FEEDING CHANGE
From the Ground UP

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FEEDING CHANGE FROM THE GROUND UP

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Abstract

This project aims to answer the question, through the utilization of the appropriate learning environment, can children learn how to improve the nutritional health of themselves and their families? The solution will be addressed with a children's health education center in Fargo, North Dakota where the children will learn from and about the environment.

The project is led by the idea that when given the opportunity to investigate the natural environment as a place of learning, children gain knowledge of the role the human body plays in it and the state of nutritional health that follows.

Key words:
Children, health, learning environment
Problem Statement

Through the utilization of the appropriate learning environment, can children learn how to improve the nutritional health of themselves and their families?
The Statement of Intent
Statement of Intent

Typology

Children's Health Education Center

Claim

Through the utilization of the appropriate learning environment, children will have the opportunity to learn how to improve the health of themselves and their families.

Actor: Children
Action: Improvement
Object: Nutritional health
Manner of Action: Learning environment

Premises

- Children, instead of just being taught to follow, should be encouraged to investigate the world around them.
- Improvement is needed in the awareness of what the human body takes from and returns to the environment.
- A person’s nutritional health is important not just for physical reasons, but also for the mental and emotional reasons.
- The natural environment is a valuable place of learning that is underutilized.

Theoretical Premise/Unifying Idea

- When given the opportunity to investigate the natural environment as a place of learning, children gain knowledge of the role the human body plays in it and the state of nutritional health that follows.

Project Justification

The American population needs to recognize what the consequences of today’s actions will be in the future. We need to stop consuming natural resources without thinking about what effect that will have on future generations. The physical health of our population is proof of our over-consumption. The focus of this project is on children because they are the future; it is with them that the highest potential for societal change resides.
The Proposal
The Narrative

We are consuming too much. It’s that simple. We are consuming too much of our environment. We are consuming too much food. There is a limit to our sources.

The solution is the part that is not simple. There are many things that factor into the solution of this problem. I believe architecture can be one of them.
**User/Client Description**

**Children’s Health Education Center**

A learning program for children of all ages—from pre-school to high school to college and beyond.

- 100 students
- 15 Instructors
  - Instructors having a variety of backgrounds in culinary arts, nutrition, dietetics and agriculture.
- Program Director
  - Assistant to the Director
  - Business Manager
  - Receptionist
- Facilities Management Staff
  - Janitorial
  - Maintenance
  - Laundry
  - Grounds Keeping

Parking for staff, students and parents.

**Occupancy**

- Childcare center
- Research labs
- School-age program classrooms

**Market**
Major Project Elements

Children’s Health Education Center

- Classrooms
- Rest rooms
- Staff offices
- Janitorial/Mechanical/Laundry
- Gymnasium
- Gardens
  - Indoor (enclosed greenhouse) and Outdoor (open)
  - Ground level and roof-top
- Living machine
- Equipment storage
- Learning Kitchen
- Refrigeration & Freezer food storage areas
- Dry/cool food storage

Funding will be from grants and private donors. There is also a possible opportunity for income from the sale of the produce grown.

The center would be seen as an “elective” opportunity program for children. The children would pay to attend (comparable for what a parent would pay for child care). Partial to full scholarships would be available (also through grants/private donors) for children of low-income families.
United States of America

North Dakota
Surrounding states of Minnesota, South Dakota and Montana. Canadian provinces of Manitoba and Saskatchewan.

Red River Valley
Cass County

Fargo-Moorhead Metro Area
The Red River of the North slices a curved path down the center of the two cities (as well as the states of North Dakota and Minnesota).

Fargo
Downtown
Site Information

315 North University Drive,
Fargo, North Dakota

Woodrow Wilson School Building
& Parking lot

This site is of particular interest because of its downtown location and its history as a place of education.

Choosing a site in a downtown area was important to the project to reinforce and encourage an acceptance of an urban way of life. An active way of life is encouraged in an urban area, where many things are accessible without vehicular transportation. Where as, suburban areas do tend to rely heavily on vehicular transportation.

A site in this area of the country was ideal for its fertile soil. I would like to show in the project that edible gardens can be successful in an urban area and do not need to be reserved for large and open suburban areas.

I have not yet determined which parts, if any, of the existing built structures currently on the site will remain and reused in a new way.
Woodrow Wilson School was built in 1917 as an elementary school. It is now used as an alternative high school and for several other educational purposes (Institute for Regional Studies, 2004).

The school is currently for sale by the Fargo School District.

The site sits along a major arterial road, University Drive. University Drive is an important southbound passageway connecting areas of north, downtown and south Fargo. Outside of the Fargo city limits, University Drive becomes North Dakota State Highway 81.

Public transportation is also convenient. Within one block of the site bus routes 13A, 13B, 17 and NDSU route 33 are of direct access. Within only a few more blocks routes 15 and 18 are also available. The Ground Transportation Center is then only a short bus ride, connecting a rider to the entire Fargo-Moorhead area.

The approximate dimensions of the site are: 240 feet east to west and 300 feet north to south, resulting in an total of 72,000 square feet.
Site Views
In this project I plan to emphasize the power to affect change that is in children. They are not only the future and therefore will teach future generations, but they also have the power to impact their parents and elders when given the appropriate tools in the correct environment. My goal is prevention of poor nutritional habits through an educational space. I will use the natural environment as the main teaching instrument.
A mixed method quantitative/qualitative analysis will be used following a Concurrent Transformative Strategy. This will be guided by the theoretical premise in both quantitative and qualitative forms.

The process will be documented through photography, sketching, writing, and both digital and physical model making.
Previous Studio Experience

Second Year
Fall 2006 - Stephen Wischer
   Tea House, Fargo, ND
   Boat House, Minneapolis, MN
   A House for Twins, Fargo, ND

Spring 2007 - Darryl Booker
   Waldorf School, Moorhead, MN
   Dance Academy, Fargo, ND

Third Year
Fall 2007 - Cindy Urness
   Center of Excellence, Grand Forks, ND
   Cranbrook Library, Bloomfield Hills, MI

Spring 2008 - Ron Ramsay
   Low-Income Housing, Chicago, IL
   Multi-Family/Student Downtown Housing, Fargo, ND

Fourth Year
Fall 2008 - Darryl Booker
   High Rise, San Francisco, CA

Spring 2009 - Stephen Wischer
   Train Station, Hotel & Residence, Barcelona, Spain

Fifth Year
Fall 2009 - Regin Schwaen
   Airport Hotel, Fargo, ND

Spring 2011 - David Crutchfield
   Thesis Project
The Program
“...we should strive to create indoor and outdoor settings where children live well and learn well.”

