Model for Play | Creating Environments for Learning through Playful Exploration

Ana Giron

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Creating Environments for Learning through Playful Explorations

Ana Giron

Advisor: Arash Soleimani

Kennesaw State University
College of Architecture and Construction Management
Department of Architecture
Model for Play
Creating Environments for Learning through Playful Exploration

Request for Approval of Thesis Research Project Book Presented to:
Dr. Arash Soleimani
and the
Faculty of the Department of Architecture
College of Architecture and Construction Management

Ana Giron
In partial fulfillment of the requirements for the Degree
Bachelor of Architecture (B.Arch.)
Kennesaw State University
Marietta, Georgia
May 1, 2020
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.

Acknowledgments:
To my son, Adrian, who inspired this thesis.
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.

Very special thanks to Dr. Arash Soleimani, who
not only advised me throughout this thesis and
all of my architecture education, but for also
unknowingly making me question and change
my life goals.

To all the faculty in the Department of
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the last 5 years.

To my friends, in and outside architecture, for
good times, laughs, cries, and overwhelming
support.

Finally, to Alan Jovani Morales, may you rest
in peace, for being the biggest source of
inspiration and motivation.
“We discovered that education is not something which the teacher does, but that it 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
1.2 Research Questions

1. Imaginative Engagement: How can a classroom become a space of multi-functionality, where children move from task to task—creating a singular environment where children learn to navigate all the information they are absorbing. Play through imagination is an extracurricular activity. Our children are placed in sterile blocks with assigned work areas and no route of assignments day in and day out. Our education systems, especially used in primary education, create an assembly line of students, and produce a single type of student. A system designed to help teachers and enhance the learning of students? Thoughts, learning, imagination. What first comes to mind? It might be the driver education of children. In the United States educational system, imagination is not the main focus of learning. Architecture is often left out of the decision making. This research is an assembly line of students, and produce a single type of student. 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Our education systems, especially used in primary education, create an assembly line of students, and produce a single type of student. A system designed to help teachers and enhance the learning of students? Thoughts, learning, imagining.
"Our task, regarding creativity, is to help children climb their own mountains, as high as possible."

-Loris Malagazzi

2.0 Theorem

2.1 Development of a Child

2.2 Multi-sensory Experience of a Child

2.3 Education | Theories of Good Practice

2.4 History of Public Schools and Standardized Testing in the US

2.5 Learning | The Unstandardized Way

Modern Educational Theories

2.6 The Evolution of the Learning Environment

2.7 A Conclusion
2.1 Development of a Child

From Birth to Adolescence

<table>
<thead>
<tr>
<th>Area of Study</th>
<th>Early Childhood</th>
<th>Middle Childhood</th>
<th>Adolescence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Infants rely on reflexes for basic needs.</td>
<td>Children begin to develop basic gross motor skills.</td>
<td>Children develop fine motor skills.</td>
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<tr>
<td>Psychosocial</td>
<td>Infants strongly rely on their reflexes to learn.</td>
<td>Children also develop observational learning.</td>
<td>Adolescents begin to explore abstract concepts.</td>
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<tr>
<td>Sensorimotor</td>
<td>Senomotor stage: infants explore the world through all senses.</td>
<td>Children in this stage are also able to hypothesize.</td>
<td>Adolescents can relate abstract concepts.</td>
</tr>
<tr>
<td>Preoperational</td>
<td>Preoperational stage: children begin to mature physically.</td>
<td>Adolescents also develop symbolic language.</td>
<td>Adolescents can hypothesize.</td>
</tr>
<tr>
<td>Concrete Operational</td>
<td>Concrete operational stage: children begin to relate abstract concepts and create new relationships.</td>
<td>Adolescents can relate abstract concepts.</td>
<td>Adolescents can relate abstract concepts.</td>
</tr>
<tr>
<td>Formal Operational</td>
<td>Formal operational stage: children can form their own model of the world.</td>
<td>Adolescents can also relate abstract concepts.</td>
<td>Adolescents can also relate abstract concepts.</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Cognitive development of children includes language, memory, and imagination.</td>
<td>Adolescents can also relate abstract concepts.</td>
<td>Adolescents can also relate abstract concepts.</td>
</tr>
<tr>
<td>Socioemotional</td>
<td>Socioemotional development of children includes social skills and emotional regulation.</td>
<td>Adolescents can also relate abstract concepts.</td>
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2.2 Multi-sensory Experiences

<table>
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<tr>
<th>Multi-sensory Experiences</th>
<th>Perceivably</th>
<th>Dimensionality</th>
<th>Spatial Qualities</th>
<th>Sound/Noise Permanence</th>
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Chapter Title

2.3 Education

Theories of Good Practice

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 industry, and later as an 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 of 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

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 value of his teachings and his kindergarten schools.

