Model for Play

Creating Environments for Learning through Playful Explorations

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DEDICATED TO:

My son, Adrian,
and his love for exploring and questioning all the world has to offer.

My Tia Nony
for instilling a love of architecture in design from a young age.

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To my parents, Maria and Rigo, brothers,Rigo Jr. and Jose, and the rest of my amazing family, who have been the greatest support system I could have ever asked for.

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1.0 Proposal

"We discovered that education is not something which the teacher does, but that is a natural process which develops spontaneously in the human being. It is not acquired by listening to words, but of experiences in which the child acts on his environment."

-Maria Montessori

1.1 Thesis Statement

Cultivating imagination in early childhood education is a fundamental stage in the development of children. This cultivation is set aside when children reach school age. The traditional classroom has become a workstation environment, where children move from task to task—creating a singular type of student and disregarding the inherent differences of the human condition. Educational experience has become stagnant and repetitive, with little to no room for the development of individual imaginations. The design of the classroom setting is a critical point of exploration—as the mechanism for change in the education of children. This thesis aims to explore the learning environments the present and their ability to encourage educational engagement through playful activities. Through the spatial design of learning environments, this thesis will create alternative educational environments, which engage students through the stimulation of imagination; spark exploration; and allow for natural play. The design creates a new model for primary school learning, that uses learning, play, and nature to create rich learning spaces—which can adapt from traditional learning to more active and exploratory learning strategies.

1.2 Research Questions

1. *Imaginative Engagement:* How can spatial aspects of the classroom stimulate and engage students' imagination?
2. *Learning Environments and Education*: How can the classroom environment enhance student engagement with regards to the subject matter being taught?
3. *Multi-functionality*: How can a classroom become a space of multi-functions rather than being a space for one function?

1.3 Bodies of Knowledge

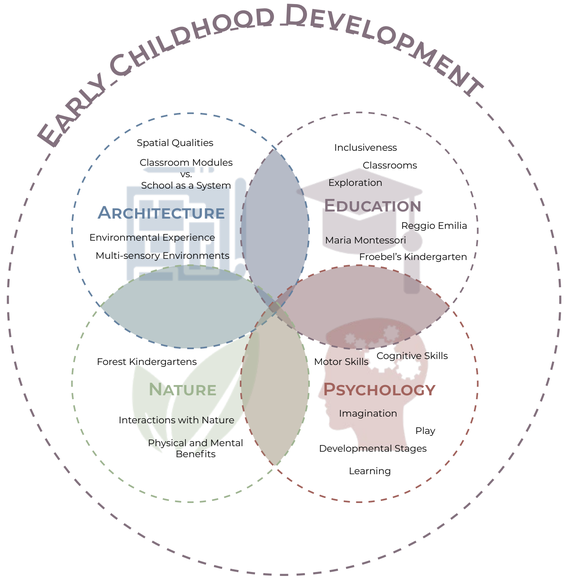


Figure 1.1 | Bodies of Knowledge Venn Diagram

1.4 Personal Statement

Think about the imagination. What first comes to mind? It might be the driver of artists' creations or maybe a child pretending to be a superhero, but did learning come to mind? According to Maria Montessori the first 4 years of life, all children do is absorb information but it also require exploration and play to navigate all the information they are absorbing. Play through imagination allows children to develop skills like social interactions, motor skills, and spatial relationships. Children learn through exploration and play at their very core. Some of the most important life skills children learn through example, trial and error, mimicking. If this is how children engage with the world, why doesn't the elementary school classroom reflect and mimic those explorations?

Children spend 180 days, 8 hours a day in a school building for at least 13 years of their lives. Schools are the most influential spaces for children. In these buildings they learn about the world, society, culture and so much more. With this in mind, how are we positively influencing children in these environments? My son, who has only been in school for one very short year, is a prime example of how school can negatively effect children, if the environment is not promoting positive learning. Adrian is a normal boy, who loves parks, art and learning music. So what is the problem? Adrian never remembers what he learns in school. His grades say differently, but what I have observed is that Adrian chooses not to remember what he learned. In fact, he does everything possible not to discuss what was learned. At the same time, I observed that everyday—with the exception of special occasion days—Adrian came home with at least 8 worksheets if not more. This led me to believe that he is showing all signs of a rejection towards school. Not because he didn't like school, or he didn't have the abilities for it, but he is simply bored. My son is one example, but what about all the children who don't want to go to school, because it's boring, unengaging?

In the United States educational system, imagination is not the main focus of study—as a matter a fact it is looked as something unnecessary. Imagination is an extracurricular activity. Our children are placed in cinder-block boxes with an assigned work area to work a routine of assignments day in and day out. This workstation system, especially used in primary education, creates an assembly line of students, and produce a single type of student. A system like this negates the natural human ability to be different and experience things differently. The standardization of education, most importantly, educational environments, has allowed for a lack of design to take place. Classrooms are bland and monotone. The integration of the classroom to learning is left up to teachers to fill those walls and make them come to life. But, what if classrooms came ready for exploration? What if the walls were pre-designed to help teachers and enhance the learning of students?

As architects, we form an important part in creating environments that cater and promote the development of all cognitive skills of children. Schools have evolved to become the result of specific programmatic square footages and budgets—design is often left out of the decision making. This research hopes to bring design back to early childhood education and also open up a discussion into the endless possibilities that design can bring to the education of children.

With this in mind my thesis will take the idea of exploration and play as a key factor in the design of classroom settings—to create environments where imagination is engaged in all type of learning. My thesis will look to redesign the traditional classroom and allow for the flexibility all students needs to move about their learning environment.

2.0 Theorem

"Our task, regarding creativity, is to help children climb their own mountains, as high as possible."

-Loris Malagazzi

2.1 Development of a Child

From Birth to Adolescence

Infancy and Toddlerhood
Infants and toddlers experience rapid growth in all physical aspects.
Infants strongly rely on their reflexes to explore the world.
Motor skills develop from central and upper body to lower body and extremities
By 18 months children will have learned basic gross motor skills like walking and gripping objects

Sensorimotor Stage
[Object Permanence]
Children develop motor activity without use of symbols through experience and trial and error.

0-2

0-1

Stage 1: Trust vs. Mistrust
Infants learn to trust people around them to provide their basic needs.

Early Childhood
In this stage growth in children slows down to a steady pace.
Children begin to loss baby weight and develop leaner, more athletic bodies.
Gross and fine motor skills become more refined—children usually learn to acquire handedness and learn to write.
Children also develop observational learning in this stage.

Preoperational Stage
[Symbolic Thought]
Children develop language, memory, and imagination. They also develop egocentric and intuitive intelligence.

2-7

1-3

Stage 2: Autonomy vs. Shame & Doubt
Toddlers begin to develop independence and begin to learn how to do things on their own.

Middle Childhood
Children's skeletal bones start to broadening and lengthening. This stage is also characterized with loss of baby teeth and growth of adult teeth.
Between ages 8 and 9 children also experience growth spurts.
In this stage children begin to mature and completely refine their gross and motor skills.

Concrete Operational Stage
[Operational Thought]
Children begin to logically and methodically manipulate symbols. They also start to become more aware of the world around them

7-11

3-6

Stage 3: Initiative vs. Guilt
Children begin to take initiative and further develop their independence.

Adolescence
Children in this stage hit puberty and experience their adolescent growth spurt. This is considered the end of childhood and beginning of adulthood.

Formal Operational Stage
[Abstract Concepts]
Adolescents develop the ability to relate abstract concepts and create new relationships from them. They are also able to hypothesize and concertize abstract concepts

11+

6-12

Stage 4: Industry vs. Inferiority
Students begin to develop their self-consciousness.

12-19

Stage 5: Identity vs. Role Confusion
Adolescents begin to form their own identity by experimenting with who they are.

Physical

Psychosocial according to Eric Erickson's 8 Stages of Psychosocial Development

Cognitive according to Piaget's Stages of Cognitive Development

1. "Erikson's Stages of Development Chart." Psychology Charts.
2. "Piaget's Stages of Cognitive Development." Psychology Charts.

2.2 Multi-sensory Experiences

of a child

From birth until the time children can articulate words and meaning, dependence of sensory stimulation and activity is the only way children learn. In all aspects of early activity, there is no one sense that is particularly used. Juhani Pallasmaa sought to explore the interrelationships of all the senses and speaks on the ability of just our senses to create and deduce experiences into memories of "space, matter, and time."[1] If this stands to be true, how can architecture create these meaningful experience in children?

Each of our senses serve to guide our bodies through our environments. By far the most regarded sense is that of sight. Of course sight gives us immediate pictures of the world. But sight alone doesn't give us a meaningful experience. Take away sight and you can still experience the world around you.

Our haptic sense becomes a point of exploration when it comes to experiences as children. When a child learns to grasp objects, they begin a journey of exploration unlike any other. Children will explore that object not only by touching it, it will more than likely end up in their mouth—because taste is in many ways the first sensual experience we have as humans. It is the first way humans experience pleasure. That object engage every other sense as well—the way it sounds will be explored, how it smells. This starts forming ideas of different objects and what they represent. Representation for children becomes their first method of analysis.

When designing for children, the idea of representation should play a key role. Spaces should engage all senses of children to create the meaningful experiences required to maintain the knowledge and memories of them. Investigation into the materiality, tectonics and spatial arrangements should take into account the idea of a child without sight. How can a space engage all senses in all their capacity?

1. Pallasmaa, Juhani, The Eyes of the Skin (Chichester, West Sussex, UK: John Wiley & Sons Ltd, 2012), 76

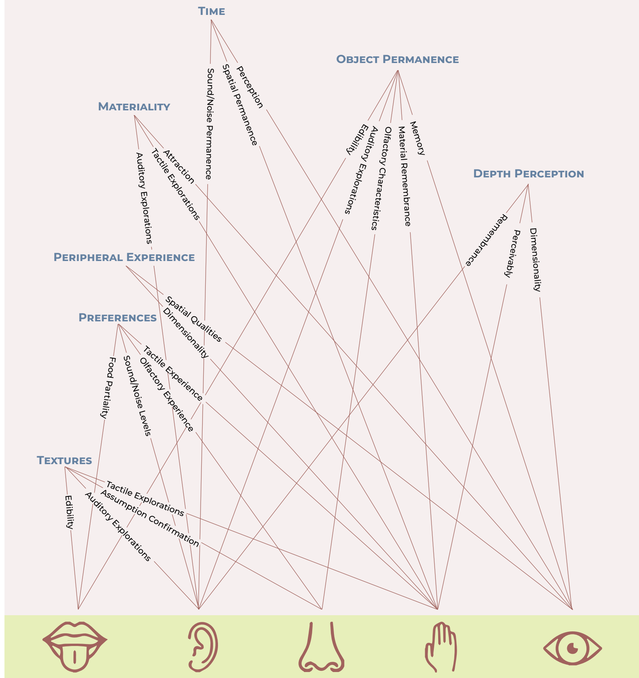


Figure 2.1 | Multi-sensory Experiences

2.3 Education
Theories of Good Practice

Figure 2.2 | Theories Introduction

Educating the young has been a part of human civilization, since its birth. Mass education of the young has its beginnings at the dawn of the industrial revolution. First, to educate people quickly and efficiently to work jobs required by industries and later as a information-transfer system available to all young children. Since then, education has had two main characteristics: structured classrooms with master-student relationships and simple information transfer from master to student. The following educators and theorists, explored the opposite in children. Friedrich Froebel's kindergarten placed childhood at the center and not as a transition in life. Maria Montessori allowed children to explore their interests at their own time, at their own pace. Loris Malaguzzi believed children were capable to building knowledge on their own and embraced this idea in his schools.

All three educators placed students at the center of their education systems. An idea that still to this day is not widely accepted as the correct way to structure education. My study takes guidance and precedent from all three of these educators in the design of learning environments with children at the core of learning, with an air of exploration and a spirit for self-development.

Friedrich Froebel's Kindergarten

Figure 2.3 | Friedrich Froebel
http://infed.org/mobi/friedrich-froebel-froebel/

Background:

Born in Germany in 1782, Friedrich Froebel is known for the creation of the kindergarten system. Froebel, who grew up largely alone, developed a theory of unity between all things. This would be a core values of his teachings and of his kindergarten schools.

Froebel's Principles:

Froebel believed in the realness of childhood. He believed that childhood is not just preparation for something later in life, childhood is a stage in life in itself, therefore education should reflect this, and not just be a preparation for adulthood, but how to live as a child. The whole of a child, therefore, should be considered—mental, physical and emotional. All these aspects of a child are interconnected and so their education and all its subjects are interconnected.

Understanding what children need and when they needed was vital to Froebel. Learning and exploring the best periods for education of a child is essential to successful education of them. The child's environment becomes a place for discovery—this would become Froebel's most important concept in the creation of kindergarten.

Gifts and Occupations:

There are two basic components to Froebel's learning approach—gifts and occupations. Gifts where Froebel's designed play materials which included objects like balls and shaped blocks. These were and still are elementary toys for small children. The 10 gifts were meant to be guides to discovery.

Occupations were specially designed activities to engage students—sand, clay, chalk, etc. These were designed to teach certain skills for children. Like gifts led to discovery, occupations lead to invention.

Froebel's gifts are now a used worldwide and have educated and influenced some of the greatest creatives, including Frank Lloyd Wright and Buckminster Fuller. Many early childhood education toys are spin-offs of these gifts and occupations.

Figure 2.4 | Froebel's Box of Gifts
https://www.pgpedia.com/f/froebel-gifts

Froebel's Kindergarten:

Designed to be an education system for younger children, Kindergarten has become vital for the education of children around the world. Froebel designed Kindergarten to be exactly what it means, a garden for children to explore. He believed in the idea that humans are creative beings.4 Because of this, early education of children should involve hands-on activities that help student explore how things work. Play. Play was and continues to be the core idea of kindergarten. Froebel wanted to allow children to express who they are and what they want. These ideals were credited by Maria Montessori and directly influenced the core values and ideas of the Reggio Emilia approach. Froebel's theories resonate in all alternative learning environments and in teaching methods still today. Kindergarten is the hallmark early childhood education today.

1. Play and Playground Encyclopedia. "Froebel's Gifts."
2. Infed. "Friedrich Froebel."

Maria Montessori and Her Approach

Figure 2.5 | Maria Montessori
https://childresearch.com/blog/archives/11454

Background

Born on August 31st, 1870, Maria Montessori was a pioneer of her times. Defying all social norms and following her dreams, Montessori was among Italy's first medical school graduates and physicians. Through her early practice in psychiatry, Maria found herself more and more interested in the education of students with "intellectual and developmental disabilities."[2] She would dedicate the rest of her life researching and developing the world renowned Montessori Method of teaching and learning, a "child-centered" method.

The Montessori School

Montessori believed that learning was an inherent capability of children. She, in fact, believed that if left to themselves, children would be more than capable of teaching themselves. In 1907, she opened her first, Casa de Bambini or Children's House, to explore this very idea. Her center expressed all the ideas in which she wished her students would learn—independently, freely, and their own pace. She provided the children with ample activities from which to choose from, with enough free floor and table space to do them, and as much time as they needed to complete the activities they chose. To much surprise, this classroom setup created a peaceful environment where children succeed. Adults witnessed how well behaved students were and

The Montessori Method

Montessori's method has one defining quality: free exploration. Classrooms, although methodically planned and designed, allow children to explore their interests, at their own pace. Furthermore, there is a different dynamic relationship between student and teacher. Teachers plan out each student's day, using their previous observations of the child and although the teacher is the ultimate authority, teacher's play a more passive, mentorship role in the classroom. Instead the child plays an active role in their own education. How can a Montessori education conform to education standard? Each child at each stage does receive formal lessons from teachers. Lessons are broken up into three parts—naming: explanation from teacher, recognition: individual exploration of topic, small test: evaluation from teacher. How the child chooses to partake in their exploration, though, is always their own decision.

Figure 2.6 | Montessori Classroom
https://www.flickr.com/photos/state-records-nsw/11719434374

The Montessori Classroom

Montessori designed her classrooms with the main users of the space in mind. Each classroom was designed with child-size furniture and natural materials—to stimulate children's haptic senses. All "play" materials were also made with natural wood. Montessori materials for learning involved as much of the senses and the mind of a child as possible. She looked to not only increase a child's cognitive capability through her materials and classrooms but also develop the children's all important gross and fine motor skills.
Montessori's classrooms were and still are designed to bring about exploration and independence in children. Allowing them to take charge of their own education.

1. American Montessori Society. "Who Was Maria Montessori?"
2. Nelson, Melanie, and Erika Johnson. The Montessori Method. Films Media Group, 2010.
3. Maria Montessori. [Electronic Resource] : Her Life and Legacy. Giants of Psychology. Films Media Group, 2004.

Loris Malaguzzi and The Reggio Emilia School

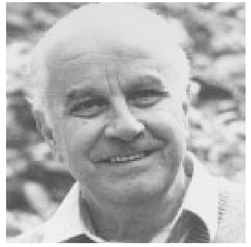


Figure 2.7 | Loris Malaguzzi
https://www.reggiochildren.it/identita/loris-malaguzzi/?lang=en

Background:

Born in Corregio, Italy in 1920, Loris Malaguzzi became one of many Italian pioneers in early childhood education. Growing up in fascist Italy, Malagazzi was encouraged by his father to pursue a career as a teacher.
In 1945, Malaguzzi discovered a small town called Villa Cera in the northern part of Reggio Emilia, and saw a group of women collecting rubble to build a new preschool for the town's children. Malaguzzi was urged to stay and teach at the school. In this school began the journey of the Reggio Emilia approach.
With help from local parents and officials, in 1963 Malaguzzi was able to develop a system of preschools around the Reggio Emilia province to replace the failing schools in the area.

The Reggio Emilia Approach:

Taking from other alternative learning theories, like The Montessori approach, the Reggio Emilia approach looks at children as strong and independent persons, who can make their own decisions and build their own knowledge. This approach looks to create a well- rounded social beings, ones that can maintain long lasting relationships. Children are allowed to create their own opinions and theories about how things works around them.
The teacher and parent do not behave as authority figures in the classrooms but more like researchers, observing and guiding students to explore and question their observations and deductions. The child, in conclusion, is in charge of their own education, with teachers being dynamic enthusiasts of the students' chosen activities. The approach also seeks to educate children in real-life subjects not abstract ones, which are hard to comprehend for children. Malaguzzi believed that children spoke in hundreds of different ways and languages, it was how they expressed themselves. It was up to the teacher to observe and help children develop all these languages and help children make sense of them.
There are three concepts present in the Reggio classroom—the student as his own teacher, the teachers themselves and the environment, which is considered the third teacher.

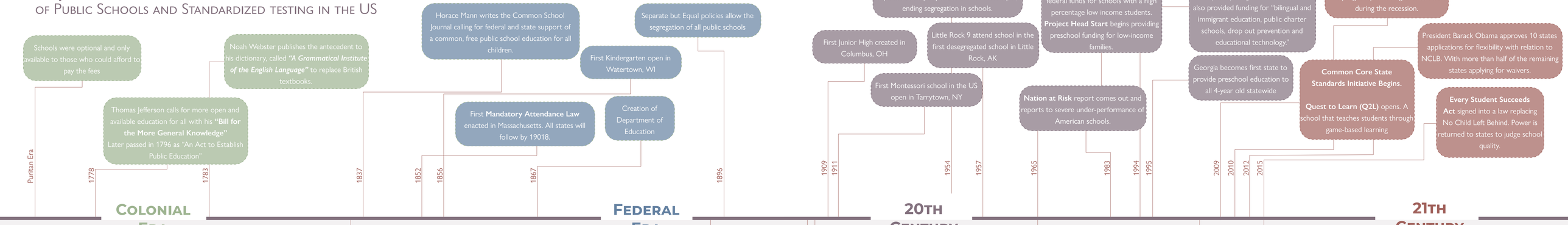
Figure 2.8 | Loris Malaguzzi observing a student

The Reggio Emilia Preschool:

The "atelier"3 or school environment, is designed with an artists studio in mind. A place for children to express who they are. Another important aspect of the school is the welcoming area, which welcomes students and parents and also becomes a threshold between the world outside and the world inside. The Reggio school is designed to act like an Italian city normally would. There is a central node where all school children are allowed to access throughout their day, Much like a piazza it serves as a place for social engagement. The central space is connected directly to all classrooms and other spaces. This removes hallways from the building, creating direct interaction between classrooms. One final aspect of the Reggio school is their documentation. Students and teachers are encouraged to documents all observations to be displayed on the walls of all the school, this to further encourage exploration.