(Black, 2006, p. 46)

This research is centered on the ideas that were laid out in the theoretical premise: when given the opportunity to investigate the natural environment as a place of learning, children gain knowledge of the role the human body plays in it and the state of nutritional health that follows. In the pages to follow I will explain each part of the project. I will begin, as it always should be, with the children.

Empower Children


... the young people in school today will inherit a host of pressing — and escalating — environmental challenges: threats of climate change; loss of biodiversity; the end of cheap energy; depletion of resources; environmental degradation; gross inequities in standards of living; obesity, diabetes, asthma, and other environmentally linked illness. This generation will require leaders and citizens who can think ecologically, understand the interconnectedness of human and natural systems, and have the will, ability, and courage to act. (Stone, Excerpt from Smart by Nature, 2010)

Children, instead of just being taught to follow, should be encouraged to investigate the world around them. It is a simple cycle of learning that we need to instill into our children the power to seek out knowledge. We need to motivate so that children have the desire to learn. We need to provide opportunity for them to explore their talents. It is then that they will find success. The cycle of learning and success repeats when we reward and show pride in their
accomplishments.

The goal of a learning space is to encourage children to learn though interacting with the environment and to facilitate optimal participation; the space is both for children and by children. This involvement in the design helps children to enjoy being in the space. It gives them a sense of ownership of the classroom; the students are part of the building, not just occupying it. Spaces should be designed at both an adult scale and a child’s scale. This allows the children to feel safe and relaxed and therefore better able to learn. Children should be able to feel that this space was designed for them because they are important. Classrooms and learning spaces that have multiple functions and ways that they can change keep the mind of a child engaged and interested in the space. The flexibility of a space empowers children to be able to have an impact on their classroom. Encouraging them to actively participate empowers them to feel as they can impact the world beyond the classroom. (Bergsagel, Best, Cushman, McConachie, Sauer, & Stephen, 2007; Nair & Fielding, 2005)

“You need to instill a certain passion for nature. You can’t do that in the classroom alone. By growing and eating vegetables, they learn to see themselves as part of natural cycles. Our health depends on the health of our food, which depends on the health of the soil. Children learn that we are embedded in the soil.”

Fritjof Capra (Stone, A Food Revolution in Berkeley, 2002, p. 40)

Now that children have the motivation to learn, we need to provide opportunities for them to explore their talents. We should design keeping in mind that each child learns differently. Each child is unique. The three primary modes of learning are visual, auditory and tactile/kinesthetic, each should be addressed. Spaces such as hands-on learning labs allow open creative expression and growth of individuality, but also allow for group work. Group collaboration is a main focus of new school methods as institutions are recognizing that students can learn just as much from each other as they can from a teacher alone. An opportunity to learn in informal casual learning spaces reinforces relaxation. This is in contrast to high stress, high achieving and overwhelming
boxy spaces. Presentation spaces allow students to learn from lectures by teachers, guest speakers and students themselves. These spaces should be set up in a way that promotes interaction between the speaker and the audience. This not only insures that information is heard and understood, but creates respectful relationships, providing connections to community resources. For example, linking students up with professionals in the community allows the formation of great mentorship opportunities. The community surrounding a school is full of knowledge in a great range of topics (Bergsagel, Best, Cushman, McConachie, Sauer, & Stephen, 2007; Nair & Fielding, 2005).

It is important to acknowledge students’ efforts and to reward them. One way is to display student work proudly in areas for all to see. Reward should not just go to the highest achieving students, but to all who have shown progress and demonstrated hard work. Daily work can be displayed in spaces near the classrooms in ways that are easily interchangeable. Larger projects and prestigious achievements deserve a higher quality display in important areas of the school that is shared by the entire enrollment. It is here that students can gain motivation and praise from their peers (Bergsagel, Best, Cushman, McConachie, Sauer, & Stephen, 2007; Nair & Fielding, 2005).

When students feel that they have done well and are reinforced by their families, teachers and peers they have the motivation to start the cycle of learning and achievement again.

Cycle of Food

“We really want to emphasize fruits and vegetables and whole grains — that’s really important when we’re talking about a generation of kids who consider french fries a vegetable…” (Satkofsky, 2002, p. 19).

When a close look is taken at the state of our country, it is clear that improvement is needed in the awareness of what we humans take from and then return to the environment. “Where does what we eat come from? And “what happens to our waste?” These are questions that we need to be actively seeking answers to.

We have become a society where the majority of individuals are consumers, with only a small percentage producing, or even having the knowledge of the food production process. It is easy to ignore what is in our food or where it came from as long as it tastes good.

Making good food choices begins with knowledge of where it comes from and how it is prepared. People of all ages should have at least a
general idea of how fruits, vegetable, herbs and grains are grown. We should know what processes the plant goes through and what chemicals if any are aiding in its growth. The amount of natural resources consumed by agricultural equipment and the impact agriculture has on the soil are both questions that we as a population should be examining.

We should also investigate where the meat we eat comes from. What are the conditions of livestock? Much of this information is kept from the general public for good reason: it is gruesome. But does this allow them to abuse their secrecy and do things that the general population would not approve of if we knew it was happening?

Our food is grown or butchered and then it is packaged and directly shipped as “fresh” food products. If not sold fresh, it is frequently shipped to be further processed into convenience foods such as: hot dogs, chicken nuggets, boxed meals, and snack foods. Not only are processed foods less nutritious there are additional costs of transportation each time that products are shipped. The more often and greater distances that food must travel to reach the consumer, the more we use natural resources.

After we consume our food, whatever is not used by our body moves out as waste. Traditionally after our waste is flushed into the waste water system, the average person never has to (or really wants to) think about where it goes next. What happens is that our waste enters the sewer sanitation system, is treated and then becomes a problem of where to put it. We are running out of room to continue to stock-pile this “unusable” water. This water is in fact not unusable and can be treated and reused though a living machine.

Living machines are wastewater treatment systems that utilize plants to do the work naturally. Living machines treat both black water and grey water. Grey water is water from sinks, showers/baths and laundry machines. Black water is from toilets and because it contains fecal matter it needs to be treated more carefully. With this in mind, living machine systems were designed to prevent human contact with untreated or partially treated water. After treatment, the water can be reused in toilets and for irrigation, completing the cycle (Despommier, 2010).

The goal of investigating where our food comes from and what happens to our waste is to “…create an understanding of the continuum of garden to kitchen, kitchen to table, and table back to garden” (Crane, 2003, p. 29). Introducing agriculture into urban areas is a way can we
reinforce this. Urban agriculture “…creates stronger links between growers and consumers” (Flisram, 2009, p. 17). Farmer’s markets are a growing trend of urban agriculture. Vertical farming is another new possibility for urban areas.