Froebel’s Principles

Froebel believed in the wholeness of childhood. He believed that childhood is not just preparation for something later in life, childhood is a stage in life in itself. He rejected the idea of preparing children for a profession far adulthood, but lived life as a child. The stages of childhood should be considered—mental, physical and emotional. All these aspects of a child are interconnected and 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 were 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, etc. These were designed to teach certain skills for children. Like gifts, the focus is on discovery, occupations lead to invention.

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 his kindergarten to be a way that it’s necessary to create a garden for children to explore. He believed in the idea that humans are creative beings. Because of this, early education of children should involve hands-on activities that help the student explore how things work. Play, movement, and creativity are the core ideas of Froebel’s kindergarten. Froebel wanted to allow children to express who they are and what they want. These ideals were embodied in Froebel’s kindergarten and altered permanently our values and ideas of the kindergarten approach.

Froebel’s theories are still in all early childhood learning environments and in teaching methods still today. Kindergarten is the hallmark early childhood education today.

Figure 2.3 | Theories Introduction

Figure 2.4 | Froebel’s Box of Gifts

Figure 2.5 | Kindergarten

For more information on Friedrich Froebel, visit: http://infed.org/mobi/fredrich-froebel-frobel/
Children succeed. Adults witnessed how well-behaved students were and were much surprised, this classroom setup created a peaceful environment where children have the freedom and independence to explore at their own pace. Maria Montessori believed that learning was an inherent capability of children. She designed her classrooms to allow children to take charge of their own activities from a young age. Each classroom was designed with child-size furniture and natural elements, with practical activities and materials that would stimulate children’s minds. The Montessori Classroom

Montessori designed her classrooms with the main room of the space in mind. The classroom was designed to maximize the child’s learning and development. The classroom included practical activities, such as childcare, reading, writing, and painting. Each child was encouraged to take responsibility for their own learning and development. The Montessori 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 no direct teacher-student interaction. The ultimate authority, the teacher, play a more passive, mentorship role in the classroom. Instead of the adult dictating what activities the children will engage in, Montessori believed that if left to themselves, children would be more than capable of developing the world-renowned Montessori Method of teaching and learning.
American education and standardized testing came about simultaneously. The idea of a common school for all, with common testing requirements, became a reality in the late 19th century and early 20th century. As a rise in population, and especially young children, in the US began in the 1800s, 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 common way to get results of student and school performance began to take place. College entrance exams, like the SAT, same arranging their standardized testing, it was assumed that the US and that of standard testing. These tests were so widely used that states require students to complete them within a year. The Common School Movement, which gave a broad history of the developments of the public school and standardized testing in the US.

Colonial Era

American Education and Standardized Testing in the US Timeline

Federal Era

20th Century

21st Century

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

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

Table 2. A Brief History of Public Schools and Standardized Testing in the US

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1642</td>
<td>Massachusetts Governor had requested and secured funds to support education in Massachusetts.</td>
</tr>
<tr>
<td>1647</td>
<td>First Grammar School was established in Cambridge, Massachusetts.</td>
</tr>
<tr>
<td>1668</td>
<td>The Massachusetts Bay Colony passed a law requiring all children to attend school.</td>
</tr>
<tr>
<td>1789</td>
<td>Thomas Jefferson signs the Bill for the More General Knowledge.</td>
</tr>
<tr>
<td>1837</td>
<td>The Common School Acts are passed in New York.</td>
</tr>
<tr>
<td>1867</td>
<td>The First Junior High School is established in New York City.</td>
</tr>
<tr>
<td>1890</td>
<td>The Stanford-Binet Intelligence Test is developed.</td>
</tr>
<tr>
<td>1900</td>
<td>The Scholastic Aptitude (SAT) is introduced.</td>
</tr>
<tr>
<td>1954</td>
<td>Brown v. Board of Education rules that segregation of all public schools is illegal.</td>
</tr>
<tr>
<td>1965</td>
<td>Elementary and Secondary Education Act is passed, providing funding for education and testing in public schools.</td>
</tr>
<tr>
<td>1983</td>
<td>No Child Left Behind Act (NCLB) is signed into a law. This policy requires states to create standards and assessments for students.</td>
</tr>
</tbody>
</table>

