Create, Learn, Play:

Planning Creative, Whole-body Learning Environments for Young Children

Submitted towards the fulfillment of the requirements for the Doctor of Architecture Degree

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Dedication

This doctorate project is dedicated to my mother, Gail Silva. She is my unwavering source of love and support, and I am eternally grateful for her.

I also dedicate this project to my grandparents, Gerald and Sylvia Silva. They have always supported and encouraged my dreams. My grandmother's selfless career as a preschool teacher and director for over thirty years is the inspiration for this project. I am blessed to have them in my life.

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Abstract

The built environment plays a significant role in the education of a child, with some teaching philosophies referring to it as another teacher. Neural development happens through a combination of genetics and experience. Sensory learning therefore suggests that young developing children are very sensitive to the environment around them. The environment includes the landscape, physical structures and equipment, and people. This thesis proposes that the physical environment (landscape, building structure, and equipment) can positively affect the holistic development of a prekindergarten aged child (between three- five years in age) by providing an enriching learning environment that facilitates whole-body learning and creativity.

As a result of examining the multidisciplinary literature on child development and creativity science, as well as studying the way existing progressive preschool pedagogies treat their learning environments, a planning guide has been produced. The planning guide provides strategies for designers and educators to create holistic early learning environments that consider a child's emotional, mental and physical wellbeing.

Children are experiential learners who learn using their whole body. Movement and multi-sensory learning are therefore critical for healthy development. Rich, multilayered explorations of materials encourage creativity, curiosity and imagination. Supportive interventions that allow children multiple opportunities to explore, create, and connect, are vital to an early childhood education facility that wishes to encourage critical thinking and problem solving skills via the development of divergent thinking.

It is important to create a supportive network of harmonious interventions. These interventions will become the foundation on which Whole-body Learning and Creativity can be built. The resulting guide is organized into three major sections that go on to discuss supporting topics in detail. Due to the fluid nature of some of the interventions there is some overlap between sections; however the interventions will be discussed topically as they pertain to a given section.

The first aspect discussed in this chapter is Harmony. Harmony is an overarching theme that is achieved with the understanding that the design is made up of balanced parts of a whole. All parts must work together in order for the design to be successful. This chapter also pertains to creating an environment that feels harmonious to the child. The major topics discussed in this section are clarity, comfort and security. The second section discusses strategies to encourage whole-body learning. The third section discusses interventions that facilitate creativity in an early childhood education facility. An early learning environment that supports whole-body learning and creativity is beneficial to a young child's holistic development.

Introduction

According to the 2012 Census, of Hawaii's approximately 1.3 million people, almost 90,000 are under five years in age. This significant population is at a critical stage of their cognitive and social development. "Child development is the foundation for community development and economic development, as capable children become the foundation of a prosperous and sustainable society.[1]" If indeed "child development is the foundation for community development and economic development," then supporting healthy childhood development is the key to supporting healthy communities and economies. For this reason, there is increased interest in allowing greater access to quality preschool facilities. Currently, a public interest group called Be My Voice! Hawaii has started a campaign to create a system for publicly funded preschools for all four year old children in Hawaii. A shift in popular opinion is occurring in Hawaii that is reflecting the significance our community places on early childhood education. With the increased interest in early childhood education and the possibility of federally funded preschool s, there may be a need for multiple holistically designed preschool environments to be built in the near future.

Research demonstrates that access to high-quality early education programs can improve young children's social and emotional skills, as well as their overall cognitive development. A program that focuses on a developmentally appropriate curriculum that encourages creativity and progressive learning can instill a curiosity and love for learning that becomes a strong foundation for later success. The HighScope Perry Preschool study is one of the most well-known longitudinal studies on the benefits of early childhood education. This longitudinal study examined the lives of 123 children classified as at-risk and in poverty. From 1962—1967 children ages 3-4 years of age were randomly divided into two groups whereas one group received a preschool program, and the other group received no preschool program. At age forty, 97% of the living participants were interviewed, and additional data was collected from the subject's school, social services and arrest records.[2] The results of the longitudinal study significantly supported the benefits of early childhood education. "The study found that

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[1] National Scientific Council on the Developing Child, *the Science of Early Childhood Development,* (National Scientific Council on the Developing Child, 2007), http://www.developingchild.net

[2] "HighScope Perry Preschool Study," HighScope, accessed January 19, 2013, http://www.highscope.org/content.asp?contentid=219

adults at age 40 who had the preschool program had higher earnings, were more likely to hold a job, had committed fewer crimes, and were more likely to have graduated from high school than adults who did not attend preschool.[3]"

It is important that greater emphasis is placed on the importance of quality early childhood education. The age at which a person begins to foster their cognitive development is crucial. Between the age of zero to five years old, a person's brain is developing rapidly. Young children particularly before age six are at their peak of cognitive development. According to Egan, much of a child's ability to develop fantasy and imagination peaks by age five[4]. The window during which the brain is able to easily learn and change is also brief. Brain plasticity is at its peak during early childhood. Once neural connections are made, and reinforced, it is much harder to change behavior later in life.

According to the Center for Disease Control (CDC) childhood obesity has more than doubled in the last 30 years[5]. In a recent study, researchers discovered that children in preschool and daycare are much less physically active than previously thought. The study identified three main barriers or societal priorities that hinder children's physical activity: injury concerns, focus on school readiness and academics, and financial restrictions on play equipment[6]. As previously stated, young children are experiential learners who use their whole bodies to learn about their reality. Creating facilities which encourage physical activity is critical to a child's physical, emotional, and mental well-being.

It is generally accepted in contemporary society that programs and interventions that facilitate creativity and innovation are ideal for helping children develop skills which allow them to be more prepared for the adult world. Fostering creativity allows people to become problem solvers and to see things from angles other people may not see. By implementing certain architectural innovations that encourage dynamic creative play, child-led narratives, divergent

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[3] "HighScope Perry Preschool Study."

[4] Kieran Egan, *Children's Minds, Talking Rabbits and Clockwork Oranges: Essays on Education.* New York: Teachers College Press, 1999, 87.

[5] "Childhood Obesity Facts," Center for Disease Control, accessed January 29, 2013, http://www.cdc.gov/healthyyouth/obesity/facts.htm

[6] Kristen A. Copeland, Susan N. Sherman, Cassandra A. Kendeigh, Heidi J. Kalkwarf, and Brian E. Saelens, "Societal Values and Policies May Curtail Preschool Children's Physical Activity in Child Care Centers," *Pediatrics* 129 (2012): 265, accessed February 2, 2013, doi:10.1542/peds.2011-2102.

thinking, and collaborative problem solving, an environment that encourages creativity and innovation in preschool aged children can be developed.

The built environment plays a significant role in the education of a child, with some teaching philosophies referring to it as another teacher. Most neural development happens through a combination of genetics and experience. Sensory learning suggests that young developing children are very sensitive to the environment around them. The environment includes the landscape, physical structures and equipment, and people. This thesis proposes that the physical environment (landscape, building structure, and equipment) can positively affect the holistic development of a prekindergarten aged child (between three- five years in age) by providing an enriched learning environment that facilitates whole-body learning and creativity.

By examining the multidisciplinary literature on child development and creativity science, as well as by studying the way existing progressive preschool pedagogies treat their learning environments, a planning guide has been produced. The planning guide provides strategies for designers and educators to create holistic early learning environments that encourage whole-body learning and creativity.

Definitions

Creativity:

For the purposes of this project, a standard social science definition of 'creativity' will be used, as proposed by Barron and Stein. In this dual criteria definition, 'creativity' is an action or idea that is original, and effective, such that original meaning novel or new, and effective meaning useful and relevant. Originality without effectiveness is considered a random act. Runco and Garrett (2012) aim to clarify this dual criteria definition by writing that, "Originality is undoubtedly required. It is often labeled novelty, but whatever the label, if something is not unusual, novel, or unique, it is commonplace, mundane or conventional. It is not original, and therefore not creative. Originality is vital for creativity but is not sufficient. Ideas and products that are merely original might very well be useless[7]."

Preschool:

Preschool refers to the years of schooling prior to the start of kindergarten. A preschool differs from a daycare in licensing and educational goals.

Young Children:

For the purposes of this paper, young children are children between the ages of three to five years old. Young children may be differentiated from toddlers, and infants who are younger than them, and children and adolescents who are older than them.

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[7] Mark A. Runco and Garrett J. Jaeger, "The Standard Definition of Creativity," *Creativity Research Journal* 92 (2012): accessed February 18, 2011, doi:10.1080/10400419.2012.650092.

Project Organization

In the near future there may be an increased need for preschools to be built in Hawaii. This possibility offers the opportunity to make sure our children have access to holistically enriching preschools that current preschool models may not be offering. This project offers strategies to educators and designers to create preschools that encourage whole body learning and creativity. As illustrated in Figure 1, the project is organized into two main parts, the analysis and the synthesis; and three major categories of information, roots, shoots, or fruits.

The analysis contains three major areas of study used to discover what a holistically enriching preschool environment was like. In this study, the analysis is known as the "roots," because this part contains the information from which the second part of the paper is anchored and draws its information. The three "root" sections include multidisciplinary research on child development theory and creativity science; observational and literature research on existing progressive preschool models; and a case study on a mixed pedagogic kindergarten whose environment was purposefully designed to support its curriculum.

The second part of the project is the synthesis of the information from part one in the form of a planning guide. The planning guide offers strategies and interventions to consider when planning or renovating a preschool. The planning guide is divided into three major sections titled, Harmony, Whole-body Learning, and Creativity. The first section, Harmony, falls under the "shoots" category of information. This section contains overarching concepts that are necessary to be in place before the "fruits" can be produced, the same way a canopy of leaves must be present before a tree may bear fruits. The last category of information includes the last two sections of the guide, Whole-body Learning and Creativity. These two sections fall under the "fruits" category. The fruit are the resulting interventions and strategies that should be encouraged in order to create an enriching, holistically designed preschool. These are the interventions that are critical to an enriching, holistically designed preschool, but are often left out of overly didactic, sedentary preschool models.
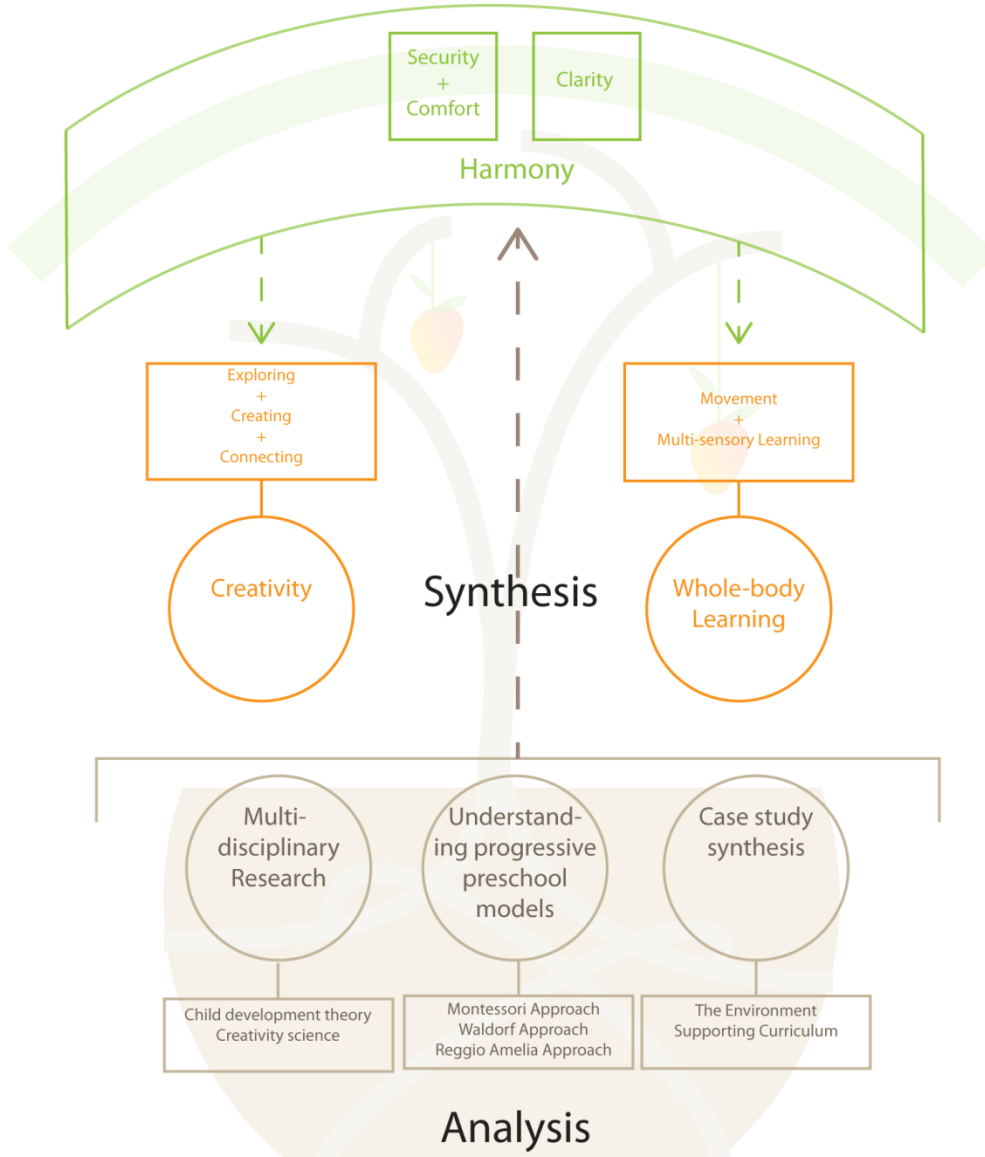
Figure 1 Project organization diagram

Roots

Chapter 1: Nurturing the Mind with the Physical Environment

Young children are at a peak cognitive developmental age when, like sponges, they are constantly absorbing information about the world around them. "As neurons develop, their continued growth and survival depend on environmental stimulation. Input from the child's environment prompts new synapses. Neurons that are not stimulated tend to die. The quality and quantity of early stimulation thus have long-term implications for cognitive development. Environments that are rich in sensory stimulation-visual, auditory, olfactory, tactile, taste, and kinesthetic-enhance brain growth in this manner.[8]" The physical world can therefore be utilized as a tool and teacher to reinforce and encourage certain behavior. The following section will discuss how children experience their physical environment, and how they develop creatively.

The Developing Child

This section will give a brief overview of the major development of three and four year old children. Children of this age are increasing in self-awareness, and as a result self-efficacy. Recognizing these major milestones will allow the design of a preschool environment to be developmentally appropriate, and geared towards suitable physical, emotional, and mental expectations and achievements. As illustrated in Figure 2 Environmental and Biological

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[8] Margaret B. Puckett et al., *The Young Child: Development From Prebirth Through Age Eight* (New Jersey: Pearson Education., Inc, 2009), 230.

Influence Diagram, there is a constant exchange happening between environmental influences and genetic or biological influences that determine a child's development.
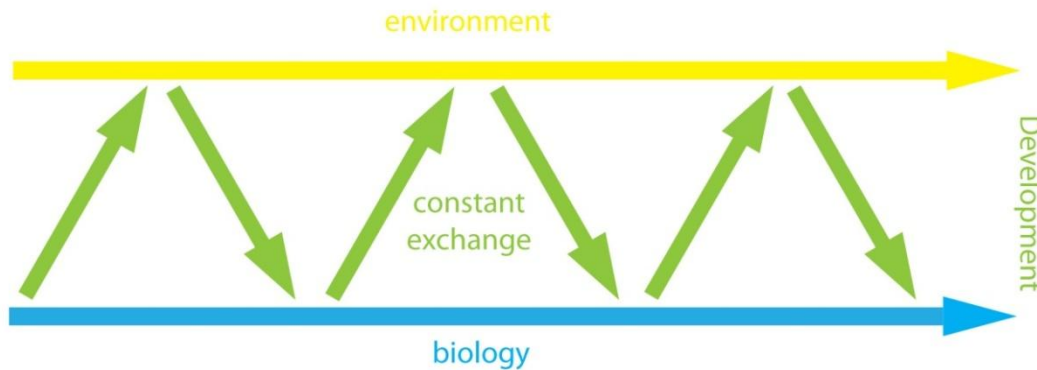
Figure 2 Environmental and Biological Influence Diagram

Constructivists such as Jean Piaget believed that behavior and skills are learned through reinforcement and exposure to certain experiences. As they move through developmental stages, children are able to make new connections about themselves in relationship to the world around them. Young children learn by doing; learning is therefore experiential. In a preschool environment, this theory would be supported by allowing children as many *real world,* hands-on experiences as possible. The constant interaction between a child's biology and environment ultimately determines their physical, emotional, cognitive, and social growth and development. Other theorists such as Lev Vygotsky emphasized the role of sociocultural influences on a child's development. Although children vary in development, most early childhood educators generally agree that there are certain milestones young children accomplish between ages three and four. Table 1 Developmental Milestones, adapted from Pucket et. al., illustrates some of the large and small motor control milestones an average three or four year old child should be able to accomplish.