1. Play and Playground Encyclopedia. "Loris Malagazzi."
2. Edited by Giulio Ceppi and Michele Zini. "Children, Spaces, Relations: Metaproject for an Environment for Young Children."

2.4 A Brief History
of Public Schools and Standardized testing in the US



American Education and Standardized testing came about almost simultaneously The idea of a common school for all with common testing requirements become a catch all in the late 19th century and early 20th century. As a rise in population, and especially young children, in the US began in the 1900s, the idea of the "common school" became more and more relevant. Along with child labor laws and the experimentation with intelligence and abilities testing, the need for a simple way to get results of student and school performance began to take place. College entrance exams, like the SAT, were among the first standardized tests to be administered.
Flash forward to the 2010s, and we can see the obvious relationship between public schools in the US and the use of standardized testing. These tests are now so widely overused that states require everything from pretests—subjecting students to these tests within days of returning to school—to the more useful Advanced Placement Tests that give students college credit for good scores.
This timeline gives a brief history of the development of the public school and standardized testing in the US.

Figure 2.9 | History of Public Schools and Standardized Testing in the US Timeline

1. "Historical Timeline of Public Education in the US," Race Forward, October 8, 2015.
2. Chen, Grace. "A Relevant History of Public Education in the United States." Public School Review, January 22, 2012.
3. Fletcher, Dan. "Standardized Testing." Time, Time Inc., December 11, 2009.
4. "History of Standardized Tests - ProCon.org." Standardized Tests, October 23, 2018.

2.5 Learning
The Unstandardized way

Creative Thinking

We live in a time of constant, rapid change, one that requires and demands a society that moves with it. Creating this type of society begins with the education of the future professionals of the time. With that said, one of the most important qualities a student should have is that of dynamic, or creative thinking. Being able to problem-solve and evolve quickly has become increasingly desired by all professions. But how do we teach creative thinking? Jean Piaget tells us that children are natural inquirers.1 They don't need anyone to teach them how to learn. When given a question to answer, children instinctually have a process of creative problem solving. (Figure 2.2) Mitchel Resnick, a LEGO Papert Professor of Learning Research at the MIT Media Lab, describes this process as the "creative learning spiral."2 For people to be creative thinkers, they need to not be taught how to think, but to be allowed to cultivate the instinctual ability to creative think.

The Tacit Iceberg

Mathematician and Computer Scientists, Seymour Papert, believed that children could learn just about anything if their tacit knowledge3, not just their explicit knowledge, was engaged during learning. Tacit knowledge (Figure 2.3) is that knowledge which can't be taught, it is learned through experience and is hard to quantify. Learning, until now, has focused on explicit knowledge which educators can manipulate. This knowledge is easily quantified and is characterized by its ability to be transferred from one person to another without any context or engagement of the receiver of the information. Explicit knowledge is representative by that of a passive learner. When tacit knowledge is used to educate, it gives students the ability to relate to what they are learning more deeply. Papert describes on of the most important flaws in current learning: the dissociation of subjects with the real world. When students can't relate to subjects of their study, it is more likely that they will grow a negative attitude towards the subject. Using tacit knowledge allows the student to give meaning to what they are learning, by connecting to their passions and interests. This move education from teacher-focused to student-centered, student-led.

1. Ashley Marcin, "What are Piaget's Stages of Development and How They Are Used?", Healthline, 8 August 2019.
2. Resnick, Mitchel. Lifelong Kindergarten. Cambridge, MA: MIT Press, 2017.
3. Papert, Seymour. 1980. Mindstorms: children, computers, and powerful ideas. New York: Basic Books.

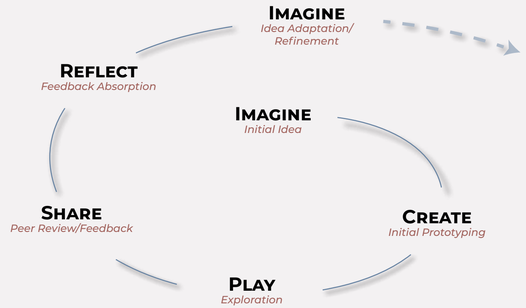


Figure 2.10 | Creative Learning Spiral *according to Mitchel Resnick*

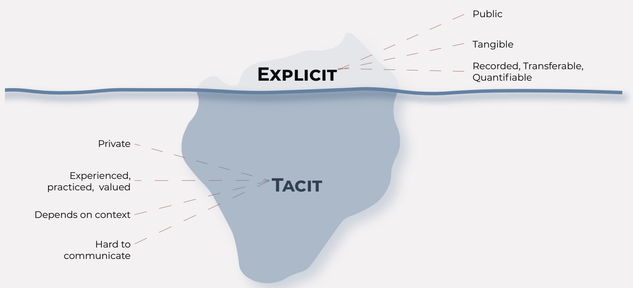


Figure 2.11 | Tacit Knowledge Iceberg

Figure 2.12 | Collective Components

Student-Centered, Student-Led

A student-centered, student-led learning environment, is one that puts the student at the center of learning; creating a transition from teaching to learning. In this system, the student becomes the engaged and active member of the relationship and the teacher becomes a passive observer and kind-of mentor, instead of an authority figure. Putting student interests an passions at the center of learning, allows students to explore how the world works and how their lessons relate to it.
Knowledge and its transfer, in this model, "becomes more an organic process, and the focus of the discussion changes from fixing a problem to growing a solution."4 Lecture-based learning turns into project-focused learning: which allows students to develop their own theories of the world, whether true or false, creating a sense of autonomy and independence to further inquiry and exploration.

The Collective

The concept of the collective has grown into one of the most influential movements of the 21st century. With the collective emerges a new way of collaborating and engaging with the world. It is an idea (Figure 2.4) that takes into account the individual and how that individual fits into the whole of the collective. Learning environments give the student a sort of structured freedom. Rules become guidelines, lectures become investigations, and learning moves from burden to fun. In the collective students are allowed to follow their own path, while still contributing to the overall goals of the group itself. In a classroom setting, the student is allowed to follow their own path while still completing all standards and learning milestones required.

New learning methods call for new learning environments. Environments that embrace the ideals of the collective and the organic learner. Classrooms would turn into a sort-of maker space for children, with exploration, play and imagination as the heart of the room.

4. *Thomas, Douglas, and John Seely. Brown. A New Culture of Learning: Cultivating the Imagination for a World of Constant Change. Lexington, KY: BasicBooks, 2011.*

2.6 The Evolution
of the Learning Environment

At the core of human existence has been the transfer of knowledge from generation to generation. In prehistoric times there was oral traditions and pictorial languages. Story-telling and learning by example were at the core of all learning. In classical times, there were forums and apprenticeship. Still in these times learning by example was the main source of knowledge transfers. One important development of the time was that of written languages, which gave rise for to the more formal learning environments that are still seen today.

As city populations grew and an increased desire to educate society arose, the establishment of formal schools of knowledge rose. This resulted in what we now know as universities and colleges. Lecture-learning was the main source of educating in this system. This model would very soon become the model for all education, not just university-level learning. Teacher-centered education, still widely used today, presents the student as a passive, information gathering machine and also places the educator as the authority of the environment. This model would become very important during the Industrial Revolution, which sought to produce machines of productivity—which included human beings.

After the Great Wars of the early 1900s, this model of learning began to be questioned and the need for a new one became very apparent. This had a lot to do with the rise of the electronic technologies that were revolutionizing the world. Education theorists called for a student-centered, student-led learning, which will make more dynamic learners, who could adapt to all sorts of situations. This places the educator in the passive, mentor position and the student as the active person in the relationship.

Theories and movements in education have since began to take root, though with little effect of the public school system of the US. As education moves forward, a more student-focused system will be the future of the learning environment.

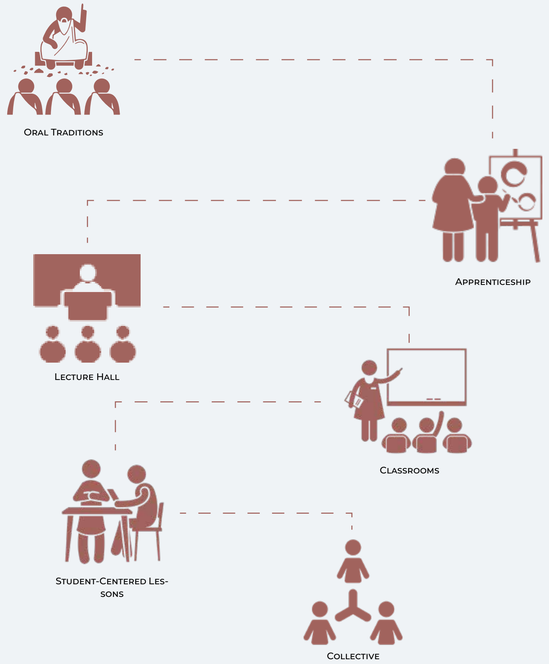


Figure 2.13 | Learning Environments through Time

2.7 Conclusion

Whether it is for survival, for play or for learning, children rely on their very intuition and ability to discern information to live in the world—especially young children who lack or have yet to master the art of language and writing. By stimulating children's natural ability to imagine and explore, as adults we can create a new kind of student, one that can problem-solve, one that can be as dynamic as the times we live in and are moving towards, and one that can engage and adapt with the world around them.

Theories and practices of post-industrial learning and teaching aren't a 21st century concept, but it is in this century that these theories can be seen to start to take fruition. We see more and more a new way to teach children, which requires less performance testing and more student-focused lessons. In a world that asks for more creativity and less routine, we have to begin in the classroom.

People in the United States spend 2,340 days of their first 18 years of lives in public school classroom (only 10% of PK-12 students attend private school).[1] That is over a third of their days in those years, spent in these environments. Does it not then follow that these environments should be designed to allow each and every person a fully immerse experience into their learning?

In all the examples and ideas of thought presented, there was a concept of exploration and a degree of freedom and independence for students. For students to choose what they want to learn and how they want to learn it. With that said, this thesis will look at this proposition in architectural terms. It will explore the way children interact with their current learning environments and how they can be better designed to allow children to explore and engage all their senses in their learning. They say that as humans we don't truly remember anything unless it has a sensory experience attached to it. My thesis will look for what those sensory experiences could be to enhance the learning of environments of elementary school children.

[1] Council of American Private Schools, "Private School Statistics at a Glance," Accessed 11 August 2019, https://www.capenet.org/facts.html

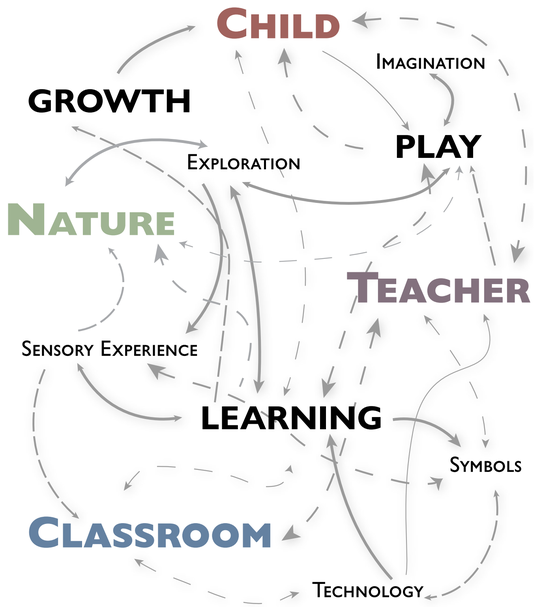


Figure 2.14 | Research Focus

3.0 Theory Reflections

"We discovered that education is not something which the teacher does, but that is a natural process which develops spontaneously in the human being. It is not acquired by listening to words, but of experiences in which the child acts on his environment."

-Maria Montessori

3.1 Introduction

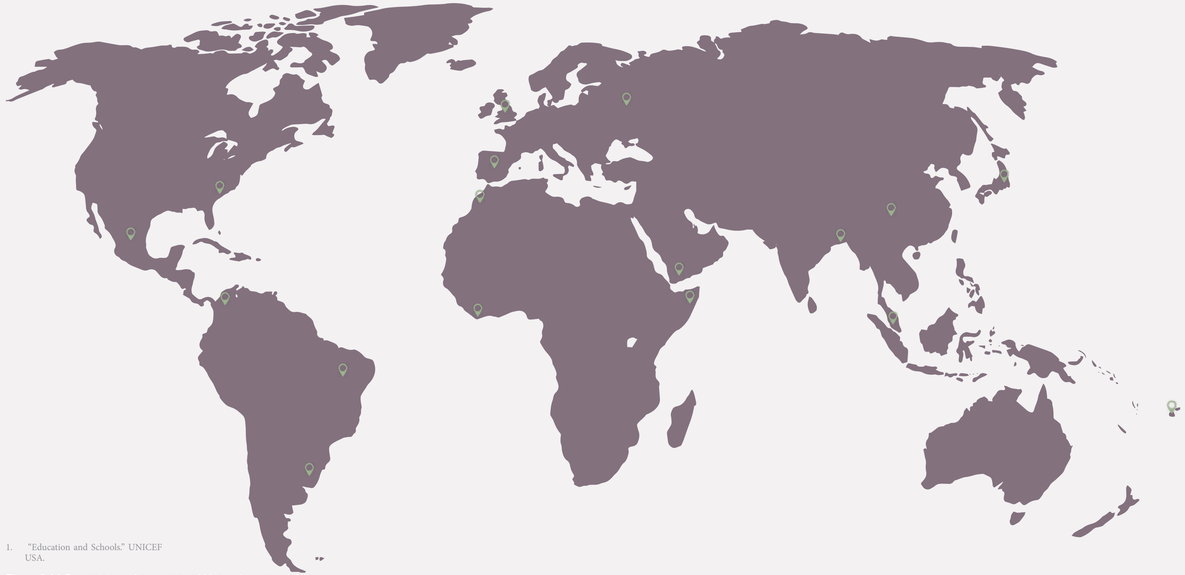
In many ways, classroom architectural design is new topic of discussion within the realm of education. Most school designs are seen from a top-down approach and classrooms often become empty spaces within a beautifully designed education building.

This thesis approaches design from the opposite lens, bottom-up. The studies in this chapter, approach the classroom in many ways to find out the underlying ordering systems within them—human and built. There are those that look at human interactions within learning environments and those that look at the way classrooms are arranged and designed in the present day. Much of these explorations analyzed the pros and cons of certain aspects of learning environments, all with the purpose of extracting the best information, which will inform the final design of this thesis.

Information extracted from these studies, where viewed through the lens of creating not only new classroom typologies, but also creating new classroom cultures.

3.2 Learning Environments around the World

It is an understood fact that cultural context is vital to the development of children. It is through culture and environment that children grow to develop their own thoughts and opinions. Using a expose conducted by **UNICEF,** using photographs taken by **Reuters Pictures,** this study shows the lack of social and cultural context within the classroom around the world. The same 1st world model is used by most schools around the world. We can see some cultural variants in countries like Bangladesh and Somalia, but the concept of the classroom remains the same. There are specified spaces for each student and all attention is directed at the educator. The model explorations show the all too similar configurations that classrooms have when they are analyzed through spatial qualities—enclosure and furniture configurations. This study is meant to shine a light on the need for more flexible spaces for learning that provide students of all different cultures and backgrounds a space where they can thrive.



1. "Education and Schools." UNICEF USA.

Figure 3.1 | Classrooms Around the World Locations Map

North and South America

Washington, D.C.

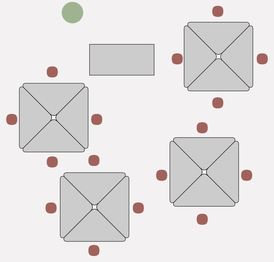
Mexico

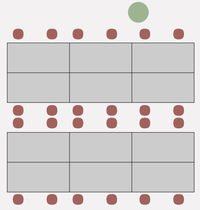
Colombia

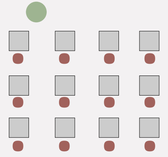
Brazil

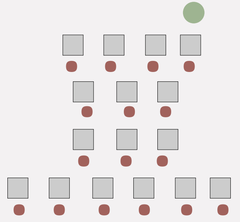
Uruguay

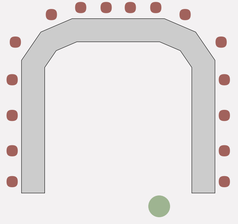
Classroom Seating Arrangement











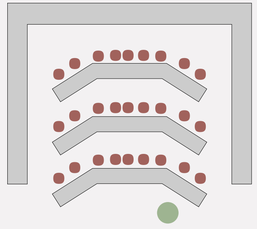
Europe and Russia

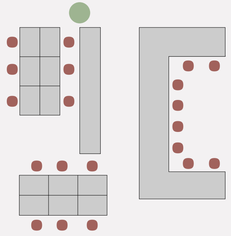
London, UK

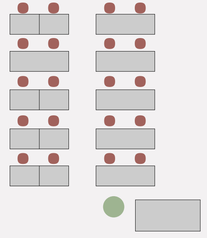
Spain

Moscow, Russia

Classroom Seating Arrangement



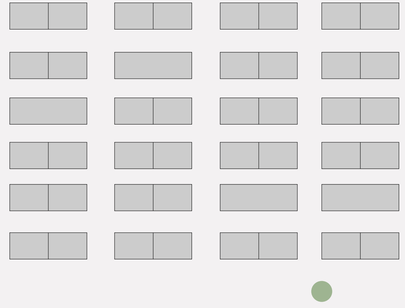




Middle East and Africa

Yemen

Classroom Seating Arrangement



Asia and Pacific Islands

Morocco

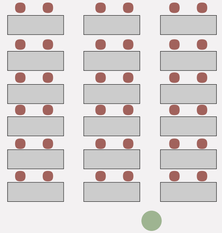
Ivory Coast

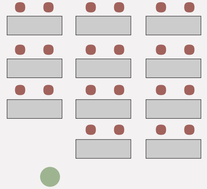
Somalia

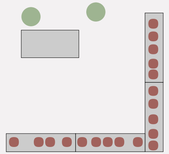
Rural China

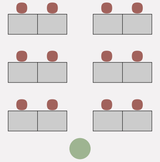
Japan

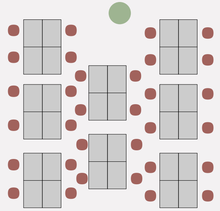
Classroom Seating Arrangement







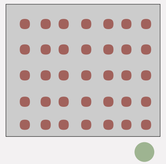


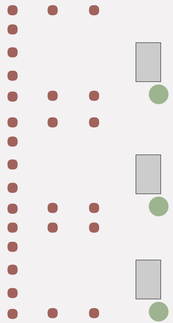


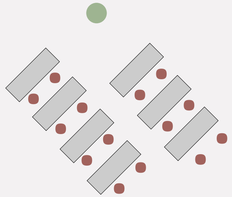
Bangladesh

Malaysia

Fiji







3.3 Georgia's K-5 Common Core Curriculum

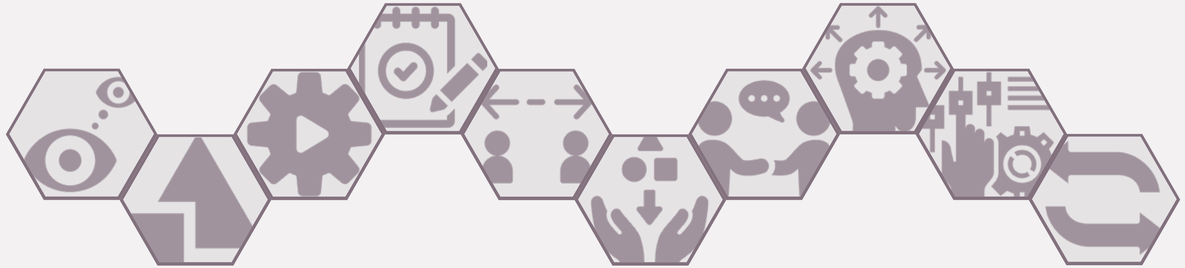


Figure 3.2 | Introduction to Curriculum Analysis

Curriculum is a integral part of the education of children in the United States. In many ways these writing statements make or break a child from an early stage. In all sets of common core standards there are characteristics which when extracted could enrich a space in ways not thought about before. There is a process of learning that can be extracted and explained through simple terms like recognition and communication. In many ways this study looks to synthesize all core standards of education for elementary school students to feasible concepts of learning and then translate them into spatial relationships and qualities.

Subject Matter

Curriculum Themes

Concepts

Mathematics

- Counting and Cardinality
- Operations and Algebraic Thinking
- Numbers and Operations
- Measurements
- Geometry

Recognition

Ability for students to recognize and identify mathematical concepts like numbers, shapes, and their properties and attributes

Abstractions

Ability for students to take mathematical concepts and extract information from them.