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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 thrives with a creative type of thinking. This kind of thinking begins with the imagination of the future possibilities of the world. One that says, “If not one of the most important qualities a student should have is that of dynamic, or creative thinking. Being able to problem solve and notice patterns has become increasingly desired by all professions. But how do we teach creative thinking? Mathematician and Computer Scientist, Seymour Papert, believed that children, could learn about anything if their tacit 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 environment to another without any context or engagement of the learner’s imagination. Explicit knowledge is characterized by its capacity for transfer, as understanding, is taught and learned. Papert describes us as the rock’s with its Instantaneous Focus in current learning, the abstraction of subjects with the real world (Figure 2.4). Student-centered, student-led learning environments allow 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 as authority figure, pushing student elements as agents of the center of learning, allowing students to engage in how the world works and how their lessons relate to it.

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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 one idea (Figure 2.4.1) that brings us together, the individual and the machine. The concept of the collective learning environments is that the collective is a sort of collective of experts of information sharing. The “collective” is a knowledge exchange where students are allowed to contribute to the same pool of information, and to the same group itself in a classroom setting the student is allowed to follow their own path while still completing all standards and learning objectives required.

New learning methods call for new learning environments. Environments that embrace the trends of the collective and the organic learner. Classrooms would turn into a sort of maker space for children, with exploration, play and imagination at the heart of the room. We live in a time of constant, rapid change, one that requires and demands a society that thrives with a creative type of thinking. This kind of thinking begins with the imagination of the future possibilities of the world. One that says, “If not one of the most important qualities a student should have is that of dynamic, or creative thinking. Being able to problem solve and notice patterns has become increasingly desired by all professions. But how do we teach creative thinking? Mathematician and Computer Scientist, Seymour Papert, believed that children, could learn about anything if their tacit 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 environment to another without any context or engagement of the learner’s imagination. Explicit knowledge is characterized by its capacity for transfer, as understanding, is taught and learned. Papert describes us as the rock’s with its Instantaneous Focus in current learning, the abstraction of subjects with the real world (Figure 2.4). Student-centered, student-led learning environments allow 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 as authority figure, pushing student elements as agents of the center of learning, allowing students to engage in how the world works and how their lessons relate to it.
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 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 sphere. 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 begun to take root, though with little effect on the public school system of the US. As education moves forward, a more student-focused system will be the future of the learning environment.

2.7 Conclusion

Whether it is for survival, for play or for learning, children rely on their very intuitions 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 new kinds of schools, one that can problem solve, one that can break down the barriers of tradition and on-rushing technology, and one that can engage and adapt with the world around them.

Theories and practices of post-industrial learning and teaching have evolved in a modern century context, 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 performance testing and more student-focused learning. 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 classrooms, while 37% of all students attend private school. That is one-third of their days in these years, spent in these environments. Does it not then follow that these environments should be designed to allow each and every person a fully immersive experience into their learning? In all the examples and ideas of thought presented, there is a concept of exploration and a degree of freedom and independence for students. For students to become the end users and beneficiaries of these environments, there must be more flexibility in what children are doing and engaging in. If we can create a learning environment that is engaging for all children, we will be able to engage all of them where they are at. They say that as humans we don’t truly remember anything unless it has a sensory experience attached to it. If we can create environments that allow children to explore and engage all of their senses, we will be able to engage all children in the learning environment.

In all the examples and ideas of thought presented, there is a concept of exploration and a degree of freedom and independence for students. For students to become the end users and beneficiaries of these environments, there must be more flexibility in what children are doing and engaging in. If we can create a learning environment that is engaging for all children, we will be able to engage all of them where they are at. They say that as humans we don’t truly remember anything unless it has a sensory experience attached to it. If we can create environments that allow children to explore and engage all of their senses, we will be able to engage all children in the learning environment.
"We discovered that education is not something which the teacher does, but that it 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 a 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 report conducted by UNESCO, using photographs taken by Reuters Pictures, this study shows the lack of focus and cultural context within the classroom across 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 to more flexible spaces for learning that provide students of all different cultures and backgrounds a space where they can thrive.

