



 **A NEW SCHOOL**
ALTERNATIVE LEARNING ENVIRONMENTS FOR THE FUTURE

A NEW SCHOOL: ALTERNATIVE LEARNING ENVIRONMENTS FOR THE FUTURE
BRADEN J. JOHN
ARCH 772 DESIGN THESIS SPRING 2024 : REGIN SCHWAEN
PROGRAMS: RHINO, LUMION, ILLUSTRATOR, PHOTOSHOP, POWERPOINT

OVERVIEW

- Introduction
- Problem
- Background
 - Case Studies
- Research
- Results and Conclusions





INTRODUCTION

Introduction

- Educational Facilities play a pivotal role in shaping the future of our cities and societies.
- Learning environments don't only effect where students learn but how well they learn too.
- Many schools are designed with outdated views and economic outlook rather than acting on new research and having a student focused environment.
- Many students are not in a learning environment conducive to them, especially those with learning disabilities.

Braden J John
NDSU
M.ARCH





PROBLEM

Problem

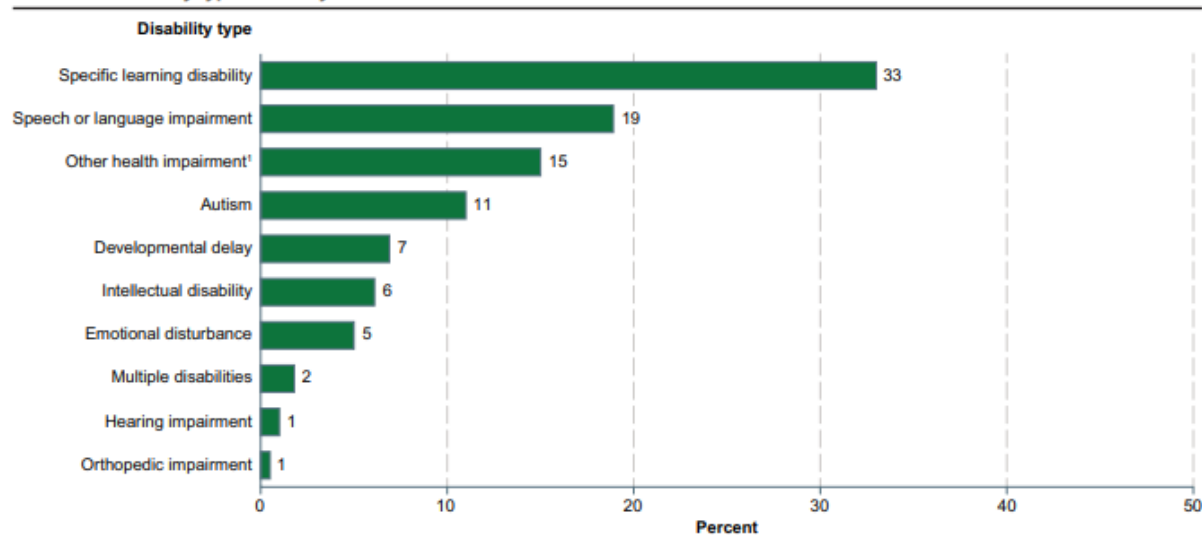
- Rise of Learning Disabilities
- ADHD Prevalence
- Lowering Educational Success
- Outdated Facilities
- Education as a Linear Path





Rise of Learning Disabilities

Figure 5. Percentage distribution of students ages 3–21 served under the Individuals with Disabilities Education Act (IDEA), by disability type: School year 2019–20



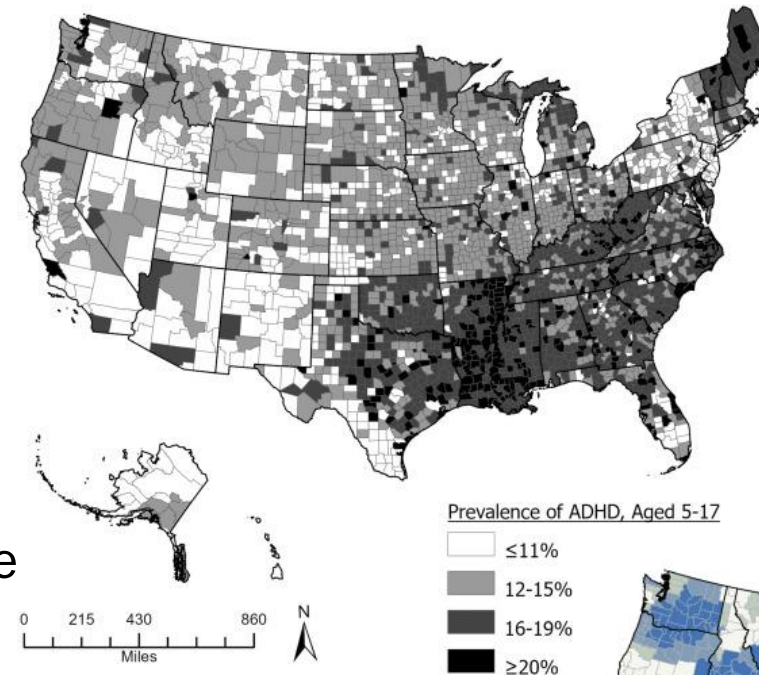
Source: (Irwin et al., n.d.)

- Students served by the Individuals with Disabilities act increased to 7.3 million in 2019-2020 from 6.5 million in 2009-2010. (Irwin et al., n.d.)
- Percentage increase is 13% of public-school enrollment in 2009-2010 to 14% in 2019-2020.(Irwin et al., n.d.)
- Many of these disabilities affect learning.

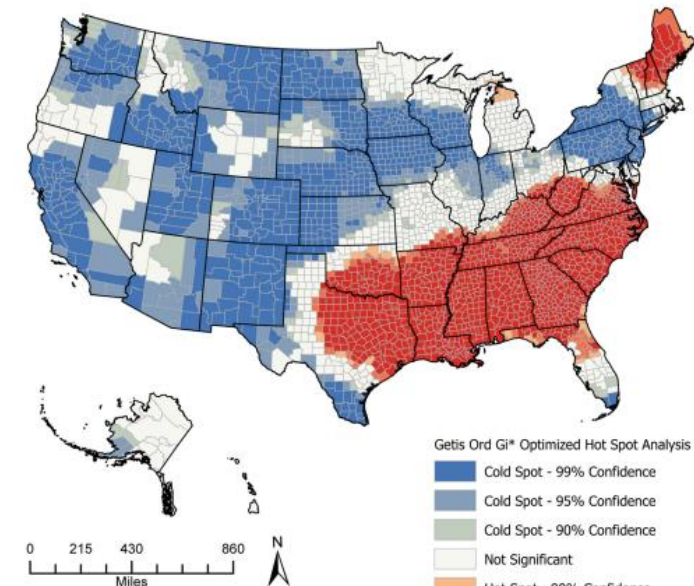


ADHD Prevalence

- The CDC describes symptoms of ADHD being “daydreaming a lot, forget or lose things a lot, squirm or fidget, talk too much, make careless mistakes or unnecessary risks, have a hard time resisting temptation, have trouble taking turns, and have difficulty getting along with”.(CDC, 2021)
- ADHD affects 8.4% of Children ages 2-17 years old (Zgodic et al., 2023)



Source: (Zgodic et al., 2023)

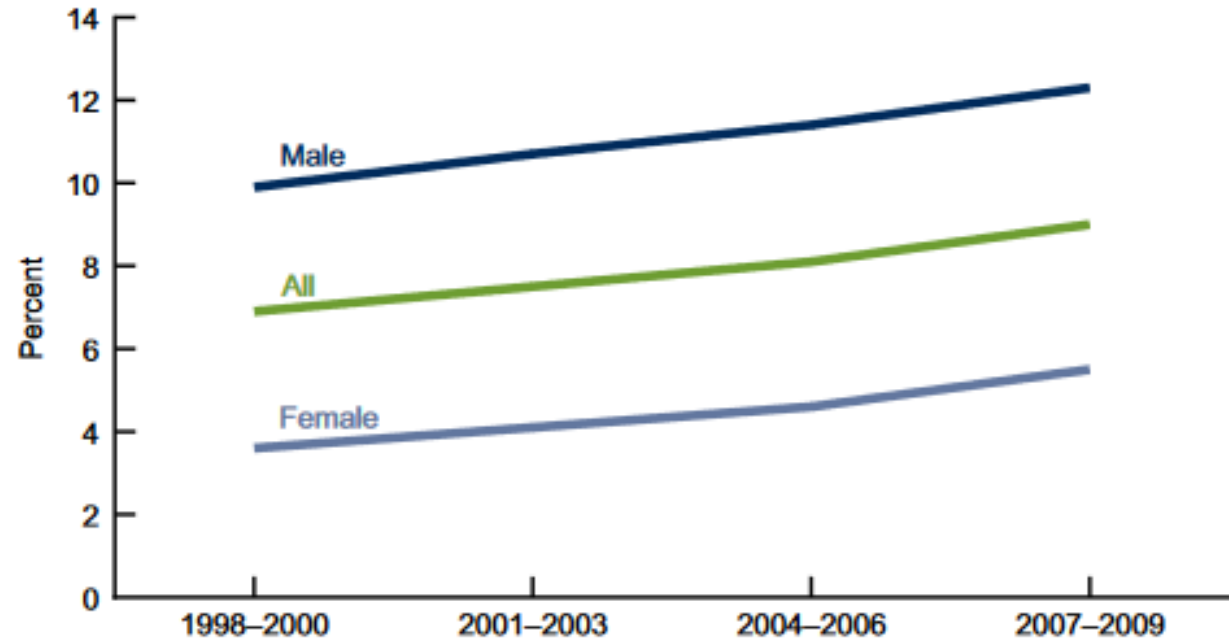


Source: (Zgodic et al., 2023)