Operations

Ability for students to take mathematical concepts and abstractions and understand concepts of arithmetic, numerical expressions, and pattern analysis.

Subject Matter

Curriculum Themes

Concepts

Science

- Ways of Thinking
- Scientific Process
- Earth and Space Science
- Physical Science
- Life Science

Obtain

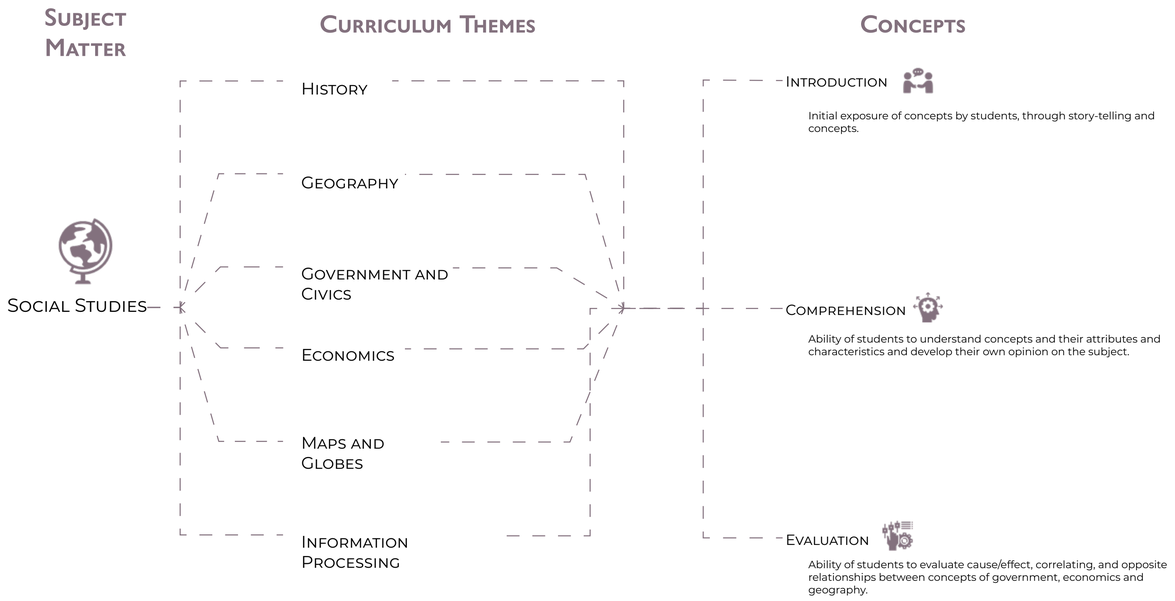
Introduction of information and ability of students to question/ investigate information

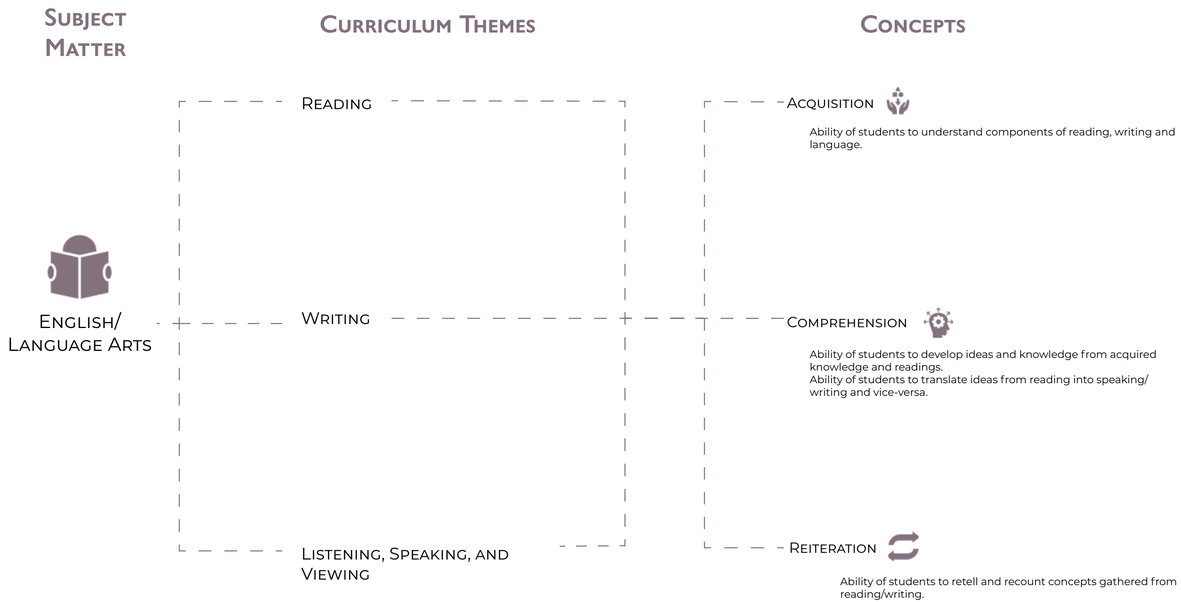
Evaluate

Ability of students to analyze obtained information, to develop arguments/solve problems.

Communicate

Ability of students to communicate findings/arguments, orally or written


Subject Matter
Curriculum Themes
Concepts
History
Geography
Government and Civics
Economics
Maps and Globes
Information Processing
Social Studies
Introduction
Initial exposure of concepts by students, through story-telling and concepts.
Comprehension
Ability of students to understand concepts and their attributes and characteristics and develop their own opinion on the subject.
Evaluation
Ability of students to evaluate cause/effect, correlating, and opposite relationships between concepts of government, economics and geography.


Subject Matter
Curriculum Themes
Concepts
Reading
Writing
Listening, Speaking, and Viewing
English/ Language Arts
Acquisition
Ability of students to understand components of reading, writing and language.
Comprehension
Ability of students to develop ideas and knowledge from acquired knowledge and readings.
Ability of students to translate ideas from reading into speaking/ writing and vice-versa.
Reiteration
Ability of students to retell and recount concepts gathered from reading/writing.

In this study, curriculum standards were analyzed to extract their underlying ordering systems. In all subjects there is a sense of continuity and overlap. In subjects, like math and science standards were similar in objectives—introduction to information, evaluation, and practice. Similarly, English/Language Arts and Social Studies have objectives that speak about information acquisition, interpretation, and reiteration. Figure 3.3 explores all the different connections made throughout the Georgia Common Core Standards.

Connections were made in terms of:

Sensory Stimulation—What senses are stimulated when a child is engaging in a specific subject? This category makes connections to the senses that children will mostly use while studying a specific subject.

Development—Certain subjects require more developmental maturity than others, this area explores two specific stages in development that are associated with children in elementary school age (4-10 years of age) and their correlation to the subject matters.

Work Type—Different subjects and activities lend for different types of work. Some require students to work individually while others are better taught/learned through small/large groups. This category analyzed the type of work

Space Configuration—A classroom's spatial configuration and seating arrangement is key to successful lessons and activities. This category explores which subjects render more successful classroom activities.

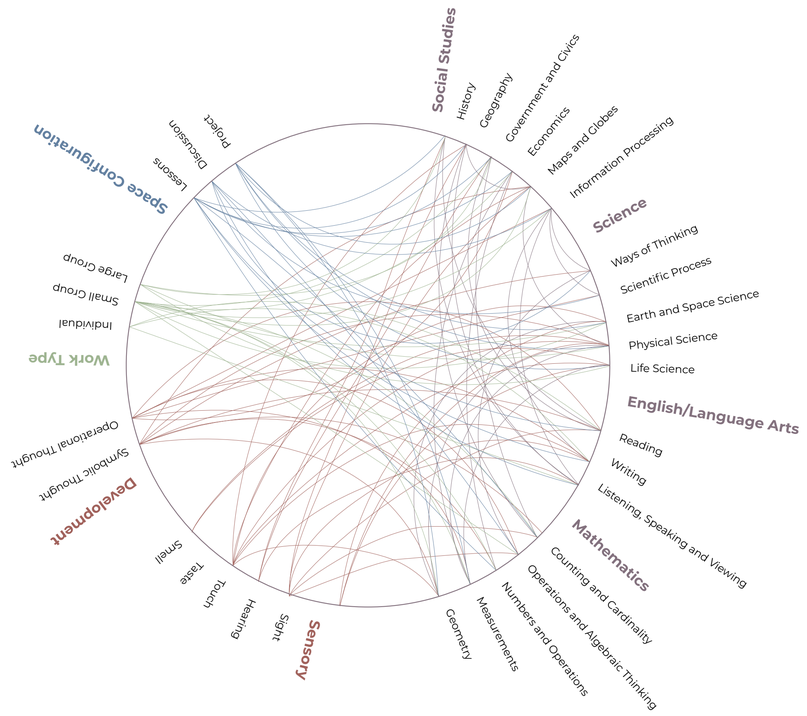


Figure 3.3 | Curriculum Exploration Diagram

3.4 Socio-Individual Classroom Relationships

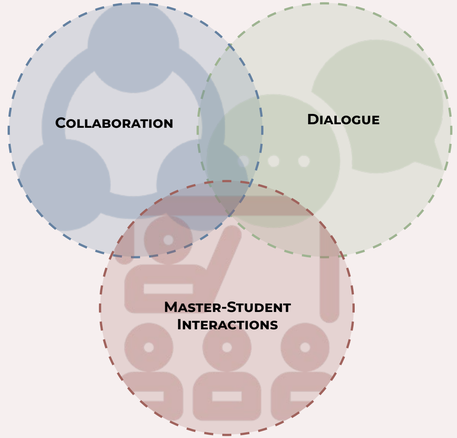
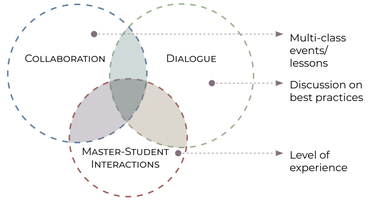


Figure 3.4 | Socio-Individual Classroom Relationship Analysis Introduction

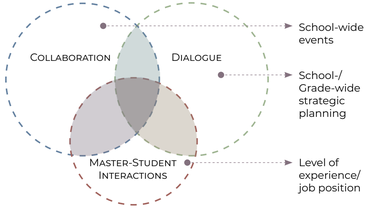
To better understand the dynamics happening in a classroom, understanding the relationships of students/teachers with each other and their environment is key. The first study looks into the different types of interactions happening between different people within a classroom/school setting—through the lens of collaboration, dialogue and master-student relationship. (This study is based on qualitative concepts and not a qualitative study.)

Teacher-Teacher

Individuals

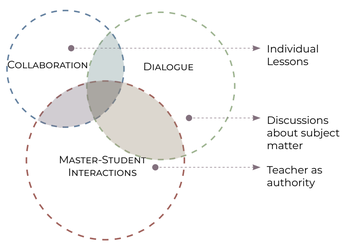


Collective

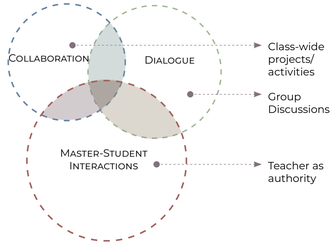


Teacher-Student

Individuals

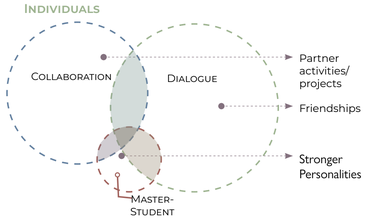


Collective

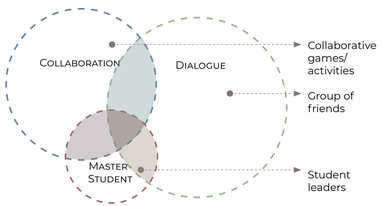


Student-Student

Individuals



Collective



*Studies are qualitative

3.5 Learning Environment Configurations

Campfires to Classrooms

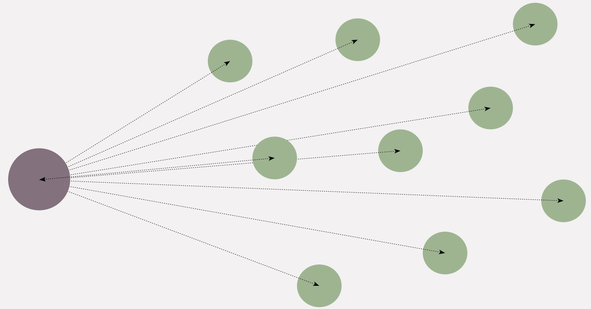
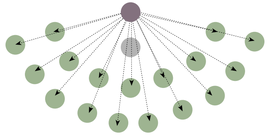


Figure 3.5 | Learning Environment Analysis Introduction

The transfer of knowledge has always been part of human history. The evolution of learning environments has progressed from campfire story-telling to the classrooms of our time. This study explores the advantages and disadvantages of four different learning environments—oral traditions of story telling, lecture halls, classrooms and playgrounds/play areas—and the interactions and relationships of all members within them.

Oral Traditions

Oral Traditions were centered around story-telling in the prehistoric times and later in open discussions at Greek Forums. Before the invention of comprehensive written languages, knowledge was passed down by word-of-mouth. After written languages, the rise of formal methods of education took root.



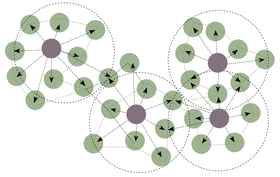
Campfire Storytelling

\+

- Informal Setting
- All age groups

\-

- Lack of dialogue
- Master-Student relationship



Greek Forums

\+

- Informal Setting
- All age groups
- Cluster gathering
- Abundance of dialogue

\-

- Reserved for older men

Transfer of Information

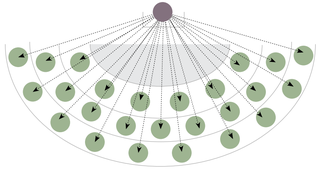
Personal Interactions

Teacher/Master

Learner/Student

Lecture Halls

With the rise of universities, came the rise of the lecture hall. These spaces created a clear line between Master-Student; a precedent that will remain in the history of education until present times. Lecture Halls were among the first classrooms and became models for classrooms in the future.



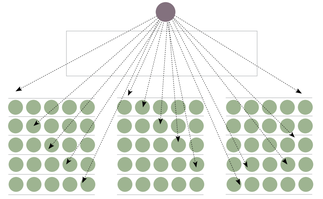
Semi-Circular Auditorium

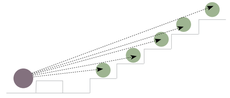
\+

- Gathers large groups

\-

- Formal setting
- Master-student relationship
- Reserved for university learning
- Doesn't allow exploration





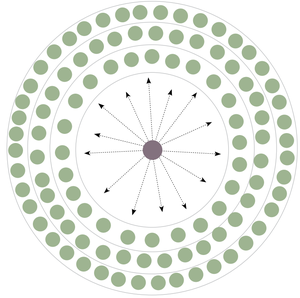
Science Hall

\+

- Exploratory area for lecturer
- Dialogue in between students in stands

\-

- Formal setting
- Master-student relationship



Theater-in-the-Round

\+

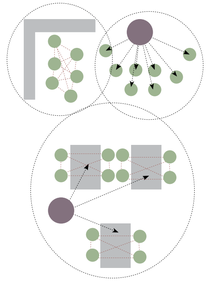
- Larger crowds
- Observational aspects for students
- Gathers large groups

\-

- Master-student relationship

Classroom

Childhood education classrooms began to arise in the late 1800s, along with movements of psychology and education, and its role in a child's development. Springing from theories of Froebel and Piaget, childhood education started to pop-up world wide. Early childhood education took on a special role in education the youngest of people, with theories embracing the exploratory nature of children. Schools though took on the lecture hall approach and the master-student dynamic--this mostly because of the spirit of the times. The industrial revolution begged for a person who could follow directions and perform tasks efficiently. This also gave rise to standardized testing, which we still see today. In this study we see the evolution of the classroom as students get older and the level of standardization which children are put through as they get older--from an exploratory space in preschool to a strict master-student, "efficient" system in high school



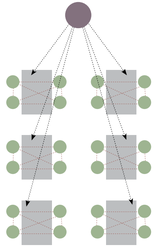
Multi-Zone
Preschool

\+

- Multiple areas within a space
- Intimate
- Flexibility of activity

\-

- Master-student relationship



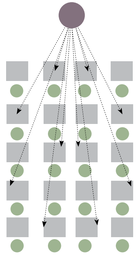
Grouped
Elementary

\+

- Dialogue in between students in grouped tables

\-

- Master-student relationship
- Structured setting



Desk Rows
Middle | High

\+

- Individual spaces

\-

- Master-student relationship
- Very structured setting
- Lack of dialogue

Transfer of Information

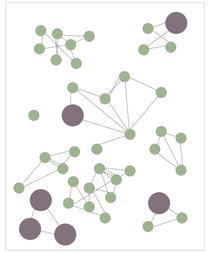
Personal Interactions

Teacher/Master

Learner/Student

Playground

Childhood education classrooms began to arise in the late 1800s, along with movements of psychology and education, and its role in a child's development. Springing from theories of Froebel and Piaget, childhood education started to pop-up world wide. Early childhood education took on a special role in education the youngest of people, with theories embracing the exploratory nature of children. Schools though took on the lecture hall approach and the master-student dynamic--this mostly because of the spirit of the times. The industrial revolution begged for a person who could follow directions and perform tasks efficiently. This also gave rise to standardized testing, which we still see today. In this study we see the evolution of the classroom as students get older and the level of standardization which children are put through as they get older--from an exploratory space in preschool to a strict master-student, "efficient" system in high school



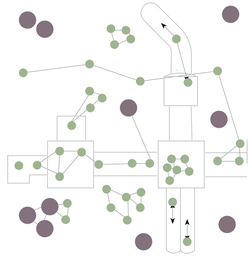
Open Field

\+

- Informal Setting
- Multitude of Interactions/ Exploration
- Flexibility of activities
- Blurred relationship lines

\-

- Completely unstructured
- Short relationships



Built-Play

\+

- Informal Setting
- Multitude of Interactions/ Exploration
- Engaged Imagination
- Children of all ages

\-

- Short relationships
- Lack of interaction between adults and children

3.6 Existing Classroom Arrangements

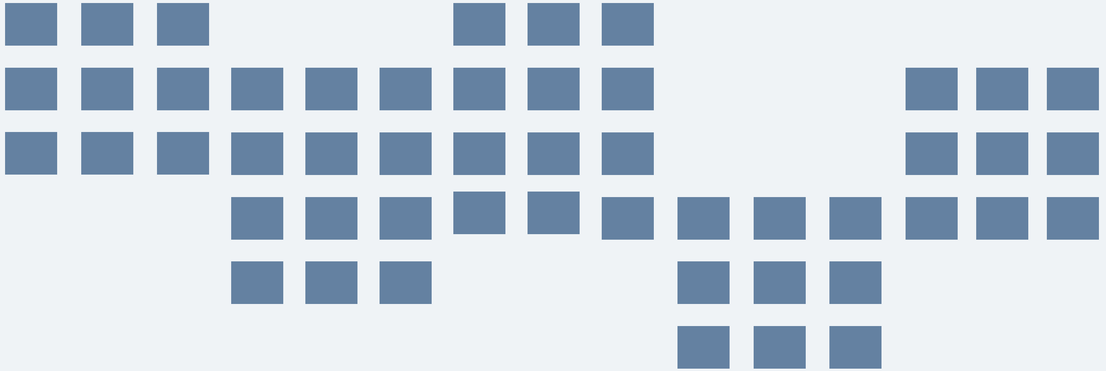


Figure 3.6 | Classroom Arrangement Analysis Introduction

Teachers around the country have found many different classroom configurations to deal with classroom management of work and behavior. This study looks at the different classroom typologies, their advantages and disadvantages and the forces that control the arrangements. There are three widely accepted types of seating arrangements—traditional rows, u-shape/ circular, and clusters. More commonly now are combination classrooms that combine one or more arrangements to suit different needs of a classrooms.

