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Fused

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The value of rural public schools is not found in their quaintness; the value of rural schools is found in the contributions that they make to the life of their community and the contributions that their students make, when their instruction grounds them in their place.
A consolidated Pre K-5 school for three agricultural communities, exploring how pedagogies of the 21st century require different expressions of school design.

Abby Baumert

A Terminal Project
Presented to the Faculty of
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Major: Architecture

Under the Supervision of Professor
Sharon Kuska

Lincoln, Nebraska
May, 2012
Since the 1800’s, the consolidation of rural schools in the United States has been a controversial topic for policymakers, school administrators, and rural communities. Primary concerns with consolidation include budget, efficiency, student achievement levels, school size, and community identity. In the history of American education, consolidation has been an alternative way to solve rural issues. Currently, rural schools and communities facing declining enrollments and financial cutbacks are challenged by the growing trend of consolidation and school reorganization.

Debates continue today, whether the consolidation movement is considered a success. Opponents of school consolidation point to research that suggests consolidation may not lead to cost savings and in some cases may even lead to increased costs for transportation and specialized staff. Furthermore, towns that lose a school to consolidation may face a loss of social and fiscal capacity. However, some projects have brought attention to the strengths of rural and small schools. Advocates for small schools, opposing consolidation, express the low teacher/student ratio, personal environment, higher number of students in extracurricular activities, cooperative learning, and integrated curriculum. Socially, schools in rural areas act as the main social activity, allowing students to have a strong connection to their community and immediate environment.

School district consolidation has a long and jagged history in Nebraska. The historical trend has been towards fewer school districts. In fact, in 2005 the passage of Legislative Bill 126 in the Nebraska Unicameral encouraged the merger of many small rural school districts with larger K-12 districts, signaling a move toward district consolidation.

In recent years, changes in the state school aid formula have encouraged voluntary school district consolidation. For this reason, the idea of consolidation has breached my hometown and nearby communities. Knowing that consolidation is currently being considered, I wanted to devote my efforts towards creating a unified and more up-to-date school environment for the rural communities of Clarkson, Howells and Dodge.

In addition to the school consolidation conflict, there is a pedagogical shift occurring within schools across the nation. The current Information Age is a period of American history representing a time of great cultural transformation from the industrial factory model to a new paradigm that is more student-centered. Educational approaches to accommodate media saturated students have created experimentation and controversy. The current situation between Clarkson, Howells and Dodge allows the unified school board to finally capitalize on those missed opportunities to create better school facilities and incorporate newer teaching pedagogies.
**FUSED** is a graduate design thesis that explores the relationship between emerging pedagogical trends and architecture, while adapting to a rural school consolidation concept. This thesis examines two central questions: how to develop a new learning environment which captures a new identity and how to utilize emerging pedagogies in a 21st century learning environment.

The intent was to design a PreK-5 educational facility located within an agriculturally driven region of Northeastern Nebraska, in which the architecture enhances the educational experience and provides a quality environment for the expanded learning community. The learning spaces should motivate and promote learning as an activity, support collaboration, provide for personal exploration, and be flexible towards the ever-changing needs of children. With the growing utilization of technology, schools are beginning to take advantage of online learning opportunities. Providing an environment that supports teaching methods which allocate for active participation, self direction and the clustering of different interest groups, will maximize the use of a facility. Similar to this thesis, investigations must be conducted to explore educational delivery methods that are more flexible, suiting the 21st century.
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OBJECTIVES

Schools play a vital role in sustaining rural community life. When schools are consolidated, the costs to the community are more difficult to quantify than the economies of scale that motivate such consolidations. Therefore, architects have the duty and ability to change or influence certain aspects of society. Although the most recent consolidation proposal between the towns of Howells and Dodge has passed, it’s not too late to provide a potential solution which can benefit these communities and their surrounding counterparts. Objectives for this thesis include, but are not limited to, the following:

GOAL:
Design of a PreK-5 school facility which will inspire and encourage educators to adopt a new 21st century pedagogy.

OBJECTIVES:

- Relate planning decisions regarding the dimensions of spaces, furniture, and equipment to the scale of children.

- Provide spatial conditions which contribute to students feeling social togetherness and community. Provide places for encounter on the interior and exterior.

- Provide spatial conditions relating to the human well-being which include: color scheme, heating and cooling and ventilation, acoustics, lighting, aromas, and furnishings.

- Introduce sustainable features that could double as an educational tool, integrating 21st century technological systems into the design.

- Rediscover the advantages of natural daylighting in the classroom.

- Blur the edges between the indoor and outdoor environments.

- Generate a learning environment which encourages student motivation and connectivity with technology and multimedia.

- Create a safe and welcoming environment for learning, teaching, and working. Create a venue for community events.
SCALE

COMMUNITY

SUSTAINABILITY

QUALITY OF SPACE

SAFETY
**History of School Consolidation in America**

Since the 1800’s, the consolidation of rural schools in the United States has been a controversial topic for policymakers, school administrators, and rural communities. Primary concerns with consolidation include budget, efficiency, student achievement levels, school size, and community identity. In the history of American education, consolidation has been an alternative way to solve rural issues. Currently, rural schools and communities facing declining enrollments and financial cutbacks are challenged by the growing trend of consolidation and school reorganization.

During the mid 1800’s, the elimination of small schools for larger ones was driven by the belief that a large school would provide a better quality education. In addition, the need for one-room school houses soon decreased with the invention of the automobile, resulting in newly paved roads which allowed students to travel farther and faster.

The industrial revolution in the late nineteenth century again contributed to the school consolidation movement. The prevailing belief was that education could contribute to an optimal social order using organizational techniques adapted from industry (Orr, 1992). Suddenly school reformers felt like all schools should look similar and began to advocate for a centralized model of education in urban areas. As a result, larger schools were labeled the “one best model” from which rural schools were judged deficient.

Furthermore, the rural economic decline during the 1970’s and 1980’s created a migration of jobs from rural to urban areas. The farm crisis of the 1980’s led to the loss of family farms, as modern farming techniques depended increasingly upon profits possible only through large-scale operations. This had a ripple effect on the non-farm economies in rural communities, resulting in declining school enrollments and loss of more rural graduates to urban areas where work was more plentiful (Lasley, 1995). Some school districts began to consolidate school programs and facilities as a way to save teacher jobs and maintain a quality curriculum.
History of School Consolidation

1800 - One-room schoolhouse
1820 - Industrial Revolution in America
1885 - Invention of the Automobile
1910 - "One Best Model"
1950 - Explosion of School Construction
1980 - Farm Crisis
1995 - Internet fully comes to life
2005 - NE Legislative Bill 126 approved
Debates continue today, whether the consolidation movement is considered a success. Opponents of school consolidation point to research that suggests consolidation may not lead to cost savings and in some cases may even lead to increased costs for transportation and specialized staff. Furthermore, towns that lose a school to consolidation may face a loss of social and fiscal capacity (Bard, 2006). However, some projects have brought attention to the strengths of rural and small schools. Advocates for small schools, opposing consolidation, express the low teacher/student ratio, personal environment, higher number of students in extracurricular activities, cooperative learning, and integrated curriculum (Rural School and Community Trust, 2004). Socially, schools in rural areas act as the main social activity, allowing students to have a strong connection to their community and immediate environment.

Overall, the rural school districts and communities should work closely together to determine what is best for the teachers, students, and communities involved. Since each school district is unique due to its location, culture, or size, all possible variables should be considered before embarking on the path toward consolidation.
ATTITUDES TOWARDS SCHOOL CONSOLIDATION

**Financial/Economic Factor**
- Fiscal efficiency
- Tax equity
- Rural economy
- Economies of scale
- Physical facilities

**Social/Political Factor**
- State policy
- Community attitude
- Local control
- School as community
- Small by choice

**Demographic Factor**
- Enrollment
- Out migration
- Population shifts
- Aging of population

**Education/Instruction Factor**
- Curriculum
- Extra-curricular activities
- Education outcomes
- Technology
- School size
School Consolidation in Nebraska

School district consolidation has a long and jagged history in Nebraska. The historical trend has been towards fewer school districts. The first school consolidation law was enacted in 1949. The maps on the left summarize the historical reduction in the number of Nebraska school districts.