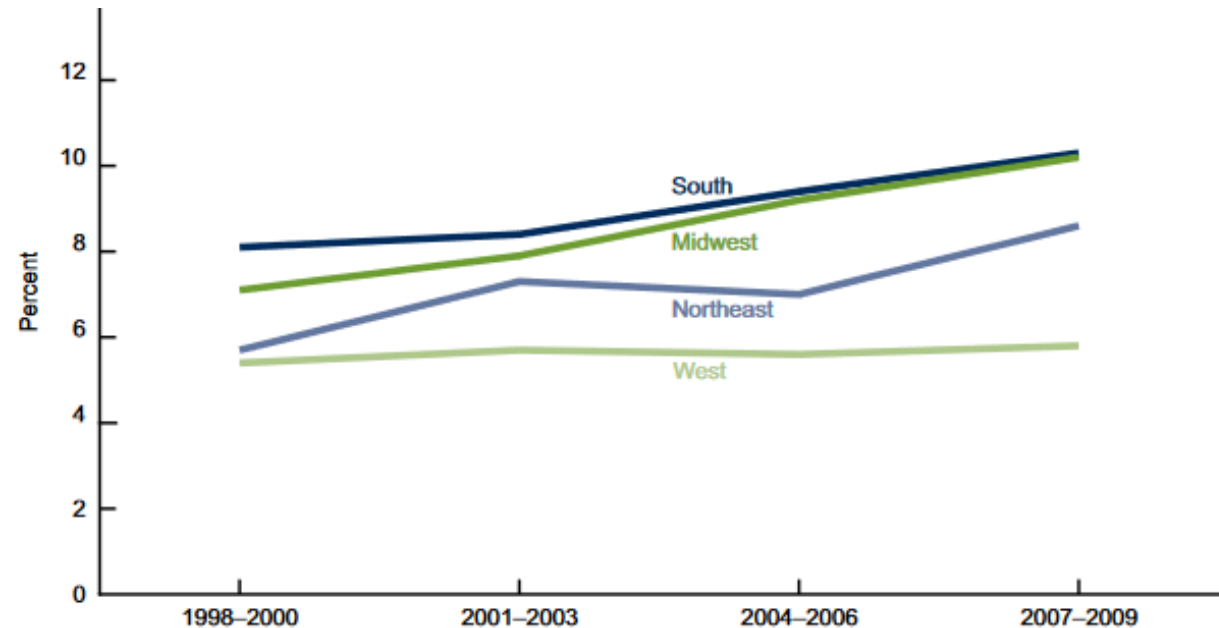


ADHD Trends

- ADHD has been rising the most out of any region in the Midwest
- “ADHD prevalence rose from 1998-2000 to 2007-2009 in the Midwest Region from 7.1% to 10.2%.” (Akinbami, 2011)



Source: (Akinbami, 2011) 3-year period



Source: (Akinbami, 2011) 3-year period



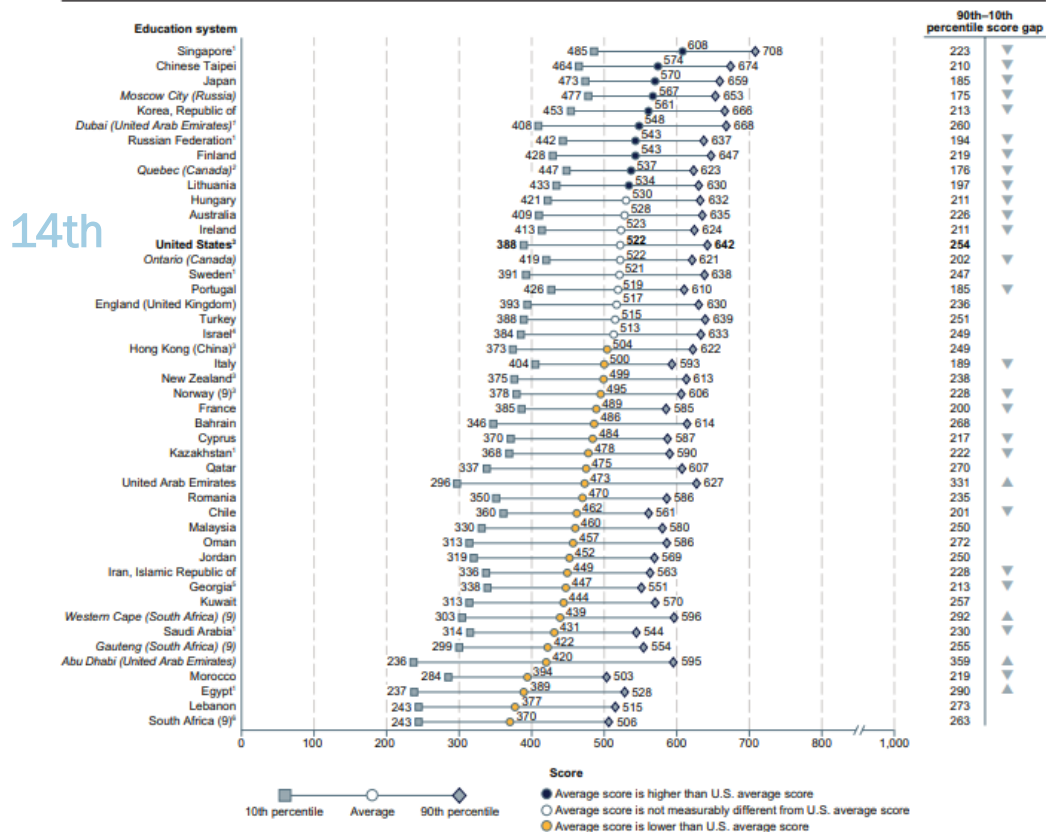
Lowering Educational Success

- In the 1900's the United States was statistically top 10 for education but continues to underperform international counterparts.
- In 2015 the United States didn't make the top 10 list for math, reading, or science. (Finn, 2019)
- In 2019, Trends in International Mathematics and Science Study concluded that the United States was still in the top 25% of education systems in both math and science but have fallen out of the top 10. (Irwin et al., n.d.)



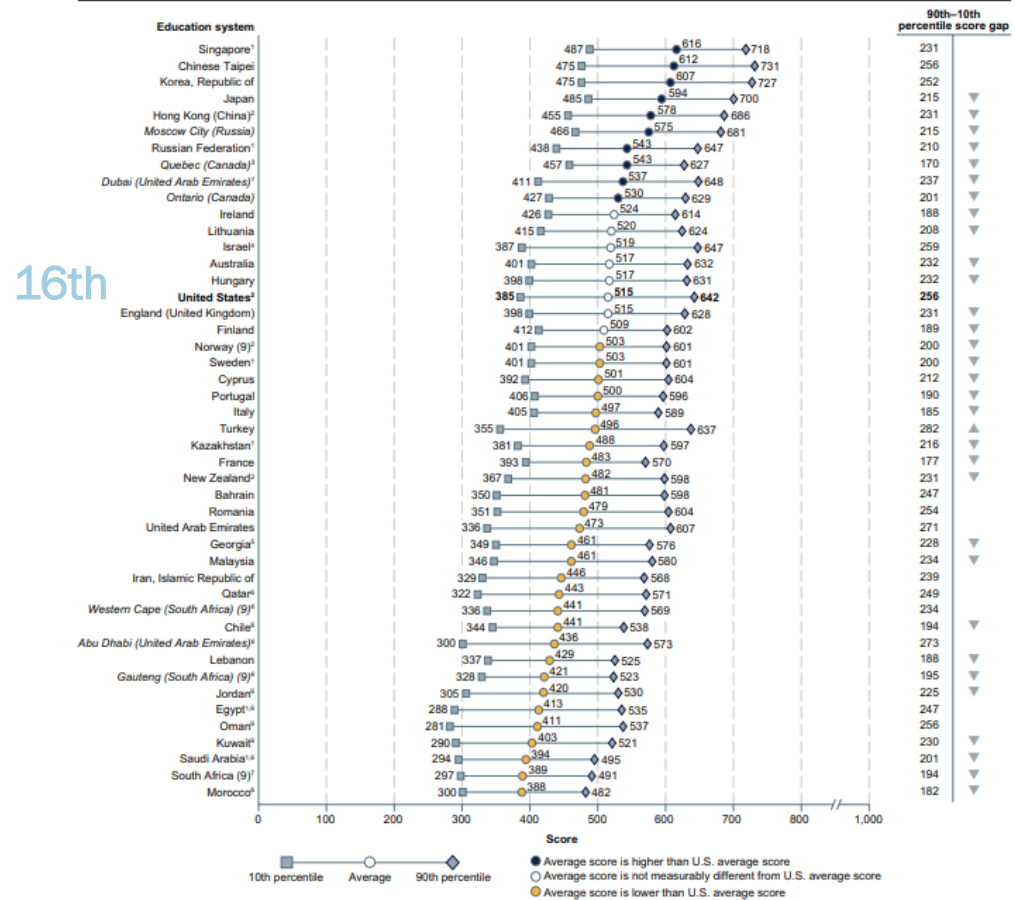
TIMSS Average Scores

Figure 23. Average scores and 10th and 90th percentile scores of 8th-grade students on the TIMSS science scale and percentile score gaps, by education system: 2019



Source: (Irwin et al., n.d.)