Table 1 Developmental Milestones, adapted from Pucket et. al.[9]

Developmental Milestones from:	Three year old child	Four year old child
Large Motor Control[10]	-runs, walks on toes, jumps in place, kicks a large ball, imitates rhythms and animal movements, throws a ball, jumps in place rides a tricycle, walks stairs one step at a time, jumps from lowest step attempts to balance on one foot	-balances on one foot, hops, gallops, runs with ease, avoids obstacles, stops readily , walks on a line, jumps over low objects, throws a ball, enjoys simple dances and rhythms
Small Motor Development[11]	-Builds a tower of five to seven cubes, strings three or four large beads, turns the pages of a book one page at a time, imitates demonstrated vertical and circular scribbles, manages a spoon and a cup with increasing efficiency, lines up objects in a "train" sequence	Builds a tower of 8-10 cubes, approximates a variety of shapes in drawings, feeds self with few spills, unbuttons front clothing, zips, handles various simple fasteners, works puzzles of three to six pieces, handles books efficiently, exhibits hand preference, spreads butter and jam on toast, dresses and undresses with assistance

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[9] Margaret B. Puckett et al., *The Young Child: Development From Prebirth Through Age Eight*, 216 and 223.
[10] Margaret B. Puckett et al., 216.
[11] Margaret B. Puckett et al., 223.

Howard Gardner's Multiple Intelligences Theory

The idea that people are unique and have natural aptitudes and tendencies when learning is discussed in Gardner's Multiple Intelligences Theory. This theory recognizes the multiple ways humans have evolved to problem solve over time. Gardner identified seven types of intelligences: logical-mathematical, bodily-kinesthetic, musical, interpersonal, intrapersonal, visual-spatial, and linguistic[12], as illustrated in Figure 3. Logically/Mathematically intelligent people are skilled in reasoning and calculating. They are able to systematically see patterns and relationships in abstract concepts. They learn best through logistic experiments, puzzles and investigations. Bodily/kinesthetically intelligent people have a high level of bodily awareness. They learn best through physical activities that allow them to move, be hands-on, and manipulate and handle the items they are learning about. Musically intelligent people are sensitive to sounds, rhythms, lyrics, and tempos. Interpersonally intelligent people are very keen on social cues; they are empathetic and naturally acute communicators. They learn best through interaction with other people in groups or one-on-one. Intrapersonal intelligent people are introspective, willful, and intuitive. They learn best through self-guided learning. They learn best when music is incorporated into lessons, through lyrics, or speaking rhythmically. Visually/Spatially intelligent people think in terms of physical space, for these people seeing is learning. They can be taught through drawings, imagery, graphics, photographs, etc. Linguistically intelligent people have keen auditory skills which promote an advanced recognition of language patterns. They learn best through reading and writing; as they often think in words.

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[12] Howard Gardner, *Multiple Intelligences: New Horizons* (New York: Basic Books, 2008), 8–18.
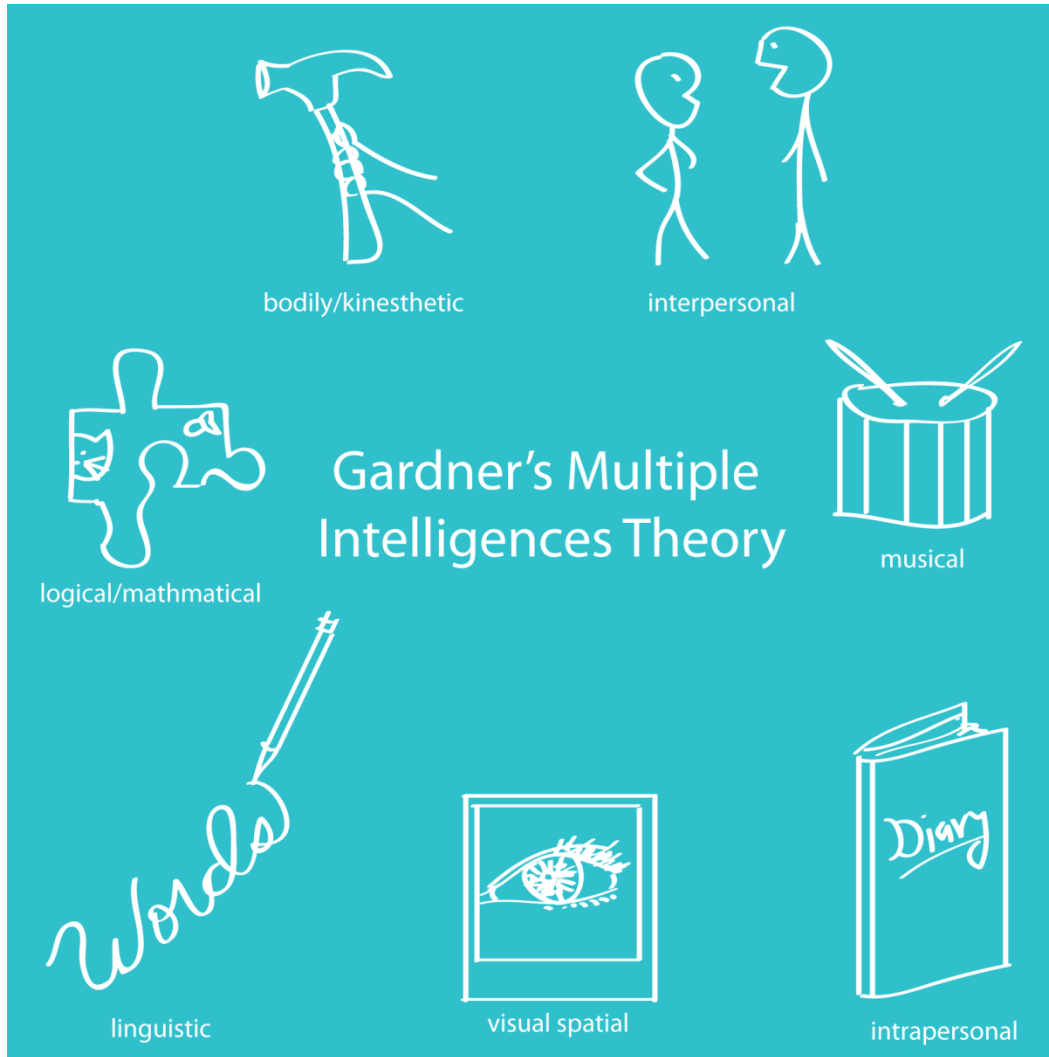
Figure 3 Diagram of Gardner's Multiple Intelligences Theory

Children and the Way They Experience Their Environment

In order to develop effective architectural interventions, it is important to understand the way children are experiencing the environments they are exposed to. Children experience space differently than adults do because of their physical and cognitive development; therefore it is important to take their spatial perception into account. According to Center for Disease Control Clinical Growth Charts, a three year old child who falls within the 50th-95th percentile for

stature is approximately between 37-40 inches tall[13]. Compared to an adult, a child's significantly lower eye level affects their visual perception, and vertical cone of visibility.

Designing with their spatial perception in mind will allow children to effectively navigate and use the designed environment. An interesting point was brought up in an article by Herbert L. Pick and Jeffery j. Lockman, in which they noted that pre-school aged children are better able to navigate and utilize their space when they first have an overview of it, say from a balcony. They also did well if first shown a whole room representation.[14] This research might suggest that when space planning, the sequencing of spaces might begin with a part of the room that is at a higher elevation than the rest of the room.

The types of physical structures children prefer are also important. According to Baird and Lutkus, during a study held at Adventure Playground, younger pre-school aged children (2-5 years old) preferred more traditional playground facilities, particularly the swings and the sandbox, while older children (6-13 years old) spent most of their time in the part of the park where they could move old tires and use lumber scraps to build forts and club houses.[15]

Children are also exploring and learning about their environment using all of their senses. Stimulating all of the senses, without overwhelming them, is crucial for an enriching learning environment. A child's sight, hearing, smell, taste, and touch are employed to gather information about their reality. Therefore, a balanced environment that stimulates all senses, without over-stimulating them is important.

Young children are immersion learners, who are constantly creating meaning through sensory information they gather from their environment. They make connections between information gathered by different senses by recognizing patterns, and categorizing learned experiences. In terms of providing children with a healthy understanding of the material world,

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[13] "Clinical Growth Charts," Center for Disease Control, accessed January 29, 2013, http://www.cdc.gov/growthcharts/clinical_charts.htm

[14] Jefferey J. Lockman and Herbert L. Pick, "Development of Spatial Cognition in Children" in *Mind Child Architecture,* ed. John C Baird and Anthony D. Lutkus (Hanover and London: University Press of New England, 1982), 61.

[15] John C. Baird and Anthony D. Lutkus, "From Perception to Architectural Construction," in *Mind Child Architecture,* ed. John C Baird and Anthony D. Lutkus (Hanover and London: University Press of New England, 1982), 13.

naturally occurring materials offer children the richest sensory experiences. Plastics and other synthetic materials are confusing and may offer contradictory sensory information. "Educationally, as plastic things can *look* very different but feel identical to the *touch*, they imply knowledge from different senses have no meaningful relationship.[16]"

Another important factor to take into considerations is that a child's primary concern in any environment will be their safety. As a survival method, young children seek security from their parents, and when they are independent of their parents, a young child's number one priority will be their welfare. Dr. John Medina, Director of the Brain Center for Applied Learning Research, writes, "the brain is not interested in learning. The brain is interested in surviving. Every ability in our intellectual tool kit was engineered to escape extinction. Learning exists only to serve the primal goal.[17]" In order for a child to learn, they must be provided with a safe environment. When their safety requirements are met, they are able to allocate cognitive resources to learning.

An environment that supports a sense of security and safety for a child is decipherable and easy to understand. A child can recognize ways in and out of a space, they understand what the spaces purpose is, and they understand what it is connected to. Movement through the space by clear, easy to navigate paths, are ideal.[18]

Section Summary:

- A successful learning environment for young children should be developmentally appropriate for a child's physical and cognitive abilities to assure safety and age appropriateness.

- Young children are experiential learners who glean information from their surrounding environment.

- Children may learn different skills at varied rates based on unique natural aptitudes and tendencies.

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[16] Christopher Day, *Environment and Children* (Burlington: Elsevier Ltd, 2007), 5.
[17] John Medina, *Brain Rules for Baby* (Seattle: Pear Press, 2010), 124-125.
[18] Christopher Day, 22.

- Children are multisensory learners who use their whole body to learn about their reality.

- A safe, secure environment is critical in order for a child to learn.

Children and Creative Development

Play

Play is an important part of a child's learning process. To a child, play and learning are not mutually exclusive. Unlike adults, who have more developed language and abstract thinking skills, children express ideas and emotions, as well as learn about their environment through play. Play is a crucial vehicle for learning, communication, and expression during early childhood. Play affords children the opportunity to experiment with emerging skills, and act out lessons learned during other classroom activities. Pramling et al says it well, "The object of learning is then similar throughout the whole school system. The act of learning, however, is different![19]" Piagetian thought would govern that play is a way for children to express and practice what they have experienced. Another interesting theory on the importance of play for young children discusses how play is a way for young children to actualize novel connections that have not yet been experienced in the real world. Very early on in life, our neurological development is rapid, with our brains making millions of synapse connections, which unless reinforced with behavior, will eventually die. Play, in which a child is moving between acts of fantasy and reality, helps to keep synapse connections alive until a more concrete experience, and resulting behavior, makes the connection permanent.[20] Playing and learning should therefore be an on-going and united process. Pramling et al writes, "being able to integrate play and learning in a goal-orientated preschool means to see the playing learning child and, in so doing, make room for children's creativity, choices, initiatives, reflections etc. It also means being aware of the objects of learning and utilising the whole day and all activities to develop the child's understanding of different aspects of the surrounding world.[21]"

In his book, Medina advocates for a certain kind of play, Mature Dramatic Play, as being the most beneficial type of open-ended play. Open-ended dramatic play allows children to

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[19] Samuelsson Pramling, Ingrid Pramling, and Asplund Carlsson, maj."The Playing Learning Child: Towards a Pedagogy of Early Childhood." *Scandinavian Journal of Educational Research*, 52(6), (2008).: 623-641.
[20] Samuelsson Pramling, 633.
[21] Samuelsson Pramling, 638.

imaginatively explore and experiment with novel and experienced ideas. Medina writes that children who engage in a significant amount of time in this type of play are more creative, better at language, better at problem solving, are less stressed, have better memories, and have better social skills.[22]

In 2011, Russ and Dillon wrote an article assessing the changes in children's creative play over a span of twenty years. They take note of the concern that in modern time children are afforded less time for unstructured play than their counterparts twenty years ago. The article cites decreased time for recess, increased emphasis on students to produce high test scores to satisfy the No Child Left Behind Act, increased after-school programs and activities, and increased time watching television as some reasons for decreased unstructured, pretend play. Surprisingly, the results of this study do not show a significant change in how a child performs pretend play, suggesting that the specific amount of time spent playing may not be an important factor as long as they are still allowed time to engage in unstructured play. However, Russ and Dillon cite other studies from Kim (2011) that connects a decrease in play to a decrease in children's creativity. The article strongly reinforced the connection between unstructured, pretend play and creativity development in children. "Both cognitive processes and affective processes in play have been related to divergent thinking. Children who have more imagination in play, more organized make-believe stories, and more emotion and affect-laden themes generate more responses and more original responses on divergent thinking tests.[23]" Play therefore performs a critical role in the creative development in children.

Runco notes that he believes everyone has creative potential. Some people have personalities by which unassisted spontaneous creativity is evident and does not need assistance. However, he also believes there are many who have unfulfilled creative potential. Techniques discussed to bring out this potential include relieving the unnecessary pressures to conform which allow children the freedom of discretion to be original when appropriate. Children should also be provided with opportunities for "problem finding (problem identification

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[22] Medina, 133.

[23] Sandra W.Russ and Jessica A. Dillon, "Changes in Children's Pretend Play over Two Decades," *Creativity Research Journal* 331 (2011): accessed February 18, 2011, doi:10.1080/10400419.2011.621824.

and problem definition), ideation (fluency, flexibility and originality) and judgment (evaluative and valuative)."[24]

Rook and van Kippenberg conducted a laboratory experiment to determine how the exposure to exemplar creative products and ideas affects a creator's creative performance. The idea is that people are sensitive to their surrounding environment when working, and once a person is exposed to a creative exemplar, it is difficult to not think about it. The resulting work carries traits of the exemplar product that may not have been included had the subject not been exposed to the exemplar product in the first place. This experiment also took into account whether the motivation behind the creative work was promotion-focused or prevention-focused. Promotion-focused means the individual is motivated to perform by positive incentives. The environment allows few negative consequences for risk taking. As mentioned in Rook and van Kippenberg's article, this sort of environment is thought to encourage creative behavior. The opposing motivation is called prevention-focused. In this type of motivation the individuals performance is based upon the knowledge that loss of privileges, position, security and other negative consequences will result if the individual performs poorly. This type of motivation discourages risk, and results in less creative performances. Rook and van Kippenberg propose three hypotheses, two of which are related to this thesis study: hypothesis one, "Exposure to a high-quality creative exemplar product(as compared with no exposure) leads to lower creativity for promotion-focused individuals and has less impact on the creativity of prevention-focused individuals,[25]" and hypothesis two, "Exposure to a high-quality creative exemplar products (as compared with no exposure) leads to more imitation and has less impact on the imitation of prevention-focused individuals[26]." Both hypotheses were proved correct. Therefore, when trying to promote creative behavior it is beneficial to provide an environment that lacks images and examples of exemplar products. A neutralized environment lacking

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[24] Mark A. Runco, "Education for Creative Potential." *Scandinavian Journal of Educational Research* 47, no. 3 (2003): 317-324.
http://web.ebscohost.com.eres.library.manoa.hawaii.edu/ehost/pdfviewer/pdfviewer?vid=4&hid=108&sid=c63ee739-5e72-4ada-95ae-3f0a4316a5a4%40sessionmgr110 (accessed November 12, 2010).