In 2005, the passage of Legislative Bill 126 in the Nebraska Unicameral encouraged the merger of many small rural school districts with larger K-12 districts, signaling a move toward district consolidation. Legislative Bill 126 proponents argued that closing smaller schools will provide a better education at a lower cost. Opponents argue that the law restricts parent choice, will increase student travel distances to school and will harm rural communities losing their local school (Aiken, 2005). In recent years, changes in the state school aid formula have encouraged voluntary school district consolidation.

Proof that Legislative Bill 126 (passed in 2005) had an enormous impact on the decline in total number of school districts in Nebraska

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Districts</th>
</tr>
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<tbody>
<tr>
<td>1949</td>
<td>6,734</td>
</tr>
<tr>
<td>1966</td>
<td>2,400</td>
</tr>
<tr>
<td>1972</td>
<td>1,461</td>
</tr>
<tr>
<td>1984</td>
<td>1,044</td>
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<tr>
<td>1993</td>
<td>729</td>
</tr>
<tr>
<td>2000</td>
<td>572</td>
</tr>
<tr>
<td>2005</td>
<td>477</td>
</tr>
<tr>
<td>*2006</td>
<td>257</td>
</tr>
<tr>
<td>2012</td>
<td>252</td>
</tr>
</tbody>
</table>

Source: Nebraska Department of Education
NUMBER OF NEBRASKA PUBLIC SCHOOL DISTRICTS

Source: Nebraska Department of Education

(1870)
Total Number of School Districts: 797

(1890)
Total Number of School Districts: 6,243

(1961)
Total Number of School Districts: 3,529

(1993)
Total Number of School Districts: 729

(2000)
Total Number of School Districts: 572

(2012)
Total Number of School Districts: 252...soon to be less
School Design Transitioning

The architectural form and layout of the school building has historically been influenced by the evolution of educational philosophy and goals, curricular objectives, instructional methods, and cultural values of schools (Walden).

Colonial Period (1650-1849)
The one-room country schoolhouse was an appropriate design response, serving basic educational and social needs of small rural communities for over 200 years. These schools had few furnishings, poor ventilation, and relied on oil lamps for light and wood burning stoves for heat. The school acted as a main gathering place for community activities such as town meetings, voting, and celebrations.

Industrial Revolution (1850-1949)
As the social problems associated with the rise of the Industrial Revolution increased in the mid and late 19th century, the need for educating larger groups of immigrants in urban centers became a central focus. Large multistoried classroom buildings with standardized plans proved to be the next necessary educational and architectural response. This became known as the common school movement. Educational reformers, including Henry Barnard, judged rural community education as insufficient in America’s industrial and urban areas. The common school movement, supported by the local property tax, gave rise to the public school system. Schools became highly formalized and hierarchically designed to sort students who were eligible for promotion to a higher level in the system from those who were not.

Barnard emphasized school ‘architecture’ over school ‘building’ by suggesting that the architect is ultimately concerned with the cultural, spiritual, and humane value of his work, while the builder is primarily concerned with its physical structure, reasonable cost, and the service of function (McClintock & McClintock).
Information Age (1950-Present)
The 1950’s revealed the beginning of the baby boom in America and the explosion of school construction. Educational systems were hiring architects to design and build schools that would last, resulting in structures made of masonry with solid wood and plaster interiors. By this time, architects across the nation had abandoned the idea that schools must look like grand mansions for learning. Notions of modern architecture, such as function dictates form, allowed buildings to be stripped of ornamentation. The large brick mansions began to be replaced by flat-roofed schools with tall expanses of glass. This aided in the need to build quickly and cheaply on vast suburban sites.

Innovations in educational delivery such as the Progressive Movement, required school architecture to respond yet again with more child-scaled, flexible, and open environmental settings. Educators such as Friedrich Froebel in Germany, Maria Montessori in Italy, and John Dewey in the United States, argued that the needs of the state, the church, or the economy should not take precedence in shaping child development.

During the 1960’s in the United States, it was argued that open education provided more educational opportunities for children including freedom for self-directed study, required less guidance by the teacher, and helped foster self-responsibility. As a result, the open classroom was adopted. One of the most influential innovations was the development of the “open plan” school design, a concept that influenced the design of thousands of schools from the late 1950’s through the early 1970’s (Marks). Such designs were characterized by large, open, and flexible spaces adaptable to team teaching, small-group or personalized instruction. However, open plan schools began to fail almost immediately after being implemented due to noise and visual distractions. Also there was no adequate training for teachers in the philosophy of open education, so teachers continued to teach using traditional methods.
After the failure of open plan schools, another design transition took place. Pod-style and house-type school layouts emerged from the Middle School House Plan movement. The intent was to foster a sense of community while providing larger more common spaces to which the entire school has access.

In the 1990’s there was a growing interest to replicate the qualities, and hopefully the advantages, of a small school by creating a “school-within-a-school” model. This approach establishes within the school a smaller educational unit with a separate educational program, its own staff and students, and its own budget. A growing body of literature does suggest that downsized school models can have a positive impact on students, including improved attendance rates, improved behavior, greater satisfaction with school, and greater self-esteem. Because a subschool model can be adopted in an existing building structure, it is a cost-effective approach to school reform; however, the challenge lies in successful implementation.

Educators, parents, and designers are striving to repair the errors of the past fifty years, by reevaluating and reconstructing K-12 programs and buildings in their school districts. The current model that pervades educational architecture of the 21st century is simply outdated and reflects age-specific grouping, uniformed progression, self-contained boxes with minimal daylight, and oversized, impersonal lecture halls. Classrooms of the 21st century need to accommodate different learning styles and capitalize on the benefits of daylighting and natural ventilation.

Students today learn, play, and live in a media saturated society. The current problem facing schools and their design is that these “information-age” children are trapped in “industrial-age” schools. Through architectural design, the opportunity exists to transform the traditional classroom into one that suits the 21st century.
Evolution of the Typology of the School

NINETEENTH CENTURY SCHOOLS
The common theme seen within this era is how the one-room schoolhouse evolved into a collection of classrooms with little to no corridors. A small amount of space was designated for circulatory purposes; as a result space was not wasted in the design. Nineteenth century schools served as a place for students to learn during the day and leave at the end of the class period. Students were packed tightly into classrooms, which typically had rural characteristics.

TWENTIETH CENTURY SCHOOLS
The common theme of the twentieth century schools is the introduction of formal, cross-axial spatial arrangements. Many of the larger classrooms were placed along a central axis, flanked by symmetrical classroom wings. The 1950’s revealed the beginning of the baby boom in America and the explosion of school construction. Educational systems were hiring architects to design and build schools that would last, resulting in structures made of masonry with solid wood and plaster interiors. However, this commitment to educational systems lost its focus around the 1960’s. The widespread introduction of fluorescent lighting and air conditioning in schools perhaps pushed natural daylighting to a secondary design element.