Figure 22. Average scores and 10th and 90th percentile scores of 8th-grade students on the TIMSS mathematics scale and percentile score gaps, by education system: 2019



Source: (Irwin et al., n.d.)



Outdated Facilities

- In the late 1900's schools were designed based off of a construction Economist view.
- This can be seen of many schools of this era as “schools could be built more inexpensively on smaller sites if the classrooms could be grouped together in modules, without constraints on solar orientation.” (Heschong et al., 2002)
- To this day many schools are prevalent with this outlook and have limited daylight, ventilation, and sustainable practices now recommended for an ideal learning environment.



Source: (American, 1996)



Education as a Linear Path

- With a single education option set as a linear progression many students are not prioritized and accommodated to learn.
- With 14% of students having learning disabilities in public schools the linear one style fits all learning system does not prioritize the students who struggle in traditional learning environments. (Irwin et al., n.d.)

OBJECTIVE

- Research how architecture and design can improve educational environments, the history of educational design, and how that history has led to negative learning environments often found today.
- Propose a K-5 Alternative Education school that exhibits strategies found from research to create the best possible learning environment for students; specifically, students negatively affected by traditional learning environments.





BACKGROUND

Project History

- In the early 1900's schools were designed with students in mind and are closer to what the ideal school for learning should be based on research.
- Following WWII, during the middle of the 1900's schools began focusing more on economics rather than students and this as well as several studies without accurate conclusions led to the end of the 1900's creating schools focused on economics and affordability with student success dropping.



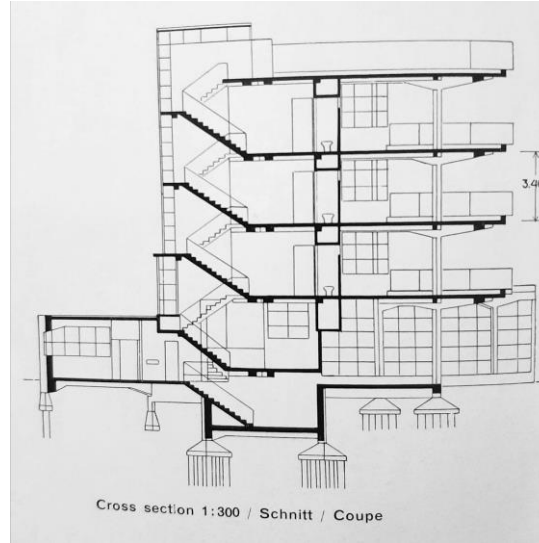
Source: (Sant'Elia, n.d.)



CASE STUDIES

BACKGROUND

1930 OPEN-AIR SCHOOL AMSTERDAM



Source: (Roth, 1958)

- Designed with the idea “Physical and intellectual development were equally important for the child” (Roth, 1958)
- Classrooms maximize daylighting, terraces allow all weather use, and windows allow ventilation.
- This design created a good learning environment for the students but was eventually diminished by three story flats encircling the school.



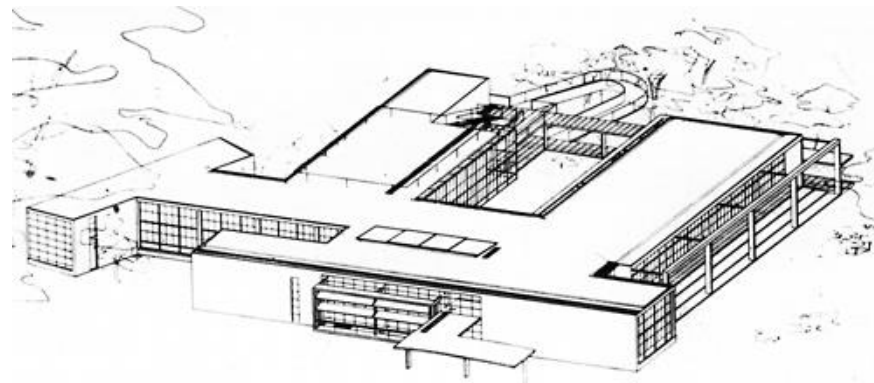
Source: (Roth, 1958)



Source: (Roth, 1958)

1935

SANT' ELIA KINDERGARTEN GIUSEPPE TERRAGINI



Source: (Sant'Elia, n.d.)

- 40m courtyard in the center provides an area for students to go outside and provides natural daylighting for the classrooms. (5 Emblematic, 2016)
- Located at the roughly the same latitude as the proposed site; Como, Italy vs Minneapolis, MN.
- Courtyard orientation allows for optimal daylighting.



Source: (5 Emblematic, 2016)



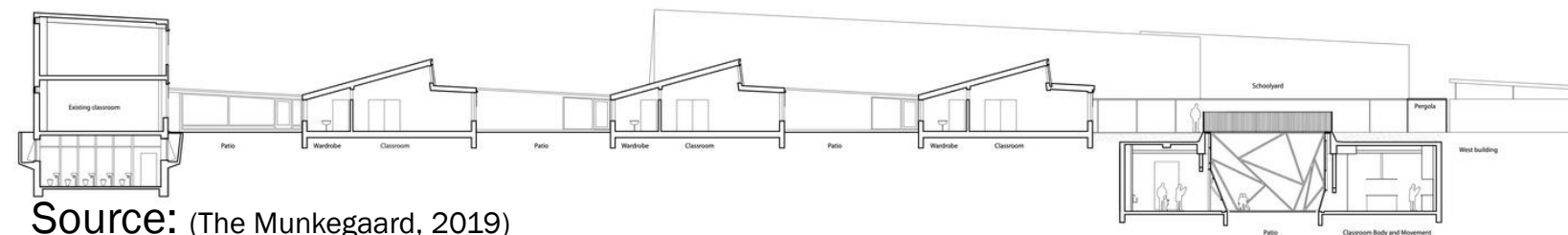
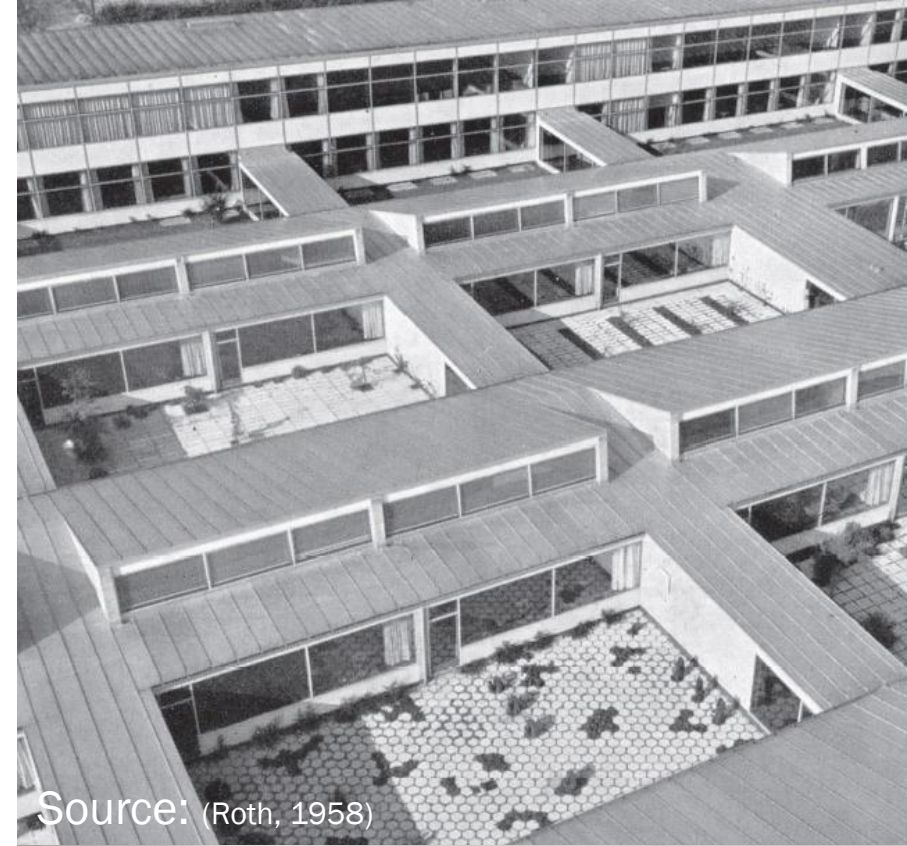
Source: (5 Emblematic, 2016)

1957

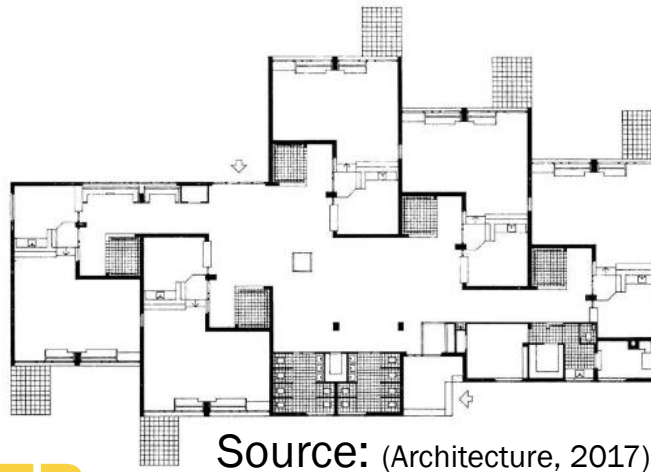
MUNKEGAARD SCHOOL

ARNE JACOBSON – DORTE MANDRUP

- 1 Courtyard for every 2 classrooms
- Still focus on an educational theorist view with hints of economist view.
- Lower-Level courtyards allow daylight down underground.



