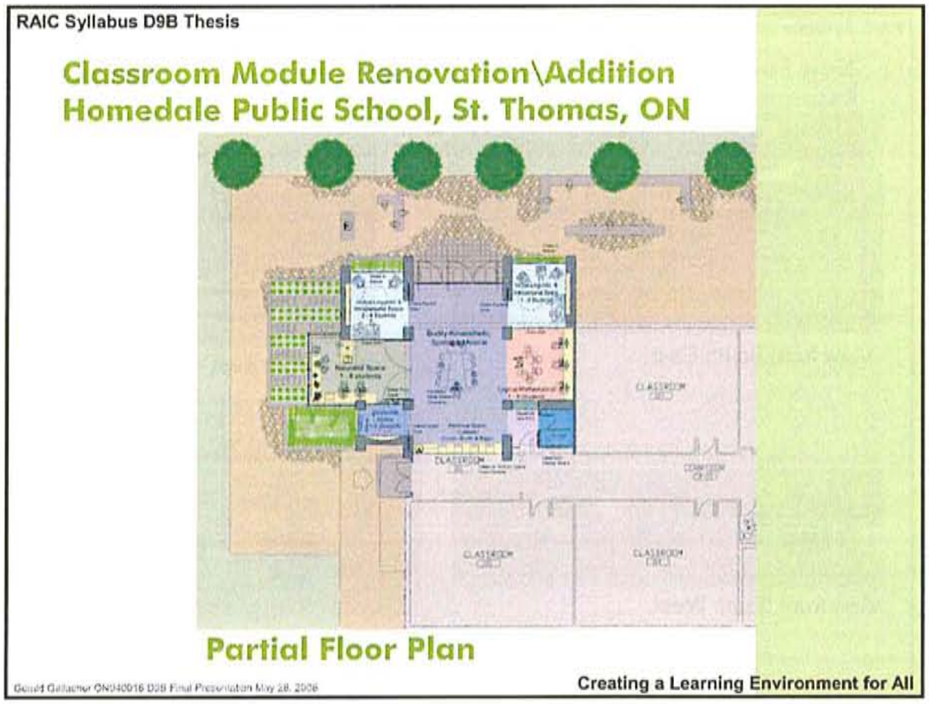


RAIC Syllabus D9B Thesis

Classroom Module Renovation\Addition
Homedale Public School, St. Thomas, ON

Partial Site Plan

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Renovation\Addition
Homedale Public School, St. Thomas, ON

Partial Floor Plan

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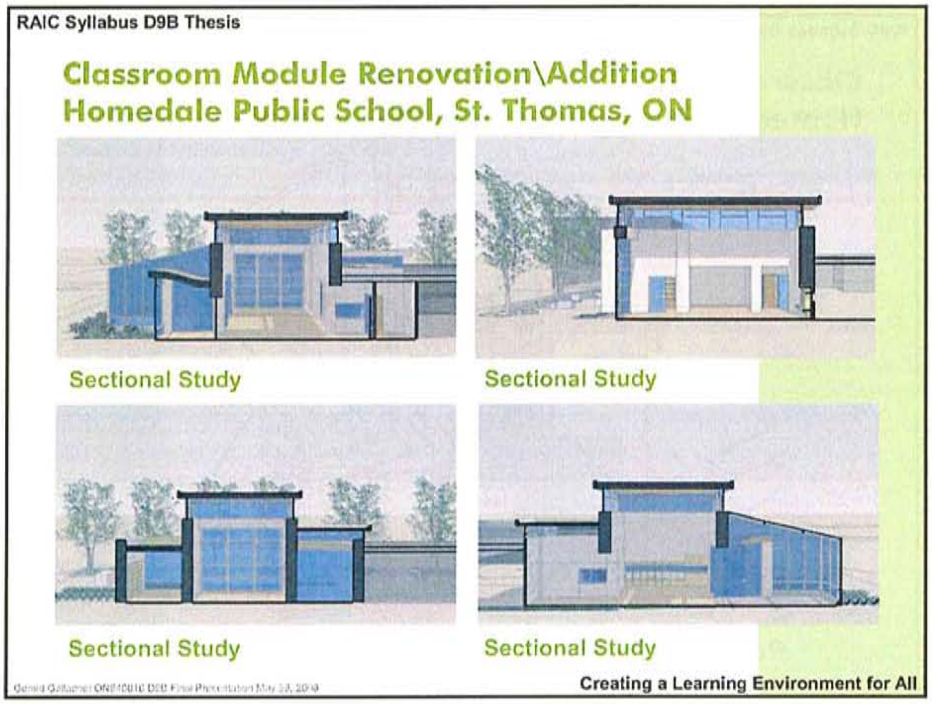
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Renovation\Addition
Homedale Public School, St. Thomas, ON