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

Middle East and Africa

Yemen

Classroom Seating Arrangement

Classroom Seating Arrangement
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**

**Mathematics**

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

**Curriculum Themes**

**Operations and Algebraic Thinking**

**Concepts**

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

**Numbers and Operations**

- **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.

**Measurement**

- **Abstractions**
  - Ability for students to analyze obtained information, to develop arguments/solve problems.

**Geometry**

- **Abstractions**
  - Ability of students to communicate findings/arguments, orally or written.

**Curriculum Themes**

**Science**

- **Scientific Process**
- **Earth and Space Science**
- **Physical Science**
- **Life Science**

**Ways of Thinking**

- **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.
Initial exposure of concepts by students through story-telling and examples.

Ability of students to understand concepts and their attributes and characteristics and develop their own opinion on the subject.

Ability of students to evaluate cause/effect, correlating, and opposite relationships between concepts of government, economics, and geography.

Acquisition

Ability of students to understand components of reading, writing, and language.

Comprehension

Ability of students to develop ideas and knowledge from acquired information and readings.

Ability of students to translate ideas from reading into speaking/writing and vice-versa.

Ability of students to retell and recount concepts gathered from reading/writing.
In this study, curriculum standards were analyzed to identify 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 (literacy, Bright). Language Arts and Social Studies have objectives that speak about information acquisition, interpretation, and evaluation. 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 how specific stages in development are associated with children in elementary school age (4-10 years of age) and their correlation to the subject matter.
- **Work Type**—Different subjects and activities lend for different types of work. Some require students to work individually while others are best 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 explains which subjects render more successful classroom environments.

**Figure 3.3 | Curriculum Exploration Diagram**

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**3.4 Socio-Individual Classroom Relationships**

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 various 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.)

**Figure 3.4 | Socio-Individual Classroom Relationships**

---

**Mental States**
- Imagery
- Mindsets
- Knowledge

**Time**
- Present
- Past
- Future

**Actions**
- Teaching
- Learning
- Interaction

**Collaboration**
- Group work
- Teamwork

**Dialogue**
- Discussion
- Project

**Master-Student Interactions**
- Lessons
- Discussion
- Project
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 playground/play areas—and the interactions and relationships of all members within them.

Figure 3.5 | Learning Environment Analysis Introduction

The diagram illustrates the interactions and relationships of all members within the different learning environments.
**Oral Traditions**

Oral Traditions were centered around storytelling 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; often written languages, the rise of formal methods of education took root.

- Informal Setting
- All age groups
- Informal Setting
- All age groups
- Cluster gathering
- Abundance of dialogue
- Lack of dialogue
- Master-Student relationship
- Reserved for older men

**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 still remains in the history of education until present times. Lecture Halls were among the first classrooms and became models for classrooms in the future.

- Gathers large groups
- Exploratory area for lecturer
- Dialogue in between students in stands
- Larger crowds
- Observational aspects for students
- Gathers large groups
- Formal setting
- Master-student relationship
- Reserved for university learning
- Doesn’t allow exploration
- Formal setting
- Master-student relationship
- Formal setting
- Master-student relationship
- Master-student relationship
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 worldwide. 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— from an exploratory space in preschool to a strict master-student, “efficient” system in high school.

**Classroom**

- Multiple areas within a space
- Intimate
- Flexibility of activities
- Dialogue in between students in grouped tables
- Individual spaces
- Masters’ in charge with clear directions
- Structured setting
- Lack of dialogue

**Playground**

- Informal setting
- Multitude of interactions/exploration
- Flexibility of activities
- Engaged imagination
- Children of all ages
- Short relationships
- Lack of interaction between adults and children

---

## Multi-Zone

Preschool

- Teachers present
- Cooperative learning
- Grouped tables
- Infants

Elementary

- Grouped
- Small group interactions
- Teachers in charge

Middle | High

- Open Field Built-Play
- Informal setting
- Multitude of interactions/exploration
- Engaged imagination
- Children of all ages
- Short relationships
- Lack of interaction between adults and children

---

## Teacher/Master

**Learner/Student**

- Transfer of information
- Personal interactions
- Learning/Teaching Configurations

**Theory Reflection**

41
3.6 Existing Classroom Arrangements

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 classroom.