1960 MONTESSORI HERMAN HERTZBERGER



Source: (Architecture, 2017)

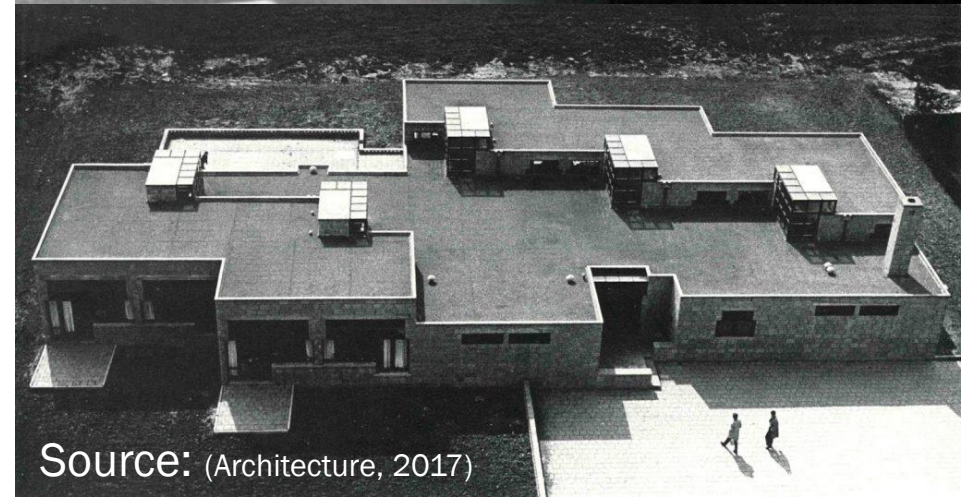
- Light towers to allow daylight into interior
- “L” shape classrooms to allow a variety of activities at the same time. (Architecture, 2017)
- Designed in Economic view without sacrificing education.



Source: (Architecture, 2017)



Source: (Architecture, 2017)



Source: (Architecture, 2017)

1993

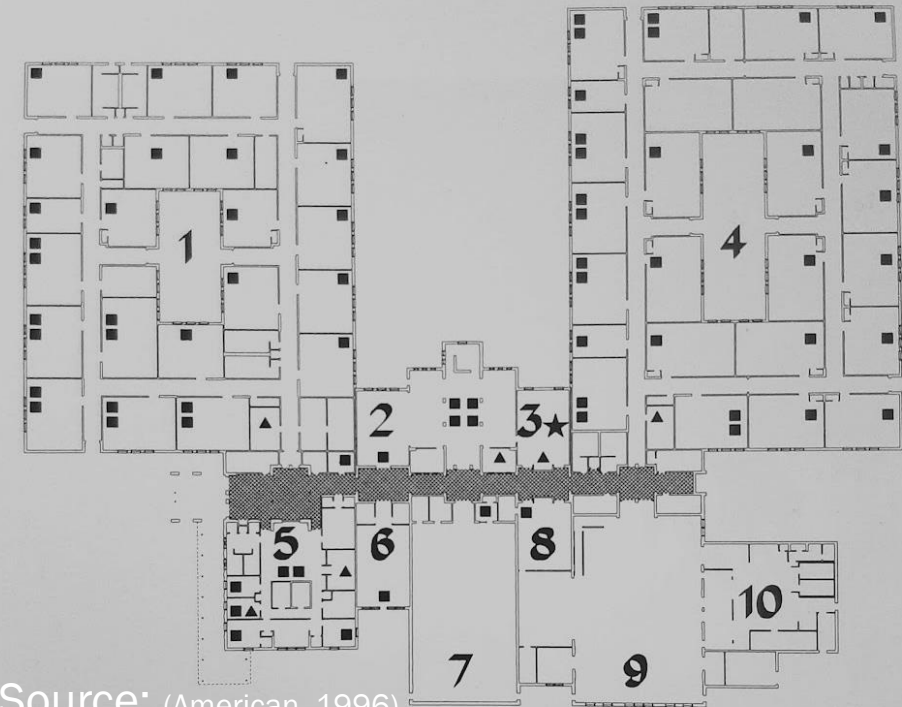
AMELIA ELEMENTARY SCHOOL

BOND COMET WESTMORELAND + HINER ARCHITECTS

- 18/46 of the classrooms do not have any windows and 2/3 of the classrooms with windows have small windows along one wall. (American, 1996)
- This school now struggles in comparison to other schools within the same district and has lower math, reading and science scores.
- Designed in Economic view with focus on technology that was state of the art at the time. (American, 1996)

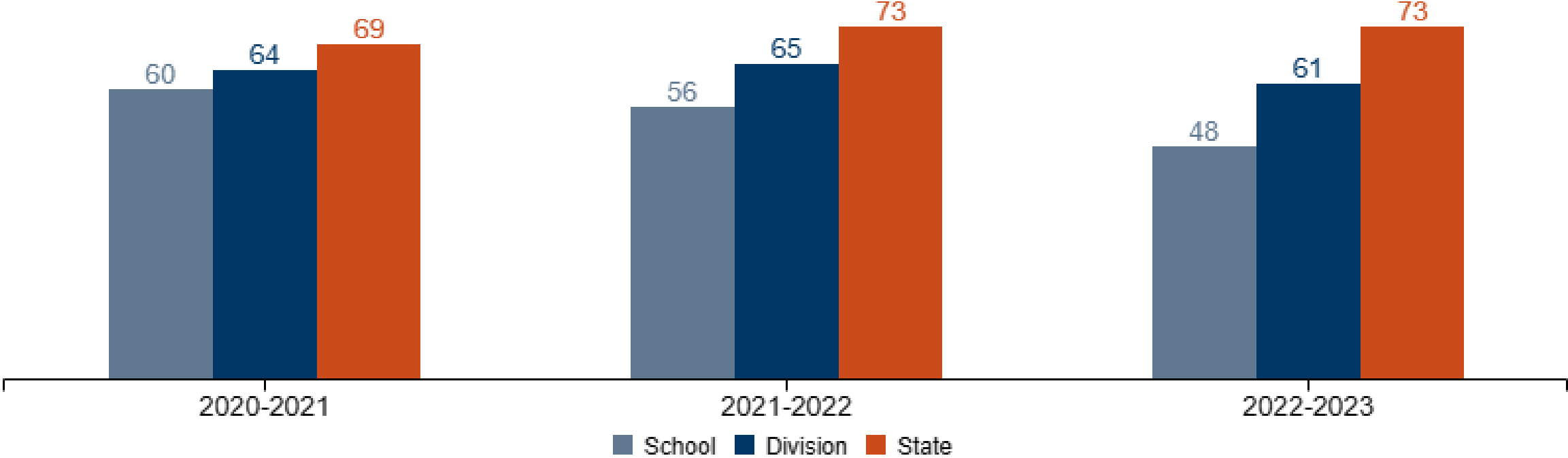


Source: (American, 1996)



Source: (American, 1996)

Source: (Amelia County, 2023)



Amelia Elementary School Reading Proficiency





PRECEDENT CASE STUDIES

BACKGROUND

2012

LOGAN CENTER FOR THE ARTS

TOD WILLIAMS & BILLIE TSIEN ARCHITECTS

- Exhibits the positive effects of daylighting, and sustainable practices for a school
- Located in an urban environment, University of Chicago, while giving the impression of being in nature from within.
- While it is a higher education building, key concepts could be integrated into school design at any level.



Source: (Logan Center, 2012)



Source: (Logan Center, 2012)

2021

LIFE CAMPUS

VILHELM LAURITZEN ARCHITECTS

- Exterior has trees and natural grasses instead of the common manicured lawn of most educational facilities and allows students to be enveloped by the natural environment.
- Alternative learning environment focused on STEM as well as integration of nature and outdoor environments.
- Interior focus on adaptability, daylighting and views of outdoors, as well as invoking active learning through exposed architecture and mechanical systems.