TWENTY-FIRST CENTURY SCHOOLS
By examining the twenty-first century schools of today and predicting where the future of this building type is transitioning, one common theme is the introduction of open and common space being implemented in the school design. Flexibility, adaptability, and variety in instructional areas are key features.
TRADITIONAL “FORD MODEL”
- Based on philosophy of industrial assembly line
- Suggests learning is passive
- Learning happens under teacher control
- All students are ready to learn the same thing, at the same time, in the same way, from the same person
- Similar age-groupings together in each classroom

21ST CENTURY MODEL
- Permeable boundaries between activity areas, defined by variations in height, floor and ceiling materials, movable screens and furnishings
- Indoor/outdoor spaces of varying sizes allow easy transitions for quiet/individualized learning and active/multi-group learning
- Teacher acts more as guide to the learning process
- Learning can take place anytime, anywhere and at the student’s own pace
- Multi-age groupings and peer-tutoring are encouraged

“RED BRICK SCHOOLHOUSE” MODEL
- Multi-age grouping in one large room
- Learning happens under teacher control
- During a typically school day, students engage with their outdoor learning environment on a regular basis
**Pedagogy Trends**

The transition of the school building would be incomplete without mentioning the pedagogical movements which began around the turn of the 19th to the 20th century and continue to serve as models for 21st century schools.

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**MONTESSORI**

Maria Montessori (1870-1952) developed pedagogy for teaching disadvantaged children at her Children’s House in 1907 in Rome. Focused on children ages four to seven, she recognized that children acquire knowledge through practical applications.

In order to promote adult-child continuity and close peer relationships, a Montessori school generally groups children into multi-age classes spanning three years, permitting independent development and cooperative learning and allowing children to teach one another.

A Montessori teacher can be described as an unoobstrusive facilitator in the classroom who guides and observes children working individually or in small groups as they engage in self-directed activities. The Montessori classroom is referred to as the prepared environment. Each task flows to the next level of learning. Classrooms are not confined by interior walls and extend to the outdoors. Maria’s most important innovation in classroom furnishing is the abolition of school benches. She ordered special cabinets, shelves, chairs, and tables which children could carry around effortlessly.

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**WALDORF**

Waldorf education was founded by Rudolf Steiner (1861-1925), whose central belief was that each person must find a balance among body, soul, and spirit (Steiner, 1995). Steiner’s theory of child development focuses on three cycles of seven-year stages. The first stage (birth to age 7) includes nursery and kindergarten children who learn by imitation and doing. Imaginary play is considered important because it fosters the child’s growth physically, intellectually, and emotionally. During the primary years (ages 7-14), children are involved in an integrated, multisensory approach to learning and expression, with more emphasis on oral listening and memory.

In contrast to Reggio Emilia and Montessori school teachers, the Waldorf teacher generally plays a performance role. Yet, learning is not confined to the classroom. Participation with the world outside of the school setting is important such as nature walks, working in a garden, or constructing play shelters with boards, branches, and other materials.

The building forms are asymmetrical and vault-like, with color-coordinated interiors.

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**REGGIO EMILIA**

This approach to preschool education was developed by the schools of the city of Reggio Emilia in northern Italy after World War II. Under the leadership of its founding director, Loris Malaguzzi (1920-1994), the system evolved from a cooperative movement into a city-run system that provides leadership role in Italy, throughout Europe, and in other parts of the world such as Asia, Australia, and North America.

In this program, the learning community extends beyond the walls of the classroom and school. Teachers are viewed as learners, the physical environment is understood as the “third teacher” and the children’s development occurs through the use of symbolic languages as they work through specific projects.

The Reggio Emilia learning environment is a nested series of integrated systems. (1) The microsystem is the child; (2) the mesosystem is the school environment that shapes the learning of the child; (3) the exosystem is the community that influences the school environment; and (4) the macrosystem is the global society that influences the community of the school.
**CURRENT PEDAGOGICAL SHIFT IN EDUCATION**

<table>
<thead>
<tr>
<th>Approach</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>teacher centered model</td>
</tr>
<tr>
<td></td>
<td>student centered model</td>
</tr>
<tr>
<td>Present</td>
<td>social learning model</td>
</tr>
<tr>
<td></td>
<td>distance learning model</td>
</tr>
<tr>
<td>Future</td>
<td>interdisciplinary model</td>
</tr>
<tr>
<td></td>
<td>mobile learning model</td>
</tr>
</tbody>
</table>

**Pedagogy Trends-Themes**

This portion of the thesis project is designed to be an introduction to the pedagogical language in primary education. The current generation of classrooms and other learning spaces are unsuited for the emerging new technologies and teaching pedagogies. Therefore, the design of new learning environments is a critical focus of this thesis.

Six primary themes regarding current pedagogical practice include: the teacher-centered model, the student-centered model, the social model, the emergence of distance education, and the future of education (the interdisciplinary and mobile learning models). Each theme provides insight into the theory and practice of instruction in primary education. Based on the current shifts in pedagogical practices, this section examines the traditional, current and future pedagogical models in order to provide insight on how a designer should design an educational environment to fit the current needs of society.

**MODALITIES OF LEARNING**

(According to Dr. Ken Fisher, spaces can be clustered using the following characteristics)

- **Mode 1** >>> teacher centered
- **Mode 2** >>> student centered
- **Mode 3** >>> informal / social

Figure Above: Teacher-to-student knowledge transfer. Teachers acquire knowledge and then the students act as mirrors, reflecting the information back.
ADVANTAGES TO TEACHER-CENTERED LEARNING
Concept of tradition – “it has always been done that way”
Efficient model to teach multiple students at once

DISADVANTAGES TO TEACHER-CENTERED LEARNING
Presentational approach where the teacher is in control and not the student
Student’s ability to learn is dependent on the teacher’s role and how the teacher translates his or her knowledge of a specific topic or discipline

ADVANTAGES TO STUDENT-CENTERED LEARNING
Self-directed study, promotes critical thinking skills
Work in collaboration with teams or student groups

DISADVANTAGES TO STUDENT-CENTERED LEARNING
Project-based learning
Can lead to the architectural solution of a computer lab
As stated earlier in this thesis project, what once started out as a one room school house for learning, educational environments are now increasing the size and quality of social and informal space. More informal settings include: cafes, learning theatres, galleries, IT space and libraries. Therefore, if there is a decrease in the amount of classrooms within a learning environment, the “space between” then begins to take precedent.
Today, creative designers create flexible learning programs that can accommodate students’ needs better than traditional approaches ever could. Pedagogically, most of these creative curriculums and interwoven disciplines encourage students to think of subjects and ask questions in new ways compared to traditional, singular disciplines.
PLANNING FOR FLEXIBLE ENVIRONMENTS
(which are responsive to this pedagogical shift will involve)

>>> flexibility in the configuration of spaces and the patterns of their arrangement

>>> group spaces facilitating collaborative problem solving or project based work

>>> breakout spaces adjacent to more formal learning areas where the process can be extended in a less formal and social mode

>>> wireless networks to facilitate database access as and when required

>>> data projection capabilities to all walls to optimize the flexibility in use of a space and ease of transformation of the space

>>> laboratories which take on more of the characteristics of studio environments

>>> study carrels and rooms which complete the range from extraverted/social work to introverted/private study and reflection
EXPANSIBILITY

FLEXIBILITY
the quality of space which allows it to adjust to any change in its function, character, or size.

CONVERTIBILITY

corridor  media
break-out lounge  exhibition

multi-function
interior changes
According to Dr. Kenn Fisher and his concepts of “Linking Principles to Place,” he states, “Pedagogical activities require specific spatial qualities to be effective. Each principle requires specific pedagogical approaches to support that principle and these pedagogies are applied through five core activities.” These activities are shown below.