Sectional Study

Sectional Study

Sectional Study

Sectional Study

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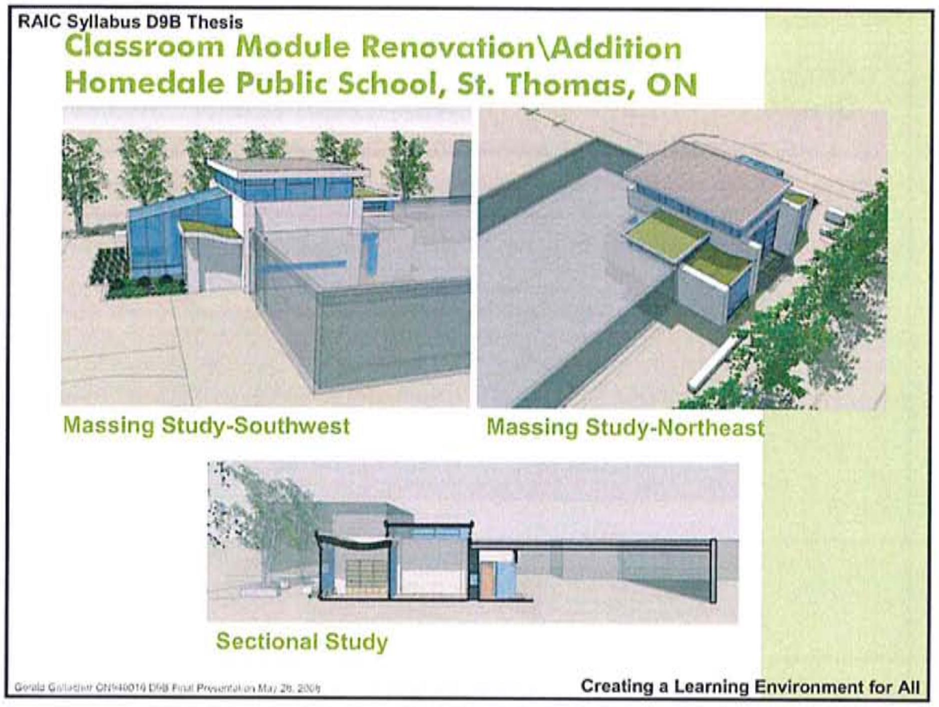
Creating a Learning Environment for All