Source: (LIFE Campus, 2023)



Source: (LIFE Campus, 2023)



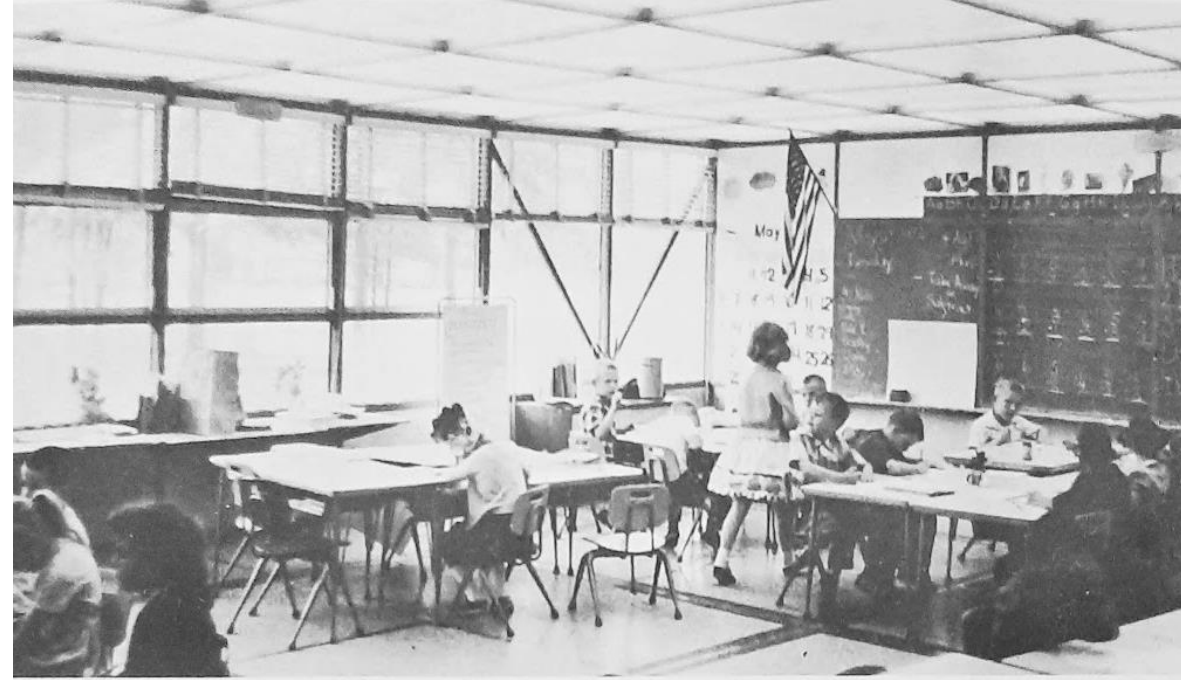
RESEARCH

1965

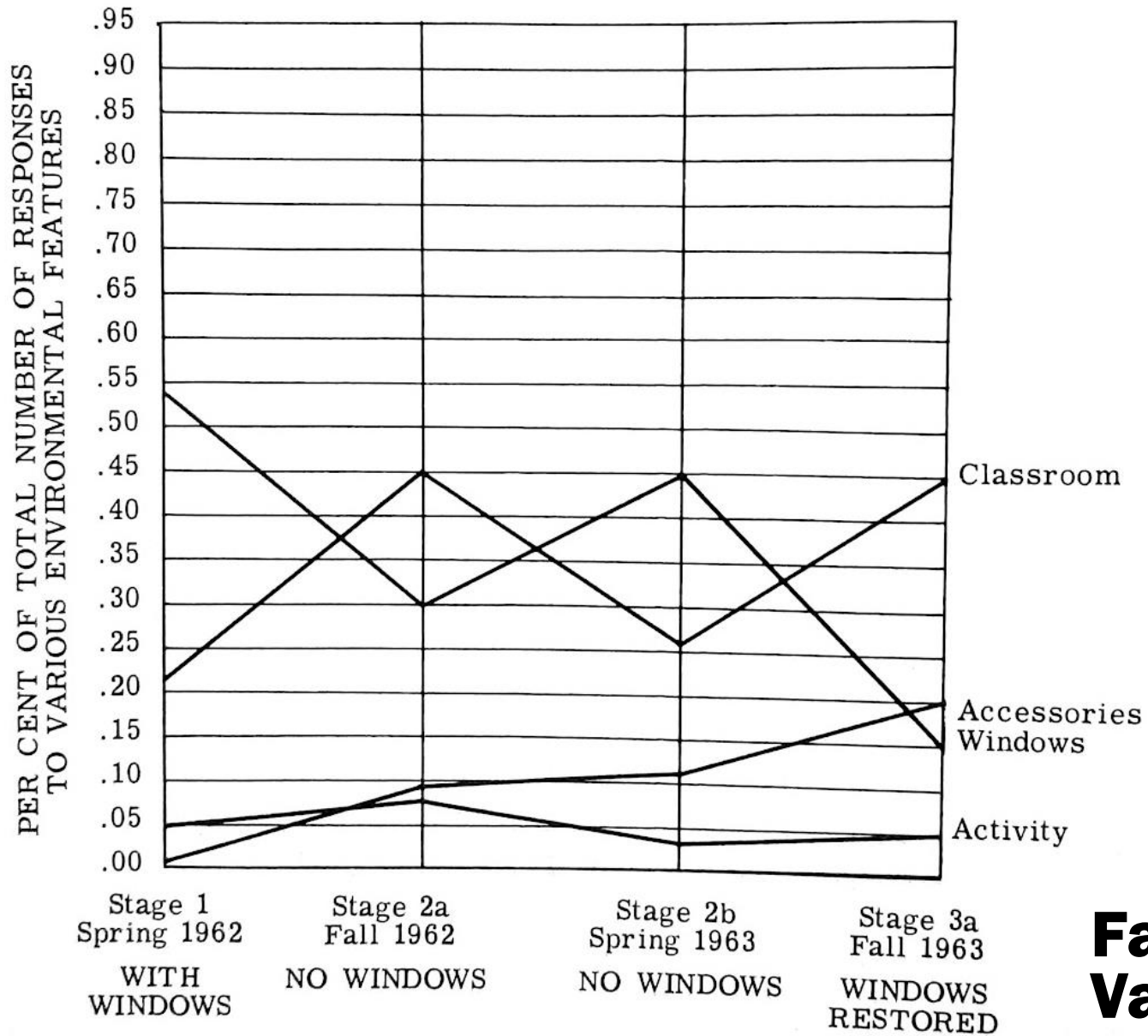
EFFECT OF WINDOWLESS CLASSROOMS

UNIVERSITY OF MICHIGAN

- 2 Test schools (Control: Mann & Test: Hoover)
- 3 years, 1961-1964
- Kindergarten – 3rd Grade
- 3 stages, 1st with windows, 2nd without windows and 3rd with windows restored
- ~130 students enrolled per stage, 393 enrolled through all stages (University of Michigan, 1965)



Source: (University of Michigan, 1965)



Favorable Responses to Various Features

Source: (University of Michigan, 1965)



1965

Windowless Classroom Results

- Inconclusive and too small of a study, the researchers acknowledge that more research must be conducted to come to a conclusion. (University of Michigan, 1965)
- The authors follow this up with assumptions that windows are not needed because windowless classrooms provide more space for educational materials on the walls. (University of Michigan, 1965)
- They came to this conclusion while accessories and the positive response to them increased regardless of windows or no windows throughout the study. (University of Michigan, 1965)
- This concept as well as the notion that windows are distractions led to less daylighting and windows in classrooms the rest of the 1900's

2002

DAYLIGHTING IMPACTS ON HUMAN PERFORMANCE IN SCHOOL

LISA HESCHONG

- 3 districts studied (Orange County CA, Seattle WA, and Fort Collins CO)
- Each district had 6,000 – 8,000 Students
- Compared test improvement between least and most daylit classrooms
- Looked at both Windows and Skylights

Window Code	Grade	Typical condition
0	None	None
1	Bad	One small window
2	Poor	A few small windows, tint
3	Average	Modest windows, and/or heavy tint
4	Good	Large windows, light tint or clear
5	Excellent	Large windows on two sides

Source: (Heschong et al., 2002)

Code 1 vs Code 5



Source: (Heschong et al., 2002)



Source: (Heschong et al., 2002)

2002

Window/Daylighting Performance Results

- In Orange County “The classrooms with the highest Window Code were found to be associated with 15 to 23 percent faster rate of improvement over a one year period when compared to classrooms with the lowest Window Code.” (Heschong et al., 2002)
- These results were similar in daylighting with 20-26% improvement (Heschong et al., 2002)
- In Seattle students in classrooms with the largest window area and daylight were testing 9- 15% higher than the least window and daylit classrooms. Fort Collins had a 14-18% improvement. (Heschong et al., 2002)

Skylight type A & B



Source: (Heschong et al., 2002)



Source: (Heschong et al., 2002)

2002

Skylight and Other Performance Results

- In California “operable windows were found to be associated with 7 to 8 percent faster improvement in three out of four cases, when compared to classrooms with fixed windows.” (Heschong et al., 2002)
- Skylight type A had positive results with 19-20% improvement. (Heschong et al., 2002)
- Skylight type B had high daylighting that lacked diffusion that would result in glare and thermal discomfort. This didn't affect math testing but had a 21% decrease in reading test scores. (Heschong et al., 2002)
- Similar results occurred in both Seattle and Fort Collins.