<table>
<thead>
<tr>
<th>Pedagogical Activity</th>
<th>Pedagogical Approach</th>
<th>Implications for Building Design</th>
<th>Spatial Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivering</td>
<td>Learner centered pedagogies with multiple learning Focus on presentation</td>
<td>Design reflects community diversity, respects and values different cultures Students have access to teachers</td>
<td><img src="image" alt="Spatial Icon" /></td>
</tr>
<tr>
<td>Applying</td>
<td>Peer to peer learning, integrated problem and resource based</td>
<td>Breakout spaces are provided to allow individual student work Furniture is suitable for cooperative learning</td>
<td><img src="image" alt="Spatial Icon" /></td>
</tr>
<tr>
<td>Creating</td>
<td>Integrated, problem and resource based learning</td>
<td>Access to ICT devices, multi-media supports interdisciplinary learning</td>
<td><img src="image" alt="Spatial Icon" /></td>
</tr>
<tr>
<td>Communicating</td>
<td>Theory linked to practice Integrated curriculum delivery</td>
<td>Quiet spaces, Multi-purpose rooms that enable student to work on different subjects, Teacher spaces to encourage cross-disciplinary teaching</td>
<td><img src="image" alt="Spatial Icon" /></td>
</tr>
<tr>
<td>Decision making</td>
<td>Project and resource based learning on practical problems</td>
<td>ICT facilities that support curriculum links to professional and community practice</td>
<td><img src="image" alt="Spatial Icon" /></td>
</tr>
</tbody>
</table>
LEARNING THEORIES

Genetic Determinism

Behaviorism

Constructivism

Practice Theory

Learner Passive

Environment Passive

Learner Active

Environment Active
Genetic Determinism

Learner development is direct result of genetic makeup
Acquisition by chance

Behaviorism

- Teacher-directed
- Individual responds/reacts to environment
- Learner is influenced by the environment peripherally & is guided by the social environment
- Learner must change behavior
- Acquisition by exposure

Practice Theory

Involves levels of participation & grounds learning in physical setting
Interplay of acquisitions & transformations

Constructivism

- Multiple intelligences
- Involves levels of participation
- Acquisition by discovery
Rural Setting - Clarkson, Howells & Dodge

Rural places can be defined as remote areas that include farming communities, villages, small towns, and other non-metropolitan locations of populations under 19,000 characterized by attachment to and care of land, multiplex and intergenerational relationships, and strong community ties (Beggs, Haines, and Hurlbert).

This thesis involves the rural communities of Clarkson, Howells, and Dodge in Northeastern Nebraska.

Clarkson is located in Colfax County, 3 miles west of the junction of Nebraska Highways 15 and 91. Clarkson lies 85 miles northwest of Omaha and 90 miles northwest of Lincoln.

Howells is located in the far northeast section of Colfax County and centrally located between Columbus, Fremont, and Norfolk.

Dodge is located in the far northwest section of Dodge County and located at the junction of Nebraska Highway 91 and Nebraska spur 27.

In 1882, the Fremont, Elkhorn and Missouri Valley Railroad planned to run a line from Scribner to Oakdale, through Clarkson, Howells, and Dodge. The map to the right reveals a beaded line of towns, which were established along this railroad route. By 1903, the FE & MV railroad was absorbed into the Chicago and Northwestern Railroad line. In 1962, this line abolished the railroad tracks that ran through Clarkson, Howells, and Dodge. As a result, the only transportation routes available to these towns are from highways and country/gravel roads.
**Population Trends—Nebraska**

Small, agrarian communities that continue to experience trends such as fewer, larger farms and declining population bases, the real possibility of becoming a ‘vacated’ community looms closer every year.

A majority of Nebraska has a population per square mile of 1-10 people. Within the area of focus for this thesis project (Colfax and Dodge Counties), the population per square mile is approximately 1-25 people outside of the town limits.

Since 2000, research shows that the counties of Colfax and Dodge have actually increased 0-5% in population. However, the area of growth in these two counties occurred primarily in the south and within larger towns. In Colfax County, the major growth occurred in Schuyler whose population grew 15.6% from 2000-2010 (current population 6,211). In Dodge County, the major growth occurred in Fremont whose current population is 25,174.
**Population Trends - Clarkson, Howells & Dodge**

In contrast to their growing county populations, these graphs show that the town and student populations in the communities of Clarkson, Howells and Dodge are **declining**. This issue is a concern to the citizens and school districts alike. Population declines, like these, have forced many rural schools to consolidate or reorganize their current school districts.
CLARKSON PUBLIC SCHOOL SYSTEM

The rural community of Clarkson is located in the north-central part of Colfax County, approximately six miles west of Howells, along Highway 91. The 2010 census indicated a town population of approximately 650 people. The Clarkson School System is located in the north-central portion of Colfax County and in the south-central part of Stanton County. It is a Class III school system accredited by the Nebraska Department of Education and consists of approximately 108 square miles. A private school, St. John Neumann School, is located within this district and serves Grades 1-6, but doesn’t offer Kindergarten. According to a feasibility study completed for the Clarkson, Dodge, Howells, and Leigh school districts, 28% of the students enrolled in Grades 1-6 living in the Clarkson School District attend this private school.

The Clarkson School System maintains an elementary school for Grades K-6 students in a building moved to the current site in 1995. A building constructed in 1954 is used to provide educational programs for Grades 7-12, with additions constructed in 1973 and 2002. The 1973 building addition has a multipurpose room, which doubles as a cafeteria. The 2002 building addition includes a new gym, commons area for athletic events, and classrooms.
The various facilities, dating from 1954, 1973, and 2002, are clustered on the site with small slivers of green space separating the buildings. The 1954 building is two stories in height. This building is arranged so that the gym resides on the northern part of the school property, connected to a linear string of classrooms on the south side, running east to west. Below the gym are a wood shop, Tech classroom, weight room, and locker rooms. The 1973 building addition connects to the west side of the original classrooms, extending the corridor to accommodate a commons area (cafeteria), library, bathrooms, and storage. The 2002 building addition connects to the node intersecting the 1954 and 1973 facilities. In 2002, a military barrack from Hurricane Katrina was brought in and attached to the northwest corner of the new gym. This connection area serves as a main entrance because it leads to the bus drop off zone on the south side of the school. The school grounds also include a garden, playground, and athletic fields.
- NEGATIVES (CLARKSON SYSTEM)

The 1954 building has a serious indoor air quality problem. This portion of the building has window air-conditioning and needs to be renovated. The hallways are dark, and the classrooms receive little to no natural light. The computer lab and distance learning rooms are secluded and use conventional methods for lighting. Several rooms are simply not used or underutilized. The new entry created during the 2002 addition is only used by visitors for athletic events and locked during the day, making it underutilized.
The 2002 addition for the elementary students was in excellent condition and provided more natural light into the classrooms. Classroom doors were surrounded by windows to allow visibility in both directions, sharing activities going on in the classroom and in the hallway. The new gym is used by all age groups and for a multitude of activities or events. Smart boards were provided in all classrooms and the computer lab utilized new technologies. Adjacent to the elementary classrooms is an outdoor learning garden for students to explore the natural world.
Existing Public School Systems

HOWELLS PUBLIC SCHOOL SYSTEM

The community of Howells is located in the northeast corner of Colfax County and has a town population of approximately 560 people, according to the 2010 census. The Howells School System is located in the northeast corner of Colfax County, the southwest portion of Cum-ing County, and the southeast corner of Stanton County. It is a Class III school system accredited by the Nebraska Department of Education and consists of approximately 95 square miles. A private school, Howells Community Catholic School, is located within this district and serves Grades 1-6, but does not offer Kindergarten. According to a feasibility study completed for the Clarkson, Dodge, Howells, and Leigh school districts, 63% of the students enrolled in Grades 1-6 living in the Howells School District attend this private school.