[25] Laurens Rook and Daan van Knippenberg, "Creativity and Imitation: Effects of Regulatory Focus and Creative Exemplar Quality," *Creativity Research Journal* 348 (2011): accessed February 18, 2011, doi:10.1080/10400419.2011.621844.
[26] Rook and van Knippenberg, "Creativity and Imitation," 348.

suggestive, easily identifiable objects would encourage more original work. This theory might also be an argument for space for children to work and play individually to avoid distraction. Providing children with an environment that is not bombarded with preconceived images of the world will allow them to make less biased interpretations of the world they observe.

In terms of motor creativity and creative thinking,[27] Sternberg and Lubart proposed a theory which explains how the motivation behind a creative act can affect the level and frequency of the creative act. In this study, it was found that creativity flourished more in a setting that used positive reinforcement to increase creative results, as opposed to consequences. This study can be interpreted as the need to create an environment that children feel encouraged to explore and express their ideas, rather than feeling like they will incur a negative consequence if they do not perform. The emphasis is therefore on the act of creation more so than the result.

Section Summary:

- For young children, playing and learning are not mutually exclusive ideas.

- Play is a way for young children to practice and express what they have experienced, as well as experiment with novel ideas they have not yet experienced.

- Mature Dramatic Play should be encouraged to improve a number of cognitive and social skills.

- Open-ended manipulatives are crucial in developing creativity and imagination.

- Over exposure to predetermined imagery can be detrimental to creativity.

Chapter Conclusion

Chapter one focused on multidisciplinary literature dealing with how children develop and experience the space around them. From birth to age five a majority of brain development happens, therefore young children are at a peak cognitive developmental stage where they are

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[27] Patrizia Scibinetti, Nicoletta Tocci and Caterian Pesce, "Motor Creativity and creative Thinking in Children: The Diverging Role of Inhibition," *Creativity Research Journal* 262-272 (2011): accessed February 18, 2011, doi:10.1080/1040049.2011.595993.

constantly absorbing information from the world around them. Children take in information about their reality using multiple senses. A child learns about the world using their whole body. Young children are experiential learners who glean information from their surrounding environment.

As children grow physically and mentally they acquire different cognitive and motor skills. Therefore, a successful learning environment for young children should be developmentally appropriate for a child's physical and cognitive abilities to assure safety and age appropriateness. A child's physical development also affects their spatial perception. Children may learn different skills at varied rates based on unique natural aptitudes and tendencies. Children are also incapable of learning if they do not feel safe in their environment. Interventions that increase a child's sense of security will allow them to learn better.

Unlike adults, who have more developed language and abstract thinking skills, children express ideas and emotions, as well as learn about their environment through play. For young children, playing and learning are not mutually exclusive ideas. Play is a way for young children to practice and express what they have experienced, as well as experiment with novel ideas they have not yet experienced. It is important to give children opportunities to interact with objects and environments that are not pre-determined. Open-ended manipulatives are crucial in developing creativity and imagination. Over exposure to predetermined imagery can be detrimental to creativity.

Roots

Chapter 2 Understanding Progressive Pedagogical Approaches

The following section will describe three well known non-traditional preschool approaches in an effort to understand their treatment of the learning environment. The three pedagogies to be discussed are the Maria Montessori Approach, the Reggio Amelia Approach, and the Rudolf Steiner Approach. All three approaches, although different in their curriculum and teaching styles, commonly value learning through play, imagination and creativity, as well as encouraging children to act as an active agent in their own learning. Most important to this study, all three approaches stress the importance of learning environment design.

Maria Montessori Approach

The founder of this approach, Maria Montessori, was a physician in Italy working with mentally handicapped children. During her time in the institution she developed an engaging pedagogy that she then further developed, and extended to children of all capacities. The pedagogy has expanded vastly since its creation. There are now an estimated 20,000 registered Montessori schools worldwide.[28]

The Montessori approach encourages children to be independent, self-directed learners. Some notable characteristics of a Montessori program are, mixed age classrooms, and long periods of concentrated work time. Children are divided into classes in approximately 3-year age groups. The theory behind this is that older children will gain a sense of responsibility

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[28]"How Many Montessori Schools are There?" North American Montessori Teachers Association, accessed January 24 2013, http://www.montessori-namta.org/FAQ/Montessori-Education/How-many-Montessori-schools-are-there

and self-efficacy from working with younger children, and younger children will find helpers and role models in the older children. The mixed age groups also allow children to develop at their own pace and not have to feel like they are falling behind their peers.

What a Montessori Environment is like:

Hoaloha Kai Montessori School (Hoaloha Kai), Honolulu, Hawaii

The Montessori approach is based on a scientific study of a child's neurological, psychological, and physical development, from which Dr. Montessori concluded that the, "mind is constructed to organize and learn from the environment. Based on this recognition, she developed a prepared environment carefully designed to support the young child's 'absorbent mind' and to assist their complete development.[29]" A purposefully designed environment is very important in the Montessori approach, "since the child learns to glean information from many sources, instead of being handed it by the teacher, it is the role of the teacher to prepare and continue to adapt the environment, to link the child to it through well-thought-out lessons, and to facilitate the child's exploration and creativity. The Prepared Environment is essential to the success of Montessori.[30]"

During a visit to at Hoaloha Kai's preschool classrooms, many notable Montessori characteristics were observed. In a Montessori classroom, children are given the freedom to move about the room to work in small groups or individually. At Hoaloha Kai, small work tables that include one or two chairs encourage independent, intimate work environments, as seen in

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[29]"Montessori Classrooms," Association Montessori International/USA, accessed April 24 2012, http://www.amiusa.org/montessori-classrooms/
[30] "An Introduction to Montessori Philosophy & Practice," Michael Olaf Montessori Company, http://www.michaelolaf.net/1CW312MI.html

Figure 4. Children also welcome to work on the floor.

Figure 4 Hoaloha Kai Montessori School, individual work spaces and art at a child's eye level

The environment is designed to accommodate choice. Low shelves allow children to access learning materials of their choosing, as seen in Figure 5. Children are given lessons on specially designed Montessori learning materials and activities located throughout the classroom. The specially designed learning materials were created to teach particular skills. After students have received a lesson on a material, they are allowed to work with it as they wish.

Figure 5 low accessible shelves for easy access to learning materials

Art work by well-known artists is displayed around the room at a small child's eye level, as seen in Figure 4. Apart from the fore mentioned art work, walls are left notably bare, with the exception of a light washing of soft colored paint on the walls. The Montessori philosophy does not encourage clutter. Different from many other preschool approaches, children's art work is not displayed on the walls at Hoaloha Kai. A child's art is considered a personal expression and understanding of their ideas. When available, natural lighting is preferred in the classroom. Hoaloha Kai's preschool classrooms are full of natural light from large windows and sliding doors, as seen in Figure 6.

Figure 6 Hoaloha Kai Montessori School, natural lighting from large windows

The major characteristics of a Montessori environment are, "beauty, order, simplicity, and accessibility.[31]" A Montessori classroom is uncluttered and encourages calm, focused, independent work. The classroom is designed to make children feel like they are welcome and that they belong. Dr. Montessori was the first to design and integrate child sized furniture into her classrooms. Figure 7 shows Hoaloha Kai's use of child-sized tables, chairs, and shelving.

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[31] "The Prepared Environment," accessed January 14 2013, www.montessori-ami.org/montessori/environment.htm

Figure 7 Hoaloha Kai Montessori School, child-sized furniture

Rudolf Steiner (Waldorf Education) Approach

Based on the philosophy of Rudolf Steiner, Waldorf schools take a holistic approach to education, to develop the physical, intellectual and spiritual realms of a child. Steiner stressed age-appropriateness, and the understanding of human development in the structure of his learning system. Curriculum responds to three developmental age groups, birth to 6 years, 7 to 14 years, and 14 to 18 years. The Waldorf preschool curriculum emphasizes learning through play. Imaginative, child-led play is encouraged; Figure 8 shows two children at Honolulu Waldorf School independently exploring a butterfly enclosure.

Figure 8 Honolulu Waldorf School, children exploring a butterfly enclosure

Simple toys and objects made of natural materials are provided to spark different kinds of imaginative play. The learning materials provided are open-ended, and may be used for multiple purposes. Creative thinking, problem solving, and social skills are learned through the children's imaginative play. The youngest Waldorf learners are gently introduced to school in a secure, home-like setting, where they begin to learn the rhythms and patterns of daily school life and gain independence. They believe that children learn through pattern, repetition, and imitation.

The Waldorf preschool classroom is designed to be, "a warm, beautiful and loving home-like environment, which is protective and secure and where things happen in a predictable, regular manner.[32]" The Waldorf environment is designed to be aesthetic, organized, and utilize natural materials.

> "Since the surroundings in which children are raised and educated affect them deeply, great care must be taken to create an environment that is nourishing to the senses. Waldorf teachers therefore strive to create an environment where order and beauty prevail. The walls of the kindergarten are usually painted with luminous washes of watercolor; the window curtains are made from plant-dyed fabric; sturdy tables and chairs are constructed of solid wood; and most of the imaginative toys and playthings are handcrafted from natural materials. These beautiful surroundings are simple and calming and the sense impressions that they engender promote the child's physical growth and health. Because the materials used in the kindergarten are natural and real, they help the child develop a healthy relationship to the material world.[33]"

What a Waldorf Environment is like:

Honolulu Waldorf School, Aina Haina, Hawaii

Architect: Dan Klein

As mentioned before, the Waldorf preschool is a calm, comforting, environment designed to allow children accessibility to simple open-ended learning objects made of natural materials like pieces of wood, baskets, and shells, as seen in Figure 9.

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[32] "Preschool and Kindergarten in the Waldorf School," Association of Waldorf Schools of North America, accessed April 28 2012, http://www.whywaldorfworks.org/02_W_Education/pre_and_k.asp

[33] "The Waldorf Kindergarten: the World of Young Children," Waldorf Early Childhood Association of North America, http://www.waldorfearlychildhood.org/articles.asp?id=3

Figure 9 Honolulu Waldorf School, open-ended materials

At Honolulu Waldorf School, curvilinear architecture and draping fabric is utilized in an effort to soften the sharp corners, as seen in Figure 10.

Figure 10 Honolulu Waldorf School, curvilinear architecture as a protective gesture

Honolulu Waldorf School's Early Childhood Chair, Cindy Sydow, explained that the curving architecture of the room is meant as a protective gesture, which reinforces a sense of security for the children. When children feel safe, they are able to let their guard down and fully enjoy the space.

Learning environments are both outdoors and indoors. Indoors are spacious, providing both open space to move, as well as smaller areas for privacy or smaller group work. A notable characteristic of a Waldorf learning environment is the use of natural materials. As much as possible plastics and other synthetic materials are avoided. Most furniture and learning objects are made of wood, natural fibers, stone, and some metal, as seen in Figure 11.

Figure 11 Honolulu Waldorf School, natural materials

The walls are washed in a soft, warm colored paint, and natural lighting is used as much as possible, as seen in Figure 12. Color choices are very purposeful in the Waldorf environment. Colors are chosen for their cultural and psychological connotations. For example, "the nursery, kindergarten, and early grades, a soft, warm, pink tone is usually selected for walls and curtains because of its gently active and supportive quality. Pink is a loving, innocent color, decidedly

feminine in character. Therefore, it is a natural color choice for the daily embracing of this age group.[34]" There are also very few objects hung on the walls to keep them uncluttered.

Figure 12 Honolulu Waldorf School, walls washed in warm, soft colors, and natural lighting from windows

Outdoor learning environment are designed to be simple, and natural. Natural materials like boulders, wood stumps, logs, sand, dirt, and vegetation are utilized to create their outdoor play areas, as seen in Figure 13. Ground covering is kept as natural as possible as well, with paths composed of dirt or grass, as seen in Figure 14.

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[34] "Color in the Waldorf School," Waldorf Today, accessed February 3, 2013, http://www.waldorftoday.com/2010/12/color-in-the-waldorf-school-van-james/

Figure 13 Honolulu Waldorf School, outdoor play area

Figure 14 Honolulu Waldorf School, compacted dirt paths

Reggio Amelia Approach

The Reggio Amelia Approach is named after its place of origin in Northern Italy. Created shortly after World War II, it has since become a popular preschool approach world over. This approach recognizes the child as an effective agent in their own learning. "At the heart of this system is the powerful image of the child. Reggio educators do not see children as empty vessels that require filling with facts. Rather they see children as full of potential, competent and capable of building their own theories[35]." The responsibility of a teacher in this system is as a guide to help children make meaning of their experiments with reality. A teacher observes and documents each child's activities and discoveries daily, and as a result, tailors activities and lessons towards a child's interests. Special emphasis is put on creativity and novel exploration of ideas. A large portion of this query exploration happens through artistic endeavors and in-depth material investigations. In environmental planning, they believe that a child's environment acts as a teacher and therefore special attention is paid to the design of classroom environments.[36]

What a Reggio Amelia Environment is like:

Mid-Pacific Institute Preschool Campus, Manoa, Hawaii

Architects: Urban Works Inc.

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[35] "A Look at the Reggio Approach," Reggio Kids Centres, accessed February 19, 2012,
http://www.reggiokids.com/about/about_approach.php
[36] "A Look at the Reggio Approach," http://www.reggiokids.com/about/about_approach.php

Vision Statement: "Mid-Pacific Institute will prepare students to make a difference in the world by embracing change with creativity, collaboration, critical thought, and global awareness, guided by moral and ethical values[37]."

Founded over 140 years ago, Mid-Pacific Institute is a private college preparatory institution that provides schooling for children from preschool through high school[38]. They offer a rigorous program that is strong in both the arts and sciences. Fittingly so, Mid-Pacific Institute's preschool program is based on the Reggio Amelia preschool model. As mentioned in earlier sections, Reggio Amelia preschools believe in the efficacy of a child in their own learning. Therefore, a child's learning should be guided based on their curiosity, and they should be able to explore their queries in depth. At Mid-Pacific Institute, small buildings containing two classrooms that share an adjoining atelier, as seen in Figure 15.

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[37]"Welcome to Mid-Pacific Institute," Mid-Pacific Institute, accessed April 10, 2012, http://www.midpac.edu/about/welcome.php
[38] "Welcome to Mid-Pacific Institute," http://www.midpac.edu/about/welcome.php

Figure 15 Mid-Pacific Institute: Exterior view of classrooms and site plan (not to scale)[39]

Several techniques are used to create a comforting, yet dynamic classroom environment that is not over stimulating. Large windows provide plenty of natural light. Windows are also placed low enough to the ground so that children are able to see outside. The room is organized and not too cluttered. Bright colors are used sparingly, and only to accent certain aspects of the room. The major color palette for the room is made up of neutral earth tones.

Notable classroom design considerations are as follows, as illustrated in Figure 16, Figure 17, and Figure 18:

1. Child sized tables and chairs are available to provide group work stations for different numbers of children. Smaller scale furniture is a comforting design consideration that helps children to know the space is for them.

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[39] Image courtesy of Urban Works, Inc.

2. Low shelves keep all items at a child's eye level, inviting them to independently access toys and materials. Low shelving act as room dividers as well, separating spaces in to designated centers. Low shelving also allows teachers to supervise children while they are playing independently.

3. Home-like furnishings like arm chairs and sofas are provided to extend the security associated with home into a classroom setting.

4. Graphical representations like posters and paintings are limited. Instead large bulletin boards and other pin-up spaces are used to display the work of children. The walls of the classroom are utilized as a gallery to display the children's work.

5. Draped fabric is used to create a canopy that can change the spatial quality of the corner in more than one way. If lowered, the tent-like fabric makes a cozy, intimate, semi private area. When raised up high, it brings attention to the corner, giving it stage-like qualities.

6. A variety of group seating is provided for small and large group work

7. Area rugs are provided to create a cozier, homelike atmosphere and make floor play more comfortable.

8. A loft with a draped fabric canopy provides children with a multi-level experience within the classroom. The space created on top of the loft, under the canopy, as well as the space underneath the loft create intimate semi-private spaces for children to retreat to when they need some quiet, alone time.