OUTDOOR LEARNING

- Long term recall of things learned is much better when people are moving or can use all their senses when learning. (Jucker & von Au, 2022)
- One of the few learning styles that is overall effective for most students, including those with learning disabilities that often struggle the most when learning in traditional classrooms.
- Besides learning benefits, outdoor learning students have been found to have “rejuvenating effects on attention... stress relief... self-discipline... motivation, enjoyment, and engagement... and higher physical activity and fitness”. (Jucker & von Au, 2022)

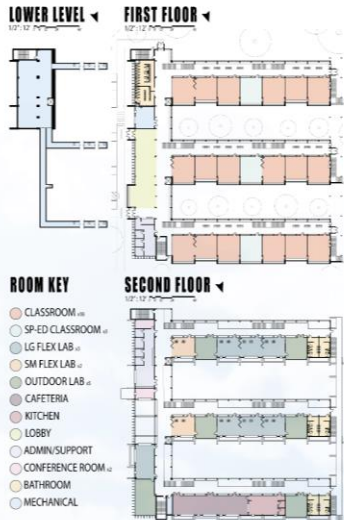
SUSTAINABILITY

- Sustainable features are beneficial to the learning environment to keep students happier and healthier.
- Sustainable features such as, passive heating and ventilation, water collection, green roofs, natural materials, solar panels and daylighting are all beneficial to any building typology but especially schools.
- Integrating sustainable design is a learning opportunity at an outdoor and nature focused educational facility.
- Use of natural and local materials for sustainability is also a priority.



RESULTS & CONCLUSION

BOARDS



7.3 MILLION ♂
The number of students served by the Individuals with Disabilities Education Act in 2019-2020 school year. This number has increased from 6.5 million in the 2009-2010 school year.

14% ♀
Percentage of total public school enrollment served by the Individuals with Disabilities Education Act. Of these disabilities the highest percentage are learning disabilities that are often difficult to detect.

8.4% ♀
Percentage of children ages 2-17 affected by ADHD. People who have ADHD struggle to focus, pay attention, and are often criticized as being overly active. The symptoms are often embraced in schools where students are made to stay at a desk, and learn in ways that are not conducive to the portion of students who are diagnosed with ADHD.

3.1% ♀
The percentage increase in the Midwest region that had an ADHD prevalence from 1999-2000 to 2007-2008, increased from 7.1% to 10.2%. The Midwest has had the highest increase of any region and is second in overall prevalence only to the South Region.

10 YEARS ♀
Over the past decade, there has been no progress in mathematics or reading performance in the United States for students performing students. Have made no progress from the first National Commission on Excellence in Education administration almost 30 years ago.

14-18% ♀
The percentage increase in test scores between the most affluent classrooms compared to the least affluent classrooms in California, CA; San Jose, CA; Orange County, CA; 20-20% and Seattle, WA, 1-13%.

SOURCES
The number of students served by the Individuals with Disabilities Education Act in 2019-2020 school year. This number has increased from 6.5 million in the 2009-2010 school year.
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A NEW SCHOOL

ALTERNATIVE LEARNING ENVIRONMENTS FOR THE FUTURE



Located across from Lake of the Isles in Minneapolis, Minnesota, this site provides ample amounts of trails, nature and seclusion to learn from the outdoors in an urban environment. The site need the needs to achieve an alternative learning and outdoor focus. It is school for students who are frequently impacted by traditional learning practices. Additionally it is strategically located within 15 min of 10 similarly sized K-5 schools within the Minneapolis Public School District. This school is intended as a location for the approximately 10 percent of students with learning challenges such as ADHD, who currently go to the schools nearby, to come to an education tailored towards them, while also providing constructive learning environments.

Urban schools often lack natural light and outdoor spaces, hindering students' cognitive development and well-being. Studies show that exposure to these elements enhance learning outcomes, but schools often prioritize outdated class due to economic constraints or lack of resources. This school is designed to make students learning environment the priority while also being easily constructible and economically feasible. Transitioning urban schools by integrating natural light and outdoor spaces can revolutionize learning outcomes and student well-being, challenging outdated norms and paving the way for future success.



CLASSROOM
Classrooms are designed to be adaptable and conducive to learning for all students. Intended to be occupied by 20 students, if necessary classrooms can adjust to accommodate for an additional 10-15 students. Every classroom faces north to allow indirect daylight through the exterior glass, as well as provide a view of nature via the lake or courtyard. Classrooms lack solid side walls and have partitions to allow class to close instruction and larger spaces if desired.



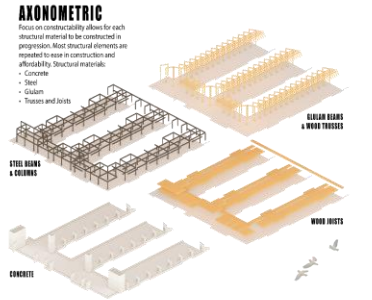
WAYFINDING
Being designed for K-5 students, wayfinding different from what students are used to is critical as reading can be challenging at this age. Each of the three wings have an assigned color of red, blue, or yellow. Key points throughout the school such as storage and stair are colored accordingly to guide students. The colors selected are based off a stylized version of the Minneapolis schools logo which is also integrated into exterior signage.



HALLWAY
Characterized by the large glass structure and expansive glass walls the hallways provide circulation, interior daylight, as well as support spaces to the classrooms. Seating and lockers provide transition before entering the classrooms. The double entry space of the hallways are interrupted by a cantilever walkway for second floor circulation. The second floor provides many additional support spaces such as labs, cafeteria, outdoor classrooms, restrooms and admin.



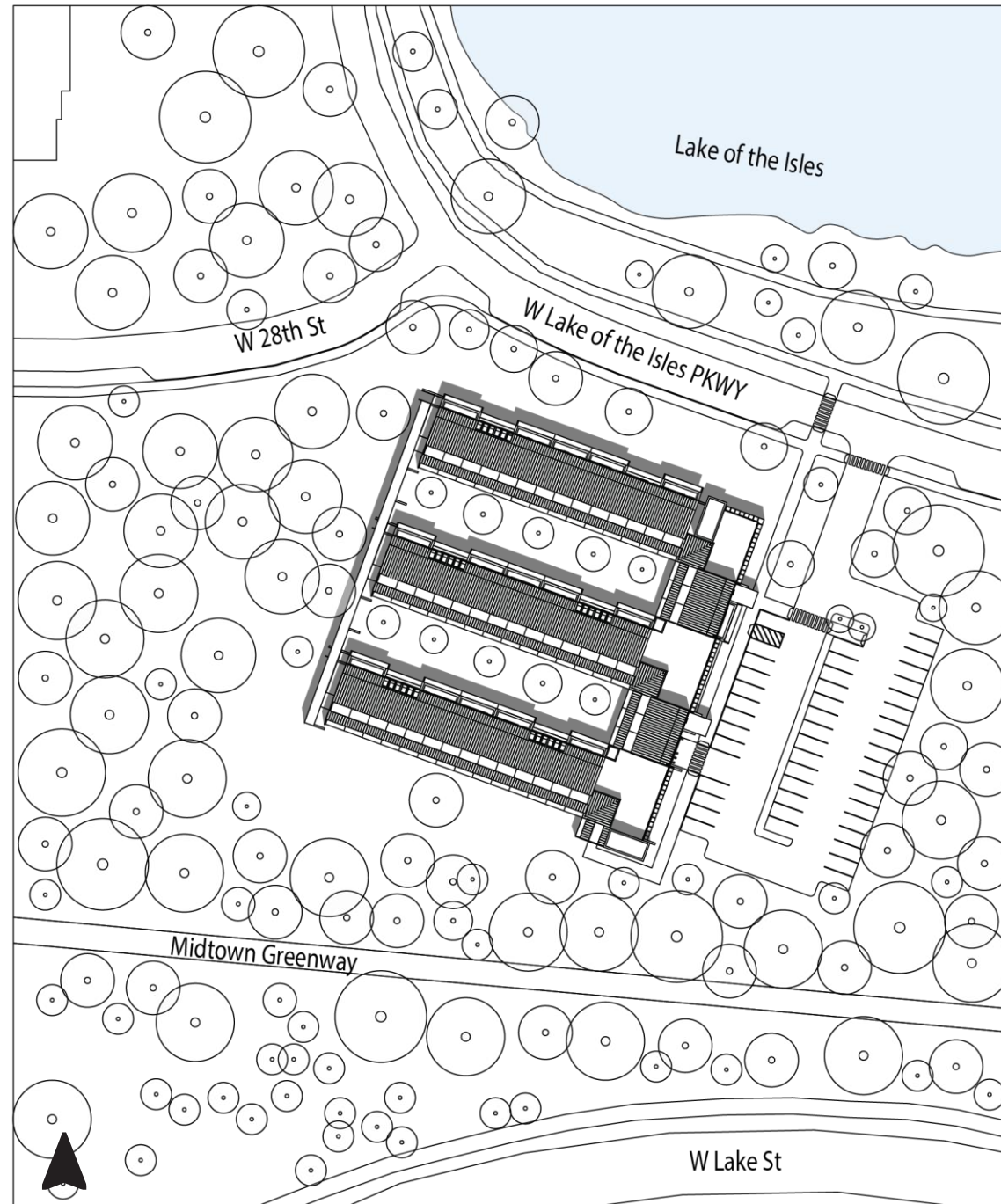
DAYLIGHT
Classrooms are designed with a focus on daylight coming from multiple directions. The South wall provides diffused daylight through a perforated screen followed by a frosted glass curtain wall, causing the feeling of sunlight passing through a tree canopy. The perforated screen also filters views into the classroom from the hallway and changes the amount of perforation gradually less near eye-level.