The Howells School System maintains an elementary school for Grades K-6 students in a building constructed in 2001. A building constructed in 1950 is used to provide educational programs for students in Grades 7-12, with an addition constructed in 1999. The 1999 building addition contains classrooms for Grades 7-12, a computer lab, library, and commons area which also functions as the cafeteria.
Most of the school facilities reside on a hill sloping from north to south, with the south portion being at the lowest elevation. The facilities are arranged with the K-6 building on top of the hill, the music, speech pathology and multi-purpose room in the middle, with the gym and Grade 7-12 classrooms on the bottom on the hill. Detached from the main building, the weight room and agricultural facility are located in the southeast and southwest portions of the school grounds, framing the main entrance of the school building. A gym, locker rooms, multi-purpose room, music and speech pathology room are all that remain of a 1950’s building. The 1999 addition, connecting to the gym on the west, consists of a commons area (cafeteria), library, computer lab, and classrooms for Grades 7-12.
NEGATIVES (HOWELLS SYSTEM)

Because of the steep grade change on the site, there is a **long and narrow ramp** on the interior that connects the K-6 elementary facility to the gym. In terms of universal access, this can be an issue. For better or worse, the middle portion of the school separates the elementary and high school students. For Grades 7-12, the northern **classrooms don’t have any windows** because of the steep slope. The computer lab is centralized and gets warm rather quickly. **Detached** from the main building are a weight room and building used for tech and agricultural classes. Although they are within close proximity to the main entrance of the school, this poses a threat to the students well-being during rain and snow storms.
Between the three communities, the Howells School System is in the best overall condition. The 1999 and 2001 additions have proved successful in natural day lighting, open social areas, effective use of spaces. Smart board technology is implemented in all classrooms and the library has a TV and computers to present and uncover research. The commons area serves multiple functions and is available for school and public activities. Classroom doors are surrounded with windows to allow visible access in and out of the classrooms, which allows for great transparency.
Existing Public School Systems

DODGE PUBLIC SCHOOL SYSTEM

Dodge is located in the northwest part of Dodge County, approximately six miles east of Howells, along Highway 91. The 2010 census indicated a town population of 620 people. The Dodge School System is located in the northwest corner of Dodge County and the south-central part of Cuming County. It is a Class III school system accredited by the Nebraska Department of Education and consists of 76 square miles. A private school, St. Wenceslaus School, is located within the Dodge Public School District and serves Grades 1-8, but does not offer Kindergarten. Approximately 35% of all the students in Grades 1-8, living in the Dodge School District, attend the private school.

The Dodge School System maintains an elementary school for Grades K-6, which was built in 1972. A building constructed in 1911 is maintained for Grades 7-12, with a separate facility for music, shop, and gym/lockers constructed in 1972. This separate facility is located one block east of the high school.
There are three separate school facilities used by the Dodge School System. Grades 9-12 are located in a three story building built in 1911. The classrooms are arranged around a small meeting place, filled with student lockers. The 1972 addition, serving Grades K-6, rests on the north side of the high school and has entrances on the south and east sides. A separate facility, which includes a gym, locker rooms, music and Tech room, is located two blocks east of the other two facilities. All of the facilities are located on a relatively flat piece of land.
- NEGATIVES (DODGE SYSTEM)

Being **100 years old**, the 1911 high school building requires a lot of maintenance. The building has **little to no ADA access** throughout the building. The hallway space can get **crowded** between class periods. With the exception of a few, most classroom doors are solid, with no visibility into the learning space. A large portion of the glass block windows have been covered, **reducing the amount of natural light** into the classrooms. The computer lab and distance learning room are secluded and dark. Whether it is summer or winter, students must walk a block to access the gym and other classrooms. The elementary addition has window air-conditioning and little natural light. A **lack of storage** has left the janitor and a few teachers storing items in the hallway or on work tables, prohibiting the use of certain spaces within the learning environment. From the exterior, it is unclear where the main entry is located.
There is the potential to renovate the 1911 high school building for historic tax credits. Organization of the 1911 building allows for an opportunity to provide an ample amount of natural day light into each classroom. Circulation throughout the building is easily understood. Although in two different locations, the school provides two athletic fields and a new playground. Distance learning courses and other technologies, such as Smart Boards, are being utilized within the classrooms.
Case Studies - 21st century school designs

Throughout the research and analysis phase I investigated a range of case studies, focusing on 21st century elementary school designs. The selected case studies were then put into a table, upon which I began to form physical and social relationships between each study. The table was used as an organizational tool exploring issues such as: design type/form, materiality, sustainability, transparency, and connection to nature/community. If the case study met or exceeded my expectations on a particular issue, I marked it with a diamond. On the contrary, for those falling short of my expectations I left the box blank.

<table>
<thead>
<tr>
<th>Design Type/Form</th>
<th>Courtyard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Block</td>
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<tr>
<td></td>
<td>Cluster</td>
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<tr>
<td></td>
<td>Town-like</td>
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<tr>
<td>Welcoming Entrance</td>
<td>Entry</td>
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<tr>
<td>Services</td>
<td>Lighting/Daylighting</td>
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<td>Connection to Outdoors</td>
<td>Views</td>
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<td>Outdoor Classroom</td>
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<tr>
<td>Sustainability</td>
<td>Energy Efficient</td>
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<td>Transparency</td>
<td>Passive Supervision</td>
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<tr>
<td>Flexibility</td>
<td>Classroom</td>
</tr>
<tr>
<td></td>
<td>Social Areas</td>
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<td>Dispersed Technology</td>
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<td>Access for Public Use</td>
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<td>School Name</td>
<td>City, State</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Davidson Elementary</td>
<td>Davidson, North Carolina</td>
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<tr>
<td>Wyckells Elementary</td>
<td>Carroll, Pennsylvania</td>
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<tr>
<td>Indian Trail Elementary</td>
<td>Carville, Ohio</td>
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<tr>
<td>Heinavaara Elementary</td>
<td>Heinavaara, Finland</td>
</tr>
<tr>
<td>Samuel Brighouse Elementary</td>
<td>Richmond, British Columbia</td>
</tr>
<tr>
<td>Poquoson Elementary</td>
<td>Poquoson, Virginia</td>
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<tr>
<td>Glenville Elementary</td>
<td>Greenwich, Connecticut</td>
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<td>Strawberry Vale Elementary</td>
<td>Victoria, British Columbia</td>
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<td>Stoddert Elementary</td>
<td>Springfield, Oregon</td>
</tr>
<tr>
<td>Rosa Parks Elementary</td>
<td>Seattle, Washington</td>
</tr>
<tr>
<td>Thurston Elementary</td>
<td>Springfield, Oregon</td>
</tr>
<tr>
<td>Rural Machias Elementary</td>
<td>Seattle, Washington</td>
</tr>
</tbody>
</table>
CASE STUDY FOCUS - Design Type/Form

* Classrooms are in black

Design Type: **Courtyard**

Indian Trail Elementary  
(Steed Hammond Paul Inc.)

Design Type: **Block & Courtyard**

Wycallis Elementary  
(Quad Three Group)

Design Type: **Block**

Heinavaara Elementary  
(Cunningham Group Architecture)

Design Type: **Block & Cluster**

Samuel Brighouse Elementary  
(Perkins + Will)
Design Type: **Block & Cluster**

Harold G. Fearn Elementary  
(Perkins + Will)

Design Type: **Cluster**

Poquoson Elementary  
(VMDO Architects)

Design Type: **Cluster**

Davidson Elementary  
(Adams Group Architects)

Design Type: **Town-like**

Kings Avenue Primary  
(Shepheard Epstein Hunter)
CASE STUDY FOCUS - Welcoming Entry

The main entrance is an important element of any school design. Firstly, the school entrance should be welcoming. Rather than look like an institution, similar to the schools of the past, the entrance should be inviting, warm, and friendly and contain some “signature” element.

“We know that community involvement in schools is a key factor in their success and so the community needs to feel that the school belongs to them. This welcoming aspect has to be balanced by the need to secure the entry and separate its publicly accessible spaces from the student areas.” --Nair, Fielding and Lackney

CASE STUDY FOCUS - Materiality

Choices for the school building envelope and interior include many types of materials and systems. Similar to the past, masonry still dominates the wall system choices of K-12 schools in America, with brick as the best choice based on cost and durability.