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

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

Figure 3.6 | Classroom Arrangement Analysis Introduction
The U-Shape or Circle Room

- Facilitates collaborative learning, helping teachers address student needs.
- Encourages interactions among students.
- Facilitates discussions and debates.

Forces

- Lends itself to smaller discussions.
- Improves student engagement.
- Increases interaction for shy students.
- Enhances control of behavior.

The Cluster Room

- Suitable for collaborative and brainstorming activities.
- Encourages reflection, problem-solving, and communication skills.
- Allows flexibility of group work.

Forces

- Provides safe interaction spaces.
- Allows for group formation.
- Increases collaboration and teamwork.
- Enhances group problem-solving and communication skills.

- Promotes individual accountability.
- Increases noise levels.
- Decreases individual accountability.
- Difficult to conduct individual assessments of abilities and level of understanding.
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, and clusters. More commonly now are combination classrooms that combine one or more arrangements to suit different needs of a classroom.
Section Title

Combination Classrooms Analyzed

Preschool Setting

Teacher Space

Individual Space

Collective-Individual Space

Collective Space

Play
Open Space for freedom of activities

Student Storage
Fixed space for students to store their belongings

Gathering Space
Designated area for the whole class to come together

Task Space
Table space for assigned activities; children share space with classmates in group tables

Classroom Storage Space
Fixed cabinet storage for classroom materials

Figure 3.8 | Preschool Classroom Hybrid Model Drawing

Teacher - Surveillance Scope

Teacher - Sight Lines

Circulation Areas

Square Footage

Distribution per Child

Square Footage of Furniture

Circulation Path

Furniture - 235 sqft

Remaining Space - 515 sqft

Estimated Personal Space Needed - 49 sqft

Actual Space broken down ~ 21 sqft

750 SqFt
Kindergarten Setting

Combination Classrooms Analyzed

**Teacher Space**
- Usually in front/back of classroom in a corner

**Student Cubbies**
- Fixed space for students to store their belongings

**Teacher’s Desk**
- Group Desks
  - Rectangular tables for small groups

**Conference Table**
- Area for teacher to meet individually with students

**Activity Corner**
- Open space for freedom of activities

**Gathering Space**
- Space in front of class to gather all class together

**Collective-Individual Space**
- Collective-Storage Area

**Individual Space**
- Collector Space
- Teacher-Student Space

**Spatial Explorations**

**Figure 3.9** Kindergarten Classroom Hybrid Model Drawing

- **Furniture** - 350 sqft
- **Remaining Space** - 525 sqft
- **Estimated Personal Space Needed** - 49 sqft
- **Actual Space broken down** - 25 sqft

875 SqFt

**Spatial Descriptions**
Combination Classrooms Analyzed

**Elementary Setting**

- **Teacher Space**
- **Teacher-Student Space**
- **Collective Space**
- **Collective-Individual Space**
- **Collective Storage Area**
- **Individual Space**
- **Computer Center Area** with computers for student use
- **Student Storage Shelf**
- **Teacher's Desk**
- **Individual Student Desk**
- **Conference Table**

**Boundaries**
- Physical and Implied

**Spatial Explorations**
- **Context-to-Time**
- **Circulation throughout the Day**
- **Spatial Hierarchies**

**Plan**

- **Typology of Spaces**

**Figure 3.10**

- **Elementary Classroom Hybrid Model Drawing**

**Figure 3.11**

- **Axonometric**

**Space Utilization**

- **Teacher - Surveillance**
- **Teacher - Sight Lines**
- **Circulation Areas**
- **Square Footage**
- **Distribution per Child**
- **Square Footage of Furniture**

**Circulation Path**

- **Furniture** - 375 sqft
- **Remaining Space** - 625 sqft

**Estimated Personal Space Needed** - 49 sqft

**Actual Space broken down** ~ 30 sqft
“Anything that is worth teaching can be presented in many different ways. Those 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 re-examining of existing elementary school programs and re-evaluating 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 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.
S.T.E.A.M. Theory and Intelligence

Multiple Thinking

Howard Gardner first coined the idea of multiple intelligences as the ability for human beings to problem solve through different methods of intelligence—Musical, Logical, Naturalistic, Spatial, Linguistic, Intrapersonal, Interpersonal, Kinesthetic, and Existential. This means that instead of focusing on performance of the student, that multiple intelligence learning will allow students to become well-rounded people, not just production machines.