“Many experts also now believe that traditional rural agriculture will not be able to keep pace with global food demand in the coming years, resulting in a global food crisis” (Flisram, 2009, p. 15). What is the solution? Vertical Farming is an idea that is being explored as possibility to support the food needs of large urban areas. The idea may seem futuristic, but Dr. Dickson Despommier, a leader in the development, explains that we already have the technology that is needed. A “vertical farm” involves growing many different crops on levels of a high rise building, “stacking greenhouses”. The layers support each other by using each other’s wastes. Fertilizers, pesticides and other chemicals are not needed. Food can be produced year-round. It is estimated that a 30-story skyscraper could produce enough food to feed 50,000 people. (Despommier, 2010) Having fresh produce readily available in urban areas would also reduce the need for transporting goods and ultimately reducing the cost to the consumer. This would then increase the ability of persons of low-socioeconomic status to afford fresh produce, and potentially improve the health of a vast number of children and adults.
“Schools are failing to act as if they recognize a connection between what children eat and how well they do in class…”

(Stone, A Food Revolution in Berkeley, 2002, P. 43)

**Nutrition for physical, mental and emotional health**

A person’s nutrition is important not just to their physical health, but also to mental and emotional health. When most people think about poor eating habits they immediately associate that with becoming fat. However, there are many more ways that our nutritional health affects our lives. Nutrition affects nearly all aspects of our lives including our life expectancy, energy level, emotional/mental health, body image, and social interactions.

Our diet, based on both what and how much we eat, affects us physically in many ways. When we consume food in a combination of poor choices and in quantities that are either too much or too little, health issues arise. The physical effects of poor eating habits can be seen both externally—weight, skin appearance, etc. and internally—how well the body’s systems, immune system, circulatory system, etc., are functioning.

The majority of American children facing weight issues tend to be overweight or obese rather than underweight. This investigation will not underplay the significance of issues facing the underweight, but will focus more on current childhood problems of being overweight and obese.

According to a report compiled by the Federal Interagency Forum on Child and Family Statistics, titled *America’s Children in Brief: Key National Indicators of Well-Being*, data collected from 2007 to 2008 showed that 19 percent of children ages 6-17 were obese. This is an increase from 11 percent in 1988-1994 and 6 percent in 1976-1980. It was observed that individuals of minorities had higher chances of becoming obese. Poor diet was a major cause of high rates of childhood obesity. Children between the ages 2 and 5 were the only group that consumed enough milk and fruit. The children’s diets were also found to have an incorrect balance of nutrient-dense foods to fats and sugars. Conversely, children 0-17 consumed on average enough grains in their diet (Federal Interagency Forum on Child and Family Statistics, 2010).

In 2003 the U.S. Department of Health & Human Services compiled a report *Prevention Makes Common “Cents.”* The physical health conditions listed as an increased risk to the overweight and obese were:

- Type 2 diabetes
- High blood pressure
- High cholesterol levels
- Coronary heart disease
• Congestive heart failure
• Angina pectoris
• Stroke
• Asthma
• Osteoarthritis
• Musculoskeletal disorders
• Gallbladder disease
• Sleep apnea and respiratory problems
• Gout
• Bladder control problems
• Poor female reproductive health: complications of pregnancy, menstrual irregularities, infertility, irregular ovulation

• Cancers of the uterus, breast, prostate, kidney, liver, pancreas, esophagus, colon and rectum

These secondary medical complications of obesity not only negatively impact the physical and mental health of the individual but those around them as well. Spouses, dependents, and other family members of persons who are obese face a variety of challenges that may include: assisting with medical cares, decreased meaningful interaction with their family member due to physical inability and early mortality, financial concerns/burdens, and increased risk of becoming obese themselves. The nation as a whole also suffers due to the enormous financial impact that treating persons with obesity and associated medical conditions has on the healthcare system. In 2003 it was estimated that the overweight and obese would cost $69 billion to $117 billion to support (U.S. Department of Health & Human Services, 2003).

In addition to the physical health complications associated with obesity, adequate nutrition is essential to supply the brain with what it needs to function properly. According to the Encyclopedia of Mental Disorders,

The human brain has high energy and nutrient needs. Changes in energy or nutrient intake can alter both brain chemistry and the functioning of nerves in the brain. Intake of energy and several different nutrients affect levels of chemicals in the brain called neurotransmitters. Neurotransmitters transmit nerve
impulses from one nerve cell to another, and they influence mood, sleep patterns, and thinking. Deficiencies or excesses of certain vitamins or minerals can damage nerves in the brain, causing changes in memory, limiting problem-solving ability, and impairing brain function. (Nutrition and Mental Health, 2010)

This suggests that in order to function at our greatest potential we need to supply our brain with good nutrients from a balanced diet. Children are especially susceptible to the effects of poor nutrition and in 1946 the National School Lunch Act was passed to provide school lunch to students regardless of family income (Spilmaeker, 2000). The issue that is pressing in today’s schools is the quality of school lunches. It is evident that our ability to learn is dependent upon providing our body with sufficient nutrients to power our brain. As Zenobia Barlow, a founder of the Center of Ecoliteracy, stated, “Schools are failing to act as if they recognize a connection between what children eat and how well they do in class…” (Stone, 2002, p. 43). Previously illustrating this point, the US Surgeon General Thomas Paran said in 1941,

We are wasting money trying to educate children with half-starved bodies. They cannot absorb teaching. They hold back classes, require extra time of teachers, and repeat grades. This is expensive stupidity, but its immediate cost to our educational system is nothing compared to the ultimate cost to the nation. (Stone, 2002, p. 43)

There is evidence of improvement in many mental & emotional health disorders—ADHD/hyperactivity, autism, bipolar disorder, dementia/Alzheimer’s, depression, dyslexia/dyspraxia, and schizophrenia with improvement in nutritional health (Food for the Brain, 2010).

Several factors influence our food choices. Before birth our nutritional health is based on the choices made by our parent(s). In a policy statement released by the American Academy of Pediatrics in 2003 and reaffirmed in 2007 it was identified that for young children, if one parent is obese, the odds ratio is approximately one in three for obesity in adulthood, but if both parents are obese, the odds ratio increases to more than ten. Before three years of age, parental obesity is a stronger predictor of obesity in adulthood than the child’s weight status (Committee on Nutrition, 2007). Children who are breast-fed were found to have fewer incidences of obesity. Several other environmental risk factors were
identified such as low socioeconomic status, low cognitive stimulation in the home, lack of access to fresh fruits and vegetables, and over-controlling parental behavior related to food (Committee on Nutrition, 2007). The American Academy of Pediatrics called all primary care physicians to advocate for and promote farmers markets and community gardens (Committee on Nutrition, 2007).

