architecture through pedagogy north minneapolis waldorf

capstone

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Table of Contents

1 Abstract
2 Problem Statement
3 Research Objectives
4 Learning Research
5 Pedagogical Inquiries
   5.1 Waldorf Stages of Learning
   5.2 Pedagogical Experimentation
6 Precedents
   6.1 The Apollo Schools
   6.2 Ventana Vista Elementary
   6.3 Strawberry Vale
   6.4 Bronx Charter School for the Arts
   6.5 Daginstitution i Skanderbrogade
7 Site
   7.1 Minneapolis, Minnesota
   7.2 Marshall Terrace Neighborhood
   7.3 Proposed Site
   7.4 Sky Topography
8 Program
9 Design Process
   9.1 Iterative Documentation
   9.2 Resolution
   9.3 Resolution
10 Resources
Abstract

Designing educational environments has largely been a realm of little innovation and advancement in the last century. New school designs are still based on the factory model of 100 years ago, and for the most part, are anything but conducive to learning and child development. Inspired by the unique pedagogy of Waldorf education (a model more common in Europe, yet quickly gaining popularity in the US), this project seeks to develop an environment for learning and discovery that is informed both by the curriculum it shelters as well as the community it serves. The project is located in a low-income neighborhood of Minneapolis, MN, in which the academic achievement gap is alarmingly high. Programmed for one classroom each of grades K-8, as well as specialty spaces required for the Waldorf curriculum, the building has a scale that mediates the residential and industrial context of the site. The design plays with the “sky topography,” cutting and filling earth and using glu-lam column structures to allude to the only existing feature on the site, a row of oak trees. A second skin envelops the entire building to create interiors green play/learning spaces that are usable even in the winter months.

Education is a social process. Education is growth. Education is, not a preparation for life; education is life itself.

John Dewey, philosopher, psychologist and educational reformer.

If we look at the way most government agencies handle the “business” of school design and construction, we find that the system seems literally designed to weed out any potential for a completely creative solution...Schools’ most important purpose—learning—and their most important clients—children and the local community—are largely disregarded in the process of their creation.

Prakash Nair, architect.

“But are They Learning?”
International Workshop on Educational Infrastructure in Guadalajara, Mexico, 2002

Thesis
In the case of educational environments, architecture ought to support and promote pedagogical visions.

Hypothesis
The study of child development and psychology as well as traditional and alternative curricula will influence a spatial experience in an educational environment to allow for greater learning, play and growth.
In an age when discovery and technology are constantly evolving and developing, our educational facilities remain stagnant in the early 20th century. The majority of today’s schools are large, institutional boxes, still modeled after factory design. Educational curricula and policy have begun to respond to and catch up with 21st century society; however, these evolutions are constrained when forced into inadequate environments. If innovation is expected to succeed on one level, it must occur holistically.

There is a clear need for schools that are appropriate vessels for the type of learning that occurs today and into our future. No longer should students be confined to the box. Educational architecture should respond to and facilitate the innate development of students as well as the ever-growing world of knowledge with which they are exposed.

Moreover, the academic achievement gaps within the Nation’s low-income communities are staggering. These areas deserve first attention if the gap is to be narrowed and a healthy society is to be attained.
Learn general principles of child development and learning at the elementary and middle school ages.

Gain an understanding of educational theories and systems; the “traditional” versus alternative methods, such as Waldorf.

Analyze spatial implications of educational models. How do the children use space? How should the building relate to the site, the interior learning space to the exterior learning space? How can the building remain flexible/open to the communities needs?

Research how architecture can improve upon those basic principles of learning and teaching. Materials, lighting/day-lighting, natural ventilation, etc.

Analyze the NE Minneapolis, MN site, climate, context and community. What are the architectural implications of these factors?
Aesthetic quality
Aesthetics apply to more than just the visual experience. Instead it involves all of the senses and full sensory experiences are crucial for young learners. The spaces should vary in their sensory stimulation. Larger group play spaces, for example, could be very vibrant in their sights, textures, and one’s movement through the space; whereas a smaller reflection space ought to be much more homogenous or calm.

A different side of aesthetic quality is the psychological value it gives the school. If a child sees the community invest in and cherish her school she will model her own appreciation in the same way. In such cases students tend to increase academic efforts and decrease vandalism.

Scale
Windows, furniture, room size and ceiling height, etc should be able to relate to both the children as well as the teachers. Students respond better and appreciate when they are at equal eye level to the adults.

Noise
While some reverberation can be an interesting auditory experience, noise can have negative affects on children’s learning. Consistent noise, even at levels as low as 90 dB, reduces attention span and memory and increases blood pressure. Moreover, spaces that have poor acoustics encourage children to be louder so that they can be heard, which makes the next child have to speak even louder to be heard over the previous children and so on and so forth.