Gardner’s theory implies that instead of just focusing on performance the traditional classroom often does not. Students are able to use multiple intelligences and learn in ways that are more natural to them. By bringing Science, Technology, Engineering, Arts, and Math all under the same roof, the curriculum allows students to explore learning in ways that are more natural to them. These activities promote the use of untraditional methods of learning. The 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 untraditional methods of learning, like project and collective learning. This process creates solutions based on thorough inquiry. Using models and patterns to create a solution-based on rules: Using models and patterns to create a solution based on rules.

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

1. Data Collection: Identifying inputs in a budget.
2. Data Analysis: Extraction of important information.
5. Abstraction: Finding important salient information.
7. Algorithm Development: Using models and patterns to create a solution-based on rules.

There are 7 steps:

1. Data Collection
2. Data Analysis
3. Data Decomposition
4. Pattern Formation
5. Abstractions
6. Model of Construction
7. Algorithm Development

The way these intelligences are used depends on the situation. For a person to have a well-balanced life, they have to have some of all the intelligences and have each one as strong as the other.

Biomimicry has been used in many fields to create nature and reusing methods that reflect processes found in nature. In this thesis, biomimicry is used to define spaces and the activities held within them. The Biomimicry Taxonomy was used to find a spatial category, later used in the final design.

1. Open Play Spaces: These spaces will serve as informal collective spaces in the design. They are areas where students can learn and play. Therefore these spaces will be designed to allow play to happen naturally.

2. Informal Collective Space: More and more we are seeing students moving from a traditional model of design to information learning to one of collaborative 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 the Biomimicry Taxonomy, it is recognized that there is a need for space where students canimprove their design or rework and deconstruct the knowledge they are gaining.

4. Formal Collective Space: These spaces will focus on more traditional methods of learning, which will gather students for formal teaching.

Biomimicry Taxonomy for Learning Design

Figure 4.1 | Biomimicry for Learning Design: According to Biomimicry Taxonomy, the same spatial category will be used in all aspects of the design process.
Color Psychology has been a long debated subject. It is something that can be surveilled subjective depending on experience and even the local context. It is talked about in certain color associations. For children, color is a stimulant that affects how they act and react in school. For example, the color blue is often used to create environments of calm and white is often used as a color to create “clean” spaces. Environments in this classroom model will use color to explore the capabilities of color in learning environments.

### 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’s open corridors and “transparent” construction allows children to explore the building from all points of view.

Materiality and Transparency

Transparent Space Partitions
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 distinctions and its plan nods at aspiration and playfulness. The clear circulation creates moments of interactions between children of all ages and allows children to explore freely. Its outdoor pond becomes an extension of the project by way of floor-to-ceiling sliding doors breaking the barrier between interior and exterior.
The Fuji Kindergarten focuses on the ability of children to explore and play in any given environment. This emphasis on play is the driver for the enormous roof deck, where children can run around and climb trees, all for the sake of play. The architects endeavored to create a landscape of children’s space as connected to both the classroom and the outside. All decisions of the ground floor have been driven by this idea; for example, the school becomes one big classroom in the central courtyard.

File: Fuji Kindergarten // Tezuka Architects

Tachikawa, Tokyo
2007

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Fuji Kindergarten // Tezuka Architects
Tachikawa, Tokyo
2007

Precedent Studies
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 seating and the school library—breaking the standard for a quite and calm library setting.