It is clear that the nutritional health of our nation and more specifically our nation’s children should be of utmost importance. By educating, arousing interest, and providing greater access to healthy foods progress can be made toward a more healthful society.

Nature as a Learning Space

What is good for the future of the environment and for communities is also good for schools and students now. Students who learn nature’s principles in gardens and serve their communities through civic participation become more engaged in their studies and score better in diverse subjects, including science, reading and writing, and independent thinking.

(Stone, Excerpt from Smart by Nature, 2010)

This leads me to my fourth and final point; the natural environment is a valuable place of learning that is underutilized.

It is important to define the classroom as both an indoor and an outdoor space. It is very probable that if a number of teachers were asked where their classroom was, they would describe a space surrounded by walls - an indoor space (Black, 2006, p. 47). In Georgia, a school completely eliminated recess at one point, seeing it as wasted time that should be spent learning in the classroom (Black, 2006, p. 47). Somewhere along the way we have attached the word “indoor” to classroom and have completely discredited the
The Edible Schoolyard garden at Martin Luther King, Jr. Middle School, Berkeley, CA

importance of the outdoors.

Children associate being outside to recess. The outdoor time is freedom from sitting still in a desk and being quiet; it is fun. Teaching outdoors involves use of all three learning styles: visual, auditory, and tactile/kinesthetic. “Hands-on experience helps kids remember what they learn... that the kids enjoy the lessons helps reinforce the learning even more.” When these elements are combined the perfect learning environment is created (Crane, 2003, p. 31).

The outdoors can be brought in with large windows, skylights and shown importance with solar panels. Natural ventilation provides a connection to nature and allows for lower levels of toxins to be produced into the air.

Randy White, a landscape architect, found a positive relationship between what happens in the classroom after being outdoors. He observed that children were better able to concentrate with more outdoor time; this is especially important considering the high number of children with attention difficulties. Children’s coordination, balance and agility were improved when outdoor classrooms were utilized. Observation and reasoning skills developed when children played with items in nature. Children were also found to be more creative and imaginative. Children learned social skills though interacting with their peers and the natural environment. Lastly, children were healthier and therefore missed fewer days of school because of illness (Black, 2006, p. 47).

The Edible Schoolyard at Martin Luther King, Jr. Middle School, Berkeley, CA is a great example of how the environment can be used as an effective teaching medium. The program, which began in 1996, involves a school garden and a kitchen classroom. The school’s principal teamed up with chef Alice Waters to create the program (Stone, 2002, p. 40).

The Edible Schoolyard project was funded by grants provided through the support of The Center for Ecoliteracy (CEL), in Berkeley, CA. The CEL was founded by Fritjof Capra, Zenobia Barlow and Peter Buckley in 1995. Part of their
The Edible Schoolyard kitchen at Martin Luther King, Jr. Middle School, Berkeley, CA

mission was to: “Inspire a curriculum integrating classrooms with hands-on gardening and cooking instructions” (Stone, 2002, pp. 38-39).

In both the garden and kitchen, the teachers at Martin Luther King, Jr. Middle School integrate lessons in subjects of science, math, social studies, history, language, health, and art. Students in Spanish class, for example, plant and then cook traditional Spanish foods (Stone, 2002, p. 41). By allowing the students to fully participate in all of the steps in the process of growing, harvesting, and preparing foods the students were able to immerse themselves in their learning. Students can also be more actively engaged in learning by participating in the idea and decision making stages of the garden allowing the students to feel ownership and pride in the project. Aside from educational lessons, students learn responsibility, teamwork, problem-solving, patience, and the value of hard work.

Many other edible school garden projects have been developed across the country since the Edible Schoolyard project began.

This research began with the ideas that were laid out in the theoretical premise: when given the opportunity to investigate the natural environment as a place of learning, children gain knowledge of the role the human body plays in it and the state of nutritional health that follows. I have explained how learning environments should empower children, the questions we should be asking about what we take from and return back into the environment, the importance of nutrition to our physical, mental and emotional health, and how valuable the natural environment is as a learning space.
When given the opportunity to investigate the natural environment as a place of learning, children gain knowledge of the role the human body plays in it and the state of nutritional health that follows.

In my research I chose to break down each part of the theoretical premise. I began with the children.

I state in the premise that: children, instead of only being taught to follow, should be encouraged to investigate the world around them. It is a simple cycle of learning that we need to instill the power to seek out knowledge into our children. We need to motivate so that children have the desire and want to learn. We need to provide opportunity for them to explore their talents. It is then that they will find success. The cycle of learning and success repeats when we reward and show pride in their accomplishments.

I then discuss how improvement is needed in the awareness of what the humans take from and then return to the environment. “Where does what we eat come from? And “what happens to our waste?” These are the questions that we need to be actively seeking answers to.
The dilemma that we have become a society where the majority of individuals are consumers, with only a small percentage producing, or even having the knowledge of the food production process is discussed.

I explore living machine technology, urban agriculture and the idea of vertical farming.

In the section on nutritional health I discuss how nutrition is important to the entire range of health issues, physical, mental and emotional.

It is clear after this research how nutrition truly impacts every part of our body.

Lastly I describe the outdoor environment as an underutilized learning space. The classroom can be a space that goes beyond the walls of a traditional school.

In this section I take a look at the Edible Schoolyard project and learn what they have been able to accomplish in a school kitchen and garden.

This knowledge that I have gained of every part of my theoretical premise will impact how I proceed with my project.
The Phæno Science Center in Wolfsburg, Germany was designed by architect Zaha Hadid in 2005. The building is 12,000 m² (about 40,000 ft²) and cost 79 million Euros (Young, 2006).

Phæno, as defined on the Phæno Science Center website, is:

A landscape which opens up an architectural adventure playground, a constructional wonderland shaped by craters, caverns, terraces and plateaus - the exciting setting for 300 phenomena from the world of natural science and technology.

(Phæno Science Center, 2010)

The subject of this case study and those that follow are all places that aim to inspire and educate their visitors. The Phæno Science center is set apart
from the subsequent case study projects by its substantial size and the number of occupants that can experience the environment at one time. Additionally, the Phæno Science Center differs from the third case study in that its target audience is persons of all ages rather than only children.