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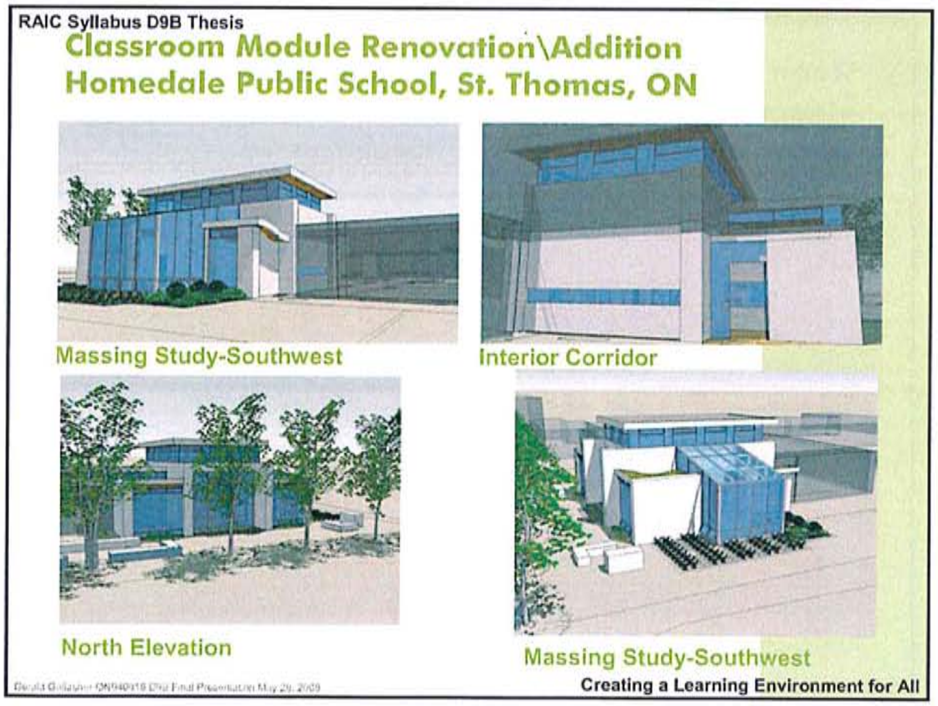
Classroom Module Renovation\Addition
Homedale Public School, St. Thomas, ON

Massing Study-Southwest

Massing Study-Northeast

Sectional Study

Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Renovation\Addition
Homedale Public School, St. Thomas, ON

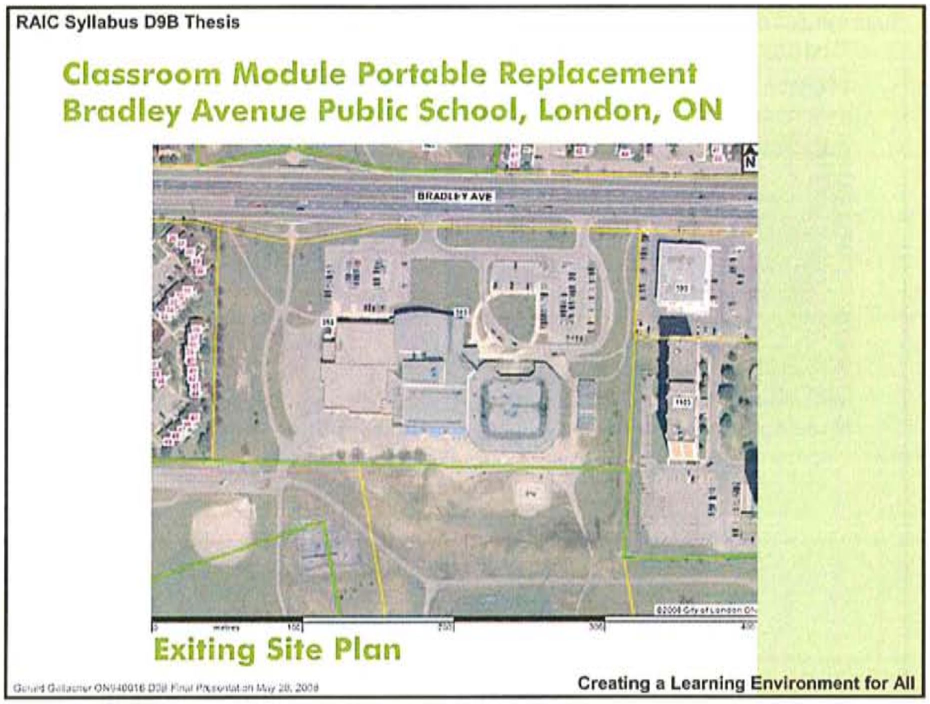
Massing Study-Southwest

Interior Corridor

North Elevation

Massing Study-Southwest

Creating a Learning Environment for All



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Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Exiting Site Plan