Lisle, IL, USA
2019
Designed to create a learning community, the Rosanna Golf Links Primary School creates a compact-like campus-style massing. The central courtyard is not only a play area but also serves as the method for circulation for the school.
Model for Play Objectives

Spatial Organization Factors

- **Exploration**
  - Active Interests
  - Finding Solutions
  - Re-inventing Ideas
- **Construction**
  - Building on Knowledge/Ideas
  - Exploration
  - Collaboration
  - Demonstration of Knowledge/Ideas
- **Collaboration**
  - Recreational/Reinterpretation of Knowledge in Groups
- **Demonstration**
  - Exposition of Knowledge/Ideas

**Learning:**
- Processing and Gathering Information
  - Traditional Learning, Research
  - Problem-Based Learning
  - Open-Ended, Project-Based Activities

**Exploration:**
- Active questioning and trial and error activities
  - Re-inventing Ideas
  - Developmental Goals for personal improvement

**Construction:**
- Informal Exploration
  - Knowledge Building
  - Teamwork
  - Repurposing of gained knowledge for personal experimentation

**Collaboration:**
- Recreational/Reinterpretation of Knowledge in Groups
  - Demonstration of Knowledge/Ideas

**Demonstration:**
- Exposition of Knowledge/Ideas

**Figure 4.5 | Space and Objectives Correlation**
Programmatic Framework

This analysis looks at what a traditional classroom unit contains 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 supplementary spaces, needed to allow a school to function.

Figure 4.6 | Program Analysis
Chapter Title Section Title

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.
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 manipulations 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
- Transparency vs Opacity

**Design Objectives**

- Learning
- Exploration
- Play

**Wooded Areas**

Trees Enclosing Mass

- Mass
- Circulation Routes
- Skylight
Interactions with Nature Design Process

Adjacent to Natural Tree Edge

- Mass
- Circulation Access
- Solid vs. Transparent

Adjacent to Designed Tree Edge

- Mass
- Circulation Access
- Solid vs. Transparent

Note: Diagrams illustrate design strategies for different environments, focusing on mass, circulation, and transparent vs. solid materials in relation to natural and designed tree edges.
Interactions with Nature Design Process

Mass Interlocking with Trees:
- Mass
- Circulation Access
- Glazing
- Enclosing Trees
- Circulation Access Platform Extension
- Glazing
- Wall Push
- Ceiling Push
- Skylights

Mass Interlocking with Trees:
- Mass
- Circulation Access
- Glazing
- Enclosing Trees
- Circulation Access Platform Extension
- Glazing
- Wall Push
- Ceiling Push
- Skylights
Sloped Areas

Mass on top of Slope

- Mass
- Pushover Point
- Access Points
- Skylight
- Glazing

Mass Within Slope

- Mass
- Access Point
- Glazing
- Skylight

- Mass
- Pushover Point
- Seismic 
- Glazing
- Pushover Point
- Seismic 
- Glazing
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- Pushover Point
- Seismic 
- Glazing
Mass in between Slopes

- Mass
- Freeform/ planter
- Access/ ramp
- Skylight

Mass Adjacent to Slope

- Mass
- Access/ Point
- Roof/ House
- Outdoor/ Extension
**Interactions with Nature: Design Process**

** Bodies of Water Intersecting Mass **

- Mass
- Interior of mass
- Pedestrian bridge for mass intersecting body of water
- Bridge covering
- Pedestrian steps
- Platform push
- Access circulation
- Thru access

** Mass intersecting Body of Water **

- Mass
- Interior of mass
- Pedestrian bridge for mass intersecting body of water
- Bridge covering
- Pedestrian steps
- Platform push
- Access circulation
- Thru access
5.0 Design Synthesis

5.1 Site

Site Map
Site Force
Context Sketches
Site Axon Study
Area Patterns
Area Traffic Patterns
Sun Path Study
Wind Patterns

5.2 Model for Play

Site Design Forces
Form
Program
Design

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

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**

**Context**
- Summit Trees Impact
- Tree Edge

**Sunlight Study**
- Early Morning
- Noon
- Late Afternoon

**Wind Patterns**
- Summer
- Spring
- Fall
- Winter

**Traffic Patterns**
- Summer Solstice
- Winter Solstice
- Spring Equinox
- Fall Equinox

**Figure 5.1 | Gilbert Road Site**
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

Rolling Hills Topography

Water Source Introduction
Large Pond
Multiple Ponds
Creek
Creek-to-Pond

Program Distribution

Communities
Science | Technology | Engineering | Arts | Mathematics

Maker Labs

Play Path Corridor

Library
Administration
Lobby
Lounge
Shared Courtyards

Gymnasium
Community Center

Auditorium

Wind Lab
Earth Lab
Water Labs
Solar Lab

Adjacent Exterior Connections
Direct Circulation

PARK PATH NETWORK

102 Model for Play: An Active Learning Primary School Campus Model
Design Scheme: 181
Model for Play | An Active Learning Primary School Campus Model
Active learning involves using creative thinking to solve problems, all while working in a collective or team. Active learning spaces provide teachers and students ample learning environments with different settings to cater to different learning styles. These environments more closely resemble the traditional classroom teaching without the traditional methods or classroom designs.