**Site Relationship**

The building relates to the site in many ways. The building shape is influenced greatly by the unique shape of the site which is formed by intersecting roads and railway lines. The building is risen above the site on cone-shaped supports.
Elevating the building created additional space that provides public spaces for social interaction underneath. The science center is in an area near several other buildings of cultural importance by architects Aalto, Scharoun and Schweger (Futagawa, 2005).

Analysis

Light is an important element in the design of the Phæno Science Center not only artistically but also functionally. The light that permeates the building through its exterior needed to be balanced by interior structures so that the exhibits could be individually lit.

The plan to section/elevation element is clearly evident in an analogous way. It is a triangular shape that evolved from the shape of the plan to strong angles in the elevation as well as the shape of interior spaces when looked at as a volume.

The circulation follows in a clustered pattern allowing visitors to walk freely amongst the individual exhibits and access the entrance/exits.

The geometry is based on a combination
of two concepts: Geometric Derivatives and Pinwheel, Radial, and Spiral. The complex polygon shape of the building could be interpreted as a combination of triangles rotated out from any of the sharp angled corner points.

The hierarchy is directed toward the dramatic corner points of the structure as intense spaces.

The science center is essentially subtractive. It is as if the spaces were pulled out of the large triangular form like taffy to the ground.

In conclusion, this case study was important to my theoretical premise research because I found this science center to be an excellent example of how architecture can inspire the interest of persons of all ages in a subject.

“Probably the largest walk-through sculpture in Germany.”
(Phaeno Science Center, 2010)
The Adam Joseph Lewis Center of Environmental Studies, Oberlin College, Ohio was designed by architect William McDonough + Partners. It is 13,600 ft², for 2,905 students and cost 7.1 million USD (Orr, 2003).

A few main goals of the project were that “the building and its landscape would be active parts of the curriculum...” and “to reconnect an increasingly disconnected urban clientele with

“Imagine a building that is like a tree, that gives more than it takes, that makes oxygen and provides a habitat for hundreds of species.”

William McDonough
Case Study Two

“What can educators do to foster real intelligence?... We can attempt to teach the things that one might imagine the earth would teach us: silence, humility, holiness, connectedness, courtesy, beauty, celebration, giving, restoration, obligation, and wildness.”

David W. Orr (Stone, Excerpt from Smart by Nature, 2010)

soils, trees, animals, landscapes, energy, systems, water, and the sun” (Orr, 2003, p. 41-42).

This case study examines a project that is similar to the other projects presented in that a learning environment is created to educate and engage its occupants. What sets this project apart is its commitment to specific environmental issues, from its program to its design.

This project is strongly connected to its site: “...the Lewis Center fits in its surroundings like a tree in the forest...” (Braungart, 2002).

Its openness to the outside brings nature visually inward to the occupant. Knowledge of plants and wildlife can be gained while enjoying the plentiful natural light.
Case Study Two

Analysis

The plan to section/elevation relationship is an equal one experienced in the plan shape of the auditorium and the elevation shape of the atrium.

The plan is arranged in a linear way with the long centralized circulation hallway as the main forming element.

The majority of the classroom spaces are basically rectangular. The more complex shapes are derivatives of rectangles and circular shapes that have been overlapped.

Hierarchy of space is given to the most dramatic ones: the atrium and auditorium spaces.

The spaces can be described within the unique added to repetitive category. The uniquely shaped room on the end of the building is preceded by several repetitive spaces.

Symmetry, with slight changes, can be found when drawing a line directly down the main hallway.

In conclusion, this project was an important look into an educational building that has the ability to teach about the environment.
Case Study Two

Classroom

Exterior - A shape that is integrated throughout the project is outlined.

Living machine diagram - the cycle of waste is illustrated. The process begins with waste disposal in the Restroom and moves through a natural cleaning process for re-use in the Restroom.
This kindergarten in Luginsland, a suburb east of Stuttgart, Germany was designed by architect Behnisch + Partners. This 3,400 ft² building is for 56 children. It was built for 1.7 million DM (German Marks) in October of 1990 (Dudek, Kindergarten Architecture, 2000, p. 156).

As with the other case studies this Kindergarten project is an educational building. If differs from the other projects in that it is designed specifically with the client of a child in mind.

Whimsey is the word that comes to mind when looking at this project, created in the form of a shipwreck. It is as if it was created from the
Case Study Three

“The structure encourages movement and exploration.”
(Dudwek, Kindergarten Architecture, 2000)

imagination of a child. The mix of textures is reminiscent of backyard “clubhouse” made from found materials. The interior spaces are engaging interior volumes of interesting shapes. It is playful.

The building is composed of many elements especially for the children. The windows are at a child’s height and the abundance of corners and niches becoming intimate spaces for children are just a few of these elements (Beltzig, 2001).

The site is on the top of a hill on the edge of the city. The children have access to a wonderful overlooking view of the nature surrounding the kindergarten (Beltzig, 2001).
Analysis

Natural light, as discussed earlier, is accessible directly to the children at their height.

The plans, sections and elevations have a common theme. They are a simple geometric shape that is intruded into by a angled line that divides the spaces into more complex ones.

The circulation is centralized. The building is designed without hallways. Spaces flow from one space to another without a transitional space.

The geometry of the general outline of the plan is a simple combination of a rectangle and a triangle. The elevations and sections show more complex combinations of polygons.

Hierarchy is found in the largest open space located in the triangular front space. It is in this space that a structural column pierces through both floors and out of the roof. This column is in a form of a “ship flag pole” on the exterior and a prominent feature of the building.

As the geometry explained, the plan is essentially a rectangle and a triangle. This creates symmetry that is primarily experienced when viewing the building in plan view.

This project was an important part of my research process. In this project I found elements that appear to have come directly from a child's mind. It is important to my project that children are involved in the design process.
Case Study Three

Playful spaces

Exterior

Just for Children
I chose these three case studies because each had different elements that I wanted to explore. I wanted to have a project that used architecture to teach and motivate, a project that held the environment highly, and a project that was designed especially for children. It is my next goal to find a way to combine all of these elements into one project. I see my project as a combination of a children's science center, an environmental discovery center and an elementary/middle school.
Case Study Summary

The Phæno Science Center in Wolfsburg, German by Zaha Hadid was an amazing and exploration of how architectural forms, not just what the building holds, can inspire people of all ages to learn about science.

Adam Joseph Lewis Center of Environmental Studies, Oberlin College, Ohio by architect William McDonough + Partners is a project that was built upon the practices that the program teaches. It gives the environment the utmost importance. The building’s way of welcoming nature into it extends beyond just a learning experience. This project was also valuable because it explores many technologies that I would like to incorporate into my design.