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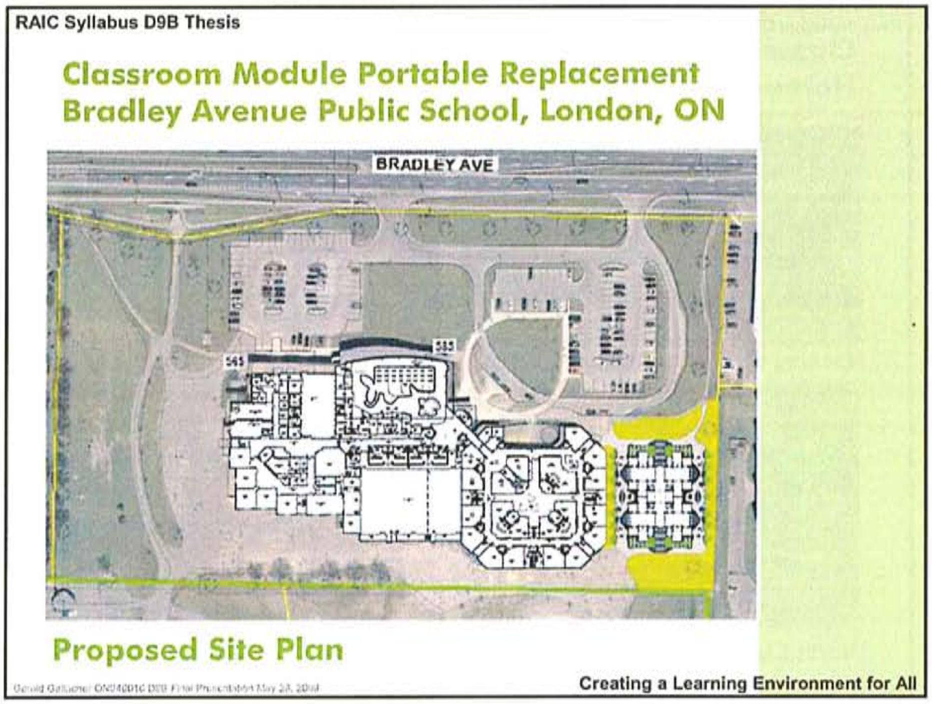
Creating a Learning Environment for All



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Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Proposed Site Plan

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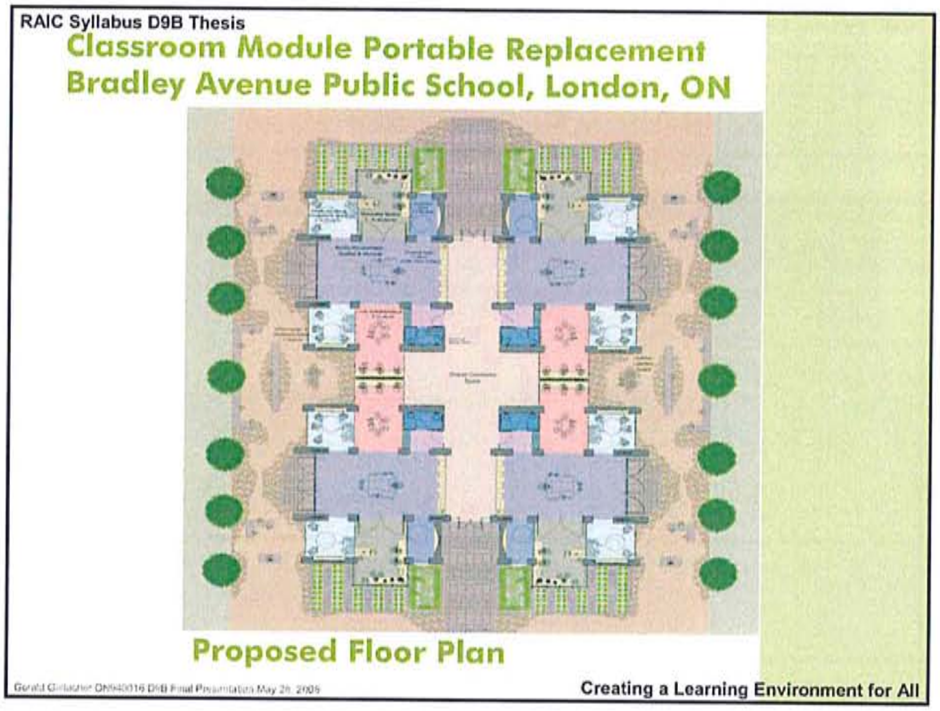
Creating a Learning Environment for All