The Traditional Rows Room

+

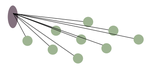
- Best for teacher-centered lessons
- Promotes individual work and productivity
- Decreases disruptions and cheating
- Good for demonstrations, test-taking and presentations
- Best for maximum supervision

-

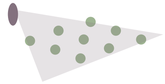
- Decreases student-centered lessons
- Decreases focus
- Decreases interactions within the classroom
- Decreases mobility
- Creates varied levels of engagement

Forces

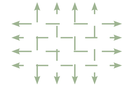
Direction of Student Attention

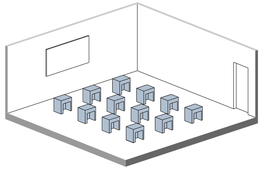


Maximum Surveillance

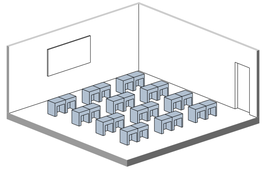


Uniform Circulation Paths

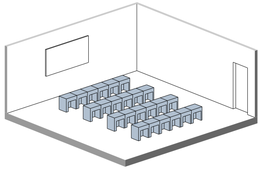




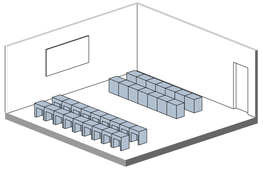
Rows and Columns



Double Rows and Columns



Rows



Runway

The U-Shape or Circle Room

+

- Sparks discussions/dialogue
- Helps teachers advise/assist students
- Increases interactions with whole class
- Creates connections between students and teacher
- Provides large area for presentations and demonstrations

-

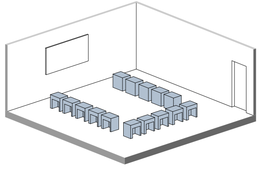
- Doesn't consider all students
- Limited to smaller classrooms
- Disproportionate student engagement
- Can be overwhelming for shy students
- Decreases control of behavior

Forces

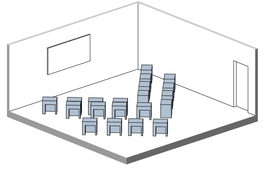
Group Discussions/Dialogue

Centrality

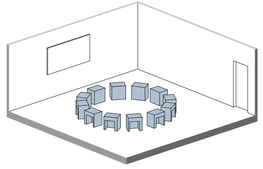
Equality



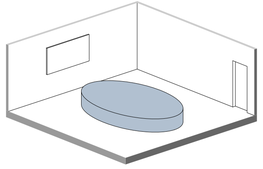
Horseshoe



Stadium



Circle



Round-table

The Cluster Room

+

- Safe interactions zones
- Allows shared knowledge
- Increases collaboration and teamwork
- Creates reflection, problem solving, and communication skills
- Flexibility of group work

-

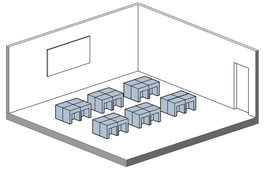
- Increases noise and disruption levels
- Possible decrease in productivity
- Decrease in individual accountability
- Harder to conduct individual assessments of abilities and level of understanding

Forces

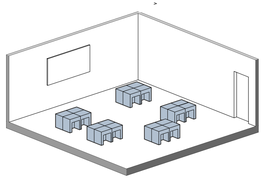
Collaboration

Engagement

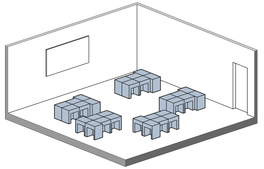
Personal Interactions



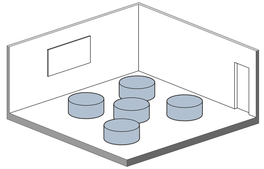
Uniform



Random



Large



Circular

The Combination Room

\+

- Flexibility of classroom program
- Considers all learners
- Increases productivity
-

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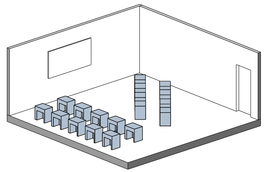
- Less control
- Extra need for classroom procedures to cater to all spaces

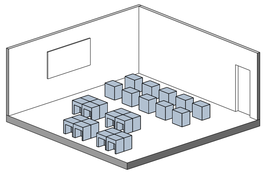
Forces

Flexibility of Program

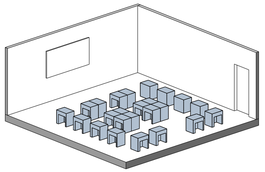
Inclusiveness



Rows-Stadium



Clusters-Rows



Horseshoe-Clusters

3.7 Combination Classrooms Analyzed

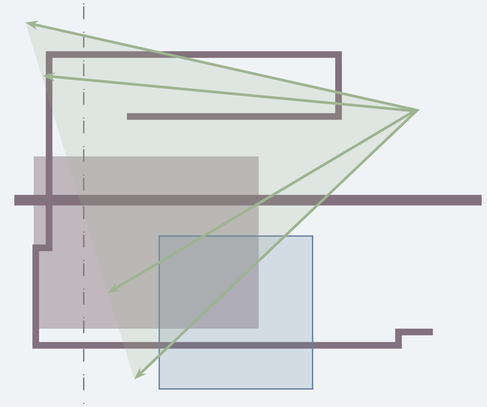


Figure 3.7 | Combination Classrooms Analysis Introduction

Teachers around the country have found many different classroom configurations to deal with classroom management of work and behavior. This study looks at the different classroom typologies, their advantages and disadvantages and the forces that control the arrangements. There are three widely accepted types of seating arrangements—traditional rows, u-shape/ circular, and clusters. More commonly now are combination classrooms that combine one or more arrangements to suit different needs of a classrooms.

Preschool Setting

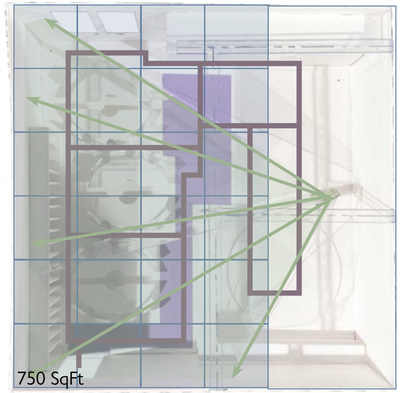
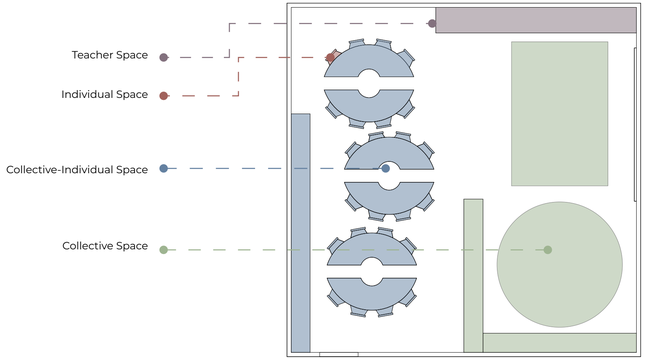
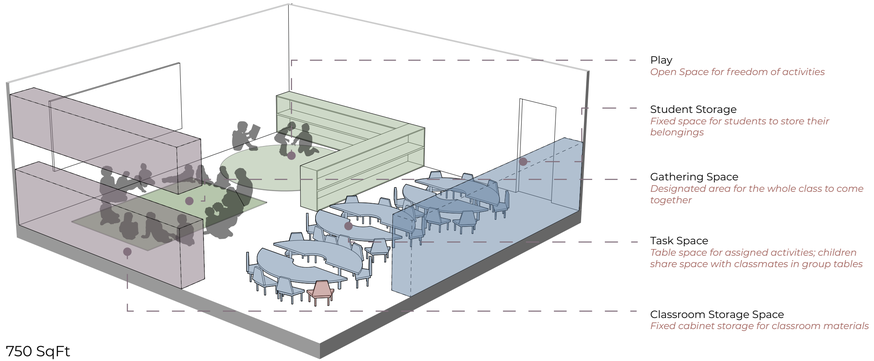


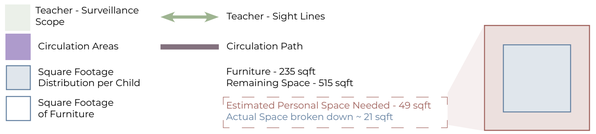
Figure 3.8 | Preschool Classroom Hybrid Model Drawing



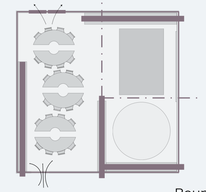
Plan | Typology of Spaces



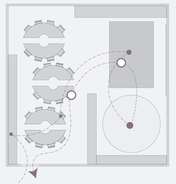
Axonometric | Spatial Descriptions



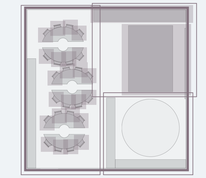
Spatial Explorations



Boundaries
Physical and Implied

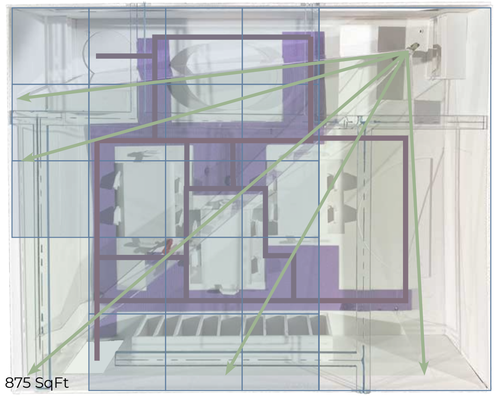


Context-to-Time
Circulation throughout the Day



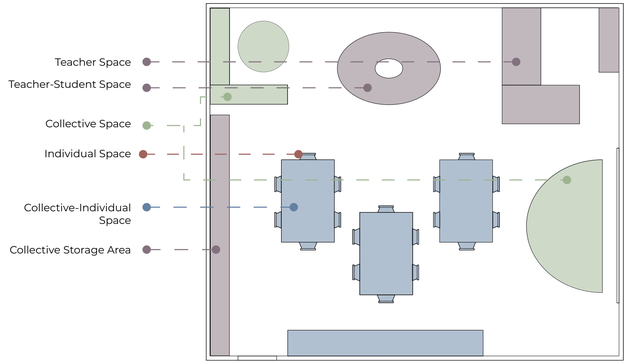
Spacial Hierarchies

Kindergarten Setting

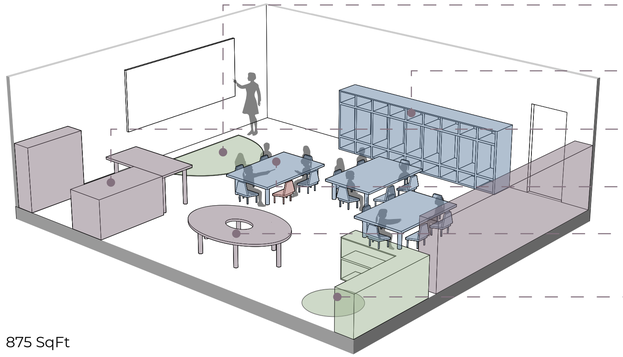


875 SqFt

Figure 3.9 | Kindergarten Classroom Hybrid Model Drawing

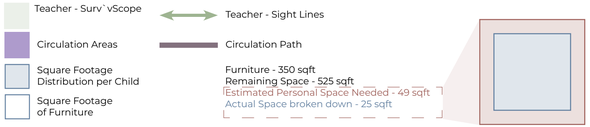


Plan | Typology of Spaces

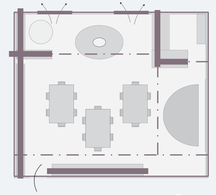


875 SqFt

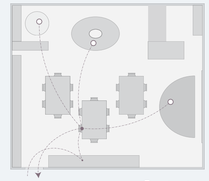
Axonometric | Spatial Descriptions



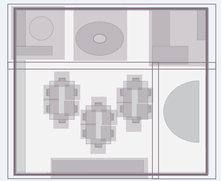
Spatial Explorations



Boundaries
Physical and Implied



Context-to-Time
Circulation throughout the Day



Spacial Hierarchies

Elementary Setting

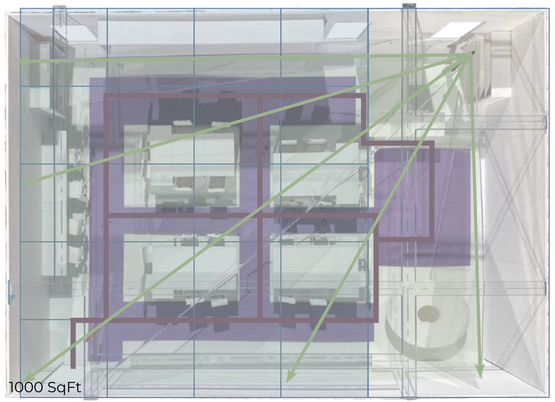
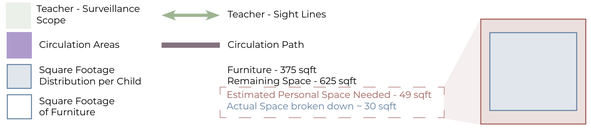
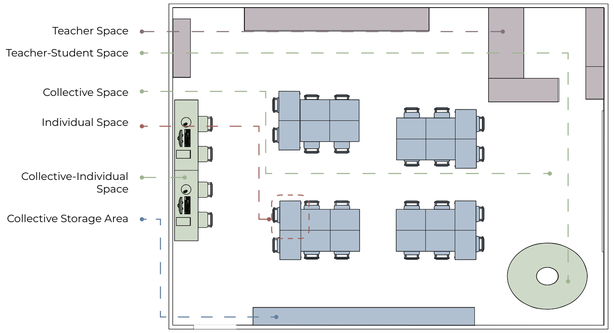
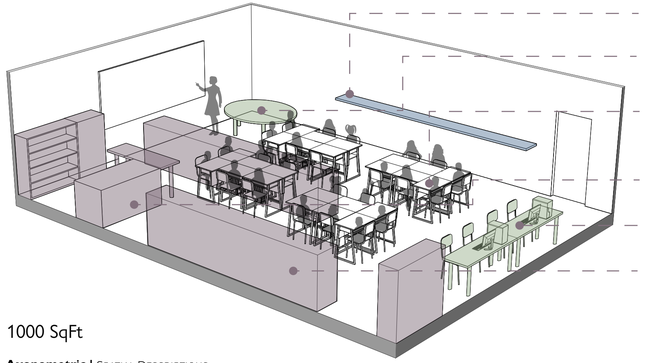


Figure 3.10 | Elementary Classroom Hybrid Model Drawing





Plan | Typology of Spaces



Student Storage Shelf
Shelf for students to store their belongings

Conference Table
Area for teacher to meet individually with students

Individual Student Desk
Desks are individual but arranged in groups

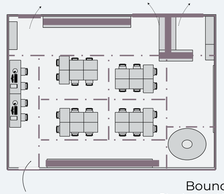
Teacher's Desk
Usually in front/back of classroom in a corner

Computer Center
Area with computers for student use

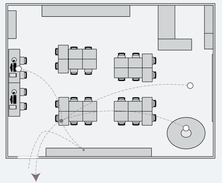
Classroom Storage Space
Fixed cabinet storage for classroom materials

Axonometric | Spatial Descriptions

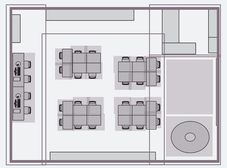
Spatial Explorations



Boundaries
Physical and Implied



Context-to-Time
Circulation throughout the Day



Spacial Hierarchies

4.0 Design Process

"Anything that is worth teaching can be presented in many different ways. These multiple ways can make use of our multiple intelligences."

-Howard Gardner

4.1 Introduction

This chapter sets the foundation for the design for Model for Play. These sections will explore new learning and design strategies for learning environments, as well as propose a exploring existing elementary school programs and re-evaluate how these spaces can be re-designed. The chapter is organized into 4 sections: Learning Components, Precedent Studies, Design Framework and Interactions with Nature.

4.2 Design Learning Components

In previous chapters, we saw learning methods and classroom arrangements that are currently in place. This chapter will dive into the components of the what the final thesis proposition will embody. It will look at learning strategies and design ideas that will influence the design of the New Model for learning environments.

Computational Thinking

Computational thinking is a process of problem solving. It involves a basic process of data collection and data analysis at its core. The proess has 7 steps:

1. ***Data Colletion***: Initial inquiry into a subject
2. ***Data Analysis***: Extraction of important information
3. ***Data Decompostion***: Breaking down information
4. ***4. Pattern Formation***: Identifying underlying factors/rules
5. ***Abstractions***: Finding important ideas in all information
6. ***Model of Construction***: Creating models to follow
7. ***Algorithm Development***: Using models and patterns to create a solution based on rules

This process creates solutions based on thourough inquiry. Using computational thinking in learning leads to rich understanding of subjects, as opposed to learning through information exchange.

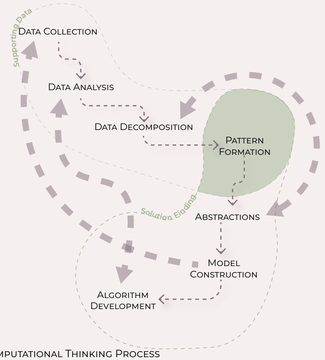


Figure 4.1 | Computational Thinking Process

Multiple Intelligence Theory and S.T.E.A.M.

Howard Gardner first coined the idea of multiple intelligences as the ability for human beings to problem solve through different methods of intelligene—**Musical, Logical, Naturalistic, Spatial, Linguistic, Interpersonal, Kinesthetic, and Existential**. The way these intelligences came about depended on the situation. For a person to have a well balanced life, they have to have some of all the intelligences and he also said that everyone was capable of learning through intelligences if given the chance.

S.T.E.A.M. curriculum uses the basic ideas of multiple intelligences by creating learning scenarios that allow students to exercise different ways of learning and educating. These activities promote the use of untradionatiol methods of learning, like project and collective learning. By bringing Science, Technology, Engineering, Arts, and Math all under the same roof, the curriculum allows students to explore learning in ways that the traditional classroom often does not.

Gardner's theory implies that instead of just focusing on performance of the student, that multiple intelligence learning will allow students to become well-rounded people, not just production machines.

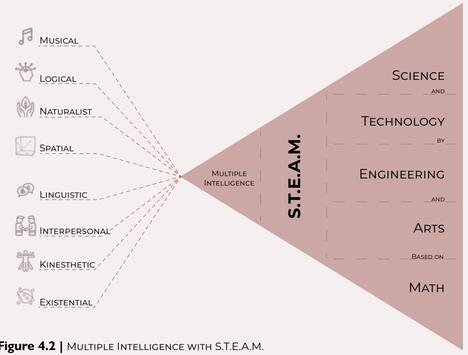


Figure 4.2 | Multiple Intelligence with S.T.E.A.M.

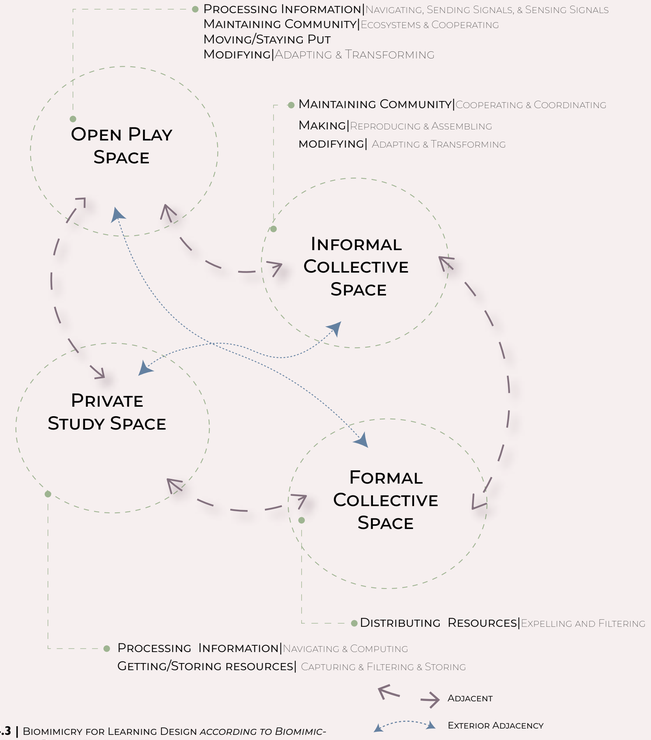


Figure 4.3 | Biomimicry for Learning Design *according to Biomimicry Taxonomy by Biomimicry Institute*

Biomimicry Taxonomy for learning Design

Biomimicry has been used in many fields to imitate nature and employ methods to reflect process found in it. In this thesis, biomimicry is used to define spaces and the activities held within them. The *Biomimcry Taxonomy* was used to find 4 spatial categories, later used the final design:

1. ***Open Play Spaces***: These spaces will serve as the community nodes in the design. Play is often times where children learn the most, therefore these spaces will be designed to allow play to happen naturally.
2. ***Informal Collective Space:*** More and more we are seeing school moving from a traditional model of design of individualized learning to one of collective learning. These spaces will allow for free and open collaboration and open discussion among students and teachers.
3. ***Private Study Space:*** Although spaces for gathering are the core of this thesis, it is recognized that there is a need for spaces where students can conduct private study to process and deconstruct the knowledge they are gaining.
4. ***Formal Collective Space:*** These spaces will focus on more traditional methods for learning, which will gathering students for formal teaching.