Ventilation
Studies have shown that learning and achievement increase dramatically when outside air is allowed to circulate in the classroom.

Natural Light
Plenty of day lighting increases learning by up to 21% from that in classrooms with insufficient natural light.

Artificial Light
Task lighting, display lighting and ambient lighting are all required in a building as diverse as a school.

Indoor/Outdoor connections
Not only does the outdoors provide a different sort of physical interaction but it also opens doors to other ways of learning. For example, a pond is an excellent hands-on ecology lesson. Visual access to the exterior helps to rest students’ eyes when glancing from a more concentrated, near-focused activity.
In close relationship with the understanding of learning is the understanding of teaching. Over the last century there have been great strides in the development of educational models and methods, from the evolution of traditional to the creation and rise of alternatives like the Montessori and Waldorf theories.

Waldorf education is a particularly interesting pedagogy; one which is widely used in Europe and is quickly gaining support and popularity in the United States.

In 1919 Rudolf Steiner designed a school for the Waldorf Cigarette Company in Germany. He based the curriculum on his theory of child development and learning, which identifies three stages of growth, each corresponding to 7 year periods—imitation, imagination and truth seeking.

Rudolf Steiner’s three stages of learning:

**Imitation**

During the first seven years of life, children use imitation to learn. They mimic the people, things and environment around them. Learning is highly sensory and exploratory.

**Imagination**

From ages 7 to 14 years of age children are in the second phase of learning, imagination. Knowledge comes through play, art and experimentation. They begin to play with the possibilities of the concepts they mastered in the first phase.

Through observing these possibilities, and perhaps more importantly, the limitations of such investigations, they begin to identify and internalize constants. For example, if a child wants to balance a pencil on a ball they will be unsuccessful and that realization will play a role in explaining gravity, surface area, form, friction, etc.

**Truth Seeking**

The final stage of learning occurs during adolescence and young adulthood, ages 14 through 21. At this point, students have become familiar with the basic principles of their surrounding world. They have learned and internalized a comprehension of universal laws.

The fundamentals they have mastered, allow for more advanced application, exploration, investigation, abstract reasoning, etc.
In an effort to become not only familiar with, but connected to and immersed within the waldorf pedagogy, physical manifestations of the three phases of learning were created.

The upper left represents imitation, where there is an understanding of characteristics and general form but the understanding is almost superficial.

The following four images are inspired by the imagination phase (the stage at which the majority of the students in the proposed school would be). These play with the components of the first phase, reordering and reforming them. In addition, as the phase progresses, that which concealed the components in the first phase becomes less and less important and therefore less present.

Finally, in the third stage, the pieces have returned to their original positions, recreating the first form. However, this time there is not only an understanding of each of the components that contribute to the form, but also understanding of why they are ordered as they are. By this point, all of the external obstructions are gone, as well.
Music, identified as one of the fundamentals of waldorf education, was the focus of this investigation.

Classical and contemporary music are comprised of the same components—notes, lines and phrases. It is the phrasing, however, that gives the life, meaning, emotion and depth to the piece.

The manipulations to the wax sections are the result of thinking about music in this way. Each pin is like a note, each string like a bar and the form as a whole is the phrase. The pins are highest at the vertex of the angles, and recede to be at the surface of the wax at the extremities of each angle segment. This simple ordering rule gives dimension and complexity to the string forms.

Interested in the spatial relationships, (density, proportion, light, volume, etc) within the physical models that were created for the stages of learning, they were cast into wax. Wax was chosen not only for its ability to maintain such relationships when sections were cut, but also for its translucent qualities.

The images are of each of the one inch sections that were cut. While not intended to be a direct spatial influence—i.e. a literal plan, section or elevation of the proposed building—these sections are maintained as inspiration for the aforementioned spatial qualities along with visceral and phenomenological characteristics/impressions of design iterations.
Innovative educational environments may be lacking, but are also not nonexistent. An early leader in school design was the Dutch architect, Herman Hertzberger. His most notable projects were the Apollo Schools in Amsterdam, Netherlands. More modern school designs include: Ventana Vista Elementary in Tucson, AZ, Strawberry Vale School in British Columbia, Canada, The Bronx Charter School for the Arts in New York, NY and Daginstitution i Skanderbrogade in Copenhagen, Denmark. These projects serve as exemplary benchmarks for contemporary school designs.
Project: The Apollo Schools

Architect: Herman Hertzberger

Location: Amsterdam, Netherlands

Date: 1980's

The Apollo Schools elegantly interweave varied scales and spatial function into an open plan. The zones of activities are easily navigated with scale, light, and material designed specifically for each type of zone.

- small group/classrooms
- common/interstitial space
- circulation
**Project:** Ventana Vista Elementary  
**Architect:** Antoine Predock  
**Location:** Tucson, AZ  
**Date:** 1994  

“This school’s origins lie in its original planners’ innovative approach toward education. When our firm became involved in the design of this landmark school, we wanted the architecture to enhance, complement, and facilitate the curriculum. Spaces and elements throughout the school were designed to create unique learning environments for children.”