LOCATION

- Minneapolis MN
- 15min of 10 similarly sized k-12 schools
- Alternative school focused on outdoor learning for the ~10% of students with learning disabilities



CURRENT SITE



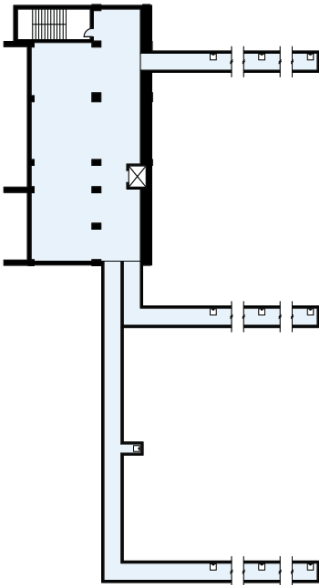
FLOOR PLANS

ROOM KEY

- CLASSROOM x18
- SP-ED CLASSROOM x3
- LG FLEX LAB x3
- SM FLEX LAB x2
- OUTDOOR LAB x5
- CAFETERIA
- KITCHEN
- LOBBY
- ADMIN/SUPPORT
- CONFERENCE ROOM x2
- BATHROOM
- MECHANICAL

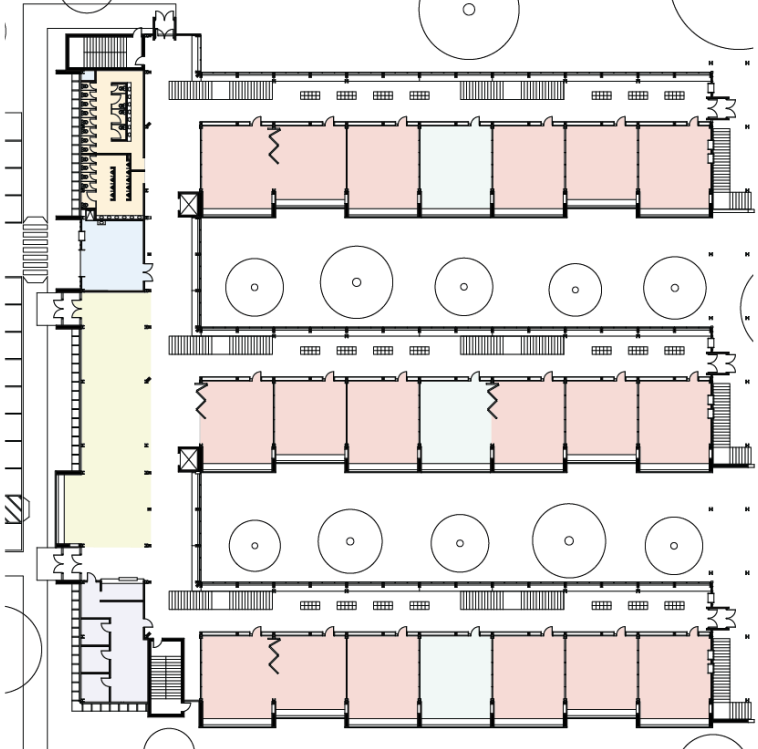
LOWER LEVEL

1/2" = 12' 0" 6" 12" 24" 48"



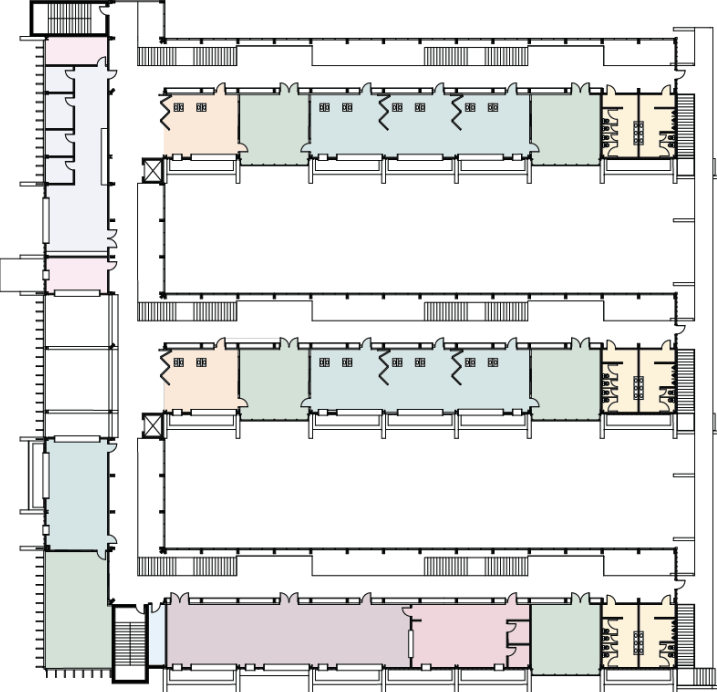
FIRST FLOOR

1/2" = 12' 0" 6" 12" 24" 48"



SECOND FLOOR

1/2" = 12' 0" 6" 12" 24" 48"