Figure 16 Mid-Pacific Institute Preschool, classroom interior

Figure 17 Mid-Pacific Institute, notable design considerations

Figure 18 Mid-Pacific Institute, notable design considerations

In Reggio Amelia preschools the atelier is an important place for the exploration of queries. The atelier is an artist's workshop or studio. In the atelier, children are encouraged to work with and explore the application of various materials and mediums. At Mid-Pacific Institute, as seen in Figure 19, the atelier space offers children access to various materials and supplies with which children are allowed to build and create. As seen in Figure 20, children are given access to high quality materials, for example, real stones and glass, and artist-quality colored pencils and markers. The school believes that the quality of a child's work will be influenced by the quality of the materials they are given. A child will work more carefully and purposefully when they know they are working with valuable, high-quality materials. Most of the materials are located on low shelves that the children can reach into easily. Large, clutter free work surfaces are also provided at child accessible heights.

Figure 19 Mid-Pacific Institute Preschool, atelier

Figure 20 Mid-Pacific Institute Preschool, high quality art supplies

Figure 21 shows Mid-Pacific Institute's out door earth/soil play area. Children are allowed to explore soil, mud, stones, and bricks as constructive play mediums. In figure 20, you can see how children have moved the bricks and placed them in the muddy area. This play zone, allows children a direct connection to a natural environment and a naturally occurring building material. Children learn about the tactile qualities, material constitution, and the malleable qualities of soil and mud. Children can also learn about the ponding properties of water.

Figure 21 Mid-Pacific Institute Preschool: mud, dirt, brick constructive play area

Chapter Conclusion

The Montessori approach, Rudolf Steiner approach, and the Reggio Amelia approach all stress the importance of preschool environment design. Although different, these three approaches have several similarities in their treatment of the environment. All three highly value child accessibility, natural materials, creating calmness in the classroom, low hue saturated colors, home-like environments, child-sized furniture, access to the outdoors, multisensory learning opportunities, and child-led learning opportunities. The Waldorf environment as well as the Montessori environment kept their walls fairly bare, which is a key difference between them and the Reggio Amelia approach. The Reggio Amelia approached used the walls of their rooms as a gallery for sharing the children's art, and other work. The Reggio Amelia approach also emphasized art and materials studies in the curriculum, through the use of the atelier. Although encouraged in all three approaches, the Waldorf environment almost exclusively used natural materials in their learning environments.

Roots

Chapter 3 Case Study, the Environment as a Teacher

Punahou School, Omydiar K-1 Neighborhood, Manoa, Hawaii

Architect: Urban Works, Inc.

In 2006 Urban Works, Inc. began the process of designing a new Kindergarten and First Grade facility at Punahou School. The Omidyar K-1 Neighborhood is an example of a learning environment designed specifically to support the school's curriculum and learning goals.

The Omidyar K-1 Neighborhood is located at the top corner of Punahou School, as seen in Figure 22. The site was topographically challenging with a steep hill to mitigate. As seen in Figure 23, the Neighborhood is bound by Manoa Road in the north (also shown in Figure 24), a mountain in the south, and Piper's Pali in the west (also shown in Figure 25).

Project Site
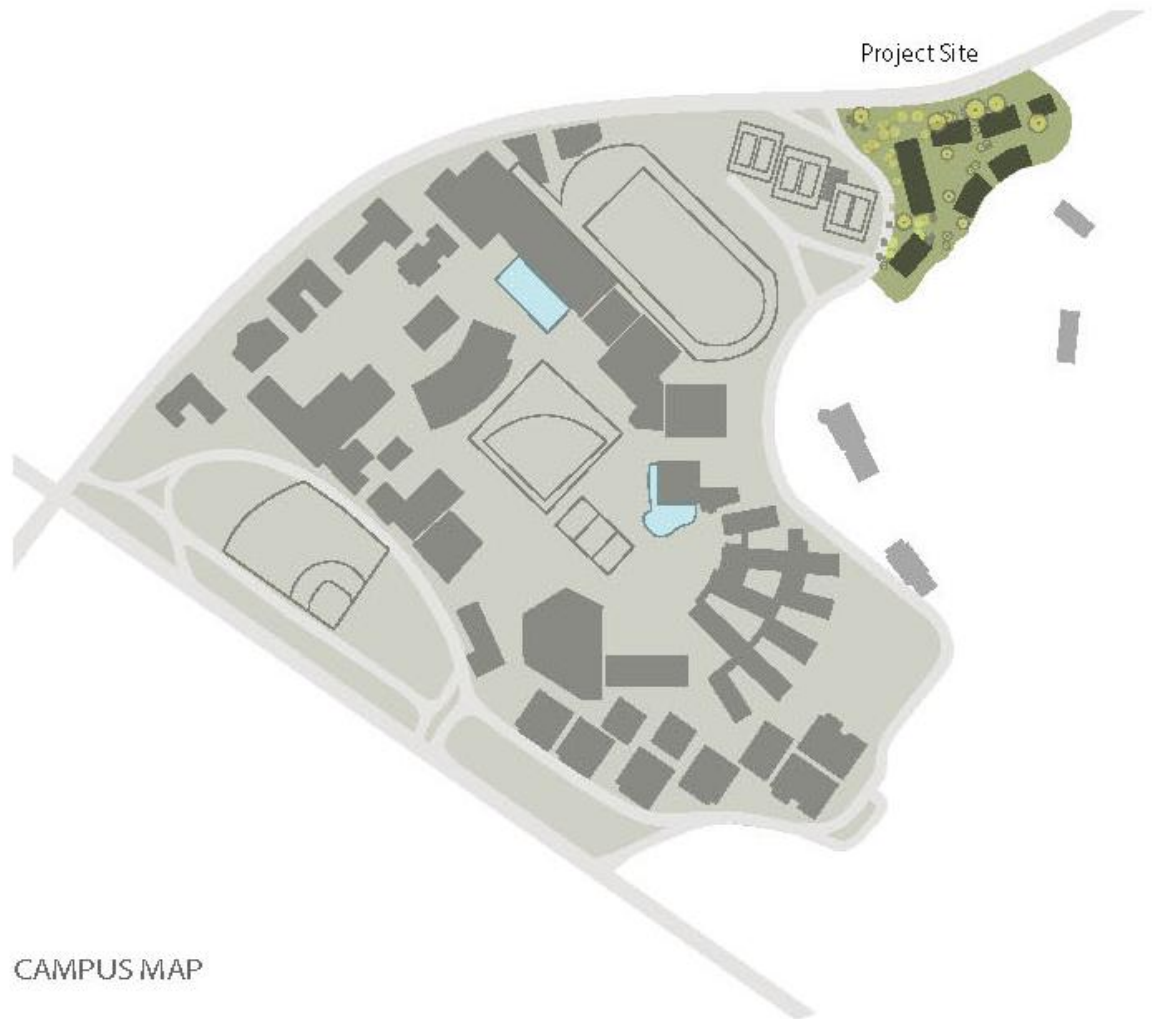
CAMPUS MAP

Figure 22 Neighborhood at top of Punahou Campus[40]

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[40] Image courtesy of Urban Works, Inc.

SITE PLAN

SITE PLAN
1 Wilcox Hall
2 Drop-off Area
3 Amphitheater
4 Hawaiian Garden
5 City House
6 Forest Houses
7 P.E. Pavilion
8 Upper Play Area
9 Mountain Houses
10 Common Lawn

Figure 23 Site Plan[41]
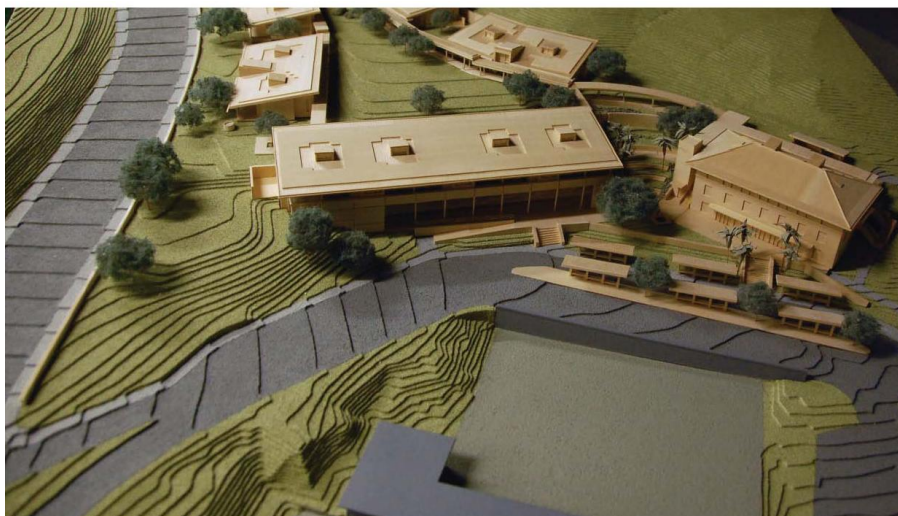
Figure 24 Model of Neighborhood as seen from Piper's Pali[42]

[41] Image courtesy of Urban Works, Inc.
[42] Image courtesy of Urban Works, Inc.

Figure 25 Model showing Manoa Road in the north[43]

As part of the program Urban Works designed three new buildings, a new pavilion, and renovated the existing Wilcox Hall. Urban Works architects' and a Punahou School design committee composed of teachers and administrators, worked in conjunction to create a design that integrated the current curriculum, and future learning opportunities into the design.

The K-1 facility was conceptualized to be a neighborhood that surrounds a large, common, park space. The concept of teaching sustainability, and environmental consciousness through the design was a very influential factor, as seen in the diagrams in Figure 26. The design teaches sustainability and environmental consciousness through several interactive features that allow children to experience passive and active sustainable systems. The strong indoor-outdoor connection via pocket gardens, large lanais, classroom gardens, and open park space allow children to learn about the natural environment by being in it, and allowed to explore it.

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[43] Image courtesy of Urban Works, Inc.
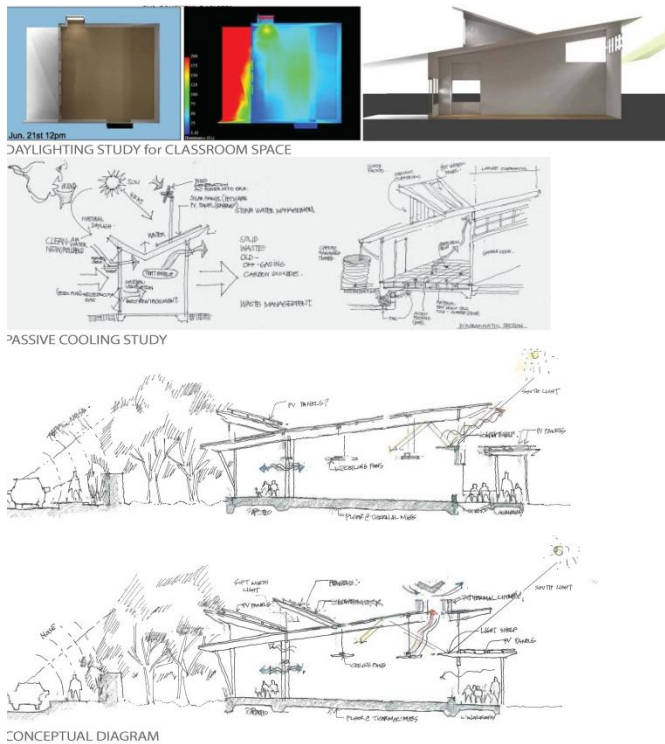
Figure 26 Passive lighting and cooling diagrams[44]

Building Program:

- 12 Classrooms (6 Kindergarten, 6 First grade): 1000 SF each

- 4 Playground Spaces

- Teacher's Commons: 850 SF

- K-1 Office: 550 SF

- Health Room: 120 SF

- Admissions: 50 SF

- Community Room (Chapel, Dining, Performance, After School Program): 2500 SF

- P.E. Instruction: 280 SF

- Creative Learning Center: 1500 SF

- Music Space: 1400 SF

- Art Space: 1400 SF

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[44] Image courtesy of Urban Works, Inc.

- Garden Space (per classroom)

- Drop-off and Pick-up Area: 1600 SF

The resulting building is a Neighborhood whose curriculum is very well represented in the design. Figure 27 and Figure 28 illustrate the architecture's integration into the existing campus settings.

Figure 27 Rendering as seen from Piper's Pali[45]

Figure 28 Forest House

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[45] Image courtesy of Urban Works, Inc.

Curriculum dealing with water catchment, water conservation, rainfall, gravity, water flow, and energy production can be taught through the use of the K-1 Neighborhood's rainwater catchment system which was integrated into the design. Rain is guided into cisterns outside every building through a system of shed roofs, gutters and rain chains. Water stored in the cisterns is accessed by several hand pumps around the campus and a windmill on top of the water fall in the upper campus play area, as seen in Figure 29. Children are able to use the collected water for their gardens, as seen in Figure 30. The integration of a windmill in the landscape design is used to teach children about wind power, and that wind energy can be used to power a water pump which in turn sends water flowing down a water fall.

Figure 29 hand pump at top of water fall

Figure 30 rain water catchment system near gardens

Windows were also designed with curriculum in mind. Windows of various sizes, operability, and height are used for various lessons, as seen in Figure 31. Windows at various heights allow children to view different parts of the outdoor environment. Children learn about day light, monitor weather conditions, observe what is going on in the rest of the neighborhood, and share what they are learning by pinning up their work in the windows.

Figure 31 Windows of varying size and shape

Children learn about photovoltaic energy through a highly visible photovoltaic panel roof on the covered walkway connecting Wilcox Hall to the City House, as seen in Figure 32. Children learn how energy is collected from the sun and used to create the electricity they use in their classroom. A main dashboard located in the campus office, as well as individual classroom

meters allow students to monitor their energy usage and compare it to the buildings energy production.

Figure 32 Photovoltaic panel roof on covered walkway[46]

A strong connection to the outdoors was seen as particularly advantageous. The Neighborhood's design offers several opportunities for children to learn in and from nature. Children in the Neighborhood have access to spacious lanais which act as an indoor-outdoor intermediate space to work in, as seen in Figure 33. There are also attached classroom gardens

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[46] Image courtesy of Urban Works, Inc.

and a large, centralized, open park space for children to spend time learning outdoors, as seen in Figure 34. A Hawaiian garden located at the top of the amphitheater acts as an outdoor creative learning center, as seen in Figure 35, and bioswales, as seen in Figure 36, teach children about water flow and drainage. The bioswales also give children a chance to imaginatively play with stones, dirt, gravel, and vegetation which are all naturally occurring, open-ended materials.

Figure 33 Spacious lanais act as indoor/outdoor intermediate space

Figure 34 Classroom gardens and open park space

Figure 35 Outdoor Creative Learning Center

Figure 36 Bioswales[47]

Chapter Conclusion

Punahou School's Omidyar K-1 Neighborhood is a good example of a learning

environment designed to directly support a curriculum. Educators, administrators, and designers

came together to plan an environment where Punahou's educational philosophies would be

reflected. Sustainability curriculum is supported by making the architecture's active and passive

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[47] Image courtesy of Urban Works, Inc.

sustainable systems visible and accessible to the children. Encouraging indoor-outdoor connections and the importance of movement are encouraged by providing spacious lanais, generous open green spaces as well as the partially enclosed P.E. pavilion. Mixed age learning is supported by the joined classrooms that share a common studio space.