Color Psychology

Color psychology has been a long debated subject. It something that can be somewhat subjective depeding on the person and even the social context it is talked about in. Certain color coceptualizations have long been ingrained in societies that, although not proven, have been widely accepted. For children color is a stimulant that effects how they act and react in school. For example, the color blue is often use to create environments of calm and white is often used as a color to create "clean" spaces. Environments in this classroom/school model will use color to explore the capabilities of color in learning environments.

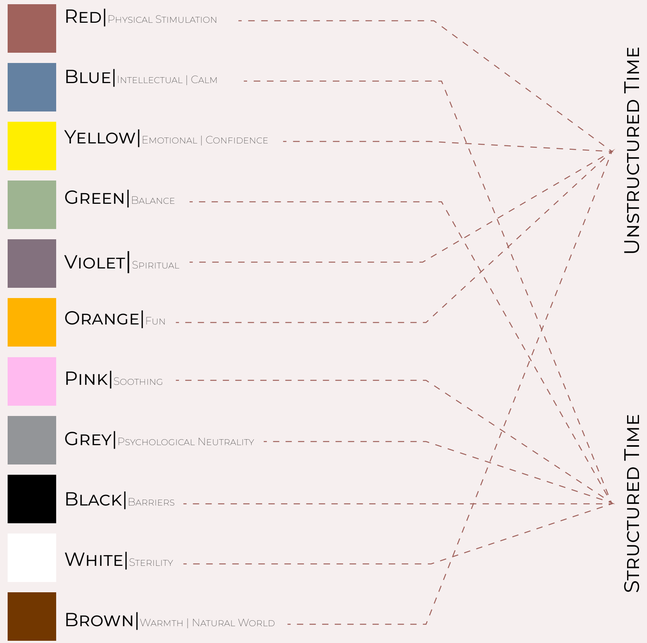


Figure 4.4 | Color Psychology and Space

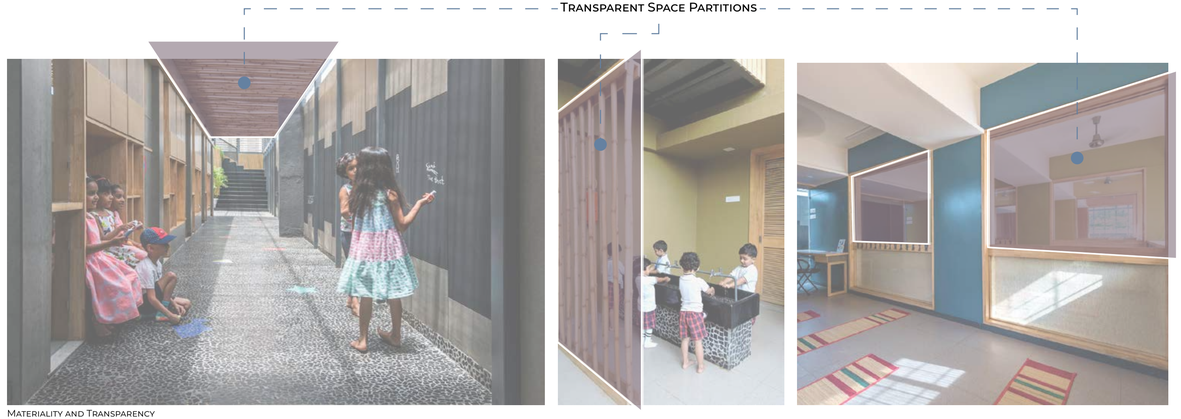
4.3 Precedent Studies

The precedents in this chapter focus on 1) flexibility of spaces, 2) incentives for play, 3) design strategies, and 4) materiality of spaces. The design methods used in these projects will be used to inspire the design of spaces in Model for Play.

The Outdoor Classroom // Studio Infinity

Pune, India
2017

This project is tucked behind a commercial building, making design decisions very critical for its success. This project creates areas of formal and informal learning, using especially natural materials and transparency throughout the building. It's open corridors and "transparent" construction allows children to explore the building from all points of view.

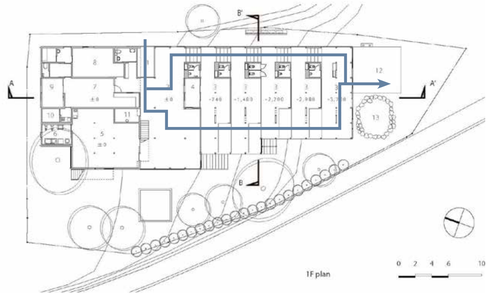


Materiality and Transparency

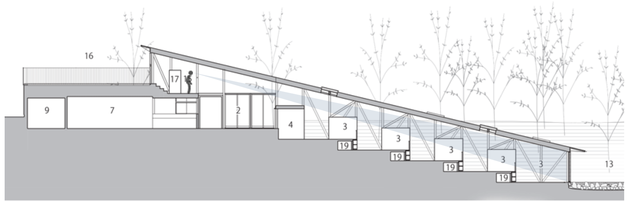
Hakusui Nursery School // Yamazaki Kentaro Design Workshop

Sakura, Japan
2014

Meant to be a house for children,the Hakusui Nursery School creates an open floor plan of circulation and common space. The school makes no age distictions and has clear nods of nature implied within it. The clear circulation creates moments of interactions between children of all ages and allows children to explore freely. An outdoor pond becomes an extension of the project by way of floor-to-ceiling sliding doors--breaking the barrier between interior and exterior.



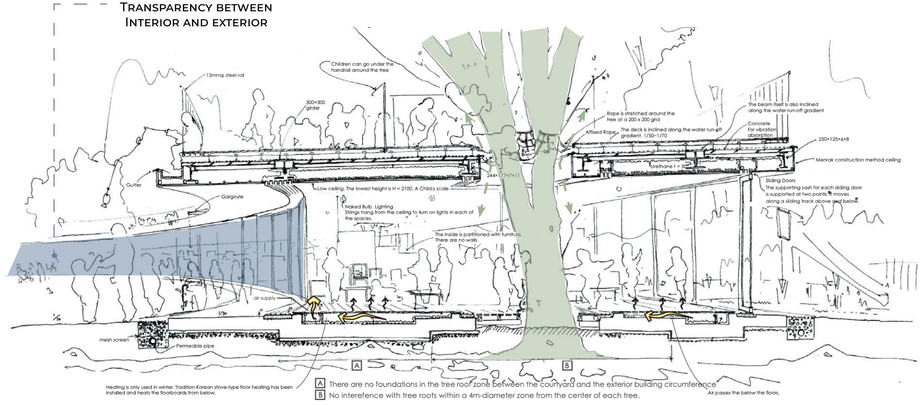
Continuous Circulation and Sight Lines



Fuji Kindergarten // Tezuka Architects

Tachikawa, Tokyo
2007

The Fuji Kindergarten focuses on the ability of children to explore and play in any given environment. This emphasis on play is the driver to for the enormous roof deck, where children can run around and climb trees, all for the sake of play. The architect embodies the idea of children's exposure to controlled danger and the integration of the classroom to the outside. All classrooms of the ground floor have retractable glazed walls that allow the school to become one big classroom in the central courtyard.

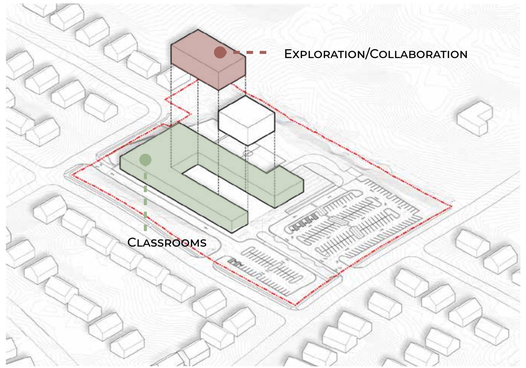


Intergration of Interior and Exterior

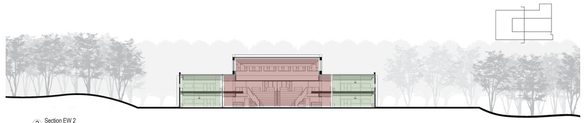
Lisle Elementary School // Perkins & Will

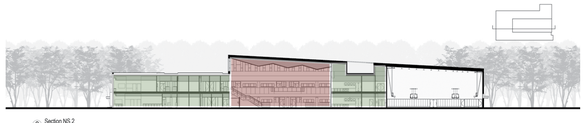
Lisle, IL, USA
2019

Lisle Elementary School boasts the idea of the courtyard within a building. This central space is meant to house any and all types of activities that take place within the school day. Flanked by collaborative classroom SmartLabs, and breakout rooms, the courtyard is home to stepped sitting and the school library--breaking the standard for a quite and calm library setting.



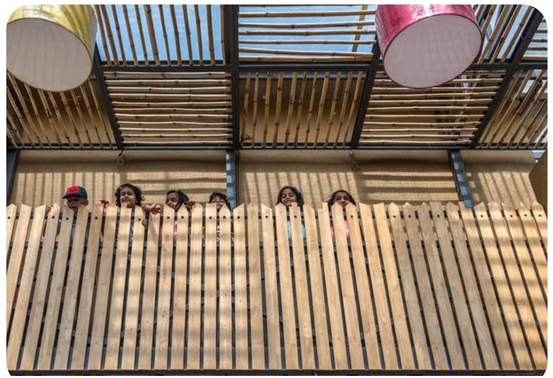
Collaboration of Formal Learning and Informal Activties





Rosanna Golf Links Primary School // Brands Architects

Rosanna, Australia
2018



Designed to create a learning community, the Rosanna Golf Links Primary School creates a campus-like architecture. The central courtyard creates not only a yard to play but is also the method for circulation for the school.

Campus-style Massing

4.4 Design Framework

Spatial considerations are explored in this section. This section outlines design objectives and how they correlate to spatial organizations and programmatic frameworks.

Spatial Organization Factors

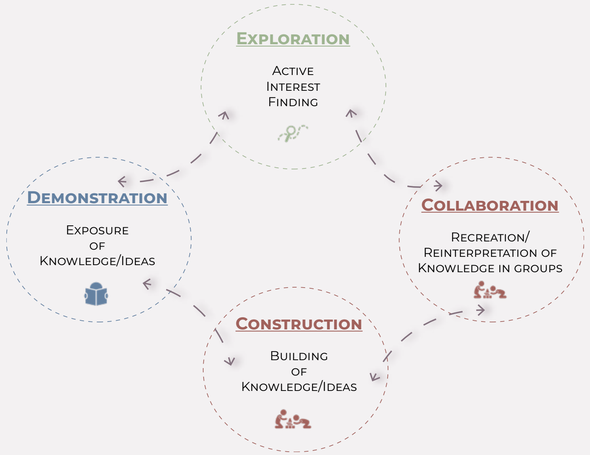


Figure 4.5 | Space and Objectives Correlation

Model for Play Objectives

Learning

Processing and Gathering Information:
Traditional Learning, Research
Problem-Solving Questions:
Open-Ended, Project-Based Activities
Finding Solutions:
Active questioning and trial-and-Error Activities
Re-inventing Ideas:
Re-purposing of gained Knowledge for personal experimentation

Exploration

Independence Building:
Informal Extended Time of interactions with Nature
Gross Motor Skill Refinement:
Constant Active Exploration
Sensory-Knowledge Building:
Guided Sensory Activities through Nature for Development and Acknowledgment of senses

Play

Development of Imagination:
Uninterrupted Play Time (Guided/Unstructured)
Creative/Computational Thinking:
Independent study of topics of interest
Social Development

Programmatic Framework

This analysis looks at what a traditional classroom unit contain within its walls and how it correlates with the spatial organization factors of the project. It also compares these to the overall program of a traditional school. It looks at core spaces and its supplemetary spaces, needed to allow a school to fuction.

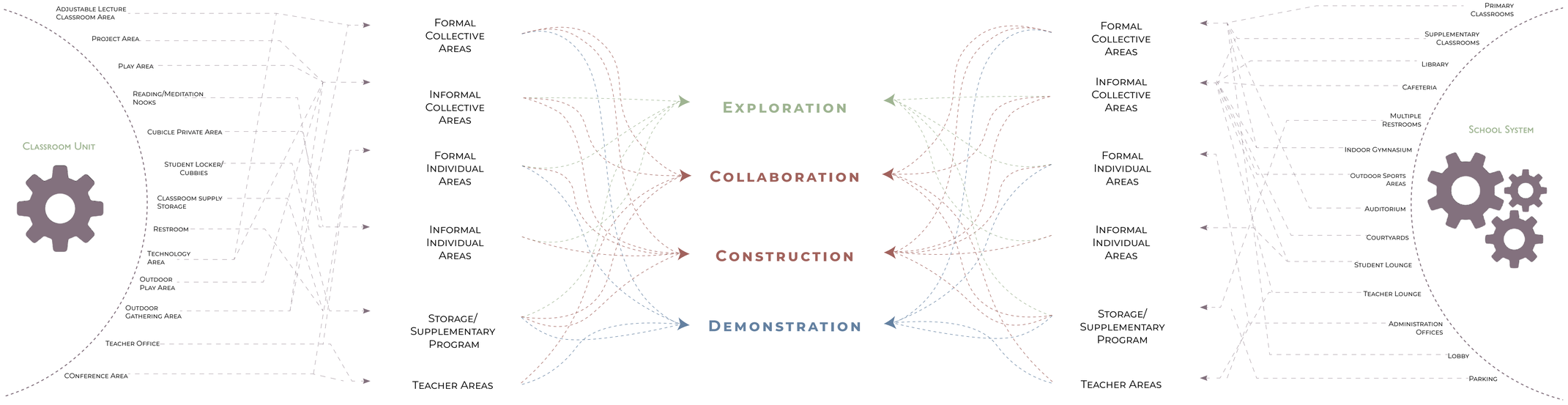


Figure 4.6 | Program Analysis

4.5 Interactions with Nature

Nature is a world full of wonder for children. A documentary called "School's Out: Lessons from a Forest Kindergarten" *showed that children who spend long expanses of time in nature are more likely to develop more acute fine and gross motor skills and saw a reduced number of hyperactivity disorders as compared with students who attended traditional kindergarten.* **Forest Kindergarten is a program found around the world which involves pre-school and kindergarten students to spend their whole days playing in nature, without any formal learning.** *The inclusion of nature in school environments becomes an important consideration. This sections explores, 1) How children interact with nature and 2) How the built environment can interact with nature.*

Nature and Children

In order to fully understand how to design for children in nature, this study looks into how children interact with nature itself. This looks at 3 different conditions—trees, hills, and water.

Trees

Run Around | Swing on | Swing on | Investigating

Slopes

Running Up | Running Down | Sliding/Rolling Down

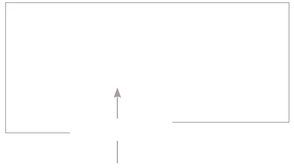
Bodies of Water

Playing Around | Playing In | Investigating

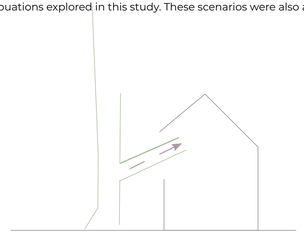
Nature and Built Environment

This study explores different massing in different environmental conditions. Three environments were studied—wooded and sloped areas and bodies of water. Each environment was studied for how a built mass would interact within, above, below, around and others to the environment. Below are the types of manipuations explored in this study. These scenarios were also analyzed through the design objectives set in the previous section.