Wall systems such as tilt-up concrete or prefabricated wall panels — either metal, precast, curtain wall or newer resin-based panels — are being used in more limited applications on large school spaces, such as gymnasiums, natatoriums or auditoriums. Another effective solution for large rooms with tall walls and long clear-spanning roofs is wood construction. Wood can be used at a variety of scales and offers warm and enriching learning environments. As the only structural building material that is renewable, designers are increasingly using wood for school construction.

In terms of multi-sensory learning, the color and texture of materials will influence the learning environment and its users.
CASE STUDY FOCUS - Connection to the Outdoors

For several adults, their fondest childhood memories come from experiences with nature and the outdoors. These memories might include navigating the rugged terrain of an open ditch, building a snow fort, or catching caterpillars during recess. Unfortunately, in today’s society children rarely have access to the types of landscapes that provide these experiences. Children are spending less time outdoors within landscapes that are highly controlled and lack the nature element. Yet, children still want to engage the outdoors. Observing changes in nature improves a child’s awareness, curiosity, observational skills, and reasoning. Some case studies use the outdoors as an extension of classroom activities, installing a transparent glass wall seamlessly connecting the indoors and outdoor spaces. A child’s connection to the outdoors is needed to relieve stress and maintain a healthy psychological well being.

CASE STUDY FOCUS - Sustainability

Today, the term ‘sustainable’ is a buzzword in school design. Within a school setting, sustainable design becomes an excellent teaching tool for students to learn about architecture, engineering, construction, and environmental science in harmony with nature.

Sustainable architecture captures high performance design in multiple ways:

1. It involves a thoughtful approach which tries to minimize the disruption of a site’s natural features.
2. It taps into nature’s energy sources from the earth, wind and sun to minimize the consumption of fossil fuels.
3. It utilizes renewable or local materials.
4. It minimizes the consumption of water within and around the building.
CASE STUDY FOCUS - Transparency

Transparency is an important concept in school design, which conveys an idea that learning should be visible and celebrated. There are multiple areas of opportunity for transparency with the school environment. For example, transparency and passive supervision can be explored in the entrance, as a way to provide a welcoming feeling and allow staff to monitor the entrance and supervise areas outside of the administration offices where students might be engaged in informal learning activities. Another way is to provide visibility between classrooms and informal learning places outside of the classrooms. This type of connection allows teachers to monitor the informal learning areas and for students to engage in collaborative work with their peers and other age groups while feeling a sense of openness. In addition, transparency can bring light into a space.

CASE STUDY FOCUS - Flexibility

Flexibility is about ensuring that space is readily available for working with a number of different sized groups of students and teachers in different situations. Utilizing flexibility means moving away from a model of single-purpose spaces and rather into multi-functional areas.

Successful flexibility within a learning environment can be evident when users are able to change or transform a particular space themselves.

A few strategies that architects have used to encourage flexibility include: moveable walls and acoustic partitions, swing walls, overhead garage doors, and furniture on casters.

*A lot of glazing allows for passive supervision and blends space. In this example, the meaning of privacy is reevaluated.

2003 Rosa Parks Elementary (Mahlum Architects)

2010 Glenville Elementary (Perkins Eastman)

2009 Harold G. Fearn Elementary (Perkins+Will)

1999 Heinavaara Elementary (Cunningham Group Architecture)

*Flexible classroom clusters support a variety of teaching methods such as looping, teaming, multi-grade and traditional self-contained classrooms.
CASE STUDY FOCUS - Dispersed Technology

In a 2008 survey by the UK group, Campaign for Learning, it was revealed that 52% of the average student's time is spent copying notes from a book or whiteboard. The same survey revealed that what children want more of is to learn in groups, to learn in a hands-on-manner, and to learn with computers.

Today, there is still one room designated as a computer lab where students go to use or learn about computers. When that model emerged 20 years ago, the design was a result of technical limitations. However, those limitations no longer exist and Information Communication Technology (ICT) can now assist in independent learning, anywhere and anytime with laptops and wireless networking. In addition, new technologies allow teachers and students more customized learning options than ever before. Students are able to work at their own pace and take more control over their learning.

CASE STUDY FOCUS - Connection to Community

Many schools across the nation are successful at utilizing a variety of community resources in their vicinity. When the school is embedded into the heart of a community, it becomes easier for children to be involved in first-hand learning opportunities.

Another way to engage students and their school with the community is through extracurricular activities.

A school may be designed to extend past a typical school day, opening the facility for community functions and fundraisers either early in the morning or late into the evening. In this scenario, it may be important to separate the community-use facilities from parts of the school that belong only to the students. This will keep student areas secure while improving the building's efficiency.
*Case Studies - Nebraska public school consolidation*

*These school districts were chosen based upon factors including the similar population size of the consolidating communities and the similar enrollment size of the consolidating districts that directly relate to this thesis project.*
Economically, school consolidation and the resulting necessity of closing a school building, can have quite a negative effect on a community. (Howley 1994)

This study showcases 3 different solutions to public school consolidation:

1) Re-use or renovate existing facilities
2) Build new facility within the community
3) Build in a central location between communities

In all of these rural communities, the ‘public school’ was listed in the top 3, largest employers of the community.

Median household incomes (2009) were between $34,000-$46,604.

The percentages to the right indicate the decline or increase in town populations. The interesting part is that the only towns to show an increase were those able to maintain or claim the high school.

Data retrieved from Nebraska Fast Facts, www.city-data.com and U.S. Census
**School Consolidation & Community Conflict**

The environment for retail sales, business, and services in rural communities is ever-changing. As the large retail centers shift toward larger localities, technology and the internet are changing the picture of sales and business on a daily basis.

As rural entrepreneurs discover the advantages of online businesses, perhaps the relationship between a school and its community and how they impact each other will become clearer.

---

**Largest Employers per Community**

2010

(Data retrieved from U.S. Census)

- Bluebird Nursery: 85
- Clarkson Public School: 40
- Vacin, Inc. (farm equipment sales): 32
- Howells Public School: 40
- Howells Fab (fire sprinking system): 25
- Vering’s Feed Service (agricultural products/supplies): 11
- Dodge Public School: 40
- Dodge Manufacturing (livestock corral panels/gates): 25
- Farmers State Bank: 8
School Consolidation Summary Statements:

“The schools in the rural setting serve, for the most part, the individual needs of children for economic, academic, and social success, and they serve our national needs for economic and political development. Sandwiched between these individual and national concerns, however, is one that in quiet times we may not even know exists—the concern for community survival” (Peshkin)

Perhaps the one, fundamental good that has come out of the conflict of the past few years is a substantially enhanced, cross-village awareness of the desire to keep children in village-based schools and of the very special place such schools have in the communities of Clarkson, Howells, and Dodge.
Design Analysis

SITE

BUILDING

Traditional Model - rigid

21st Century Model - flexible

multi-age grouping

preschool
toddler
primary
**CIRCULATION**

- protection

- exposure

insecure, distracting?

or

anticipatory, safety precaution?

