Noor Awad
Education and Materiality

Project Team:

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Research Question:
School as a Living Laboratory: How can mass timber support children development, curriculum, learning outcomes, long term student success, and student resiliency?

Research Background:
Positive Impacts of Nature on Learning:

- Boosted Mood
- Increased Resilience
- Stress Reduction
- Anxiety reduction
- Less impulsive decision making
- Increased attention
- Self Discipline
- Increased engagement
- Improved math and reading skills

Positive Impacts of Mass Timber from Mithun research “Building Better Schools”:

- Increased creativity
- Well-being
- Physiological benefits
- Focus and mood
- Stress reduction
- Student performance
- Increased productivity of teachers and staff

Abstract:
The majority of the built environment is designed for adults and explored in relation to the experience of adults. Though this is the case, it is important to recognize that the built environment significantly impacts children’s mental and psychological wellbeing. The physical buildings in which they spend their time shape their perception of the world, affect their mental health, contribute to their development, and impact their ability to learn. Given this, and the amount of time that children spend in schools, it is important to explore the impact of the architecture of schools. While this impact can be understood from the perspective of designers, children, and health officials, this research will mainly focus on the perspective of designers and social science researchers. The scope of this paper will also be limited to elementary age children and the specific impact of elementary school design on children. The goal of this paper is to explore several design considerations, including individualization, security, and nature, to

understand how elementary school design affects the mental and psychological health of children. It also sets the stage for future research and encourages architects, designers, and city planners to rethink the design of schools to better promote the health and wellbeing of children.

Research Proposal:

This research will make the claim that all elementary schools should use design strategies informed by concepts in biophilia, with a focus on mass timber, to intentionally address the health and wellbeing of students as well as learning outcomes. This research will begin by exploring secondary sources related to the biological development of children in grades K-3 to understand why this is a particularly significant stage in regards to learning outcomes. Next, the research will investigate sets of curriculum in Washington schools to draw connections between mass timber and student's ability to learn. Lastly, the impact of stress events, such as COVID, on student learning and well being will be examined in order to propose designs based in mass timber that will build student resilience. Secondary sources as well as surveys to be distributed to select Washington schools will be utilized throughout this research. The final report will include design strategies and serve as a call to action for superintendents.

Future research should explore the impact of mass timber on children outside of the age range explored in this research. Additionally, to minimize variability in curriculum, the state of Washington will be utilized as a case study to set the framework for future research.

Methodology:

Secondary sources, including existing literature and precedents regarding biophilia, mass timber, and child development, as well as scientific studies based on biometric feedback from students, will be utilized. A survey of 1-2 schools that utilize mass timber in their existing design and 1-2 that do not will be collected to analyze any differences in student behavior and learning that stem from their environment.

Scope of Investigation:
This thesis will focus on students in grades Kindergarten through Grade 3, ages 5 through 8, in the United States public school system. Future research should extend to include preschool, middle, and high school students.

While the thesis may reference precedents outside of the US, the secondary and primary research that the report is based on will be limited to sources that focus on the US public education system. The outcome of the research will focus on Washington public elementary schools. By limiting the scope of the final project to Washington, place specific design strategies and sustainable practices can be considered. In addition, the curricular structure of schools varies greatly across states. By limiting the project to one state, and likely a smaller region within the state, variability in results based on curriculum can be minimized. Present day design

constraints and opportunities, as well as anticipated future design standards based on climate change, decarbonization, and material availability will be considered.

Students:

- Students in grades K-3 (ages 5-8) are at a particularly crucial developmental stage.
- Special attention should be paid to students in this age group.
    - Any child who cannot read fairly well by the end of third grade is unlikely to graduate high school.
    - State testing begins at Grade 3
    - During grades K-3, students begin to learn about the plants and animals, the environment, and the importance of environmental stewardship.
- Stress events, such as COVID, negatively impact student wellbeing and ability to learn.
- Future research should explore other age groups.

Curriculum:

- During grades K-3, students begin to learn about the plants and animals, the environment, and the importance of environmental stewardship.
    - The use of mass timber in schools relates directly to the material that students are learning about in class.
- To minimize variability in curriculum, the state of Washington will be utilized as a case study to set the framework for future research.

Research Outline:

Part 1: Learning Outcomes
Goal: Understand why children in grades K-3 are at a crucial stage in their development, particularly in relation to how they learn and experience school.

Themes:

- Mental + Physical Development
- How is learning measured? How is education evaluated?
- Teacher Goals

Questions to be explored:

- How do students at these ages apply and integrate knowledge, in and out of class?
- What do pediatricians recommend for children at these ages?
- Is there a connection between the benefits of mass timber and stages of development?
- What most impacts learning outcomes at this age? (Poverty, food insecurity, stress, literacy)

Part 2: Curriculum
Goal:Identify alignment between curriculum goals and mass timber

Themes:

- Environmental Science (including sustainability)

- Responsible Citizens
- Academic Success
- PBL (Project Based Learning)

Questions to be explored:

- What can students learn from a tree (and by extension, mass timber)?
- Structural exploration, physics, gravity
- How can mass timber support specific education standards, such as Next Generation Science?
- Should there be an emphasis on schools founded on environmental education?
- What are the benefits of learning in nature?
- What are the benefits of learning in a mass timber space?
- Carbon benefits of mass timber (enviro. Science theme) - where in the curriculum is climate change/carbon addressed?

Part 3: Resiliency
Goal:Explore the benefits of mass timber in supporting students through stress events.

Themes:

- Health + Wellbeing
- Pandemic Response
- Biometric Feedback
- Biophilia / biophilic design

Questions to be explored:

- What are the impacts of COVID on student learning and wellbeing? Which of these impacts can mass timber address?
- Aside from a pandemic, what are stress events that children might experience? How can mass timber support students during these times?
- Can mass timber set students up for long term success?
- Can mass timber set students up for a way to modulate stress/stress management?

Research Timeline:
Fall Quarter:

- Goal:
    - Define scope
- Deliverables:
    - Abstract
    - Project proposal
    - Literature review

Winter Quarter:

- Goal:
    - Collect data
        - Surveys of Washington Schools

        - Secondary sources
        - Case studies in Washington
        - Case studies in Europe
- Deliverables:
    - First draft of report

Spring Quarter:

- Goal:
    - Refine and publish research
- Deliverables:
    - Second draft of report
    - Final report