The kindergarten in Luginsland, a suburb east of Stuttgart, Germany by architect Behnisch + Partners was a great example of a building a child might create. This idea was created without the typical use of primary colors. The playful architecture was inspiring to analyze.
A Combined History of:
Education, Agriculture & Organic Agriculture in America

When attempting to solve a current problem it is best practice to first look to the past to determine how the problem evolved. Typically, there are multiple factors that progress through a period of time gradually changing and intertwining until being recognized as a detrimental part of society. As I thought about the problem of increasingly poor nutrition in the United States, I realized that key topics in history centered on the progression of education and agriculture. The education of children in America began very primitively; children learned from their parents and elders the skills and information needed to survive in a rugged and unforgiving environment. The also learned the spiritual beliefs of their culture. This is in stark contrast to the technology driven, achievement focused, and high demand culture of education today. Similarly, agriculture began in America with individual families or tribes producing only enough food to sustain themselves. Advancements in farm machinery, irrigation, fertilization, and seed development allowed individual farmers to produce greater amounts of food. This contributed to the urbanization of the American population and thus the need for goods to be transported from rural to urban areas. As agricultural production began to ever-increasingly depend on fossil fuel consumption and chemical enhancement of products, many consumers began to question the healthfulness of the foods they were eating and their impact on the environment. Thus began a new initiative to produce and consume “organic” foods and promote locally grown produce. These broad generalizations of American education, agriculture, and organic agriculture history are discussed in detail below to further illustrate the interweaving of political and technology into their evolution.

The following timeline entries were compiled by:

Edmund Sass, Ed.D., Professor of Education at the College of Saint Benedict/Saint John’s University.

Debra Spielmaker, project director of the United States Department of Agriculture’s educational program: Growing a Nation: The Story of American Agriculture.

Irene Reti of the Regional History Project, University of California, Santa Cruz campus.

The topics are organized by color: General American History - grey, Education - blue, Agriculture - brown and Organic Agriculture - green.
1600

1607 - The first permanent English settlement in North America is established by the Virginia Company at Jamestown (Sass, 2010).


1635 - The first Latin Grammar School (Boston Latin School) is established (Sass, 2010).

1636 - Harvard College, the first higher education institution, is established (Sass, 2010).

1647 - Every town of at least 50 families is required to hire a schoolmaster and that all towns of at least 100 families should have a Latin grammar school master who will prepare students to attend Harvard College (Sass, 2010).

1690 - John Locke conveys his belief that the human mind is a tabula rasa, or blank slate, at birth and knowledge is derived through experience, rather than innate ideas as was believed by many at that time (Sass, 2010).

1700

18th century - Northern farmers produce a variety of crops and livestock, sometimes supplemented by craftwork; Southern plantation agriculture concentrates on export crops (Spielmaker, 2000).

Oxen and horses for power, crude wooden plows, all sowing by hand, cultivating by hoe, hay and grain cutting with sickle, and threshing with flail. Cradle and scythe introduced; invention of cotton gin (1793) (Spielmaker, 2000).

Tobacco is the chief cash crop of the South (Spielmaker, 2000).

Ideas of progress, human perfectibility, rationality, and scientific improvement flourish in the New World; small family farms predominate, except for plantations in southern coastal areas; housing ranges from crude log cabins to substantial frame, brick, or stone houses; farm families manufacture many necessities (Spielmaker, 2000).

1734 - Christian von Wolff describes the human mind as consisting of powers or faculties. Called Faculty Psychology, this doctrine
holds that the mind can best be developed through “mental discipline” or tedious drill and repetition of basic skills (Sass, 2010).

1751 - First “English Academy” in Philadelphia, including such courses as history, geography, navigation, surveying, and modern as well as classical languages (Sass, 2010).

1775-1783 - The Revolutionary War (Sass, 2010).

1776 - Declaration of Independence adopted. It results partly from British controls on farm exports, restrictions on land titles, and limitations on western settlement (Spielmaker, 2000).

1779 – Thomas Jefferson proposes a two-track educational system, with different tracks for “the laboring and the learned” (Sass, 2010).

1784-88 - Postwar depression and deflation; maritime commerce prosperity (Spielmaker, 2000).

1787 - The Northwest Ordinance is enacted by the Confederation Congress. It provides a plan for western expansion and bans slavery in new states. Specifically recognizing the importance of education, “...schools and the means of education shall forever be encouraged.” (Sass, 2010).

1788 - The U. S. Constitution is ratified by the required number of states (Sass, 2010).

1790 - Total (U.S.) population: 3,929,214; farmers 90% of labor force (Spielmaker, 2000).

1791 - The Bill of Rights is passed by the first Congress of the new United States (Sass, 2010).

1800

1801 - James Pillans invents the blackboard (Sass, 2010).

1815-30 - Cotton becomes the most important cash crop in the Old South (Spielmaker, 2000).

1821 - The first public high school, Boston English High School, opens (Sass, 2010).

1840s - Factory-made agricultural machinery increases farmers’ need for cash and encourages commercial farming (Spielmaker, 2000).

1843 - Sir John Lawes founds the commercial fertilizer industry (Spielmaker, 2000).

1850 - Industrial Revolution begins.

1850s - California gold rush, the frontier extends to the Pacific coast (Spielmaker, 2000).

Total population: 23,191,786; farm population: 11,680,000 (est.); farmers 64% of labor force (Spielmaker, 2000).

1856 - The first kindergarten in the U.S. (Sass, 2010).
1861 - The U.S. Civil War begins (Sass, 2010).

1862 - U.S. Department of Agriculture established (Spielmeier, 2000). Homestead Act (Spielmeier, 2000).

1862-75 - Change from hand power to horses characterizes the first American agricultural revolution (Spielmeier, 2000).

1865 - The 13th Amendment is passed, abolishing slavery (Sass, 2010).

1865 - The Civil War ends (Sass, 2010).

1867 - The Department of Education is created (Sass, 2010).

1873 - The Panic of 1873 causes bank foreclosures, business failures, and job loss. The economic depression that follows results in reduced revenues for education (Sass, 2010).

1875 - The Civil Rights Act is passed, banning segregation in all public accommodations. The Supreme Court rules it unconstitutional in 1883 (Sass, 2010).

1881 - Hybridized corn produced (Spielmeier, 2000).

1890s - Agriculture becomes increasingly mechanized and commercialized (Spielmeier, 2000).

1890-99 - Average annual consumption of commercial fertilizer; 1,845,900 tons (Spielmeier, 2000).