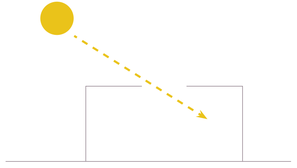
Massing Manipulations



Access to Mass



Integration of Nature



Skylight introduction

Push/Pull

Transparency vs Opacity

Design Obkectives

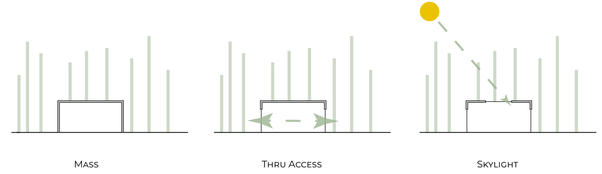
Learning

Exploration

Play

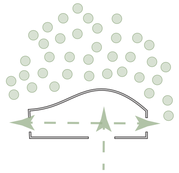
Wooded Areas

Trees Enclosing Mass

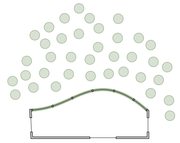


Adjacent to Natural Tree Edge

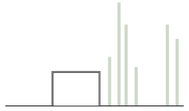
Mass



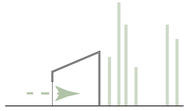
Circulation Access



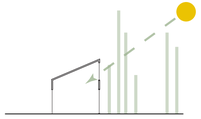
Solid vs. Transparent



Mass



Ceiling Push

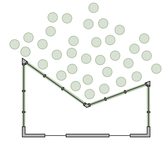


Clerestory Windows

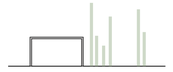
Adjacent to Designed Tree Edge

Mass

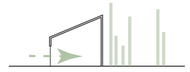
Circulation Access



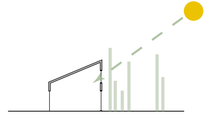
Solid vs. Transparent



Mass

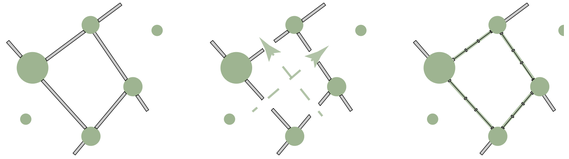


Ceiling Push

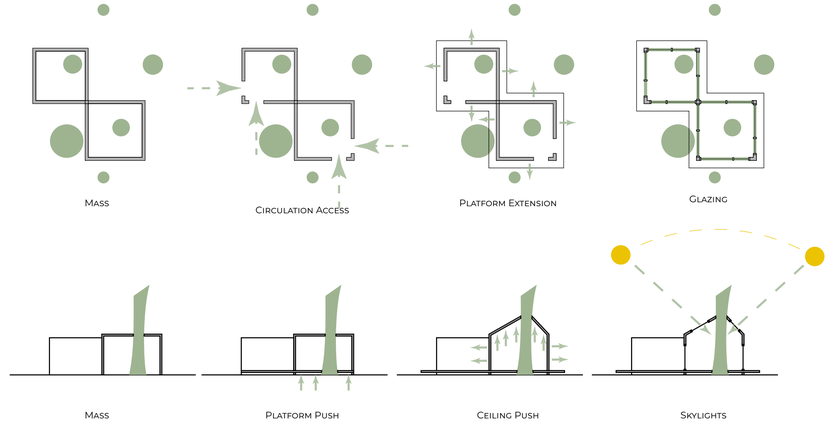


Clerestory Windows

Mass Interlocking with Trees

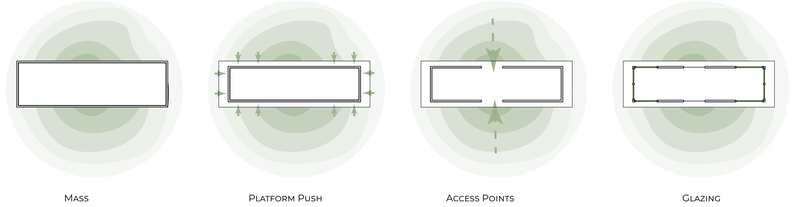


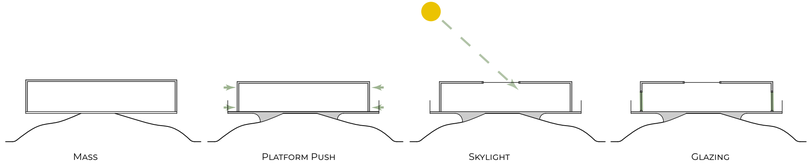
Mass Enclosing Trees



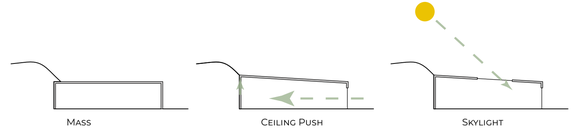
Sloped Areas

Mass on top of Slope

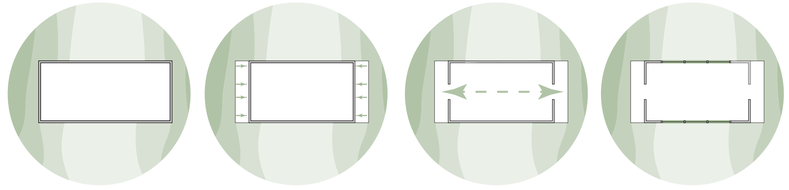


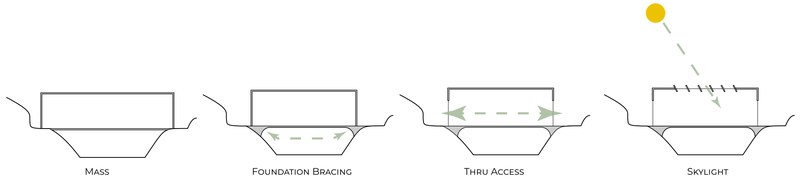


Mass Within Slope

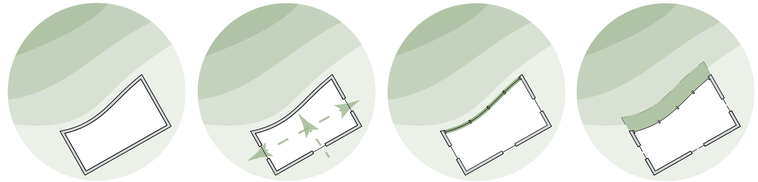


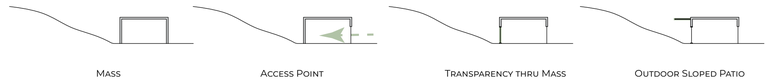
Mass in between Slopes





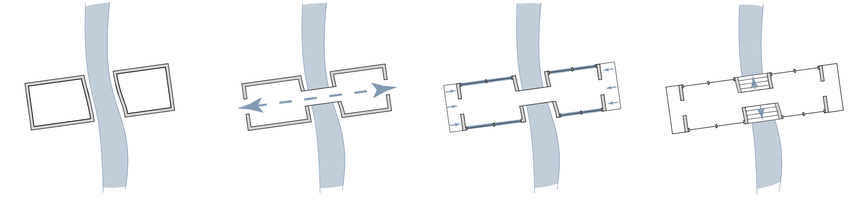
Mass Adjacent to Slope



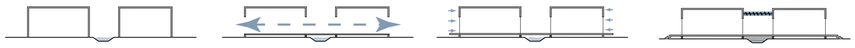


Bodies of Water

Body of Water Intersecting Mass

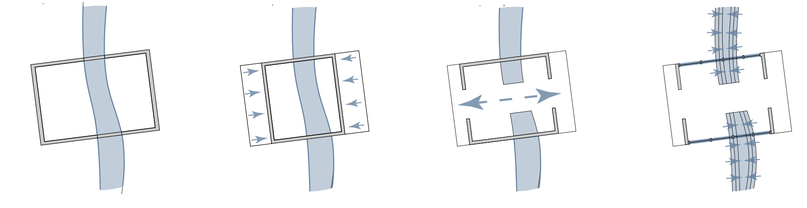


Mass | Mass Connections | Platform Push | Water Steps



Mass | Thru Access | Platform Push | Bridge covering

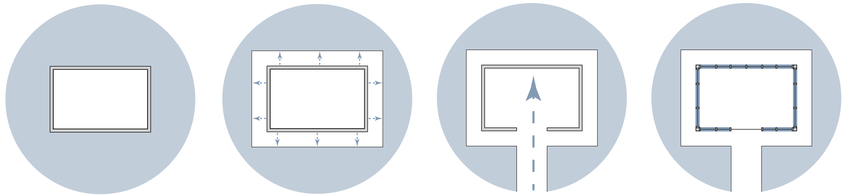
Mass intersecting Body of Water

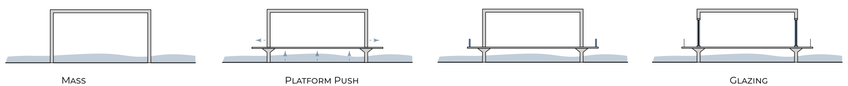


Mass | Platform Push | Access Circulation | Water Steps

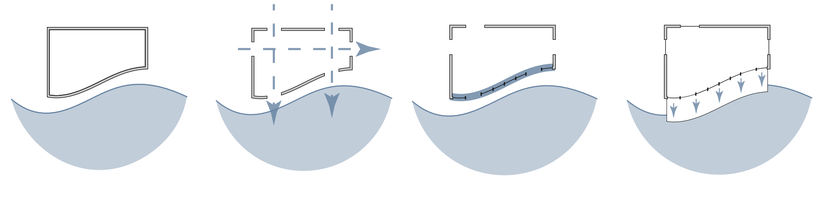
Mass | Platform Push | Thru Access | Platform Steps

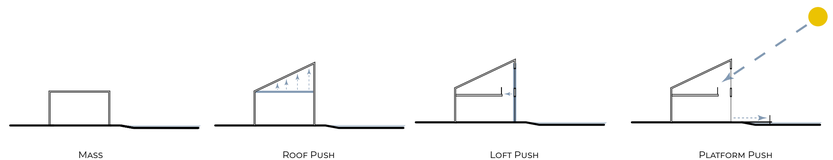
Mass Above Body of Water





Mass Adjacent to Body Water



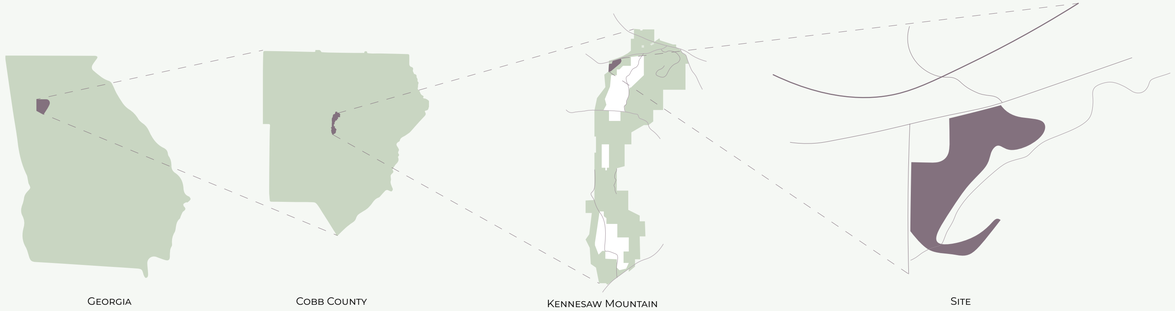


5.0 Design Synthesis

Children have real understanding only of that which they invent themselves, and each time that we try to teach them too quickly, we keep them from reinventing it themselves."

-Jean Piaget

5.1 Site



Georgia

Cobb County

Kennesaw Mountain

Site

The site chosen for this model offers 3 important considerations; 1) Direct access to nature, 2) Provides ample land to develop various, distinct learning programs, and 3) proximity to a major natural landmark: Kennesaw Mountain Battlefield National Park.

Site Analysis

Figure 5.1 | Gilbert Road Site

Context

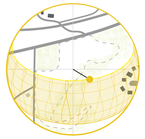
Gilbert Trail Head

Hilltop

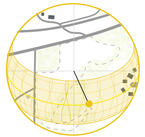
Lone Tree and Cluster of Trees

Tree Edge

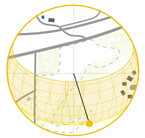
Sunlight Study



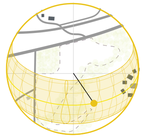
Summer Solstice



Fall Equinox



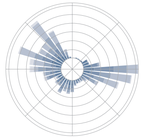
Winter Solstice



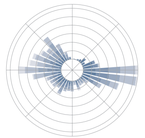
Spring Equinox

Wind Patterns

Summer



Fall



Winter

Spring

Traffic Patterns

8 AM

12 PM

3 PM

6 PM

Canopy Study

This study focuses on the foliage canopy found on the site. The southern treeline is the focus. This edge is a major component of design for Model for Play.

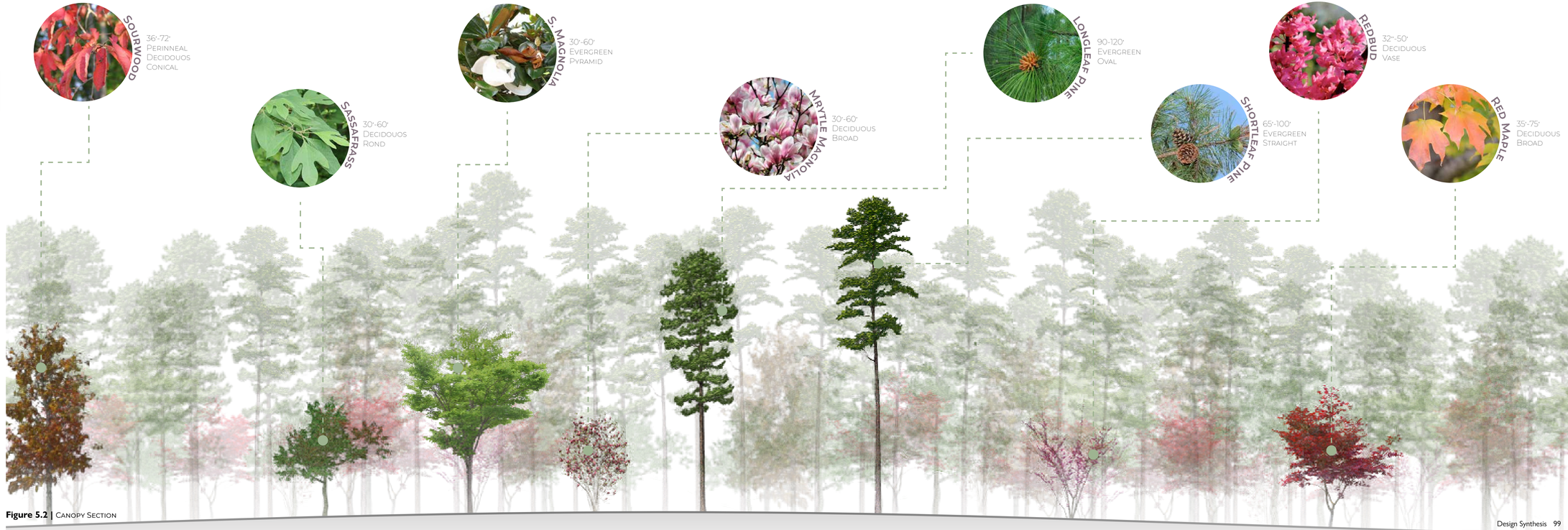
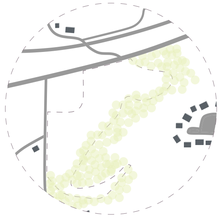


Figure 5.2 | Canopy Section

MODEL FOR PLAY

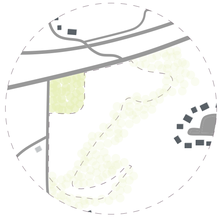
AN ACTIVE LEARNING PRIMARY SCHOOL CAMPUS MODEL

Site Design Forces

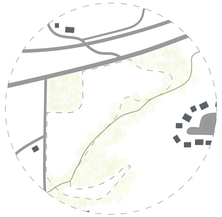


Southeastern Tree Edge

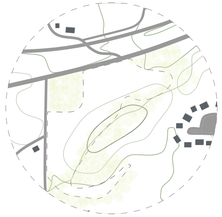
Southern Clearing



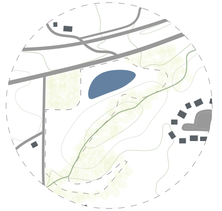
Tree Cluster



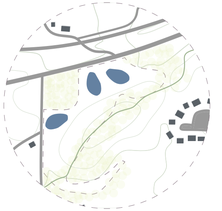
Gilbert Trail



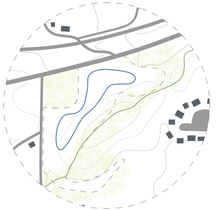
Rolling Hills Topography



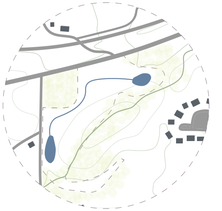
Water-Source Introduction
Large Pond



Water-Source Introduction
Multiple Ponds



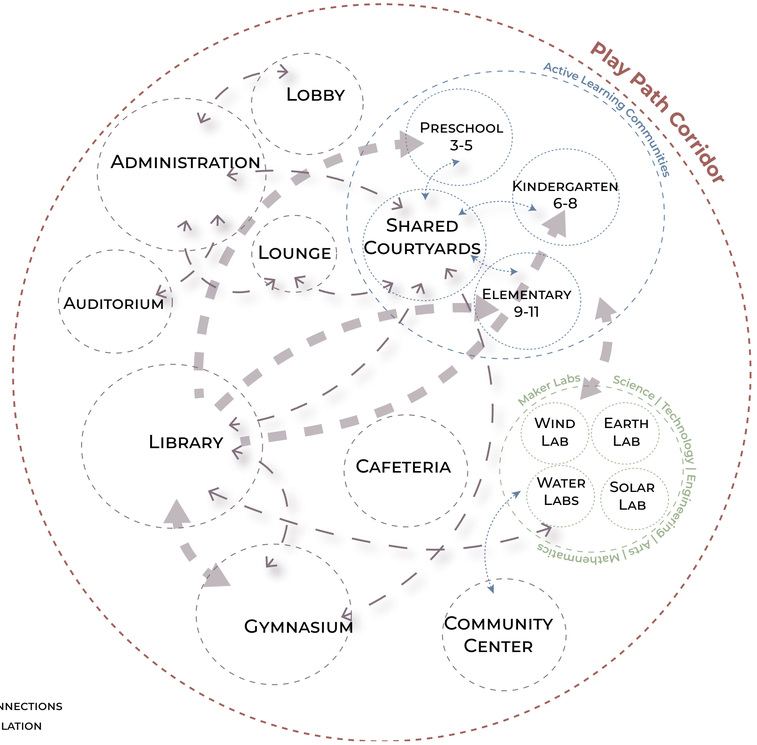
Water-Source Introduction
Creek



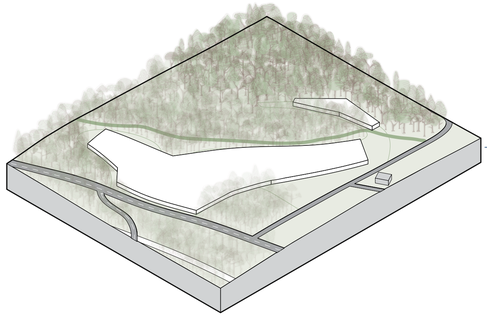
Water-Source Introduction
Creek-to-Pond

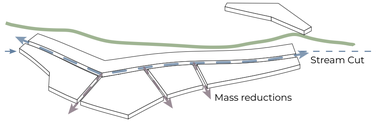
Or Or Or

Program Distribution

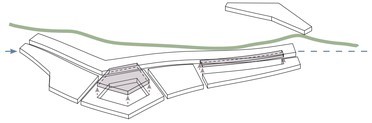


Form Design

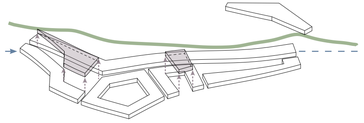




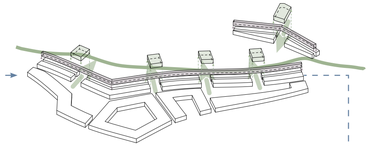
Mass Cuts



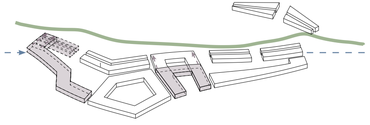
Courtyard Cutouts



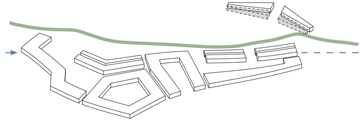
Courtyard Cutouts



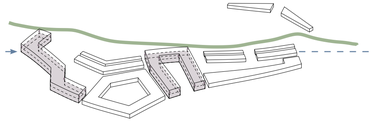
Breezeway and Forest Access Points



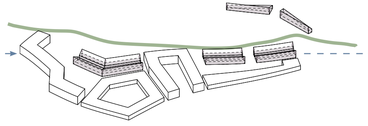
Mass Extensions



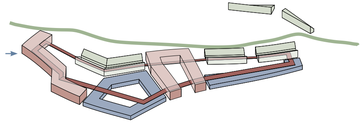
Corner Mass Removal



Second Level Addition



Forest-Edge roof Pitches



Play Corridor
- Learning Program
- Exploration Program
- Play Program

Model for Play | An Active Learning Primary School Campus Model

Model for Play | Learning Environments

Active Community Learning

Active learning involves using creative thinking to solve problems, all while working in a collective or team. Active Learning spaces provide teachers and student ample learning environments with different settings to cater to different scenarios. These environments more closely resemble the traditional classroom teaching without the traditional methods or classrooms designs.

Exploratory Learning

Exploratory learning, similar to active learning is learning through creative/ computational problem solving. The difference is that exploratory learning caters more closely to specific interests of students through guided learning.

Independent Learning

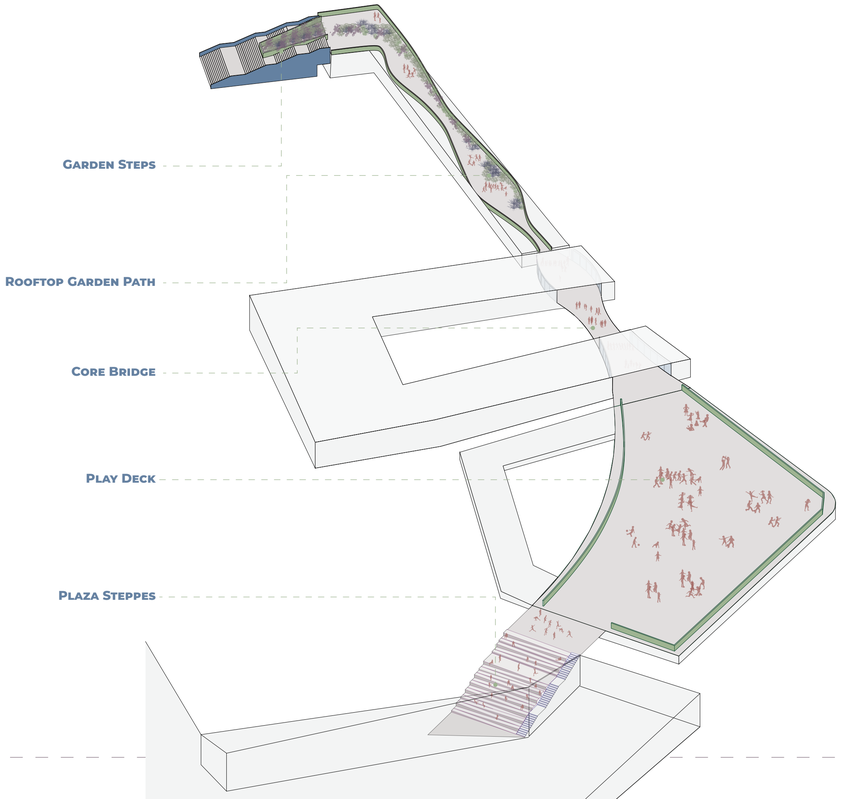
Independent Learning spaces are those that allow student to work on their own, on the subjects they wish to explore. These spaces are more versatile and free and provide students with the freedom to work at their own pace and in the environment they wish.

Play Learning

Although play is at the core of all activity in this model. There are specific areas, where the only mode of learning is play. Instead of creating enclosed play ground, the entire site becomes a space for play, through the addition of a play corridor connecting one end of the site to another.

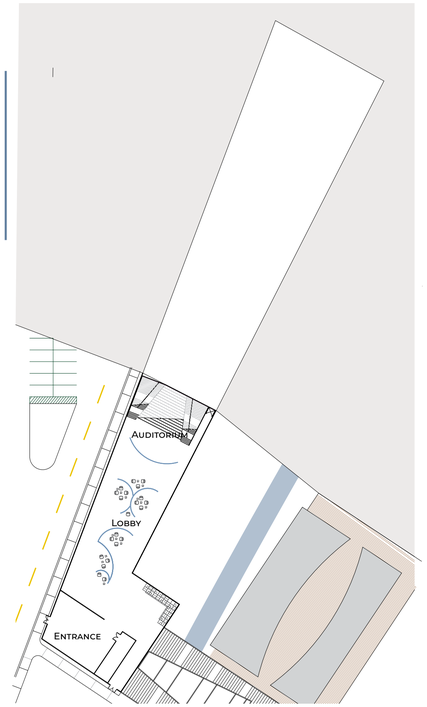
Play Corridor

The corridor serves as the connection between all points on campus. The loop contains different environments that promote play and exploration. The corridor loops up, down and through buildings as it traverses the site. The path begins at each end of the site, each entry with a set of designed steps.