EXTERIOR



EXTERIOR



ELEVATIONS



ORTHO



ORTHO

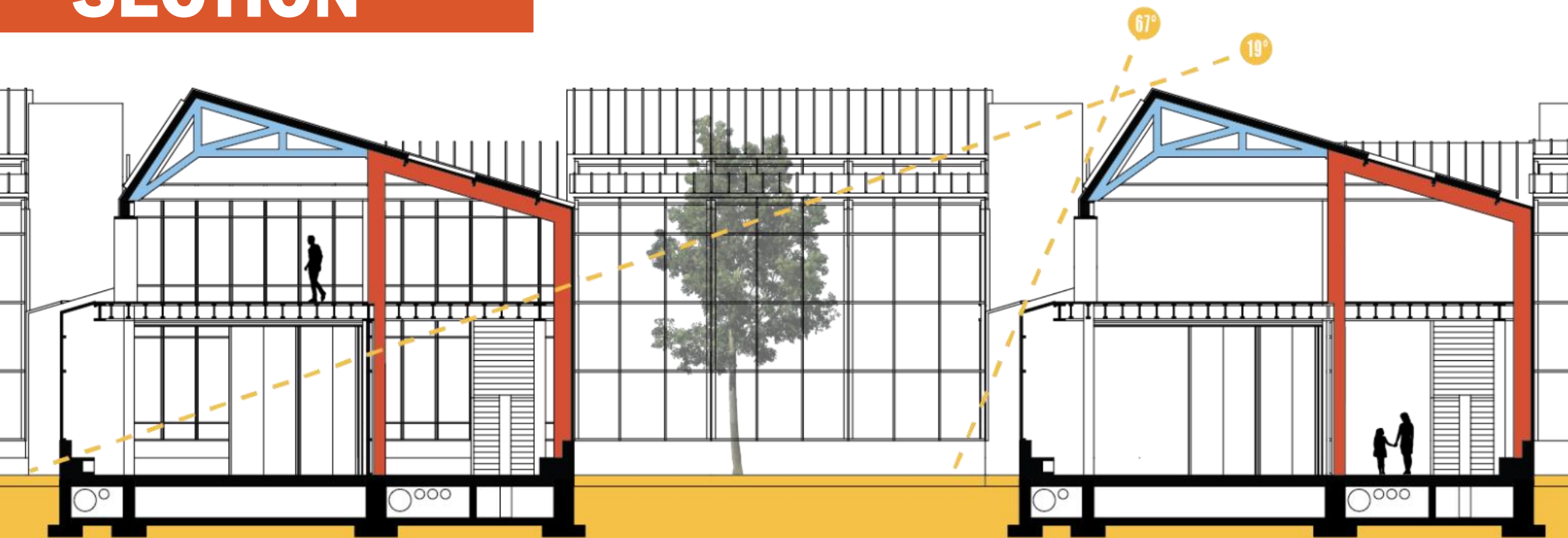


SECTION



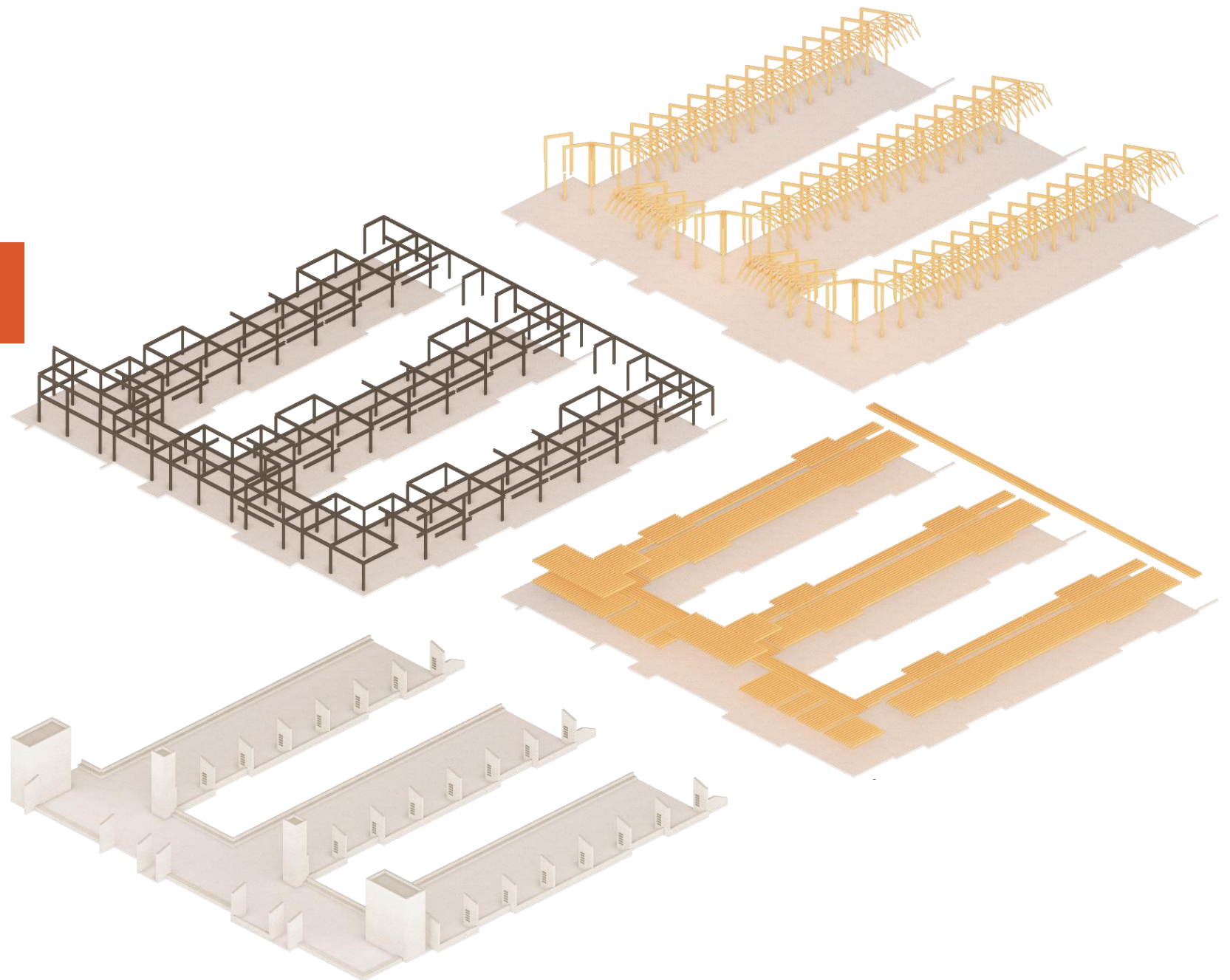
SECTION
0' 3' 6' 12' 24'

SECTION



STRUCTURE

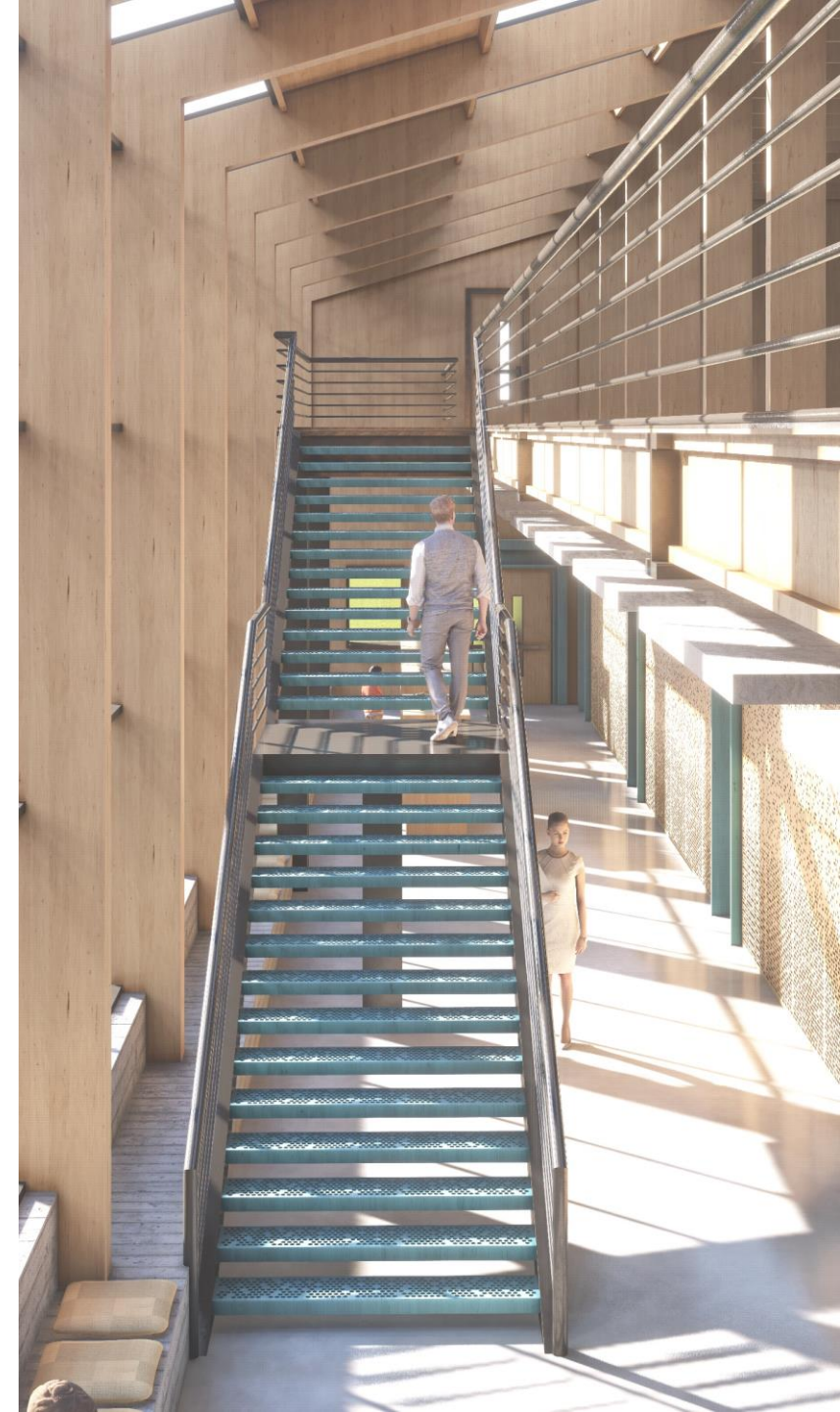
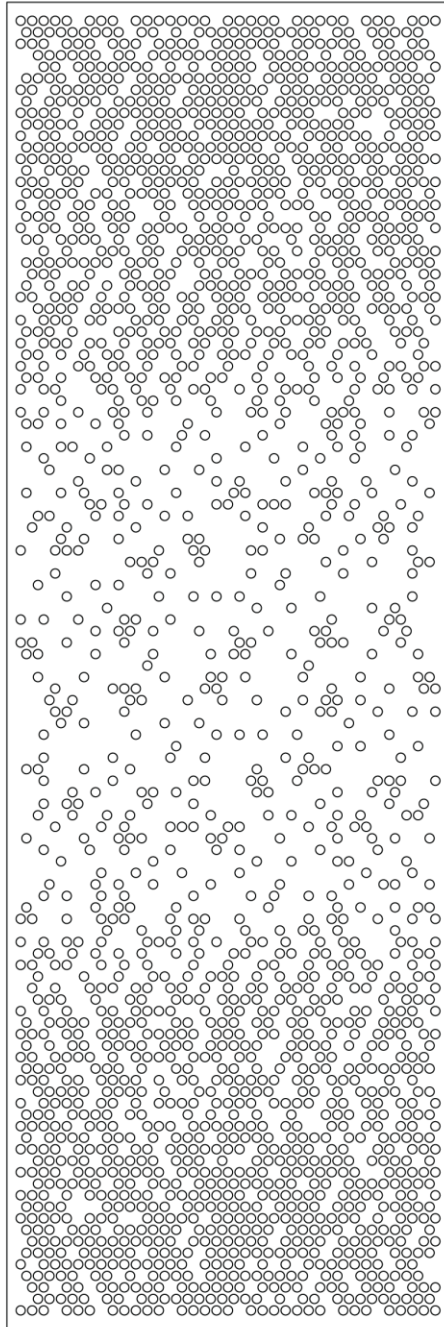
- Glulam
- Steel
- Concrete
- Wood Joists & Trusses



HALLWAY



DAYLIGHT



CLASSROOM



CLASSROOM





THANK YOU

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