1896 - The Supreme Court ruling in the case of Plessy v. Ferguson makes “separate but equal” policies legal. It becomes a legal precedent used to justify many other segregation laws, including “separate but equal” education (Sass, 2010).

1898 - The Spanish American War (Sass, 2010).

1900 - Total population: 75,994,266; farm population: 29,414,000 (est.); farmers 38% of labor force; Number of farms: 5,740,000; average acres: 147 (Spielmeier, 2000).

1908 - Model T Ford invented.


1911 - F. H. King, an American agronomist, toured China, Korea, and Japan in 1909, studying traditional methods of fertilization and tillage (Reti, 2010).

1913 - Edward Lee Thorndike’s theory that human learning involves habit formation, or connections between stimuli and responses (Connectionism). He believes that such connections are strengthened by repetition (“Law of Exercise”) and achieving satisfying consequences (“Law of Effect”) (Sass, 2010).

1914-1918 - World War I (Sass, 2010).

1921-40 - Long-term agricultural depression (Spielmeier, 2000).
1924 - Max Wertheimer describes the principles of Gestalt Theory. Gestalt Theory, with its emphasis on learning through insight and grasping the whole concept, becomes important later in the 20th Century in the development of cognitive views of learning and teaching (Sass, 2010).

1925-45 - Basic research done in land-grant colleges lays groundwork for second agricultural revolution (Spielmaker, 2000).

1929 - The Great Depression
Public education funding suffers greatly, resulting in school closings, teacher layoffs, and lower salaries (Sass, 2010).

1929 - Swiss scientist Paul Müller discovers the insecticidal properties of DDT. DDT is first used on a farm in 1942 (Reti, 2010).

Early 1930s - First Federal assistance to school lunch program (Spielmaker, 2000).

1935 - Congress authorizes the Works Progress Administration. Its purpose includes the construction of hundreds of school buildings (Sass, 2010).

1938 - Microbiologist Masanobu Fukuoka, Japan, devotes his life to the development of the “no-till” organic method. Fukuoka was able to produce yields equal to or greater than those of any neighboring farm (Reti, 2010).

1939 - Lady Eve Balfour of Suffolk, England, conducts Haughley Experiment in which she compares organic farming and chemical farming (Reti, 2010).

1940 - One farmer supplies 10.7 persons (est.) (Spielmaker, 2000).

1940 - British agronomist Lord Northbourne describes farms as organisms, advocates an ecologically balanced approach to farming, and uses the word “organic” to describe a sustainable agricultural system (Reti, 2010).

1941 - The U.S. enters World War II. Much of the country’s resources go to the war effort. Education is put on the back burner as many young men quit school to enlist; schools are faced with personnel problems as teachers and other employees enlist, are drafted, or leave to work in defense plants; school construction is put on hold (Sass, 2010).

1941 - Twenty million Americans plant Victory Gardens during World War II (Reti, 2010).

1944 - World War II veterans take advantage of the GI Bill. More than two-million attend colleges or universities, nearly doubling the college population. About 238,000 become teachers. Because the law provides the same opportunity to every veteran, regardless of background, the long-standing tradition that a college education was only for the wealthy is broken (Sass, 2010).

1945 - World War II ends (Sass, 2010).

1945 - Nerve gas research during World War II results in the development of a new class of synthetic chemical pesticides, which begin to be widely used in the post-war period (Reti, 2010).

1946 - National School Lunch Act (Spielmaker, 2000).
**Historical Context**

1950-53 - *Korean War*

1950 - Total population: 151,132,000; farm population: 25,058,000; farmers 12.2% of labor force; Number of farms: 5,388,000 (Spielmaker, 2000).


**Late 1950s** - Anhydrous ammonia increasingly used as cheap source of nitrogen, boosting yields (Spielmaker, 2000).

1953 - Burrhus Frederic (B.F.) Skinner’s *Science and Human Behavior* is published. His form of behaviorism, which emphasizes changes in behavior due to reinforcement, becomes widely accepted (Sass, 2010).

1958 - At least partially because of Sputnik, science and science education become important concerns in the U.S., resulting in the passage of the National Defense Education Act (NDEA) which authorizes increased funding for scientific research and science education (Sass, 2010).

1962 - Rachel Carson publishes *Silent Spring*, documenting the negative impact of agricultural chemicals (Reti, 2010).

1964-73 - *Vietnam War*

1964 - The Civil Rights Act becomes law. It prohibits discrimination based on race, color, sex, religion or national origin (Sass, 2010).

1965 - Project Head Start, a preschool education program for children from low-income families begins (Sass, 2010).


1970 - One farmer supplies 47.7 persons (est.) (Spielmaker, 2000).


1970, April 22 - Earth Day is founded by Senator Gaylord Nelson (Reti, 2010).


1975 - The Education of All Handicapped Children Act (PL 94-142) becomes federal law. (Sass, 2010).

1976 - The first farmers’ market in Santa Cruz County. This market later grows into the Monterey Bay Certified Markets (Reti, 2010).

1980 - The first American patent for a genetically engineered organism, a bacterium used to clean up oil spills, is granted (Spielmaker, 2000).

1980s - Biotechnology becomes viable for improving crop and livestock products (Spielmaker, 2000).

1980 - The original Whole Foods Market opens in Austin, Texas (Reti, 2010).
Historical Context

1985 - USDA scientists indicate that agricultural chemicals infiltrate ground water more than previously thought (Spielmaker, 2000).

1986 - Antismoking campaigns and legislation begin to affect the tobacco industry (Spielmaker, 2000).


1990’s - Biotechnology brings important new developments in dairy, corn, and other commodities; genetically engineered crops and livestock appear (Spielmaker, 2000).

1990 - The Federal Organic Foods Production Act (OFPA) is passed set out to establish national standards governing the marketing of organically produced products, assure consumers that organically produced products meet a consistent standard, and facilitate interstate commerce in both fresh and processed organic foods (Reti, 2010).

1992 - City Academy High School, the nation's first charter school, opens in St. Paul, Minnesota (Sass, 2010).

1993 - Jacqueline and Martin Brooks’ In Search of Understanding: The Case for Constructivist Classrooms is published. It is one of many books and articles describing constructivism, a view that learning best occurs through active construction of knowledge rather than its passive reception. (Sass, 2010).

1994 - Farmers begin using satellite technology to track and plan their farming practices (Spielmaker, 2000). FDA grants first approval for a whole food (a tomato) to be produced through biotechnology (Spielmaker, 2000).
Historical Context

2000


2001 - The No Child Left Behind Act (NCLB) is approved by Congress and signed into law by President George W. Bush (Sass, 2010).