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Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Proposed Floor Plan

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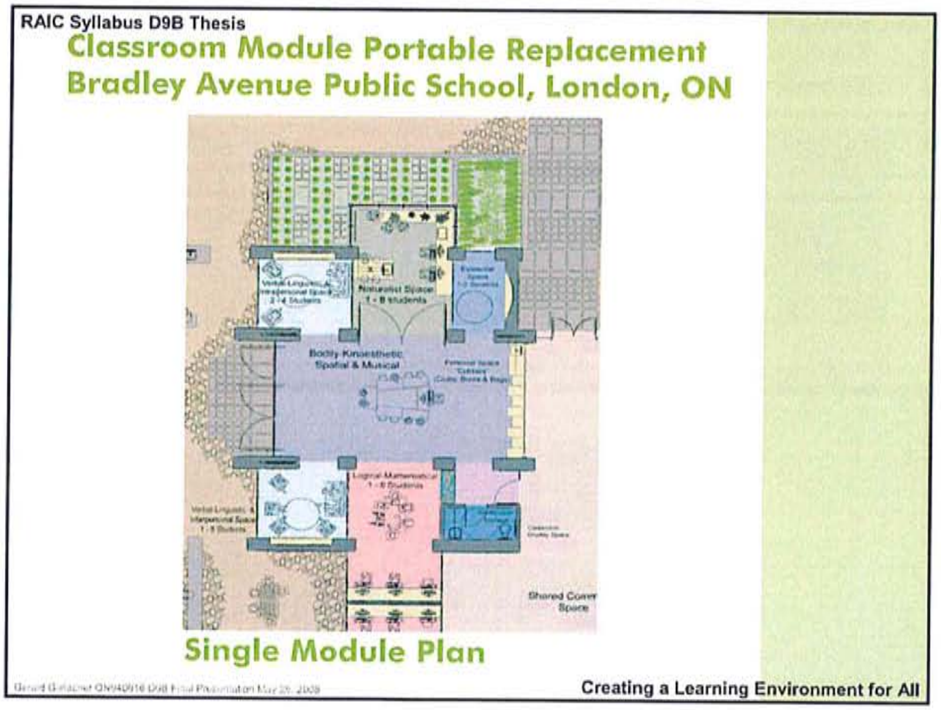
Creating a Learning Environment for All



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Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Verbal Linguistic & Interpersonal Space 2-4 Students
Naturalist Space 1 - 8 students
Existential Space 1-2 Students
Bodily Kinaesthetic Spatial & Musical
Personal Space "Cubbies" (Coats, Boots & Bags)
Logical Mathematical 1 - 8 Students
Verbal Linguistic & Interpersonal Space 1 - 8 Students
Shared Corr Space