- Antoine Predock

Designed as a “city for children,” Ventana Vista Elementary has small learning communities within the whole. So although the school facilitates a large number of students, overall, part of the approach to support the educational philosophy was to divide the students into more intimate learning groups.
**Project:** Strawberry Vale School

**Architect:** Patkau Architects

**Location:** British Columbia, Canada

**Date:** early 1990’s

Patkau Architects’ Strawberry Vale School is a relatively small program, with only 16 classrooms that are arranged in “pods,” connected by interstitial zones.
Project: Bronx Charter School for the Arts

Architect: Weisz + Yoes Architecture

Location: New York, NY

Date: 2004

On a small site in the Bronx, NY, Weisz + Yoes Architects designed an award-winning charter school. Taking powerful cues from the surrounding community, the school stands as a symbol of revitalization while still having a complete sense of belonging among its context.

“academic” spaces

common space

circulation

“artistic” spaces
Project: Daginstitution I Skanderbrogade

Architect: Dorte Mandrup

Location: Copenhagen, Denmark

Date: 2005

Daginstitution in Copenhagen is a building full of possibility for fun exploration, discovery and learning. While the overall plan is basically rectangular, the division of spaces inside is much more dynamic, broken into a variety of scales and function. Situated in the city, the outdoor space is limited. Still, outdoor access is well integrated at several locations around the building, most interestingly on the rooftop.
A native of Minnesota’s Twin Cities, I am captivated by the many lakes, converging rivers, diverse culture, changing seasons, and the list continues. Minneapolis and St Paul have much to offer, and Minnesota’s educational system overall is doing well; however, the inner cities also suffer from a surprisingly large academic achievement gap, especially in North Minneapolis. A long time observance of this issue and plans to work in the Twin Cities in the future are some of the contributing factors in my decision to choose Minneapolis as the location for my capstone project.
With half the state classified as a cold climate zone and the upper half as very cold, Minnesota experiences large changes between the seasons. Temperatures range from an average low of 4°F and high of 20°F in January to an average low of 65°F and high of 86°F in July. The majority of the state receives about 26-30 inches of precipitation annually, on average.

At about 45°N latitude, the max sun altitude on the summer solstice is 69° and on the winter solstice it is 22°, with the sun rising and setting 125° and 57°, respectively, from due south. On the equinoxes, the max sun altitude is 45.5° and it rises and sets 91° from due south.

Minneapolis is Minnesota’s largest city. Like most of urban America, Minneapolis has a rich history, varied demographics and juxtapositions of areas of high prosperity with those of socio-economic struggle. Nicknamed the “City of Lakes,” the city has numerous lakes, parks, bike trails, etc. New to Minneapolis, and the Twin Cities Metro Area as a whole, is a light-rail commuter line.
The Marshall Terrace neighborhood is in Northeast Minneapolis, located approximately 3 miles from downtown and adjacent to the Mississippi River. The area is composed of industrial, small commercial, and residential buildings, with the residential mostly in the center, surrounded by industrial structures.

Half of the households in Marshall Terrace have children under the age of 18 and of those over 20% are classified well below the poverty line.
The actual site is a large gravel lot, with existing vegetation at the perimeters and a line of tall trees dividing the site into two sections of a near 1:2 ratio. The site is long and narrow on a N/S axis.

While it is not perfectly right-angled, the approximate dimensions are 483' on the west and east sides, 175' on the north and 125' on the south. The total approximate area is around 72,000 sq ft, about 25,500 sq ft to the north of the tree line and 46,500 sq ft to the south.

Bordered by Marshall Street on the west, 29th Ave to the north, 28th Ave to the south and an alley on the east, the majority of the vehicular traffic occurs on the west side, traveling north and south.

Vacant, nearly perfectly flat, lacking much vegetation, the site is truly a blank canvas open to influence from its unique, surrounding context.
The most intriguing aspect of this site, is the “topography of the sky.” Because the Marshall Terrace neighborhood is composed of residential, commercial and industrial buildings, the contextual scales surrounding the site are greatly varied. The school design can mediate this “topography” simultaneously belonging to multiple scales of the neighborhood.
small charter school for one classrooms in each grade, kindergarten through 8th
each classroom will serve approximately 18 students and one teacher
in total there will be approximately 162 students, 9 classroom teachers, 2 specialty teachers, and 8-10 administrators and other staff
Design Process

Iterative Documentation
Design Process

West Elevation

Entry Level Plan
Kindergarten through Fourth Grade Plan
Fifth Grade through Eighth Grade Plan
Design Process

Resolution

Transverse Section

Entry Area
North Facade Perspective
Communal Learning Space
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