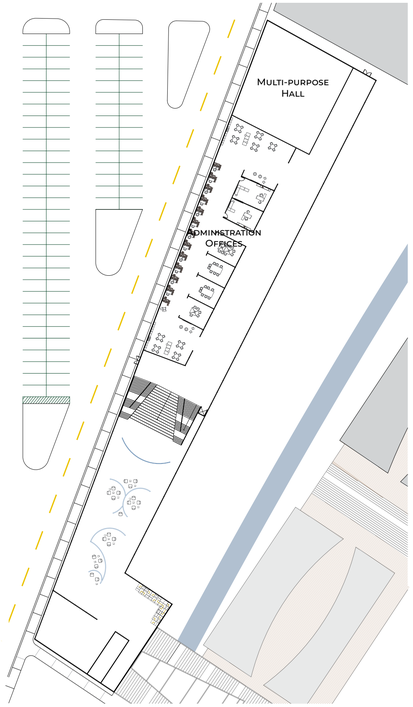


Administration Building

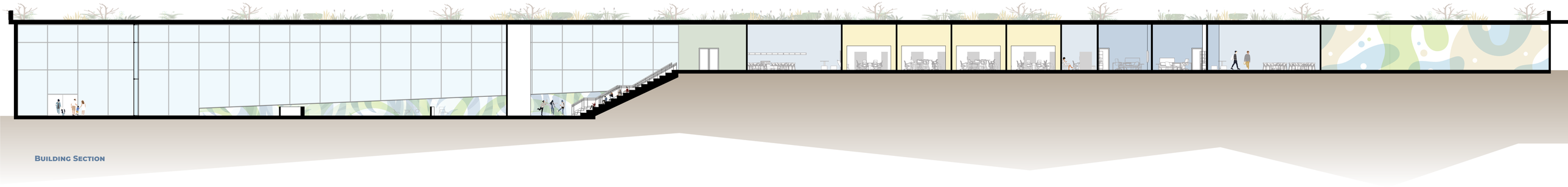
The Administration Building is home to the formal entry to the campus. This building hosts the lobby and the administrative offices for the school. The lobby has double height ceilings and ends with an open auditorium space. Once on the second floor the space becomes an open floor office-style space with conference rooms and private office and ending with a multi-purpose hall which can be home to many different activities and events.



Ground Floor



First Floor



Building Section

School Entrance

Lobby

Stepped Auditorium

Administration Offices

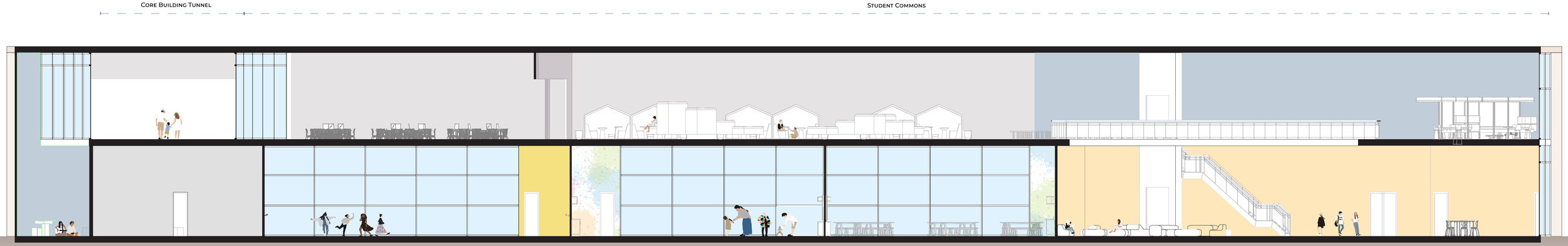
Multi-use Hall

The Core

The Core Building acts as a central point for the campus meant to be a place for lounging and informal meeting time. The cafeteria is the focal point of the focal area with indoor and outdoor seating options along the Play Corridor. Supplementary learning is also held in this building—Music, Art and Dane studios are found here. Bringing the idea from higher education, the second floor is a student commons area with multiple lounging areas as well as collaborative areas for students.

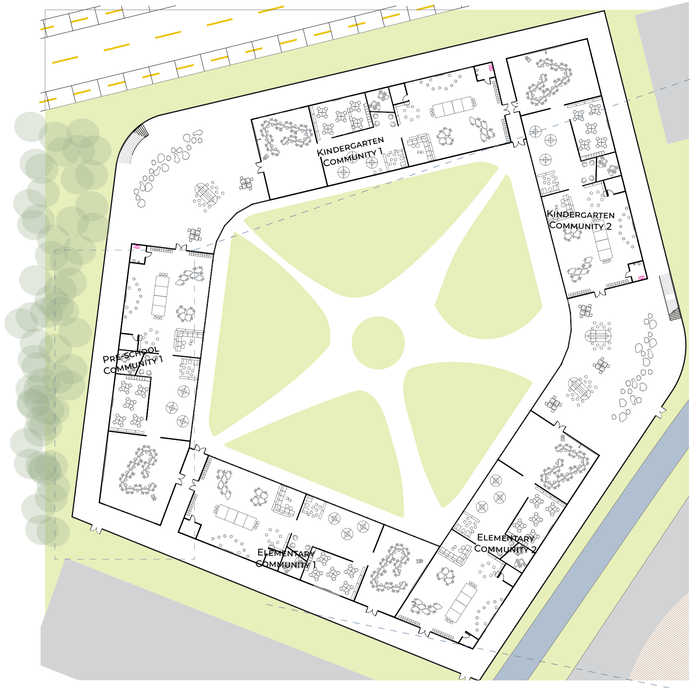
First Floor

Second Floor

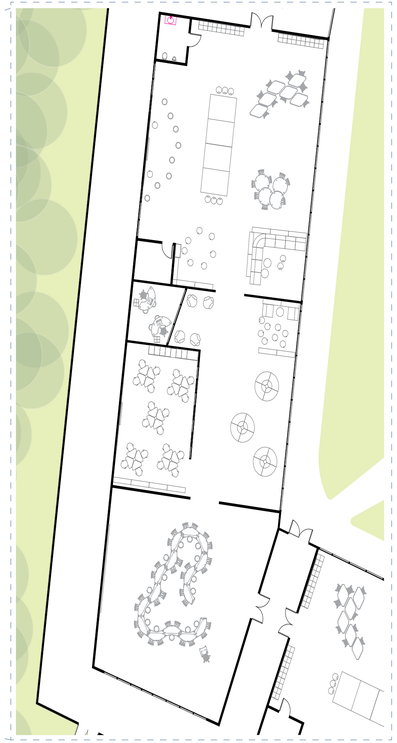

Core Building Tunnel
Student Commons
East Leg Section
Music Studio
Dance Studio
Art Studios
Cafeteria

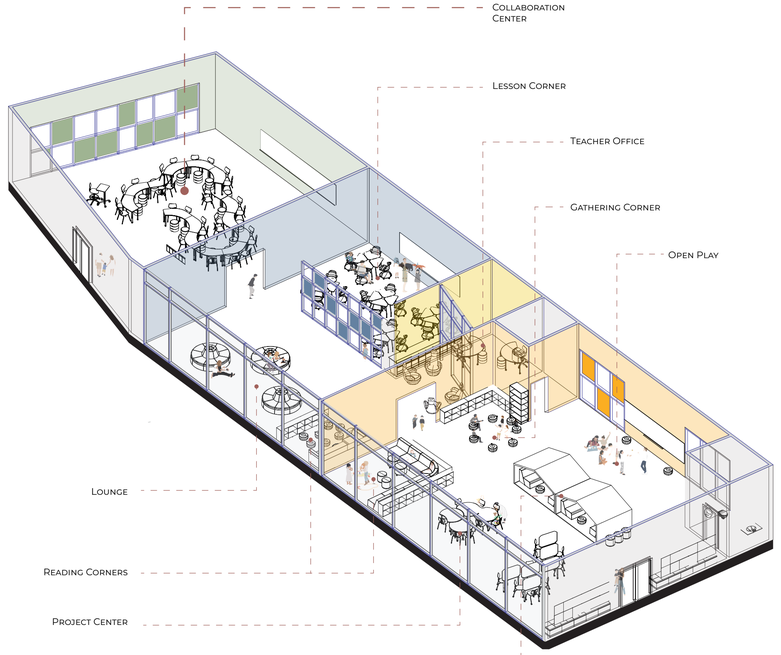
Active Learning Communities

These communities are the hub of "formal learning." Taking methods of Montessori classrooms and maker spaces, these active learning communities function as the "classrooms" of the campus. These communities implement S.T.E.A.M curriculum through Montessori learning. Each community hosts children of different ages, following the idea of collective learning. The spaces are flexible so that all furniture can be arranged for different activities. The community is broken up into three sections—the living room, the discussion center, and the collaboration area.



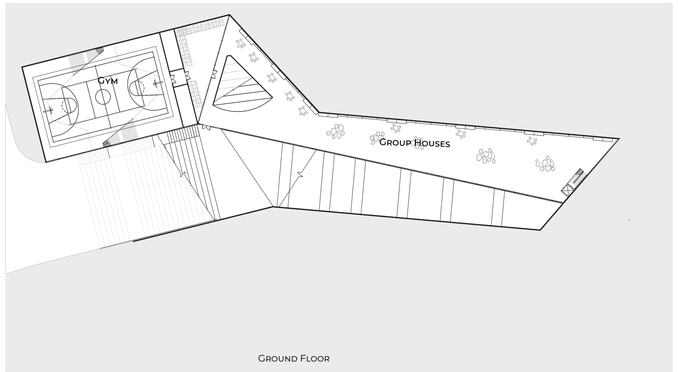
First Floor



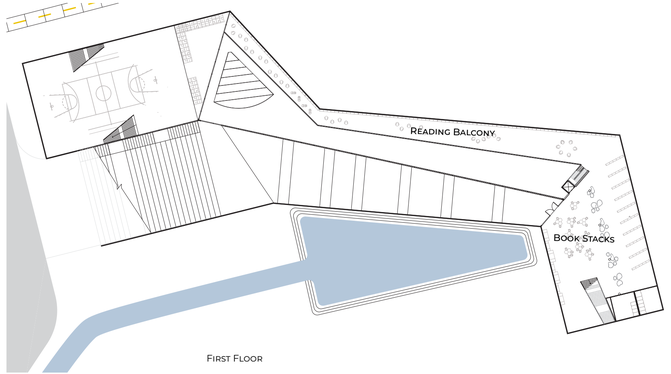


Hybrid Library-Gym Building

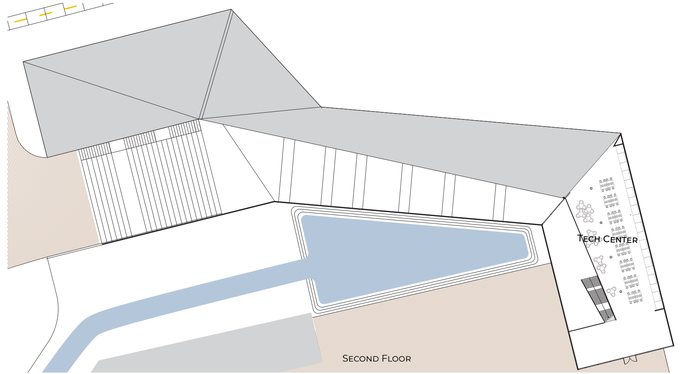
This building takes two opposing programs—the gym and the library—and puts them under the same roof. The 3-tiered library is meant to create chance interactions by making more spaces that allow for collaboration and sharing through reading and technology. Similar to the commons in the Core Building, this building reflects methods of higher education design and adpats it to the the K-5 enivronment. The gym, which is known for the noise and engagement, is a transparent space, creating a sense of openness throughout the building.



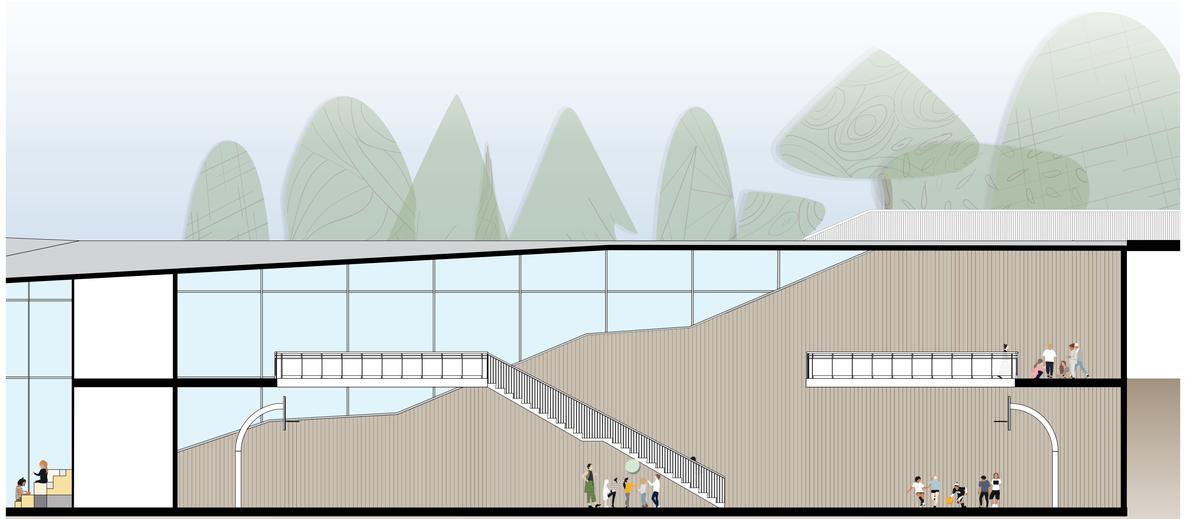
Ground Floor



First Floor



Second Floor



Gym Section

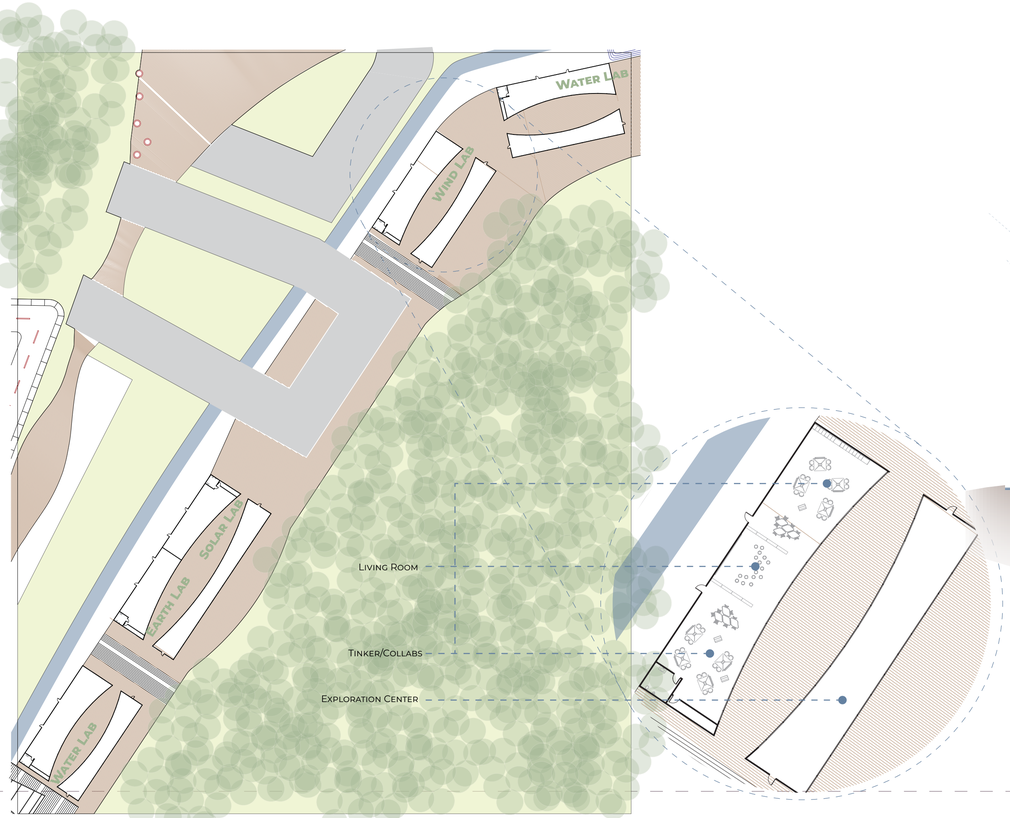
Lobby
Storage
Entrance
Sports Court
Play Balconies

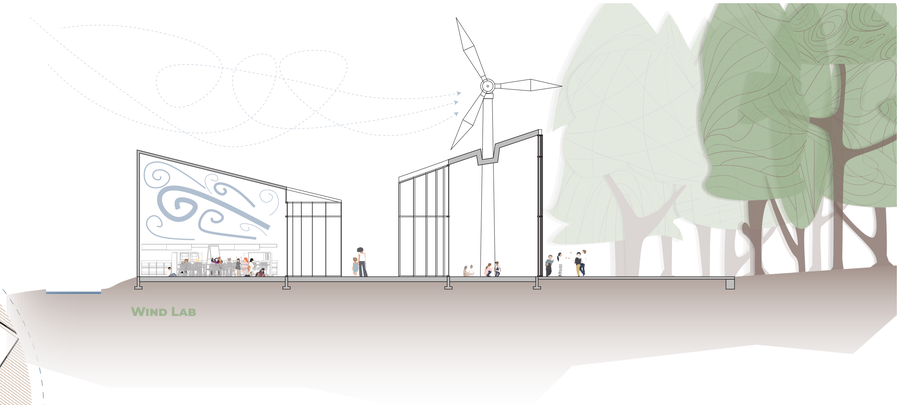
Ground Floor
Collab Homes

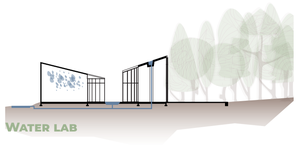
first Floor
Reading Balcony

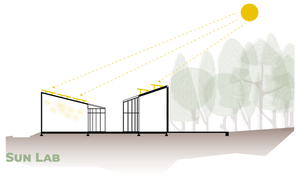
S.T.E.A.M Labs

Although S.T.E.A.M. curriculum is applied throughout the project, the Labs focus on specific methods of teaching based on the mechanics and design of building systems. Each lab focuses on how an environmental element works through the perspectives of the different subjects in the curriculum and how they interrelate.



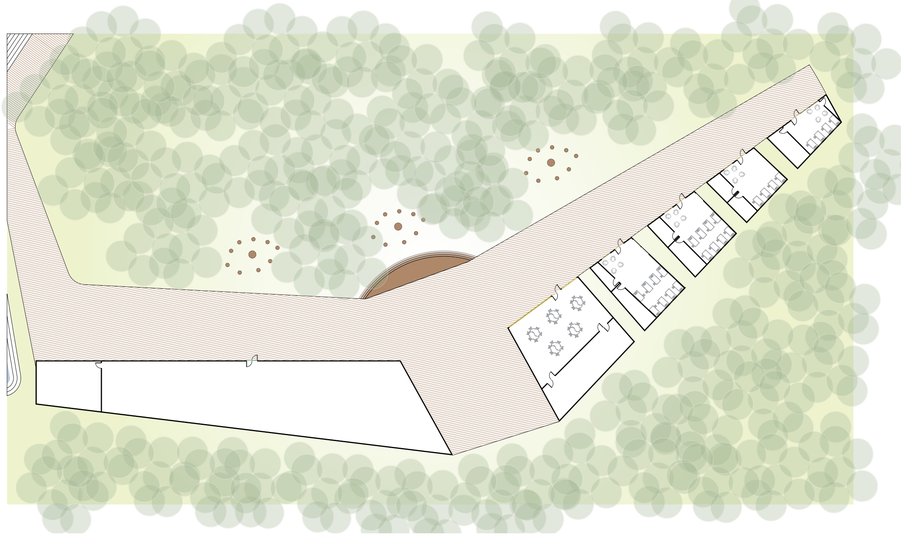






Community Camp Center

The center is home to the campus camp grounds. Kennesaw Mountain provides a variety of natural paths and grounds to explore. This center will allow for overnight activities and explorations of the nature surrounding it. The camp has multiple cabin-style buildings and a open multi-use hall.



6.0 Summary

"I am convinced that the best learning takes place when the learner takes charge."