Single Module Plan

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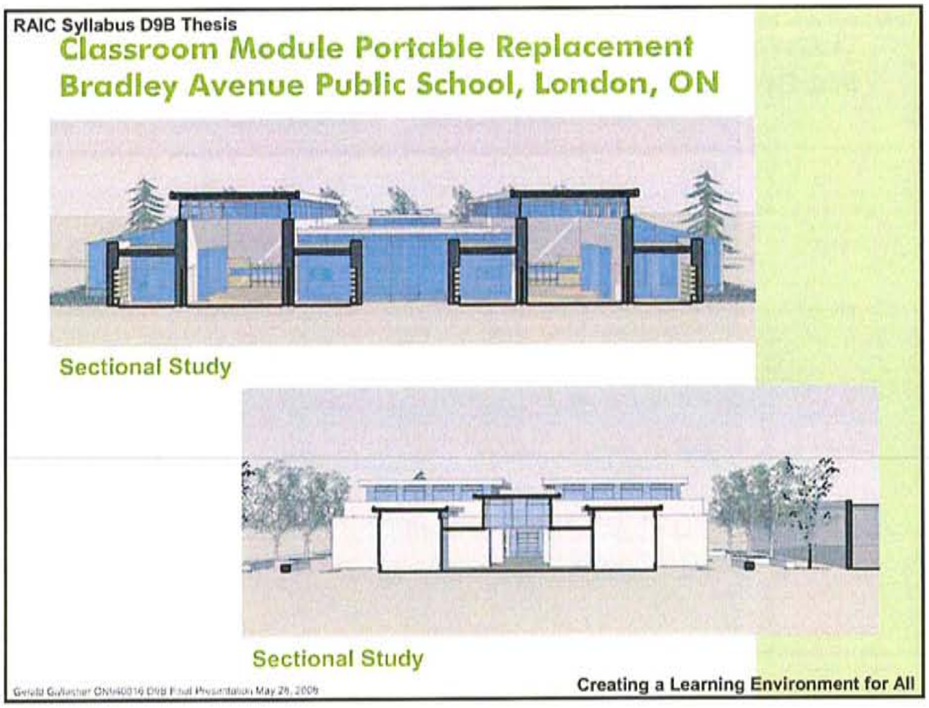
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Sectional Study

Sectional Study

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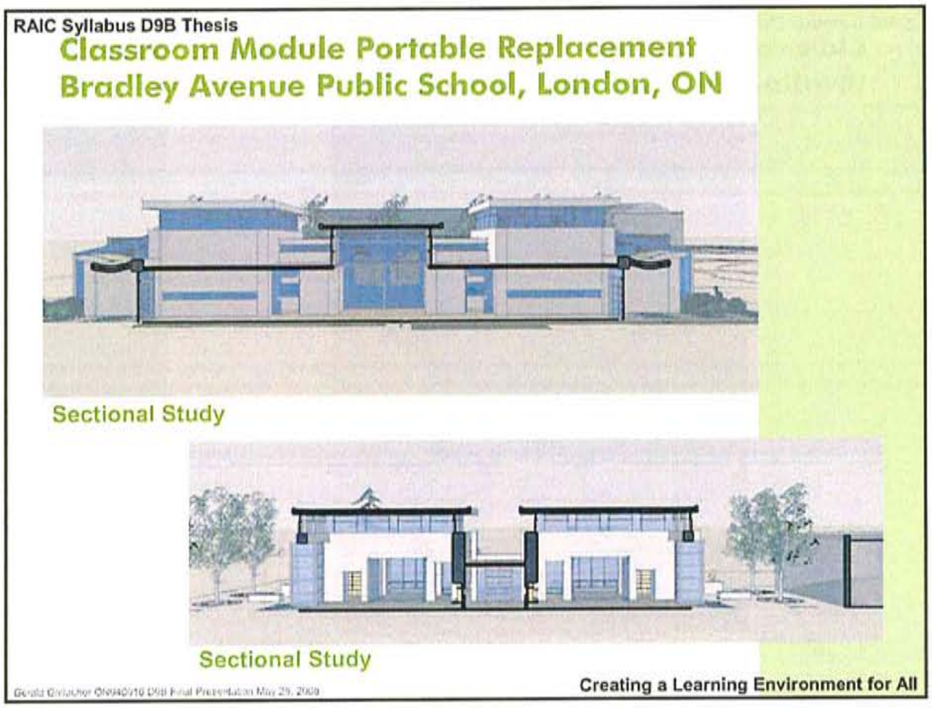
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Sectional Study