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 playgrounds, the entire site becomes a space for play, through the addition of a play corridor connecting one end of the site to another.
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 offices and ending with a multi-purpose hall which can be home to many different activities and events.

Garden Stairs
Roof Garden Path
Core Bridge
Play Deck
Plaza Steppes

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.

Model for Play | An Active Learning Primary School Campus Model
Garden Steps
Rooftop Garden Path
Core Bridge
Play Deck
Plaza Steppes

1/8 Model for Play | An Active Learning Primary School Campus Model
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 food 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 collaboration areas for students.

First Floor
- Cafeteria
- Kitchen
- Art Studio
- Dance Studio
- Music Studio
- Staff Area
- Storage/Maintenance

Second Floor
- Student Commons
- Student Commons
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 rules 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.

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Model for Play | An Active Learning Primary School Campus Model

Design Synthesis
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 courtyards in the Core Building, this building reflects methods of higher education design and adapts it to the K-5 environment. The gym, which is known for the noise and engagement, is a transparent space, creating a sense of openness throughout the building.

Gym

Group Houses

Model for Play | An Active Learning Primary School Campus Model

Ground Floor

Reading Balcony

Book Stacks Tech Center

First Floor

Second Floor

Design Synthesis
STEAM Labs

Although STEAM curriculum is applied throughout the project, the Labs focus on specific elements 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.

Model for Play | An Active Learning Primary School Campus Model Design Synthesis
6.0 Summary

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

-Seymour Papert
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 most source of knowledge and children learn more through play, play is the key to learning and children need access to play for their development. At the same time, schools that are designed to support play and learning need to be more accessible to children who have access to these environments.

When children are allowed to learn as they please. One very important aspect of this model is the idea for teaching/learning certain topics, and spaces that allow children to learn to move into the classroom where they can learn how to problem solve independently with little stimulation from the teacher. 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 obstacles for learning, but more so environments for the imagination and exploration of young minds. The variety of spaces create different environments that focus solely on the idea of play as the natural form of learning. The big concern of our time is how to teach a population of children—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 be implemented. The traditional classroom and how to problem solve effectively and in real life is the next step. Allowing children, from a young age, to think independently—something they find fulfilling. Tapping in individual interests who can get all the information they currently receive in school on the internet and technology is one way of teaching children about nature. The models for playful learning already exist in the educational theories. A lot is lost in translation when it comes to implementation and how to get these programs to happen. Now, as technology becomes the core and only way of learning. Although younger children are more engaged in learning, but more so environments for the imagination and exploration of young minds.

In the past, great educators of the past acknowledged and implemented ways of disinterest 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 one step. Allowing children, from a young age, to think independently—something they find fulfilling. Tapping in individual interests who can get all the information they currently receive in school on the internet and technology is one way of teaching children about nature. The models for playful learning already exist in the educational theories. A lot is lost in translation when it comes to implementation and how to get these programs to happen. Now, as technology becomes the core and only way of learning. Although younger children are more engaged in learning, but more so environments for the imagination and exploration of young minds.

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

-Benjamin Franklin
1.0 3-MT Competition
Monday November 4th, 2019

Miniatures Fall 2019

1.0 3-MT Competition
Monday November 4th, 2019

2.0 Miniatures
Wednesday, December 11th, 2019

Miniatures Fall 2019

1.0 Thesis Competition
April 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

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1.3 Literature Review

1.4 Research Questions

1.5 Methodology

1.6 Results

1.7 Discussion

1.8 Conclusion

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1. References List
"IT IS A HAPPY TALENT TO KNOW HOW TO PLAY."
-Ralph Waldo Emerson