Chapter 4 Planning Spaces to Facilitate Whole-body Learning and Creativity

As illustrated in Figure 37, through synthesis of the research conducted in the previous chapters, this chapter presents strategies to promote whole-body learning and creativity.
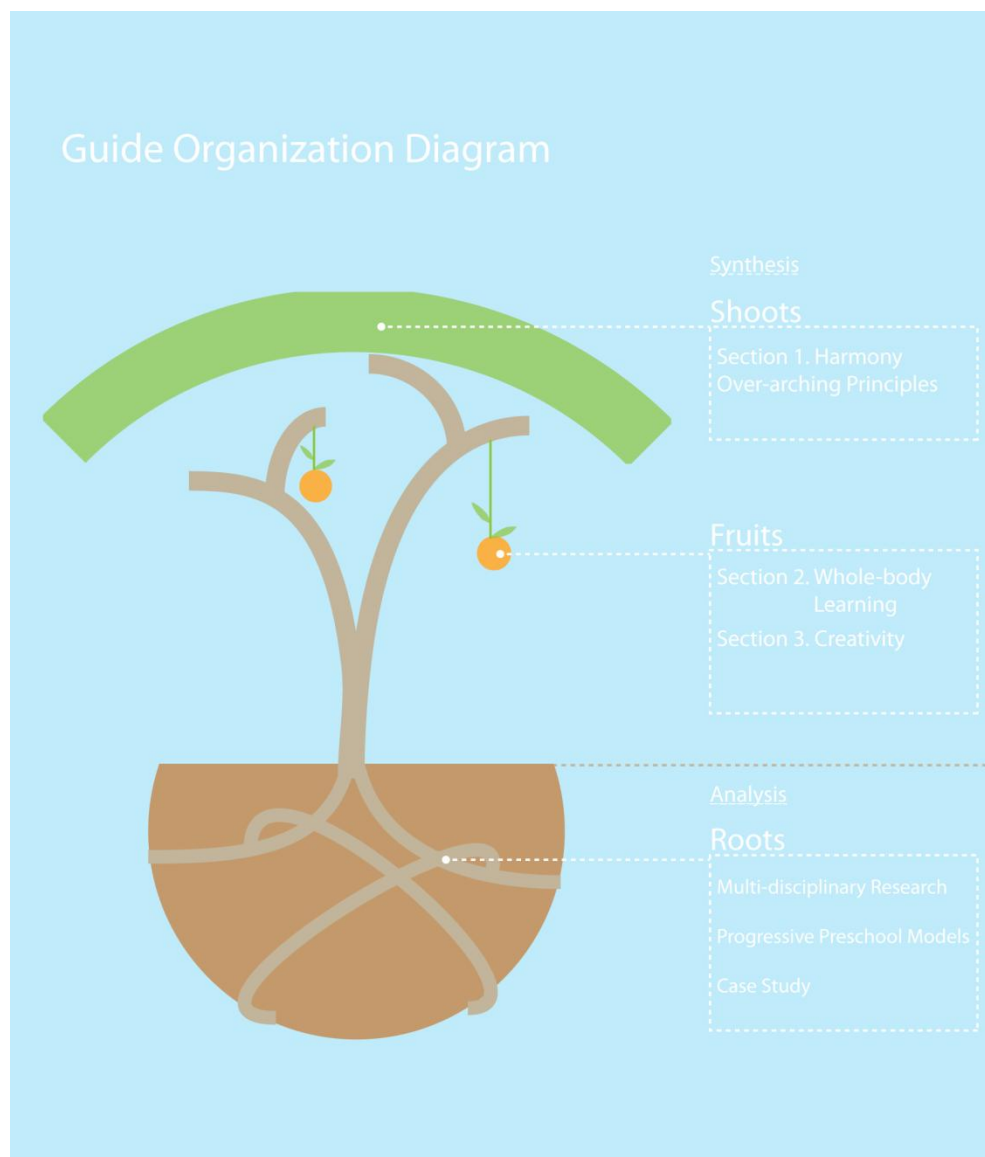
Figure 37 Guide Diagram

There are so many factors that go into creating a successful early learning facility. This planning guide focuses on three sections that represent a synthesis of the research in chapters one through three. It provides useful ideas for anyone planning an enriching early learning environment that encourages whole-body learning and creativity.

As established previously, children are experiential learners who learn using their whole body. Movement and multi-sensory learning are therefore critical to reinforce. Rich, multilayered explorations of materials encourage creativity, curiosity and imagination. Supporting interventions that promote divergent thinking encourages critical thinking and problem solving. Therefore, encouraging interventions that support exploring, creating, and connecting are imperative in an early childhood education facility. Supporting interventions that create a harmonious environment on which whole-body learning and creativity can be founded upon is also important. The guide is organized into three major sections that go on to discuss supporting topics in detail. Due to the fluid nature of some of the interventions there is some overlap between sections; however interventions will be discussed topically as they pertain to each section.

The first aspect discussed in this chapter is harmony. Harmony is an overarching theme that is achieved with the understanding that the facility's design is made up of balanced parts of a whole. All parts must work together in order for the design to be successful. This chapter also explains how to create an environment that feels less stressful to a child, which allows a child to be open and ready to learn. The major topics discussed in this section are clarity, and comfort and security.

Once strategies are implemented to support a harmonious environment, a setting that facilitates whole-body learning and creativity can be created. The second section discusses strategies to encourage whole-body learning. The major topics discussed in this section are movement and multi-sensory learning opportunities.

The third section discusses interventions that facilitate creativity in an early childhood education facility. This section will discuss ways to encourage creativity through exploring, creating, and connecting.

Shoots: Seeing your project as balance parts of a holistic design. Harmonizing interventions that facilitate Clarity, Comfort and Security. Providing the preschool environment with strong over-arching values that support Whole-body Learning and Creativity.

Harmony

Shoots

Harmony- Parts of a Whole

When designing an early childhood learning environment, it is important to remember that an inspiring environment is made up of many parts that must work together in order to have a successful whole, as illustrated in Figure 38. It is critical to remember that all of the parts are related to each other and will affect each other, for example the spatial organization of your design will affect the circulation patterns; window placement will affect the lighting, ventilation, and available views; and consistency in material choices throughout the design will affect the sense of connection throughout the entire facility. When all of the elements are balanced, an over stimulating environment can be avoided. One way balance can be achieved is by incorporating strong guiding concepts into the planning early on in the design process. These guiding concepts will allow design decisions to be consistent, and balanced throughout the entire process. Think about the success of the whole throughout the design process and strive for consistency in the overall design.

Figure 38 A holistic early childhood learning facility is made up of balanced parts of a whole

As discussed in previous sections, a child learns best when he or she feels safe, secure, and comfortable in their environment. A stressful environment is counterproductive to learning for a young child. Reinforcing security is thus an overarching design concept that should be accomplished in order to support later interventions.

The following section discusses overarching principles such as achieving clarity through assessing values and goals as a means of creating guiding concepts, and how to reinforce a sense of comfort and security through environmental design.

Shoots

Clarity

Value and Goal Assessment

It is important to be clear about what the values and goals are for the learning environment that will be designed. This is a critical step in creating a thoughtful, balanced design. Analyzing what is known, wanted, and needed is the first step in creating a harmonious learning environment. The process begins with a value assessment. Write down any overarching themes or goals desired in the learning environment. These values may incorporate philosophies or theories that will be important to the curriculum. The preschool stakeholder's educational philosophies should be reflected in the design of the space. In addition to educational philosophies, values may also include religious or cultural principles. What are the 'big ideas' that will be most important to the integrity of the learning environment? Decide what the goals will be for the space, and understand why they were chosen. These values will become guiding concepts for the rest of the design. Refer back to these values and goals throughout every step in the design process, from spatial planning to material selection. When making decisions, remember to refer back to these values and decide whether the design choices are supporting your stated values.

After the values and goals for the environment are clear, begin to evaluate what the given parameters that must be worked within are and what needs must be fulfilled. This will help in deciding what the environment must provide.

Questions:

- What are the 'givens' in this situation?

- What is the budget?

- What codes and regulations must be worked within?

- What is the schedule for this project?

- What will the learning environment need to provide in order to support the stakeholders' values and goals?

- What will be going on in the learning environment?

- Who will be present in the learning environment?

- How many people will be present in the learning environment?

After determining what will be going on in the learning environment, and who will be present there, begin to formulate a spatial plan. Knowing what will be going on in the space allows one to determine how much square footage is needed, as well as what types of spaces are necessary. For example, if the school plans on serving meals, a kitchen will probably be needed, or if gardening is an important part of the curriculum, be sure to allot sufficient outdoor space for it.

Questions:

- How much space will be needed for the activities that will be going on with the number of occupants that will use the space?

- What type of spaces are they? Indoor? Outdoor?

Analyzing these various programming considerations will allow the creation of a thoughtful environment that is truly supportive of one's goals. This type of organized, intentional analysis decreases conflicting environmental messages that might be confusing to children.

This process of figuring out and documenting one's needs and wants is called programming. Different types of programming methods exist; Table 2 illustrates the Problem Seeking method of programming. The programming chart organizes goals, facts, concepts, and needs as they pertain to a projects function, form, economy and time in order to identify the problems that can be solved with an architectural solution.[48]

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[48] William M. Pena and Steven A. Parshall, *Problem Seeking: An Architectural Programming Primer* (New York: John Wiley and Sons, Inc, 2001).

Table 2 Problem Seeking Information Index[49]

	Goals	Facts	Concepts	Needs	Problem
Function People Activities Relationships	Mission Maximum number Individual Identity Interaction/privacy Hierarchy of values Prime activities Security Progression Segregation Encounters Transportation/parking Efficiency Priority of relationships	Statistical data Area parameters Personnel forecast User characteristics Community Characteristics Organizational structure Value of potential loss Time-motion study Traffic analysis Behavior patterns Space adequacy Type/intensity Physically challenged guidelines	Service Grouping People grouping Activity grouping Priority Hierarchy Security controls Sequential flow Separated flow Mixed flow Functional relationships Communications	Area requirements: By organization By space type By time By location Parking requirements Outdoor space requirements Functional alternatives	Unique and important performance requirements that will shape building design
Form Site Environment Quality	Bias on site elements Environmental response Efficient land use Community relations Community improvements Physical comfort Life safety Social/psychological environment Individuality Wayfinding Projected image Client expectations	Site analysis Soil analysis FAR and GAC Climate analysis Code survey Surroundings Psychological implications Point of reference/entry Cost/SF Building or layout efficiency Equipment costs Area per unit	Enhancements Special foundations Density Environmental controls Safety Neighbors Home bas/off icing concepts On-premise: fixed, free group address Off-premise: satellite, telecommuting, virtual office Orientation Accessibility Character Quality Control	Site development costs Environmental influences on cost Building cost/SF Building overall efficiency factor	Major form considerations that will effect building design
Economy Initial Budget Operating Costs Life cycle Costs	Extent of funds Cost effectiveness Maximum return Return of investment Minimizing of operating costs Maintenance and operating costs Reduction of life cycle costs Sustainability	Cost parameters Maximum budget Time-use factors Market analysis Energy source costs Activities and climate factors Economic data LEED rating system	Cost control Efficient allocation Multifunction/versatility Merchandising Energy conservation Cost reduction Recycling	Budget estimate analysis Balance budget Cash flow analysis Energy budget Operating costs Green building rating Life cycle costs	Attitude toward the initial budget and its influence the fabric and geometry of the building
Time Past Present Future	Historic preservation Static/dynamic activities Change Growth Occupancy date Availability of funds	Significance Space parameters Activities Projections Durations Escalation factors	Adaptability Tolerance Convertibility Expansibility Linear/concurrent scheduling Phasing	Escalation Tree schedule Time/cost schedule	Implications of changes in growth on long-run performances

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[49] William M. Pena and Steven A. Parshall, *Problem Seeking: An Architectural Programming Primer*, 36-37.

Once the types of wanted spaces are known, and how much room is needed for them, start to lay them out using a simple bubble diagram, as illustrated in Figure 39. A bubble diagram is a technique that allows a designer to start to lay out spaces based on their size, adjacency needs, and spatial use. At this point one can work out important adjacencies of spaces, and start to figure out how people will be moving from space to space.
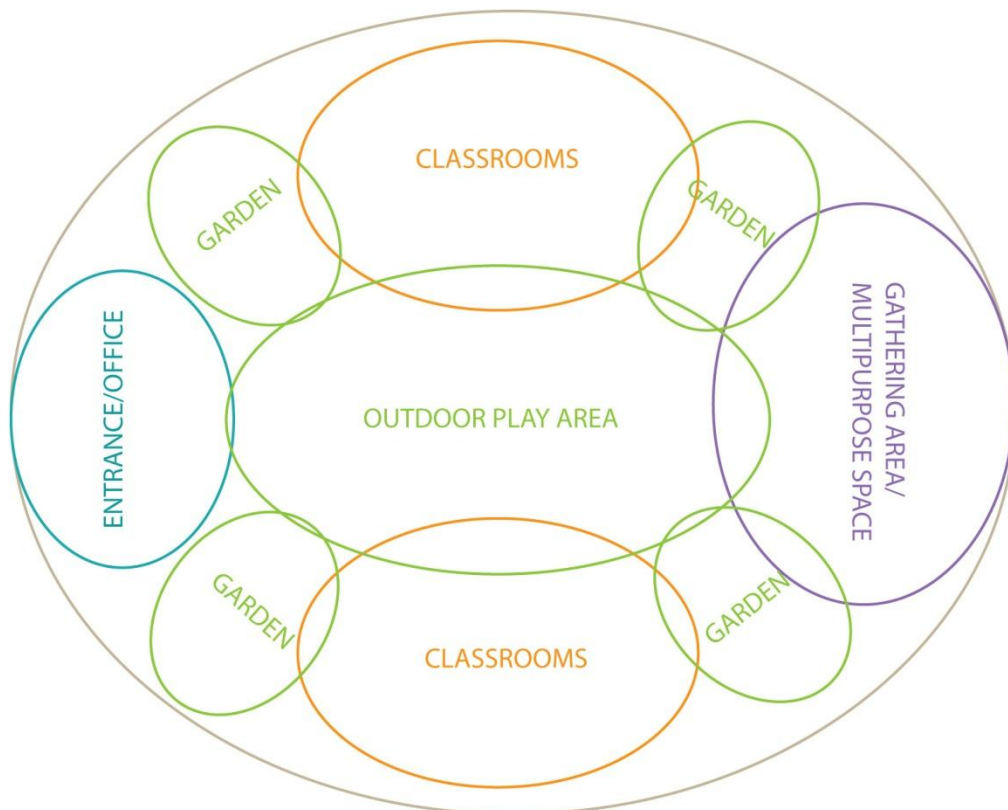

Figure 39 Example of a Bubble Diagram

If there is already a chosen site, make sure to include it in this step of the process in order to make sure things will fit on the site. When sizing the space always follow local building codes in consideration to required setbacks and easements. Child care design expert, Anita Rui

Olds, provides a useful table for estimating the per child square footage of a site[50], which is illustrated in Table 3.

Table 3 Determining Site Size[51]

Space Standard (Quality)	Outdoor Play Space	Parking	Building Size	Green Space (30-35% of total)	Total Site Size
Minimum	75 sq ft/ch	25 sq ft/ch	88 sq ft/ch	56 sq ft/ch (30%)	244 sq ft/ch
Workable	100 sq ft/ch	50 sq ft/ch	100 sq ft/ch	75 sq ft/ch (30%)	325 sq ft/ch
Better	150 sq ft/ch	75 sq ft/ch	115 sq ft/ch	119 sq ft/ch (35%)	459 sq ft/ch
Recommended	200 sq ft/ch	100 sq ft/ch	125 sq ft/ch	149 sq ft/ch (35%)	574 sq ft/ch

At a micro-scale, this is the same process teachers can go through when planning their classrooms.

Site Choice Considerations

Site evaluation is an important part of the design process. As much as possible, choose a site that allows for ease of access, safety, quiet, and access to nature and the surrounding community. Take adjacencies and proximities to a variety of community resources into account. Take into consideration what the surrounding community is like. Evaluate the site in terms of naturally occurring features, such as grade changes, on-site water sources, or existing vegetation. Take note of the prevailing winds, and sun path in order to determine building orientation. In Hawaii's hot, humid tropical climate minimizing solar heat gain and maximizing ventilation is an effective way to keep buildings cool. Remember to take local zoning requirements into consideration as well.

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[50] Anita Rui Olds, *Child Care Design Guide* (New York: McGraw-Hill Companies, Inc, 2001), 68.
[51] Anita Rui Olds, *Child Care Design Guide*, 68.

Questions to consider:

- Is there a transit station nearby for commuting parents?

- Is there access to interesting and engaging fieldtrip opportunities in the immediate surrounding community?

- Is the site located on a busy thoroughfare that might make commuting by foot hazardous?

- Are there elementary, intermediate or high schools close by so parents can drop off preschoolers' siblings at the same time?

- If the site has limited outdoor space, is there access to nature in walking distance?

- Is there access to good natural light and ventilation?

- Does the shape and size of the site allow you to orient buildings to take advantage of natural light and ventilation?

- Are there notable natural features on the site like trees, boulders, or streams?

- Are there notable views that should be highlighted?

- Are there less aesthetically pleasing views that should be hidden?

- Is the site large enough for the entire compound to be on one floor?

Creating a diagram that illustrates these considerations, as seen in Figure 40, is a helpful way to visualize the site.