Sectional Study

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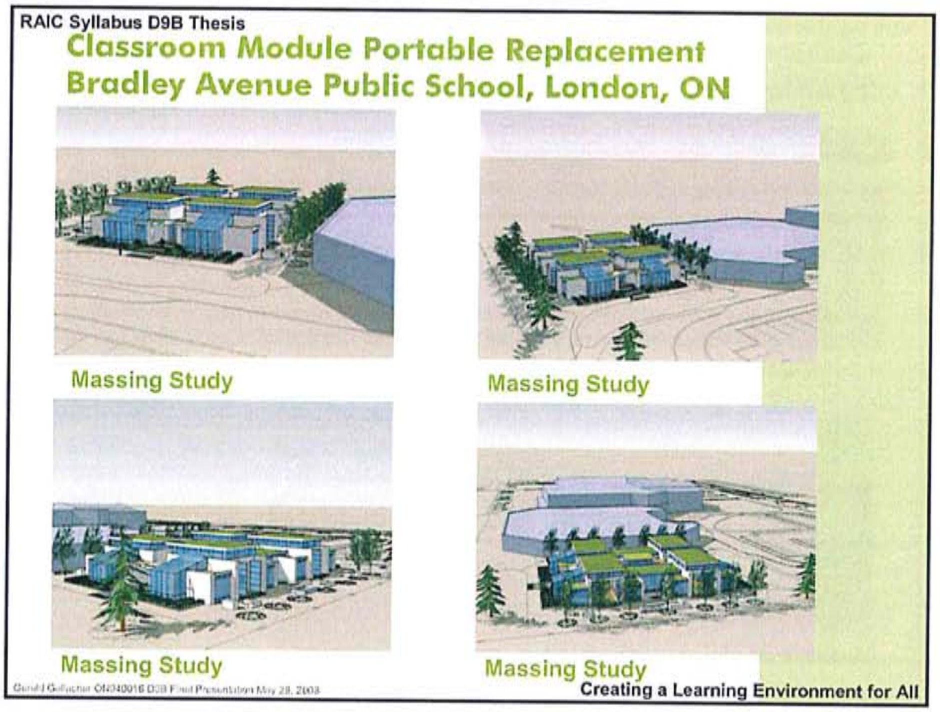
Creating a Learning Environment for All