**LIGHTING**

- Adult eye level
- Child eye level
- Surface height

**MATERIALS(COLOR**

- **Brick**
  - Visually cold and hard
  - Warm texture
  - Traditional material
  - Protecting
  - Grounded in place

- **Wood**
  - Friendly to the touch
  - Warm texture
  - Draws attention yet relaxing
  - More flexible material in terms of free verses grounded in place

- **Glass & Steel**
  - Transparency
  - Feels 'new' and modern
  - Allows for open and expansion
  - Views and exposure

- **Exciting & Active**
  - Children ages 5-8 prefer these colors
  - Reduce tension and anxiety
  - Stimulating

- **Calming & Quiet**
  - Children ages 9-10 prefer warm and cool colors
  - Great to use in reading areas
**CLASSROOM**

**Breakout Area**
- soft seating

**Active Zone**
- entry, storage, project work

**Flex Space**
- quiet, individual work, collaborative, or presentation

**Outdoor Learning Terrace**

**Dry, Clean Region**
- sleep zone
- quiet zone
- active zone

**Wet, Dirty Region**
- messy zone
- entry zone

**Fat ‘L’ shaped classroom**

- good for children but bad for supervision?
- amount of perceived space
- perception of others in the space
- sense of crowding

Olds, 2001

Dyck, 2004

Nair, 2009
Traditionally, the school building is an industrial package of these boxes efficiently put together. The goal of 21st century learning environments is to blur the lines of how the classroom is traditionally known.
1) TRADITIONAL - Double loaded corridor - Based on “Ford Model”

2) SHIFT - Allow traditional group space to become activated communal space

3) EXTEND - Widen the corridor - No more impersonal space

4) UNFOLD - The box to provide for multiple types of learning environments

5) TRANSFORM - By changing the corridor into an activated learning space

6) EVOLVE - Towards learner-centered spaces

7) BLUR - Maximize use and flexibility of existing spaces by creating overlaps/extensions

CORRIDOR-TRANSFORMED
1 Looking east from 2nd street

2 Looking southeast towards the site

3 Looking southeast from existing gym
Looking southwest from city auditorium

Looking southwest across the site

Looking northeast across the site
Vehicular Circulation
two way traffic
one way traffic

Views/Vistas
Open field, no obstructions

Social Resources
close social adjacencies
distant social adjacencies

Public/Private Green Space
# blur or combine these green spaces
# both are isolated
The school building is part of the community’s physical landscape.

A school’s activities such as the Christmas program, the athletic contests, the awards banquet, and fundraisers are incorporated into the community’s calendar.

These activities can be tied to the accomplishments of individual students and of a school’s teams, which in turn develops pride in ‘our’ students, ‘our’ teams, ‘our’ school. Such collective pride has the potential of attaching people to each other and to a particular place (Peshkin).
I developed a “parts of the whole” approach for the schematic design. I started to examine the key parts of a school from which I could combine in order to form a complete school project. Key parts include: the classrooms, media center, commons area or “learning street”, and main entrance.

Minimal square footages needed for an elementary school:

<table>
<thead>
<tr>
<th>Administrative</th>
<th>Public Entrance: 500 sq. feet</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Nurse’s Bay: 400 sq. feet</td>
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<tr>
<td></td>
<td>Conference Room: 250-300 sq. feet</td>
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<tr>
<td>Technology</td>
<td>IT Office: 150 sq. feet</td>
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<tr>
<td></td>
<td>IT Equipment Storage: 200 sq. feet</td>
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<tr>
<td>Instructional</td>
<td>Classrooms (need 6-7): 900-1,000 sq. feet</td>
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<tr>
<td></td>
<td>Media Center: 3,000 sq. feet</td>
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<tr>
<td></td>
<td>Art/Science Lab: 1,000 sq. feet</td>
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<tr>
<td></td>
<td>Music Room: 1,200 sq. feet</td>
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<tr>
<td>Food Service</td>
<td>Dining Area: 1,400 sq. feet</td>
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<tr>
<td></td>
<td>Food Prep Kitchen: 800 sq. feet</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Mechanical Room: 2,000 sq. feet</td>
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</table>
### PROGRAMMING MATRIX

<table>
<thead>
<tr>
<th>Required Adjacency</th>
<th>Proximate Adjacency Desired</th>
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<tbody>
<tr>
<td><strong>Public Access &amp; Entrance</strong></td>
<td>500 sq ft</td>
</tr>
<tr>
<td><strong>Parent Resource Suite</strong></td>
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<tr>
<td><strong>Reception/Security (Office)</strong></td>
<td>200 sq ft</td>
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<tr>
<td><strong>Principal/Director (Office)</strong></td>
<td>200 sq ft</td>
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<tr>
<td><strong>Counselor (Office)</strong></td>
<td>200 sq ft</td>
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<tr>
<td><strong>Teacher Work Areas/Lounge</strong></td>
<td>200 sq ft</td>
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<tr>
<td><strong>IT Staff (Office)</strong></td>
<td>150 sq ft</td>
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<td><strong>Server Room</strong></td>
<td>200 sq ft</td>
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<tr>
<td><strong>Equipment Storage</strong></td>
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<tr>
<td><strong>Classroom (7)</strong></td>
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<tr>
<td><strong>Classroom (7)</strong></td>
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<tr>
<td><strong>Science Lab/Art Room (1000 sq ft)</strong></td>
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<td><strong>Music Room</strong></td>
<td>1200 sq ft</td>
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<tr>
<td><strong>Library</strong></td>
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<td><strong>Environment Studies Garden</strong></td>
<td>1400 sq ft</td>
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<tr>
<td><strong>Dining Room/Cafeteria</strong></td>
<td>500 sq ft</td>
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<tr>
<td><strong>Food Prep Kitchen</strong></td>
<td>900 sq ft</td>
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<tr>
<td><strong>Food Storage</strong></td>
<td>1000 sq ft</td>
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<tr>
<td><strong>Janitor Closet</strong></td>
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<td><strong>Storage Rooms</strong></td>
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<td><strong>Student Cubbies</strong></td>
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<tr>
<td><strong>Mechanical Rooms</strong></td>
<td>2000 sq ft</td>
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Program Bubble Diagrams

Diagram 1 - Courtyard
Program Bubble Diagrams

Diagram 3 - Cluster
Three separate communities are joining to become one, searching for a new identity. The circles represent 1) pedagogical function, 2) communal function, 3) site function. Once the three circles come together there is an enclosed space which is shared by all three units. This area becomes a common ground for all to use.
Initial Sketch of Entry Commons
Initial Sketch of Media Center

- Private reading nook
- Exposed structure
- "see how it works"
- Research
- Books integrated into steps or stairs
Dodge is located in the northwest part of Dodge County, comprising three school facilities and consisting of approximately 108 square miles. A private school, St. John Neumann School, is located within this district and serves Grades 1-6, but does not offer athletic facilities. The Howells and Dodge School District consists of 76 square miles. A private school, St. Wenceslaus School, is located within the Dodge Public School District and serves Grades 1-8, but does not offer athletic facilities.

Due to student enrollments and financial setbacks, consolidation is bound to occur. The current structures do not provide sufficient space for Pre K-5 students and provide a quality environment for the expanded learning community. The learning spaces should motivate and promote learning as an activity, support collaboration, provide for personal exploration, and be flexible toward the changing needs of learners.

If such changes are real, then schools are enabled to move away from teacher-centered models and focus on learner-centered models. Consolidation gives communities like these an opportunity to upgrade the school facilities and review the model of education currently in place by school administrators. Investigations must be conducted to explore educational delivery methods that are more flexible, suiting the 21st century. Once gathered, the information can be used to design spaces that support the new model of education.

By examining the 21st century schools of today and predicting the future, educators, parents, and designers are striving to repair the errors of the past. The field of education is in a state of flux, and it is essential to ask the question, "What does it mean to educate today’s students?"
**PROCESS**

*Design Iterations*

Once the site was determined, I built a site model and a couple of building forms. The forms were organized in a variety of ways on the site in order to find the best solution.
This form was chosen for further design development.
Design Phase: 1

The form, which was chosen to develop further, began as a boomer-rang shape. The main entry was placed on the north side of the site, due to the large amount of already existing parking available and to provide a safe drop off zone for the students.
Design Phase: 2

All of the programmatic spaces were designed around a communal space. Designated areas within the plan were articulated by a change in floor heights, which mimicked the slope of the land (west being the highest point and east being the lowest point).
Design Phase: 3

During this phase, the multi-level floor plans were still being developed. The upper elementary classrooms began to take shape, being clustered along the west facade. The lower elementary classrooms were placed in the southeast wing, until it was determined that they would be better suited towards the main entrance.
Design Phase: 4