■ within walking distance from town center which offers a variety of field trips for learning about the community

■ located nearby an elementary school that older siblings might attend

■ located in a quiet residential neighborhood

■ close proximity to a senior living community allows access to potential volunteers and community elders

☐ preschool is located near transit station for commuting parents

☐ school is located near a stream and wooded area for access to nature. A park space also acts as a buffer zone between commercial area and preschool site.
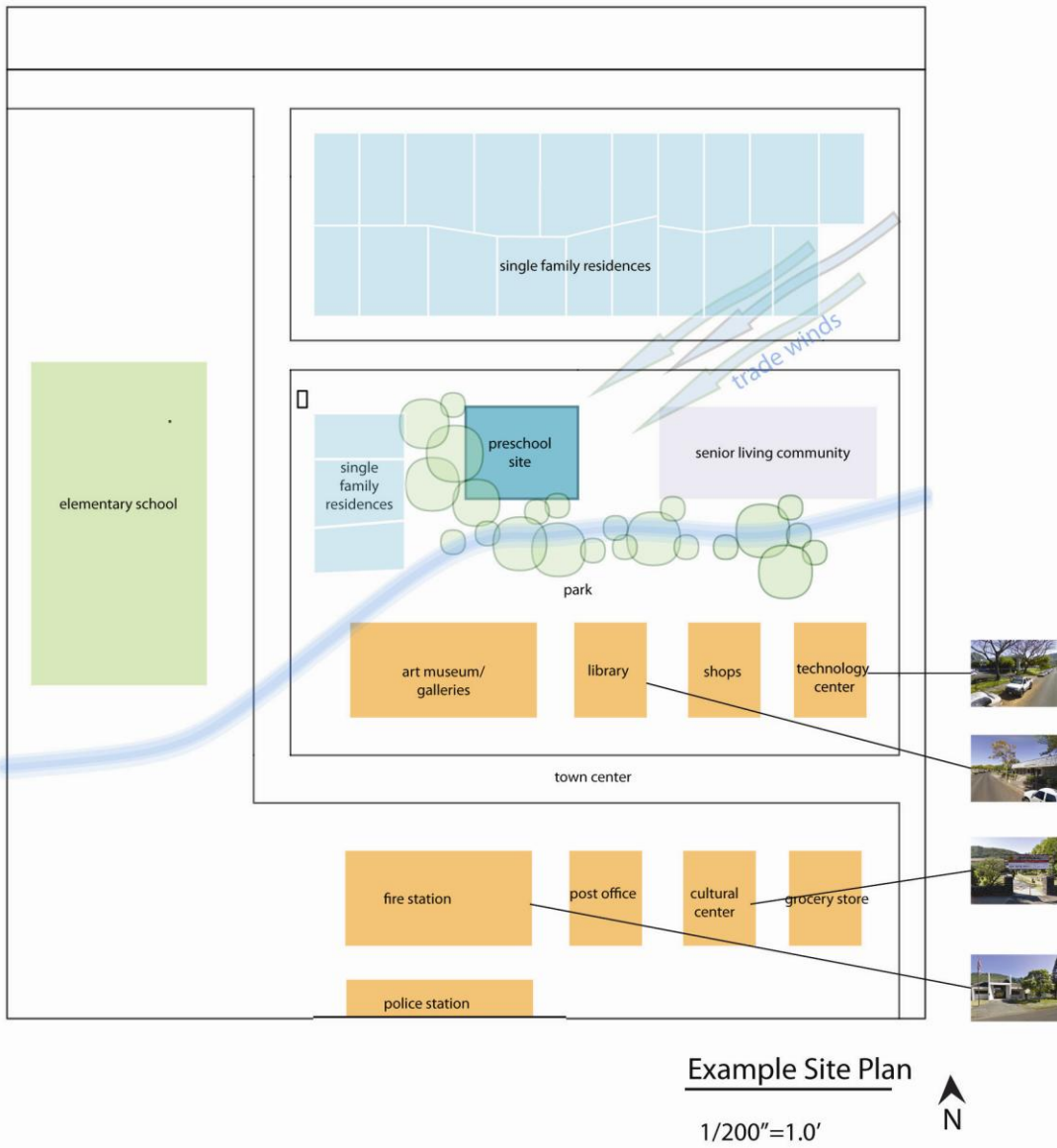

Example Site Plan

1/200"=1.0'

N

Figure 40 Example site plan with adjacencies taken into consideration

Shoots

Security and Comfort

Balancing Conflicting Needs

As discussed in Chapter 1 primal instincts to keep themselves safe are a top priority for children. A sense of security is essential for learning. Balancing a child's need to feel secure, with their need for stimulation is what psychologists Fiske and Maddi call "difference within sameness." For a young child the ratio of calmness to stimulation should be more heavily weighted on the calmness end of the ratio because of their sensitivity to stimulation. This guide does not propose that designers should create boring, one dimensional projects. On the contrary, spaces can be comforting and still be sensorially stimulating. Think about the intensity of the stimulating interventions, and lean towards subtlety; children are perceptive and sensitive to small changes in their environments. Three ways to reinforce a sense of security in early childhood education facilities are decipherability, adequate space, and following a residential model.

Decipherability

Decipherability means that the designed space can be easily read and understood by its users, particularly children. Confusing spaces that children do not understand how to navigate through or what they are used for may become stressful for them. Avoid crowded, cluttered spaces that convey a sense of disorder and chaos. Decipherability can be achieved through the use of patterns and signals, sequencing spaces appropriately, and creating clear circulation patterns.

- Patterns and signals

Create order through the use of signals and patterns which allow children to anticipate what is coming next. Knowing what is going to happen next can help children ease into a new situation, and not become startled by unfamiliar surroundings. Most buildings are already composed of reoccurring elements like columns, beams, windows, and doors. Utilize the rhythm of these elements to create signifying patterns that children will become familiar with. Utilize shape, color, size or any other common detail characteristics to create patterns and signals in the design. Place recurring elements at regular intervals, a change in interval can be used to signify a change in the function of the space. For example, if columns along a walkway are placed at a regular interval of ten feet, discontinue the pattern when you reach a classroom and change the interval to columns every sixteen feet to announce the change.

Colors and materials may also be used to signify changes in spatial function. Color coding elements such as doors and walls will allow children to associate the color with the function of the space, and anticipate the behavior that is expected of them in that space. For example, paint classroom doors the same color, and use hints of that color along the path children use to approach the classroom to signal their ensuing arrival.

Children's small stature naturally puts them at close proximity to the ground. Take advantage of this juxtaposition and use floor, and path finishes to signal changes in spatial purpose.

- Sequence of Spaces

Coordinate the layout of building spaces with the sequence in which they are meant to be traveled. Recognize common patterns occupants will need to travel on a regular basis, as illustrated in Figure 41. Celebrate movement from space to space by using special thresholds (larger doors, adorned gates, trellises over a pathway, change in ground surface, etc.), as illustrated in Figure 42, to signify changes between spaces and

prepare children for the transition[52]. Set the tone from the approach and entry to the preschool, making sure the entrance is aesthetically beautiful and welcoming.
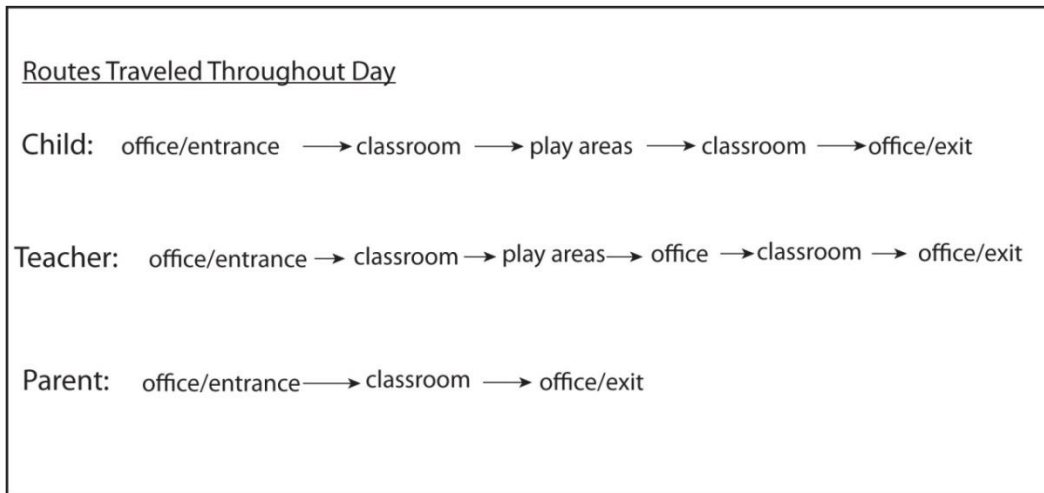
Figure 41 Routes traveled throughout the day

Figure 42 Announce transitions with celebrated thresholds

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[52] Anita Rui Olds, *Child Care Design Guide*, 92.

- Circulation, Clear Paths

  When space planning for a preschool classroom, keep in mind that the space should be organized, clutter free and flexible. Keep aisles wide and clear for transition between centers and keep the path clearly defined. Paths should be clear about the destination goal. "Young preschooler's depth perception, an important component of vision, has not yet finished developing. As a result, young preschoolers bump into each other more often and receive more minor injuries from falls than older preschoolers.[53]"

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[53] Rebecca Isbell and Christy Isbell, *Sensory Integration: A Guide for Preschool Teachers* (Beltsville: Gryphon House, 2007),52, accessed March 28, 2012, http://site.ebrary.com.eres.library.manoa.hawaii.edu/lib/uhmanoa/docDetail.action?docID=10320167

Follow a Residential Model

As discussed in Chapter 1, being away from parents in an unfamiliar setting can cause distracting stress in a child that discourages learning. As a baby, a child most likely spent much of their time in a residential setting, and has come to associate their residence with a sense of comfort and security. Including familiar residential elements in a preschool can help children transition from home to a school setting. While continuing to be professional, it is possible to include residential elements in a preschool that will make it feel much less intimidating, and more approachable and recognizable. For a small child who is about half the size of an adult, the physical scale of residential buildings is much easier to understand and occupy than an institutional one.

Strategies to implement a residential model:

- Indoors, include recognizable residential elements like couches, arm chairs, or decorative lamps.

- Keep the physical scale of the building close to that of a single-family home.

- Choose building materials common in residential buildings such as wood or bricks.

- Follow a residential sequence of spaces in the classroom, moving from public areas (living room or shared play areas) in the front of the house to more private areas(bedrooms or quiet play areas or napping areas), as illustrated in Figure 43.

- Keep dining areas in close proximity to kitchen.

- Keep a feeling of informality in the space.

- Include soft elements in the classroom such as area rugs, pillows, or cushioned seating.

Public spaces

Pathways, public
play areas for
entire school

Shared lanai, atelier,
bathroom, kitchen,
and semi-private
activity centers

Private dining, activities,
and garden area for class
only
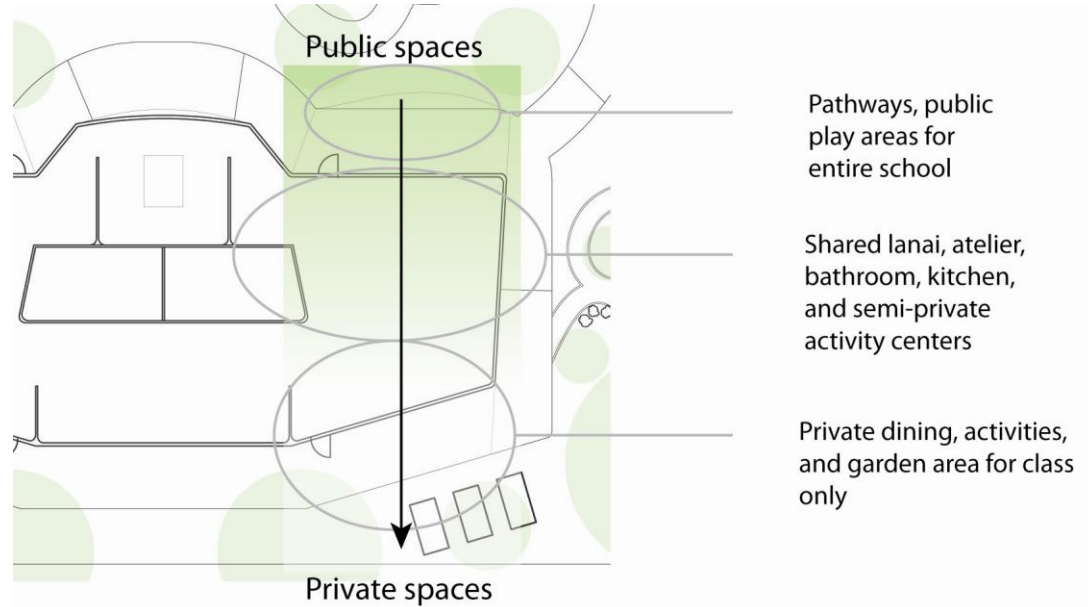
Private spaces

Figure 43 Public to private sequence of spaces

Following a residential model also includes acknowledging and responding to the vernacular
environmental design, and cultural practices which children are already familiar with. Take local
cultural traditions and practices into consideration when designing spaces. For example, here in
Hawaii, it is a culturally accepted practice to take one's shoes off before entering a house. If this
will also be done in the classroom, a designer might consider including shoe storage near the
doors to accommodate this cultural practice.

Just for Them

       As soon as a child approaches their learning environment, they should be able to recognize that this is a place designed for them. The adult world can be a big, intimidating place to a small child, therefore the physical size of furniture and equipment should be appropriate for a preschool aged child to use comfortably and safely. A child's physical stature means that spaces designed for adults do not function well for them. Figure 44 illustrates common height requirements for furniture and equipment for young children. Figure 45 and Figure 46 illustrate some examples of child-sized equipment and furniture.

Child-sizing

Shelf height maximum: 37-40"

Average height: 35-40"

Eyeline: 31-36"

Seated table height: 18"

Counter and sink height: 22-24"

Toilet seat height: 11"

Seating height: 10"
Low table height: 10"
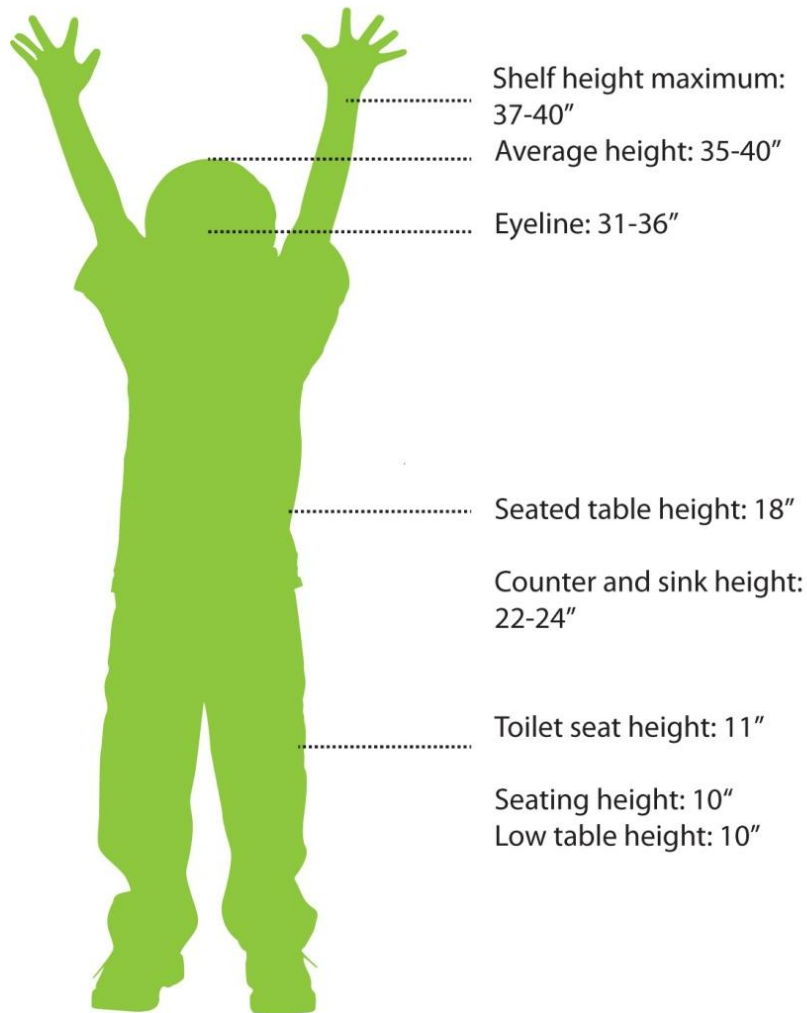
Figure 44 Common height requirements for child-sizing a design

Figure 45 Punahou School, child-sized kitchen

Figure 46 Punahou School, child-sized kitchen

Conclusion

The main goal of creating harmony within a preschool space is to ease the transition from the home environment to a school environment. In every design decision, keep confusion to a minimum by creating clear design goals. Ease separation anxiety by creating a comforting, secure environment that is decipherable and utilizes a residential design model in which children understand was designed just for them.