2008 - Larry Jacobs of Jacobs Farm/Del Cabo wins case against Western Farm Service, Inc. The court finds that the contamination of organic crops caused by pesticides drifting after application violated the rights of the organic crop grower (Reti, 2010).

2009 - First Lady Michelle Obama creates an organic vegetable garden at the White House (Reti, 2010).

2010 - With the U.S. economy mired in a recession and employment remaining high, states have massive budget deficits. As many as 300,000 teachers face layoffs (Sass, 2010).

After reflecting on the history portion of my research I have determined that we as a society can benefit from the utilization of smaller localized farming practices and more intimate learning environments. It is evident that we would not be able to return to individual family farms but there is great opportunity and promise in the augmentation of farmers markets, community gardens, organic farms, and sustainable farming practices. Exciting new technology and architectural principles for conserving energy and natural resources such as the living machine, vertical farming, and renewable energy sources are currently at the forefront of the architectural profession. My goal is to integrate these ideas with the creation of a learning space that is designed to educate children about growing, preparing, and eating healthy foods. Through the review of educational history I have learned that ideas about teacher-directed and repetition based learning have been replaced with hands-on constructive and immersion based philosophies. Based on what I have learned I am confident that designing a learning environment that is child centered, interactive, nature-based, and environmentally friendly will create a space that educates generations of children on the importance of good nutrition and conservation.
Goals for the Project

The Academic

My academic goals for the project are to explore something new and to contribute valuable information for researchers to follow me.

The Professional

Professionally, I would like this project to show who I am by exploring something that what matters to me. I would like this project to be an autobiographical story to present to prospective employers.
The Personal

Personally I want to contribute a solution to something that is important to me. I would like to combine my love of working with children into my love of architecture.

My passion is to design with a sense of a greater meaning. I am driven to find solutions for the people within. I believe architecture has the ability to create the framework upon which the stories of lives are written.
The grid of the site is a strict rectangular block pattern with little deviation from that pattern.

The school is the tallest of the buildings directly adjacent to the site, at three stories in height.

To the southeast of the site is two housing buildings that are several stories taller.

The site is flat and the only shadows cast are by built structures. It is noticeable in my site pictures how large of a shadow the school can cast.

There are houses to the east and a few to the north. The businesses surrounding are a small Custom Gun shop (north of site), a Dairy Queen restaurant (northwest of site), an insurance company and small strip mall (west of site), and a thrift store (south of site).

There are two apartment buildings a block to the southeast. One is eight stories tall and the other is nine.

The light at the site was blue-grey in color, cool in temperature and muted in intensity.

Mature trees and grass are the only vegetation
Site Analysis

on the site. There are no water features.

Wind is prevalent across the site with no major natural landforms or density of built structures to block it.

People are mainly only present during school hours. Occasionally a family will come to the site to use the playground. The sidewalks are well-kept, but see minimal traffic with exception of the side facing University Drive. Most of that use is by bicycles travelling between North Dakota State University’s Main Campus, northwest of the site, and the Downtown campus, southeast of the site.

Vehicular traffic is very heavy along University Drive. In this area of the Fargo it is a south-bound one way. Traffic has increased on 4th Avenue by use of public transportation.

The public transportation bus system has become an important part of the downtown area. Approximately every ten minutes a bus passes by this site.

Distress can be seen throughout the entire neighborhood. With the exception of scattered revitalization projects, the entire downtown area is in a state of distress. Houses and businesses have not been kept up. The residential area has become mainly low-income; middle-income households have left the area for newer more suburban areas. The future is looking hopeful though, with people wanting to return to and fix up the downtown area. Improvement can be seen already in the last few years. I estimate the majority of the neighborhood houses are renter-occupied.
Residential utility power lines run directly on the site on the west and south sides (on street side of sidewalk) and on the opposite side of the street to the north.

The soil in the area is clay to silty clay. The area is part of the Red River Valley and known for its rich black soil.

Flooding in Fargo is very common, but the site is far enough from the river for it not to be an issue.

The site, as mentioned earlier, is flat. It has a very minimal slope of between 0 and 2 percent (United States Department of Agriculture, 2010).

Climate data for Fargo, ND
Space Allocation by the numbers

The approximate dimensions of the site are: 240 feet east to west and 300 feet north to south, resulting in a total of 72,000 square feet.

The site is in a Downtown Mixed Use zone. This category does not require any site setbacks or parking requirements. This zoning category was set up to encourage density and diversity of developments in the downtown area of Fargo.

Of the 70,000 ft² available to build on the site:

- 50% will go to a built structure with 7-8 floor levels.
- 40% Auditorium/Classrooms/Kitchen Labs
- 15% Gymnasium/Large activity space
- 10% Group activity spaces
- 15% Offices
- 10% Circulation
- 10% Rest rooms/Janitorial/Mechanical/Laundry
- Roof-top gardens on 90% of all roof surfaces
- 40% will be garden (on ground level).
- 30% enclosed at ground level, 70% open
- 10% will be parking and drop off areas.
DESIGN PROCESS
• Open courtyard gateway space
• Gardens
• Entry
• Drop off?

1/24/11
design process

SKETCHES

[Diagram showing kitchen, storage, elevator, and greenhouse layout]

[Diagram with labels: greenbelt, gym/kitchen, storage, and access]
Design Process

SKETCHES

Lower Level → Ground/1st → Upper/2nd → 3rd

Fans/Air Circulation
Final Design

FINAL DESIGN
Final Design

PRESENTATION BOARDS
Final Design

PRESENTATION BOARDS

Feeding Change
Final Design

PRESENTATION BOARDS
Through the utilization of the appropriate learning environment, can children learn how to improve the nutritional health of themselves and their families?
Final Design

PRESENTATION BOARDS

Ground

The Process
ALL Processes become LEARNING ENVIRONMENTS.

Children’s Health Education Center
Greenhouses & Kitchens

UP

Harvest from OUTSIDE and INSIDE gardens

UP to Cook
Kitchen waste to compost bin

UP to STORE
CANNING FREEZING DEHYDRATING

Further UP to STORE in the Earth’s NATURAL CELLAR

UP to DINING
DINING to PRESERVED FOOD to FRESH PRODUCE

UP to DEVELOPMENT
Children to LEARN TO MAKE a LIVING
Final Design

PRESENTATION BOARDS
Final Design

Presentation Boards
Final Design Model
Final Design

Concept
Final Design

THESIS EXHIBIT DISPLAY
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“NDSU has enabled me to put a childhood dream of becoming an architect into motion.”