Rooms really began to take shape during this phase. The lower elementary classrooms moved closer to the entrance and administration wing. An amphitheater was added as an extension of the communal space, beginning to blur the indoor/outdoor connection. A debate about what shape the art/science room should be took place. The media center was relocated to the southern tip of the building.
Design Phase: 5

Rather than just being an exterior element, the “thread” begins by the music room, weaves the upper classrooms and then hugs the media center wall where it proceeds into the interior. Ultimately, this “thread” holds the pieces together. When the “thread” is loose, it provides flexible movement in or out and when it is taut, it acts as a boundary.
Summary of Program Masses

Administration Wing
- Coordinating

Nurse’s Bay
- Counseling and Remedies

Kitchen & Dining Services
- Food preparation
- Food storage
- Hands-on learning

Classrooms
- Layered environment
- Clearly defined by porch-like entries
**Activity Zone/Flex Space**
- Extension of the classroom
- Multi-purpose
- Shared by a variety of users

**Community/Commons**
- Gathering space
- Multi-purpose
- Shared by a variety of users

**Media Center**
- Researching
- Calming

**Green Roof**
- Exploring
- Investigating
- Relaxing
FINAL PROPOSAL

Physical Model - Courtyard Perspective
Southwest Perspective - Upper elementary classrooms and media center

South Perspective - Exterior ramp to green roof
Physical Model - Building on Site
Within the school context one must consider: each community’s history, heritage, values, identity, physical location, locally available materials and construction techniques. Many residents feel that their community is **unique** and wish to **preserve** its individuality.
This site was chosen for its close proximity to several social resources, including the city auditorium, nursing home, existing gym facility, and catholic school. Before, the site was isolated from Holstein Park (the town's only park). By removing a few trees, the park was able to blur into the once private playground. Now, both the public and private green spaces can be shared and linked by new pathways that reconnect the whole community. The new PreK-5 elementary school takes advantage of the views and experiences of the natural landscape.

Site Plan Legend

1 Rain Garden/Bioswale
2 Lower Age Playground
3 Outdoor Learning Patio
4 Accessible Green Roof
5 Upper Age Playground
6 Hardscape Play Area
7 Shared Green Space
8 Water Cistern
9 Parent Drop-off Zone
10 School Bus Drop-off Zone
11 Existing School Gym Facility
The concept of transforming the traditional classroom and corridor into a 21st century model led to this idea of the “thread,” which can easily be identified throughout the plan. The loose thread provides non-linear rooms, which create more customized places for learning to occur. The traditional classroom box is further unfolded by extending the learning environment out towards the communal space. What was once a narrow corridor, has now transformed into a wide multi-purpose activity space. Combined with the interior “thread,” this zone accommodates large and small learning groups. Circulation ramps allow users to move freely from each floor level.
**SECTION A**  
*Porches to Upper Elementary Classrooms*  
*Scale: 3/16”=1’*

**Wayfinding:** refers to the way people orient themselves in a given environment and eventually find their destination.

**Importance of Wayfinding**
In addition to signage, visual clues can be utilized to help orient the user:

- Architectural elements such as lobbies, stairs, ramps, and areas of special use allow users to place themselves.
- Change of wall color, type, or texture.
- Change of flooring color, type, or texture.
- Use of lighting to highlight or minimize areas.
- Change of ceiling heights and treatments.
- Furniture arrangement or type.
Grade 2  Grade 1  Music
SECTION B
Porches to Lower Elementary Classrooms
Scale: 3/16"=1'
SECTION PERSPECTIVE C
Commons and Auditorium Blur into Outdoor Courtyard
Semi-intensive green roof provides several benefits: reduction in energy used for heating and air conditioning, increased roof membrane life span, improved storm water run-off quality, and noise reduction. It also serves as an extended learning platform about plants, insects, and water. (Depth: 25% above or below 6”)

Atrium
Frosted glass, allows light to enter into the commons space which can help heat the space during the winter months.

Clerestory Windows
Clerestories provide daylight to more than 75% of occupied spaces. They articulate the circulation route and activity zones within the building. Shading devices will be used where necessary.

Space Frame
The structure will be a lightweight space frame, infilled with a semi-transparent canvas to allow light to shine through above the auditorium. This structure is supported by steel columns.

Exterior Ramp
This ramp, equipped with railings, provides access to the accessible green roof while providing shade from the south sunlight.

Interior Ramps
These ramps articulate the circulation route throughout the building. Because children do not have as much strength as adults, the ramp slopes are 1:16 or greater.

Rain Garden
This is an inexpensive and easy to implement solution to stormwater management on the site. It provides a great learning opportunity for the children, while being aesthetically pleasing. In addition, it provides unique habitats for plants and wildlife.
**Green Roof**

Semi-intensive green roof provides several benefits: reduction in energy used for heating and air conditioning, increased roof membrane life span, improved storm water run-off quality, and noise reduction. It also serves as an extended learning platform about plants, insects, and water. (Depth: 25% above or below 6")

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Exterior Ramp
This ramp, equipped with railings, provides access up to the accessible green roof while providing shade from the south sunlight.

Interior Ramps
These ramps articulate the circulation route throughout the building. Because children do not have as much strength as adults the ramp slopes are 1:16 or greater.

Rain Garden
This is an inexpensive and easy to implement solution to stormwater management on the site. It provides a great learning opportunity for the children, while being aesthetically pleasing. In addition, it provides unique habitats for plants and wildlife.
**MAIN ENTRANCE**

The main entry is accompanied by an extrusion of display boxes, which doubles as a climbing wall for students to enjoy before or after school.
**ACTIVITY/FLEX SPACE FOR LOWER AGE GROUP**

This area provides the lower elementary students with room to break out into activities within large or small groups. The flexibility of the space allows it to be used by everyone. The “thread” wall and color-coded classroom porches assist with **orientation** and **wayfinding**, providing control yet comfort.
**PRESCHOOL CLASSROOM**

The lower elementary classrooms were designed based on the notion of the ‘fat L’ concept. Near the front door and porch area is an alcove for student cubbies. Here, students can store their personal items. The remainder of the classroom space is divided into a large activity/instructional area with a private nook for quiet time or reading.
COMMONS/AMPITHEATER PIT

The commons area is an interconnected space, providing views of multiple levels of learning while exposing children to different spatial complexities. This space encourages social interaction among different age groups. After school hours, this space may be converted and used by the school/town board, fundraiser volunteers, or parents.
The commons was designed to be a multi-functional gathering space, while engaging the indoor and outdoor environments. Large clerestory windows wrap around the entire space which allows light to enter and for users to view what may be happening on the green roof.
BENEATH THE RAMP CUT
OUTDOOR LEARNING COURTYARD
**WATER CISTERN**

As a learning tool, the water cistern collects filtered rainwater from the roof allowing children to experience water in a unique way while creating a relaxing feature on the west facade.
This thesis serves as a case study showing an architectural response to the issues of school consolidation and new 21st century learning pedagogies. The result of my thesis raised many questions, particularly about current pedagogical models and teaching technologies. The final proposal of FUSED is a mere snapshot into the possibilities of how architecture can have an impact on the education and growth of children. I hope those who experience this project will share a similar understanding to the importance of the environment on a child's development.

Knowing that learning can occur anywhere, anytime, and anyplace, it was a challenge to design every aspect of my project to the degree necessary for my chosen program of an elementary school. I often found it difficult to devote the same amount of effort and design towards elements. Coordinating between the school consolidation and pedagogical research, I strived to find connections that would guide the design process and development.

My experience with this thesis project was so different than those I have had in my academic career. Throughout this process, I have learned a lot about myself as a designer. I look forward to what the profession of architecture has in store for me and you.


OECD. Designing for Education: Compendium of Exemplary Educational Facilities. OECD, 2011.


Other: Clarkson, Dodge, Howells and Leigh School District Organizational Alternatives Feasibility Study
I would like to thank all those that have helped me throughout this journey. Without them, I would not have been able to complete this project.

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