Whole-body Learning

Fruits: Planning design interventions that encourage multi-sensory learning and movement.

Whole-body Learning

Fruits

Multi-sensory

All five of our senses work together to carry information about the environment to our brain, where the information can then be processed. An environment that is multi-sensory allows a child to explore and discover their world using their whole body. The environment offers different stimuli to be experienced through a child's sight, hearing, smell, taste, and touch.

Experiential learning is the most valuable type of learning for a young child. As explained in Gardner's theory of multiple intelligences, children learn in many different ways. Therefore, an environment that provides different opportunities for multi-sensory learning should be created so children of different sensorial aptitudes may learn in an efficient and rich manner.

This section will cover interventions that encourage experiential learning through all five senses, and outdoor learning environments. Although each sense will be discussed individually, remember that it is the combination of several sensory strategies throughout a space that will create a multi-sensory learning experience.

Sight

What will the children see when they are in the designed spaces? Seeing is a very influential sense. There is so much information a child can gather from the visual realm. When planning a space come down to a child's physical level and imagine the space as they would see it. Consider strategies in terms of visual access, visual attractiveness, and visual interaction.

Visual access:

Visual access refers to what the children are allowed to see. The designer has the ability to control views and visibility. Consciously use this influence to purposefully highlight or obscure objects and places in the learning environment.

o   Place things you want children to pay attention to at their standing and sitting eye-level.

o   Allow children to gain an overall understanding of a space, so they can easily navigate through it, by creating viewing opportunities at higher elevations, for example from a loft, hill, or platform.

o   Place materials meant for the children in clear or open containers so they can see what is available to them. If objects are not meant for the children, like teacher's supplies, keep them out of sight.

o   Proper lighting is vital to sight. Children may spend several hours in a classroom, so appropriate lighting is necessary for visual comfort. The illuminating Engineering Society of North America (IESNA) recommends avoiding high brightness contrasts in the field of vision, which can cause eye strain, and to use low brightness luminaires[54]. Very bright window luminance can be controlled using roof overhangs, "reduced transmission glass,

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[54] The IESNA School and College Lighting Committee, compiler, *Lighting for Educational Facilities* (New York: Illuminating Engineering Society of North America, 2000), 8.

louvers, baffles, or shades.[55]" Table 4 illustrates IESNA's recommendations for lighting levels appropriate for different spatial functions.

Table 4 Adapted from the ANSI/IESNA Determination of Illuminance table[56]

Orientation and simple visual tasks. Visual performance is largely unimportant. These tasks are found in public spaces where reading and visual inspection are occasionally important	
Public spaces	30 lux(3 fc)
Simple orientation for short visits	50 lux (5 fc)
Working spaces where simple visual tasks are performed	100 lux (10 fc)
Common visual tasks. Visual performance is important. These tasks are found in commercial, industrial and residential applications. Recommended illuminance levels differ because of the characteristics of the visual task being illuminated. Higher levels are recommended for visual tasks with critical elements of low contrast of small size.	
Performance of visual tasks of high contrast and large size	300 lux (30 fc)
Performance of visual tasks of high contrast and small size of visual tasks of low contrast and large size	500 lux (50 fc)
Performance of visual tasks of low contrast and small size	1000 lux (100 fc)

o   Use three basic types of lighting to create an appropriate, layered lighting scheme: ambient lighting, task lighting, and accent lighting, as illustrated in Figure 47. Ambient lighting is an indirect, general, whole-room illumination that is can be provided by ceiling or surface mounted fixtures. This is the room's primary light source. Ambient lighting can also be provided by natural day lighting by utilizing windows. Certain types of windows are designed particularly for lighting like clerestory windows paired with light shelves. It is important that ambient lighting be diffused, and of low brightness, as not to create uncomfortable glare. Ambient lighting should look more like it is glowing than glaring. Task lighting is one directional lighting targeted at a specific object or area to create the lighting levels needed to complete a certain task with visual comfort. Examples of task lighting include recessed or track lighting, a reading lamp, or under cabinet lights. The last layer of lighting, accent lighting, is used to highlight certain

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[55] The IESNA School and College Lighting Committee, compiler, *Lighting for Educational Facilities*, 8.
[56] The IESNA School and College Lighting Committee, 8.

objects or areas of visual interest in the room such as art work, plants, or architectural features. Keep all lights on dimmers to adjust the amount of light to one's needs.
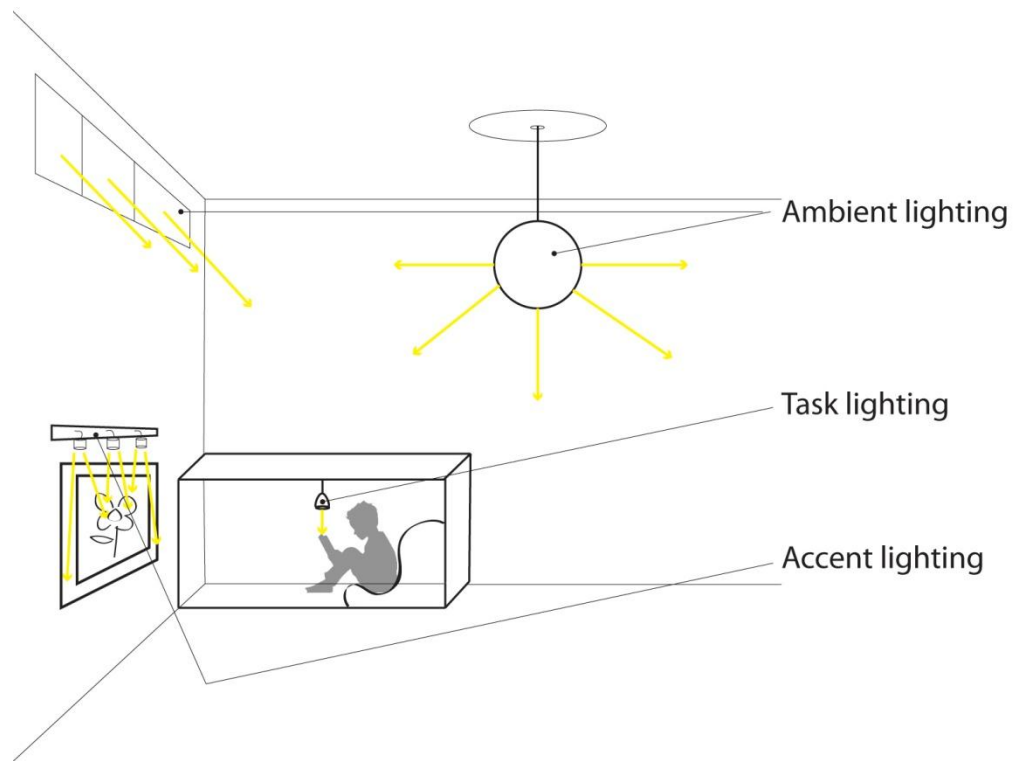

Figure 47 Multiple light sources are needed to create a proper lighting scheme

Visual attractiveness:

- o Children appreciate aesthetics the same as an adult. Take time to make their space visually beautiful.

- o Do not allow the space to become visually cluttered and over stimulating. Keep spaces organized and coordinated. Be aware of the amount and type of imagery pinned up on walls. As illustrated in the images at Hoaloha Kai Montessori School, limit the amount of wall clutter. Too many charts and posters become unnecessary visual noise. Carefully choose pieces of art (by the children or by professionals depending on the school's philosophy) and absolutely vital information to be pinned up on wall space. Treat wall space as a carefully curated gallery.

o Create a harmonious color scheme in the learning environment. There are many different theories on the effects of colors on people. Most agree that colors do have a psychological effect on children and that colors carry cultural connotations and representations. Keep in mind that warm colors visibly protrude conveying a sense of activity, and cool colors visibly recede conveying a sense of calm. Remember that children are sensorially sensitive and can pick up on subtle changes in their environments. The saturation of the colors used will also impact their perceived effect. Large expanses of high saturation colors can be very stimulating to a young child. Try not to choose a color scheme with more than three colors. Remember that children, toys, and accessories will bring a lot of color into the space. Large, colorful, high saturation furniture pieces, walls, and floor finishes will make the space too visually busy and potentially over stimulating. Let the children and their work make a space colorful. For the largest expanses of space use the lowest saturation of color and increase the color saturation as the objects get smaller, as illustrated in Figure 48.
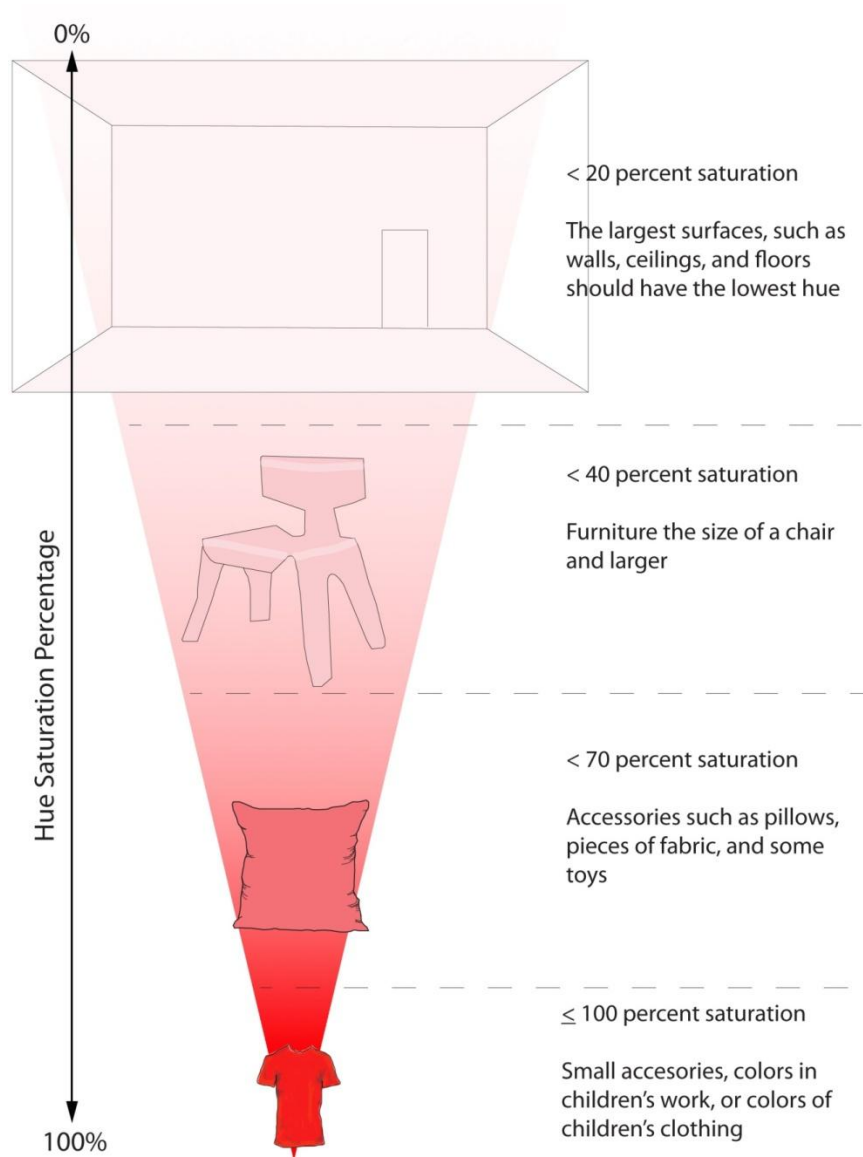
Figure 48 Color saturation diagram

Visual Interaction:

o Use windows of varying sizes, heights, and placement to highlight views. Use windows to control what a child sees from the inside out, and what people from the outside see when they look inside, as illustrated in Figure 49. Windows also allow children to monitor the natural passing of time, as well as weather conditions.
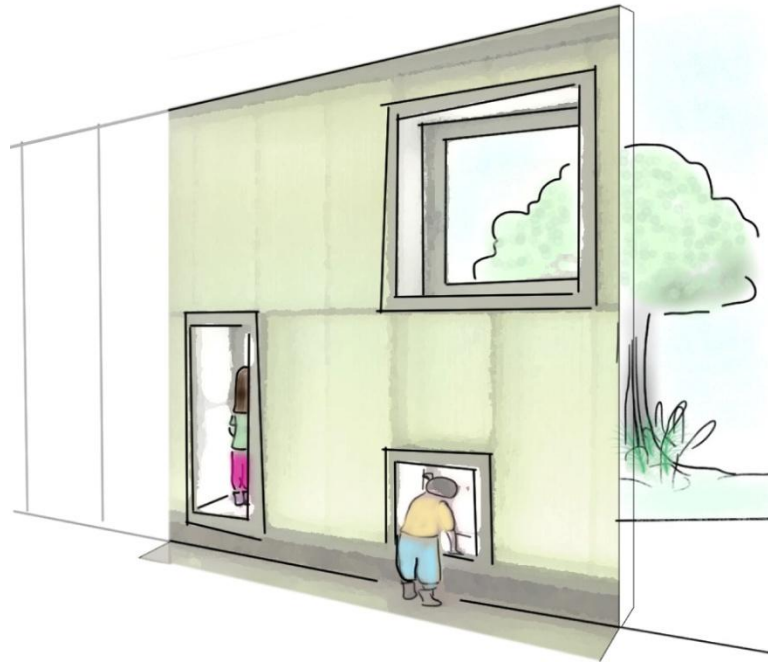
Figure 49 windows of various sizes and shapes control views of inside and outside

o   For areas of the room where children's focus should be inside, raise the sill above their eye-level and place potted plants on the sill to break up the view[57].

o   Try to avoid large expanses of undivided glass in windows which may be intimidating and not offer enough of a feeling of security to small children. Large expanses of undivided or unmarked glass can become a hazard to children who may walk or run into them. A large window with a higher sill feels more secure than one with a low sill. A small window with a low sill will still convey a sense of security.

o   Light makes sight possible, making it an integral part of visual learning. Light can be used as an interactive learning material. Provide opportunities for children to utilize projectors, lamps, reflective and refractive materials, and materials of varying opacities

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[57] Christopher Day, 107.

to create with light and shadow, as illustrated in Figure 50. Depending on the composition of a certain materials, light will either be reflected or absorbed by its surface, which teaches children about textures and material qualities.
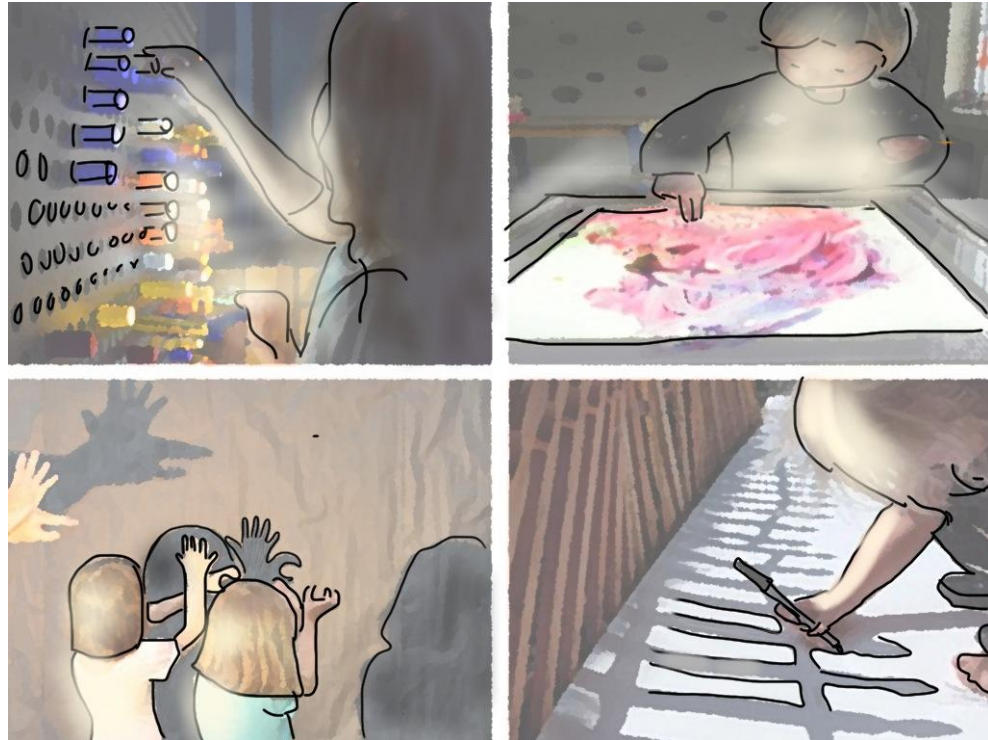
Figure 50 Interactive light: pattern making on an illuminated peg board, painting on a horizontal light board, shadow puppets on a large screen, tracing shadows on large reams of paper

Sound

Learning to listen to the sounds of the surrounding environment is a valuable learning skill. Provide opportunities for auditory learning for children who are inclined to learn best through sound and music.