-Seymour Papert

5.1 Summary

Research

The primary focus of this thesis was to research new models for childhood education. It is acknowledged by the education and psychology fields that play is the main source of education for children. In actual practice, though, play has little to do with education. New models for learning are opening up a discussion on the future of education and its need for play-inclusive environments. This research highlights not one but 6 different modes of learning that require play and exploration to be effective, including computational/creative thinking, multiple intelligence theory, S.T.E.A.M curriculum, tacit knowledge and collective learning. All these theories require not only a change it teaching methods in school--to one of play-/active-based learning, but also environments that allow these types of learning strategies to be implemented. The traditional classroom unit simply isn't enough.

Design

Public elementary schools in the US have the same design almost everywhere. Little is ever taken into account when it comes to site-based design and a buildings relation to nature. Model for Play intends to take these measures into account, while also providing a look into more play-based learning environments. This model looked to find a balance between formal learning and independent play. There are learning spaces that allow for more formal learning, which is required for teaching/learning certain topics, and spaces that allow children to learn as they please. One very important aspect of this model is the idea of independence of learning: where a child can choose what they wish to learn, in the ways they wish to learn them. When children are allowed to follow their own interests they are more likely to be engaged in their education.

5.2 Reflection

Research

The models for playful learning already exist in the educational theories. A lot is lost in translation when it comes to application. Theories are great jumping points for change but require action to really create a difference. The great educators of the past acknowledged and implemented ways that allowed children to explore. These practices are usually left behind when more "formal" learning begins to happen.

Disintrest in learning is widely accepted in our society, with children seeking other means to grow and when they get older make a living. This is widely seen in video game communities and social media influencers.

The big concern of our time is how to teach a population of children—who can get all the information they currently receive in school on the interent—something they find fulfilling. Tapping in individual interests is one step. Allowing children, from a young age, to think independently and how to problem solve effectively and in real life is the next step. Lastly, creating a desire for learning new things is vital to bring children back into the classroom, physically and mentally.

Design

Nowadays we are seeing a serge in active-learning design. This though is mostly seen in middle- and high school and in higher education. Seldom do we see a primary school that allows for programs like S.T.E.A.M. to become the core and only way of learning. Although younger children seem to need more supervision, because of their age, this research and model takes the opposite opinion. Children, if left to their own devices, can learn how to problem solve independently with little stimulation from adults. This model takes the teacher and transforms them into mentors or guides. Of course, they still are the "authority" figure in the relationship, but it makes them, in the eyes of the student, less intimidating and more approachable.

The walls that enclose classrooms, therefore, are less so barriers/obstacles for learning, but more so environments for the imagination and exploration of young minds. The variety of spaces create different dimensions of learning for children and teachers alike to explore.

5.3 Further Study

Design of learning environments is always changing. There is a movement now to a more focused way of learning, where the student comes first and the master-student dynamic comes second. Active and interest-based learning is at the forefront of the movement. It has been shown time and time again that when students are allowed to follow their interest, they are more likely to get more out of their education. Architecture plays a key role in creating spaces that are devoid of assemblies and rules and allow students to explore the world as they see it.

In the future, this study will continue and will expand on concepts of interest-based learning through play. It is the hope of this thesis that in the future design guidelines will be created to design school environments which focus solely on the idea of play as the natural form of learning.

Design, though, isn't sufficient enough to create these environment. The education system needs to shift to a system of value learning rather than a system quantitative learning, based solely on students performance and grades. A next step would be widespread curriculum changes that allow not only students to have freedom in their learning, but also allow teachers the freedom to explore teaching styles and methods that give students the ability to follow their interest.

Finally, nature has played a huge role in active learning. Having access to nature in a school, is vital to not only the physical development of children, but also the cognitive development of children. In a further study, the effects of nature on the learning of children will be investigated to see how design can change to create more moments of interactions with nature in learning.

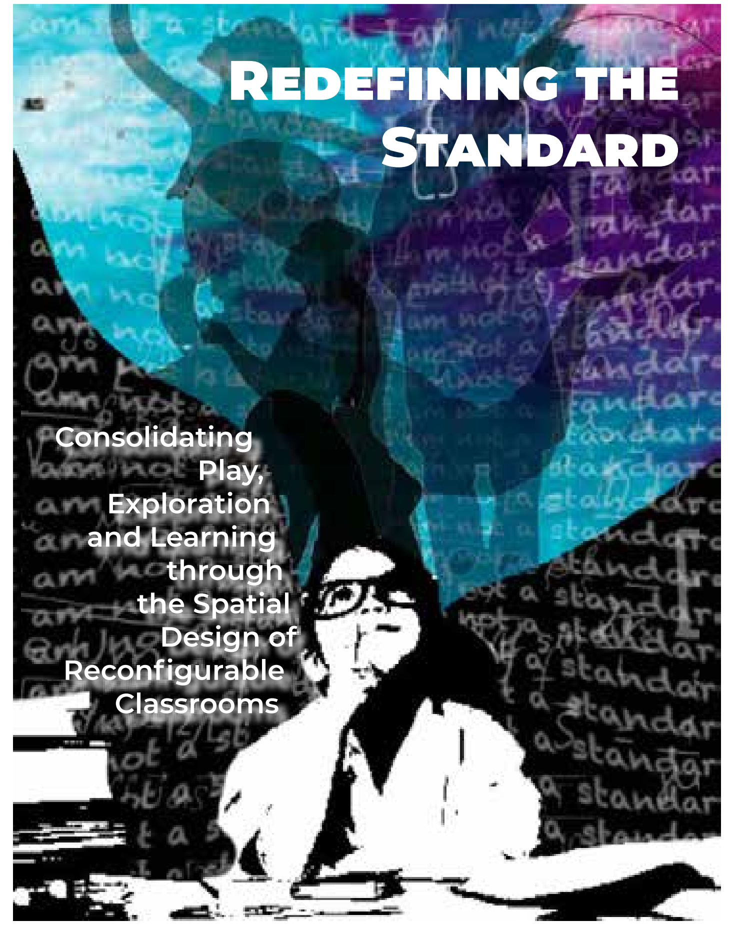
A.0 Appendix

'Tell me and I forget. Teach me and I remember. Involve me and I learn.'

-Benjamin Franklin

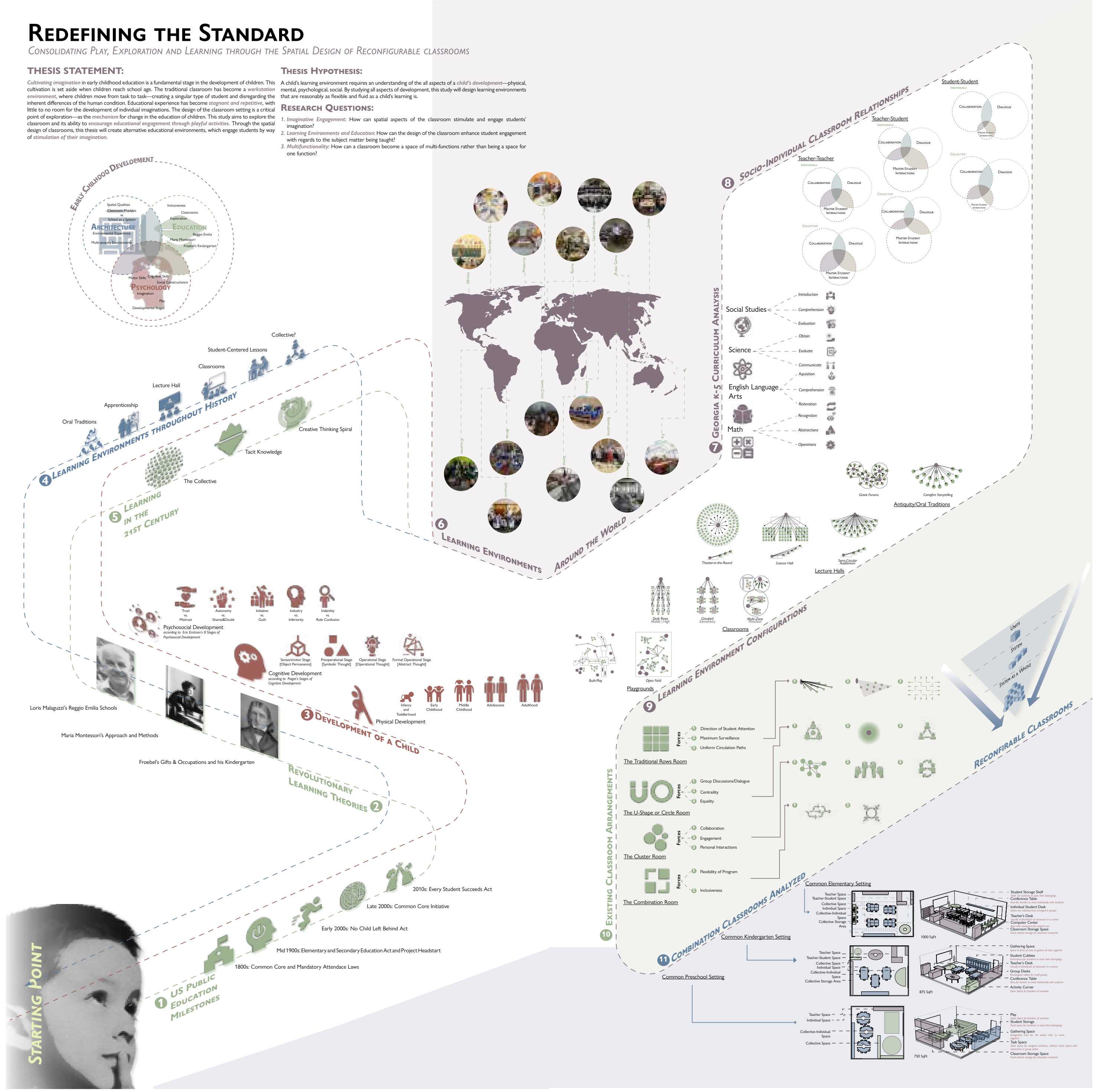
Appendix A: Presentations

1.0 3-MT Competition
Monday November 4th, 2019

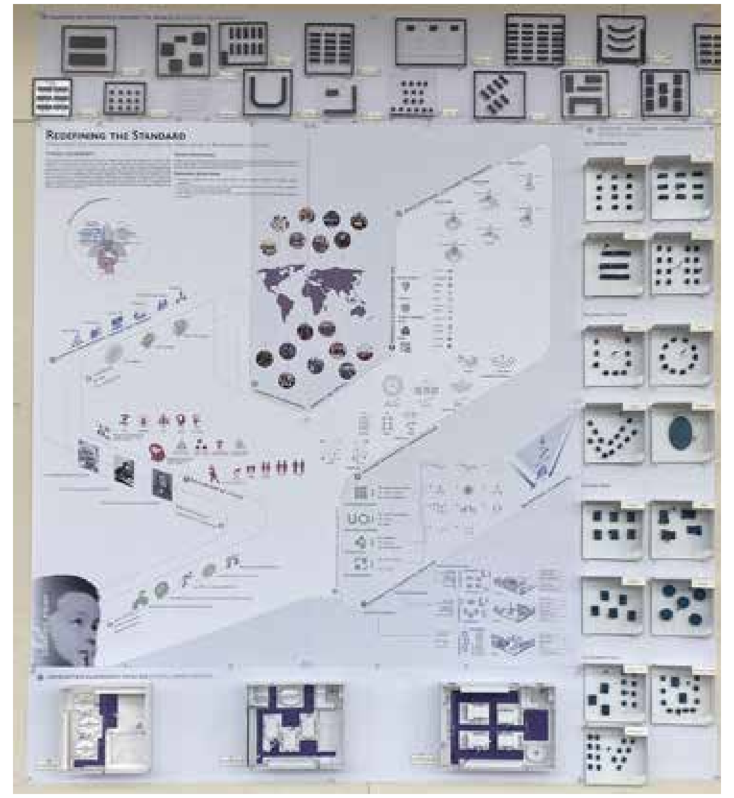


Poster | Miniatures Fall 2019

2.0 Miniatures
Wednesday, December 11th, 2019



Digital Boards | Miniatures Fall 2019



Board Composition | Miniatures Fall 2019

1.0 Thesis Competition
April 2020

Synopsis | Thesis Competition Spring 2020

Appendix B: Awards

1.0 URCA Conference Scholarship

2019 ACSA Fall Conference: Less Talk | More Action

Session Co-Presenter:

Soft Boundary [4x4]: A Critical Look at Research in Architectural Education

Stanford University

September 13th-15th, 2019

ACSA ASSOCIATION OF COLLEGIATE SCHOOLS OF ARCHITECTURE

LESS TALK | MORE ACTION
CONSCIOUS SHIFTS IN ARCHITECTURAL EDUCATION

June 17, 2019

Dear Ana Giron

On behalf of the ACSA and the 2019 ACSA Fall Conference co-chairs, Amy Larimer & John Barton, Stanford Architecture and Sunil Bald & Deborah Berke, Yale School of Architecture, we are pleased to report that your poster presentation has been accepted and will be included in the presentation session and undergraduate workshop organized by Liz Martin-Malikan (session chair) for *Soft Boundary [4x4]: A Critical Look at Undergraduate Research in Architectural Education*. The 2019 ACSA Fall Conference, LESS TALK | MORE ACTION: Conscious Shifts in Architectural Education, will be held September 13-15, 2019, in Stanford, CA. Abstracts were reviewed by anonymous peer-reviewers and this year's acceptance rate was 37%.

Accepted authors will be required to sign a copyright transfer agreement, and agree to present at the Fall Conference in Stanford. Posters and papers that are not presented at the conference will not be included in the Proceedings. Additionally, it is policy that presenters must pay the fall conference registration in order to be included in the conference program and proceedings. To assist you in preparing your final presentation and publication, we are including feedback on your poster abstract from one or more of the reviewers. Please see below for reviewer comments.

ACTION ITEMS

1. Register for the Conference
   Deadline: August 14, 2019
   Due to the uniqueness of the presentations, spaces and workshop activities taking place at this conference, we are still working on the registration rates and will have online registration active in early July. We will contact you once the registration is active.

2. Reserve Your Hotel
   Deadline: August 27, 2019
   The conference hotel is the Sheraton Palo Alto, CA. Reserve by August 27, 2019 to receive the ACSA group rate of $149. Online Reservations: Sheraton Palo Alto
   Hotel Direct Number: 1-800-325-3535

3. Work on your Full Paper/Final Poster
   Deadline: October 16, 2019
   Please submit your 2019 Fall Final Poster and/or workshop outcomes and Copyright Release Form
   Final posters/papers are not due until post-conference to allow authors to incorporate discussions and additional research into the final paper. It is required that you upload your final paper to the ACSA website by Wednesday, October 16. Final papers must be formatted to the ACSA Proceedings Template. The template and complete instructions will be emailed later this summer.

CONFERENCE PRESENTATION

Conference participants are responsible for providing their own materials/supplies (i.e. prints, paper, markers, sacto, food/drink, etc.) necessary for their presentations. Due to the high volume of comprehensive and unique material requests, ACSA is unable to provide and co-ordinate supplies outside of specific spatial needs and equipment (i.e. projectors, tables, chairs). There will be a follow-up email with more detailed information regarding your session, co-presenters, the conference presentation format, and the conference schedule.

Congratulations and we look forward to your participation! The most up-to-date conference information will be posted on our website at http://www.acsa-arch.org as it becomes available. Please do not hesitate to contact us with any questions.

Best,

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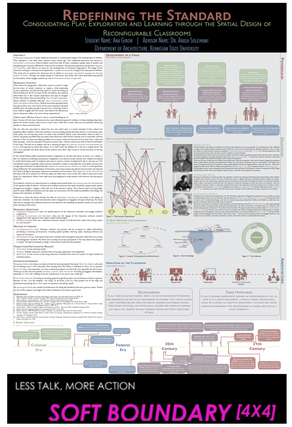
Acceptance Letter | ACSA Less Talk | More Action Fall 2019



Presentation Poster | Soft Boundary [4x4]

Conference | Less Talk | More Action


Soft Boundary [4x4]: A Critical Look at Research in Architectural Education
Elizabeth Martin-Malikan, Ana Giron, Caleb Lawrence, Maryvia LaRosa, Devon Sams, Breck Small, Jared Triemer, Kennesaw State U.

Architectural research is a broad term with a long history. In the 1960s, architectural research referred to the study of design itself, its purpose and processes. This is still how the term is often used in academia today. This paper takes a step toward characterizing architectural research, where the interaction between Theorem and Practicum is used not only as a guiding principle in the critical thinking process but also is a springboard for constructive practices in the built realm. It is an inquiry into the nature of this interaction and how it may be understood through differential modes of cross-pollination occurring within various aspects of architectural discourse and practice. Specifically, the paper examines the potentialities of architectural research in the first professional degree, or Bachelor of Architecture (B.Arch) program, which traditionally is designed to prepare undergraduate students for practice and licensure.

Using a curatorial process to not only confront the conference theme of 'less talk, more action,' but also create an active dialogue between the master and the student, 16 architects were asked by students to examine and explore the concept of the soft boundary between a theorem and practicum. This collaborative project shifts the structure where the student sets up the premise and the master-architect responds by making. This curatorial investigation is explored in four perspectives, labeled 'about', 'within', 'explore' and 'expand' that are categorized according to their relationship to the soft boundary between Theorem and Practicum. Furthermore, these four attributes permeate and connect the diverse areas of research explored, which in combination provides an argument that rather than questioning, "is doing architecture doing research" as articulated by Jeremy Till, instead asks: "is doing research doing architecture". Our aim is to expand the pedagogical field where the interaction of Theorem and Practicum is not an isolated act, but one of making.

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2019 ACSA Fall Conference **Abstract Book**

Session Abstract | Soft Boundary [4x4]

Appendix C: List of Figures

1.0 Proposal

2.0 Theory

3.0 Theory Explorations

4.0 Design Process

5.0 Design Process

References List

1.0 Proposal

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2.0 Theory

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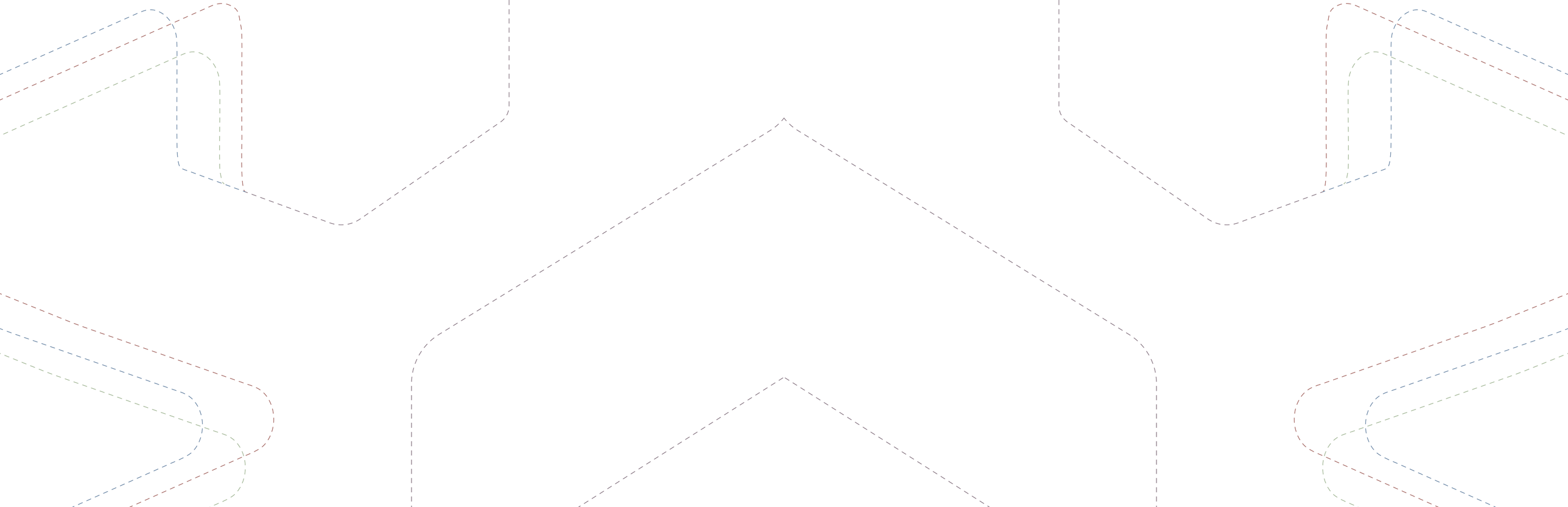

"It is a happy talent to know
how to **play**."
-Ralph Waldo Emerson