RAIC Syllabus D9B Thesis

Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

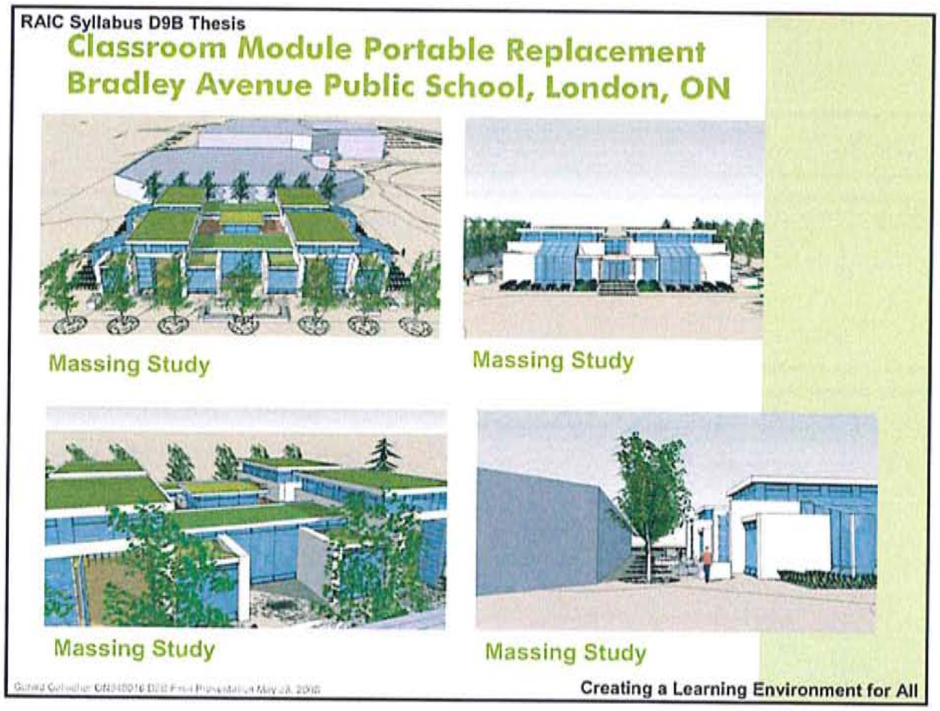
Massing Study

Massing Study

Massing Study

Massing Study

Creating a Learning Environment for All



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Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

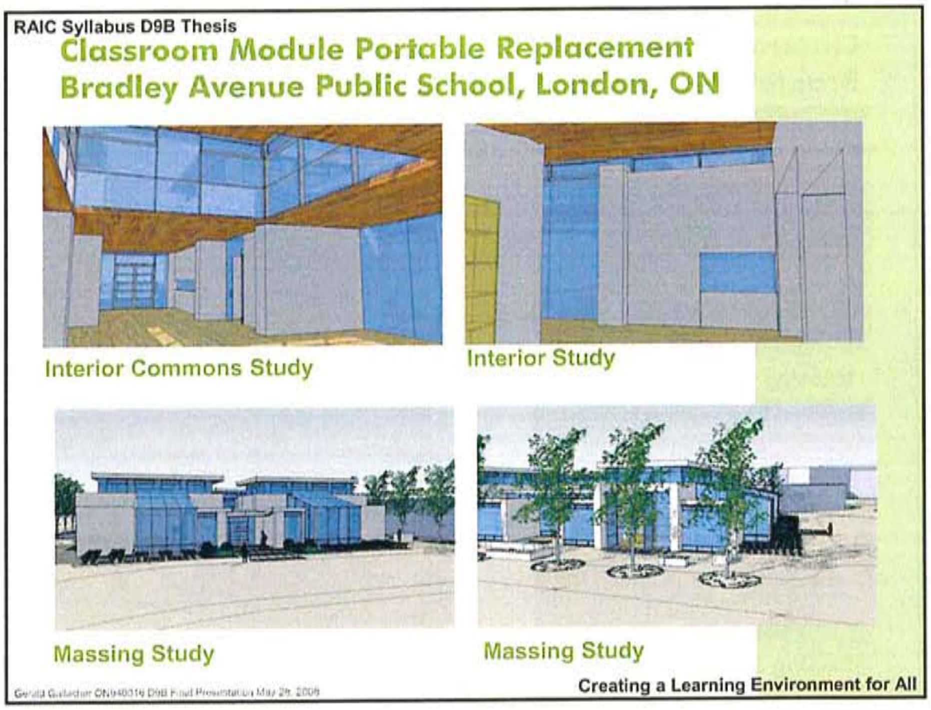
Massing Study

Massing Study

Massing Study

Massing Study

Creating a Learning Environment for All



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Classroom Module Portable Replacement
Bradley Avenue Public School, London, ON

Interior Commons Study

Interior Study

Massing Study

Massing Study

Creating a Learning Environment for All