Strategies to encourage learning through sound, as illustrated in Figure 51 :

o Choose appropriate floor, wall, and ceiling finishes for acoustic comfort. Sound bounces off of hard surfaces, and is absorbed by soft surfaces. Using too many hard surfaces will

create a loud, echoey room. Using too many soft surfaces will create a quiet space where sound is muffled and will not travel very far.

o   Integrate materials along paths that make different noises as children walk on them. For example, gravel makes a crunching noise when walked on and a wooden deck makes a clopping noise.

o   Include a music room

o   Sound tubes can teach children how sound travels

o   Integrate percussion instruments in playground

Use different materials along paths that will make different noises when stepped on, like the crunch of gravel.

Pay attention to surface finishes to ensure proper accoustics in each space.

Look for opportunities to include unexpected sound interventions, like a bamboo percusion instrument in a garden.
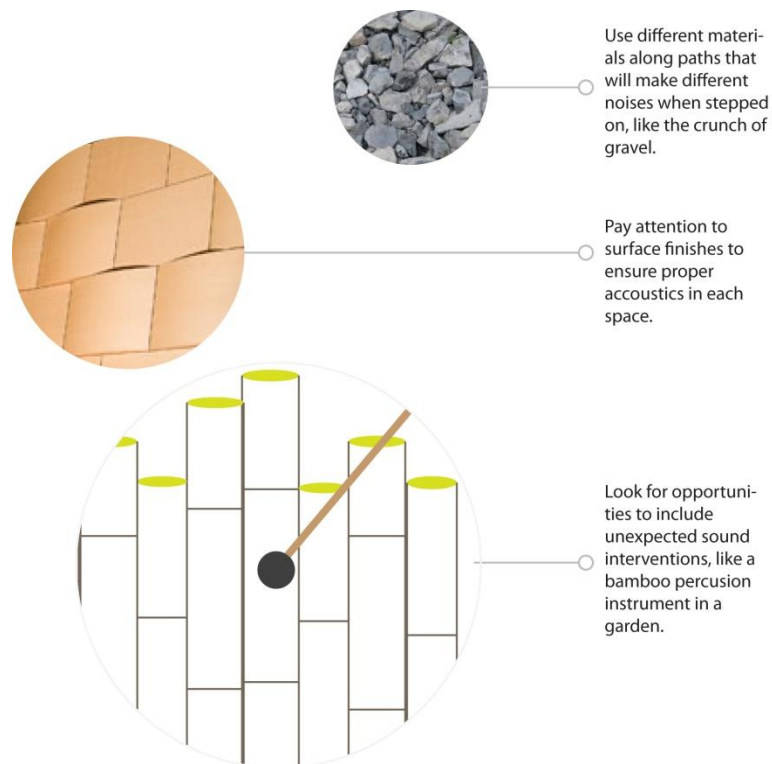
Figure 51 Sound interventions

Smell

Olfactory information can tell one a lot of information about the surrounding environment. People, animals, plants and objects usually have distinct smells associated with them. Smells also often have a strong connection to certain memories and emotions. Use the designed environment to help children to recognize different smells and the meaning behind them.

Strategies to facilitate learning through smell:

- o Take into consideration the smells already present on the site and use them as learning opportunities. For example, children can learn about what is located around their school in the community surrounding it by recognizing different smells. The smell of bread might mean there is a bakery nearby, a salty breeze might waft by smells from a nearby ocean, or exhaust or smoke might mean there is a freeway, factory, or fire nearby.

- o Pleasant smells can make a place seem welcoming. Unpleasant smells associated with toxicity and decay can be off-putting. Keep areas clean and use chemical cleaners and disinfectants sparingly, as they can leave behind harsh, unpleasant odors that linger.

- o Use authentic materials so children can learn what they smell like and in turn learn to use smell as a means of identification.

- o Reinforce odors as means of identifying spaces and their uses. For example, the atelier *should* smell like clay, paint, graphite and wood. Do not attempt to mask odors with air-fresheners or other synthetic fragrances.

- o Keep the kitchen well ventilated so smells of cooking food can waft into other areas of the school.

Taste

Tasting things allows children to discover what kinds of things are good to eat, and what kinds of things are not good to eat. Exploring food through taste allows children to determine preferences. Facilitate a sense of taste by integrating food into learning activities, which will allow children to gain a deeper knowledge and connection to the things they eat.

Strategies to encourage learning through taste:

- o Include spaces where children can be involved in food preparation. This means including lowered counters and cooking equipment.

- o Plant fruits and vegetables for meals and snacks in school gardens, so children understand where their food comes from and are invested in its production.

- o Keep food production, food preparation, and dining areas in close proximity to each other so children learn about the process the food went through to go from the garden to their plates, as seen in Figure 52.

Figure 52 Garden, kitchen, dining area proximity
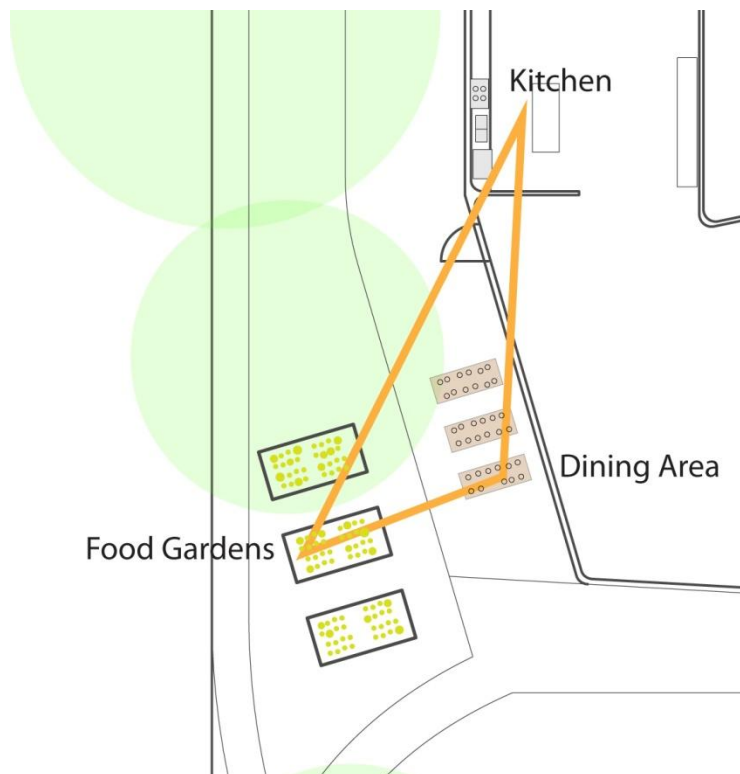
Touch

Rich sensory information can be gathered from tactile learning. Through their sense of touch, a child can learn about the texture, shape, weight, wetness, movement, and temperature of an object. Nerves in skin also relay pain which is the bodies warning signal to stop hazardous behavior. "By touch of their skin, very young children explore the world with an extremely

sensitive and intelligent "radar". The child senses materials, light, and temperature, and establishes relationships of sympathy, antipathy, and indifference.[58]"

- o Compose texturally diverse design, inside and outside, for children to touch and explore. Anticipate the way children will move through the space and create a rich textural experience accordingly.

- o Use as close to authentic materials as possible (for example, choose actual wood floors as opposed to vinyl flooring with an image of wood printed on it) to allow children to gather honest material information.

- o Create opportunities for children to explore different levels of textural gradation and compare them, as illustrated in Figure 53. For example place a scratchy woven basket filled with smooth river stones on top of a soft table runner which is on top of a smooth but textured wooden shelf. Juxtapose warm, rough terracotta tiles with cool, smooth ceramic tiles on the floor or walls. Choose more than one wall finish inside classrooms, for example painted dry-wall, wood panels, and textile wall paper. The same goes with the building materials.

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[58] Giulio Ceppi and Michele Zini, ed., *Children, Spaces, Relations: metaproject for an environment for young children* (Reggio Emilia: Reggio Children, 1998), 76.
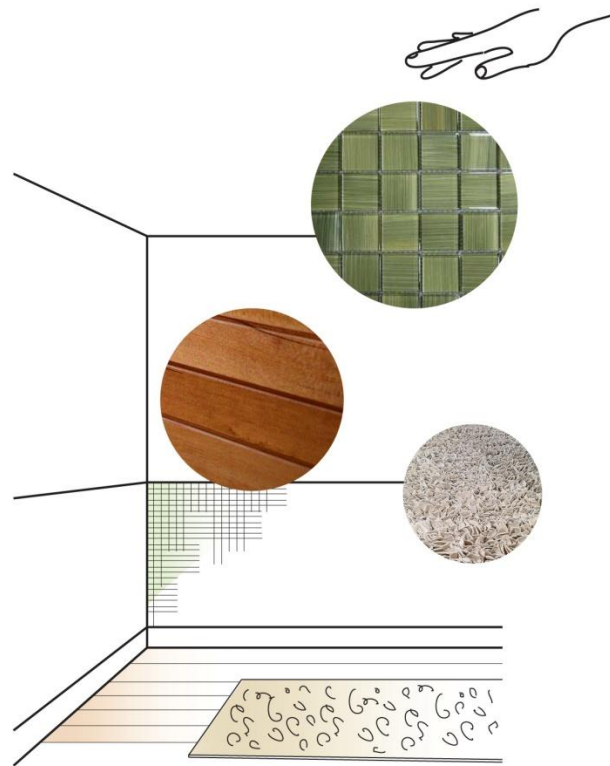
Figure 53 Textures

- o Create mystery boxes where objects are hidden from view and a child must identify the object just by touching it.

Sensory Garden

A sensory garden is a great way for children to explore their environment using different senses. A sensory garden is a garden that uses different plants or non-vegetative interventions placed in groupings along a path to stimulate one sense at a time, as illustrated in Figure 54. For example the sight portion of the path might contain brightly colored flowers or uniquely shaped or sculpted plants. The smell portion of the garden would contain fragrant flowers, leaves, or herbs. The sound portion of the garden would contain tall grasses that rustled in the wind, a bubbling water feature, tall clunking bamboo, or utilize crunching gravel along the path. The touch section of the garden might include plants with fuzzy leaves or particularly smooth and waxy ones, a tree with rough or papery bark, or a bumpy, slightly prickly cactus. The taste section of the garden might include herbs, fruits, or vegetables to taste. Non-vegetative interventions might also be included in the garden like a percussion wall or chimes in the sound section, large and small rocks of varying textures in the touch section, or sculptures in the sight section.

Sensory Garden

Smell:

Aromatic flowering plants and trees, herbs

Taste:

Fruit trees or bushes, vegetables, herb beds

Touch:

Plants with smooth, bumpy, pokey, or fuzzy textures

Sound:

Grasses that rustle in the wind, crunchy gravel on path, trickling water feature

Sight:

Brightly colored plants and flowers, plants with unique shapes
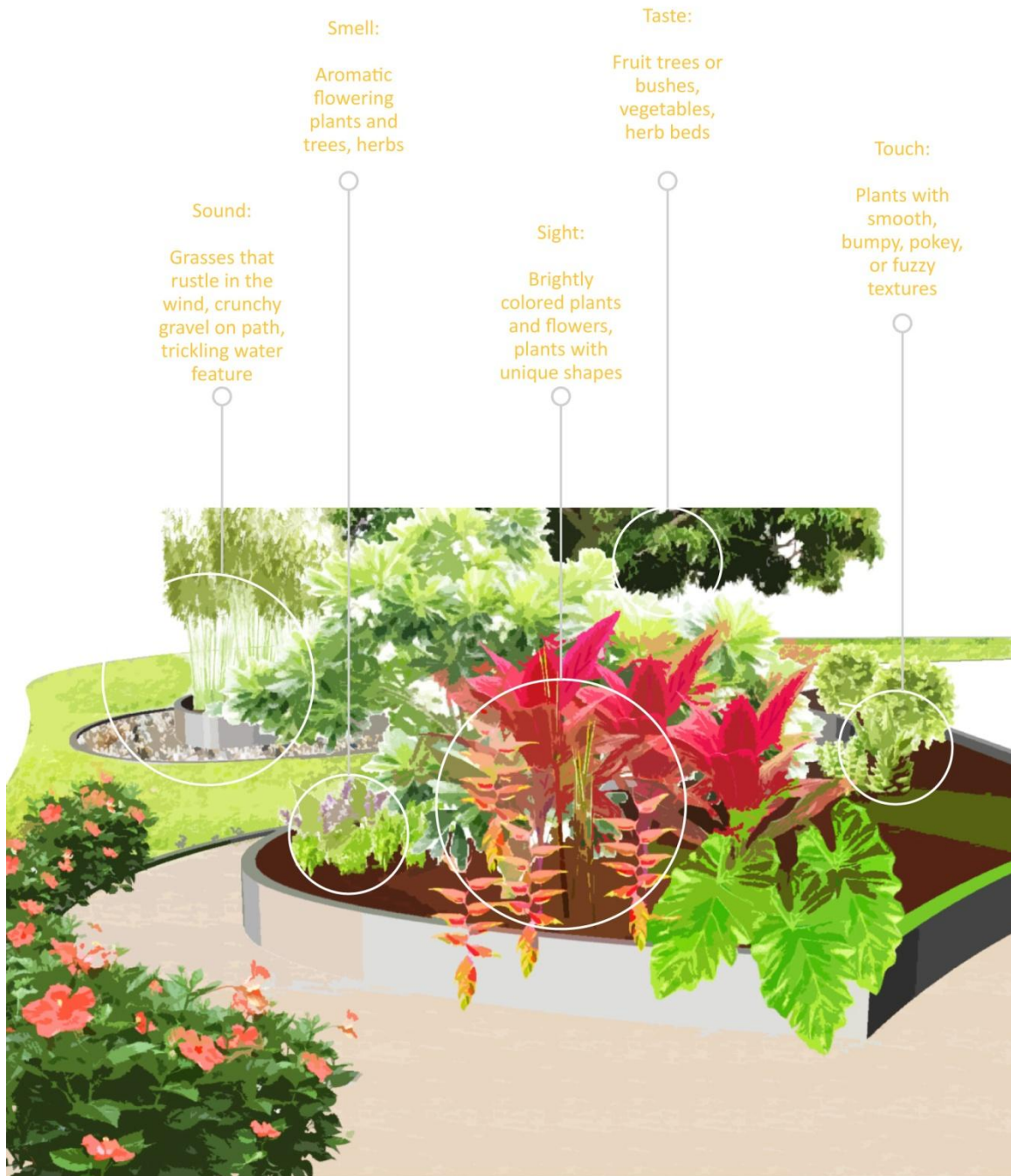
Figure 54 Sensory garden diagram

Fruits

Movement

As discussed in Chapter 1, the learning brain loves movement. Exercise is vital to all aspects of physical, mental and emotional well-being. Young children often have a hard time staying still for long periods of time and have lots of energy they need to utilize. Preschool aged children are also still developing fine and gross motor skills and need opportunities to practice moving their bodies through space. They need opportunities to run, jump, balance, crawl, spin, and climb. Work with their need for movement, rather than try to stifle it, by providing opportunities for movement inside and outside.

Large motor coordination strategies for indoors, as illustrated in Figure 55:

Although space may be limited indoors, movement should still be encouraged.

o   Create different vertical levels indoors that encourage up and down movement, reaching and climbing by utilizing platforms, steps, cargo nets, ladders, and lofts.

o   Utilize the ceiling for suspended equipment such as trapeze bars, silks, ropes, or swings[59] to support lifting, pushing, and pulling.

o   Provide open areas for stretching exercises.

o   A sturdy stool rather than a chair with a back provides a seat that better accommodates a child's need to move
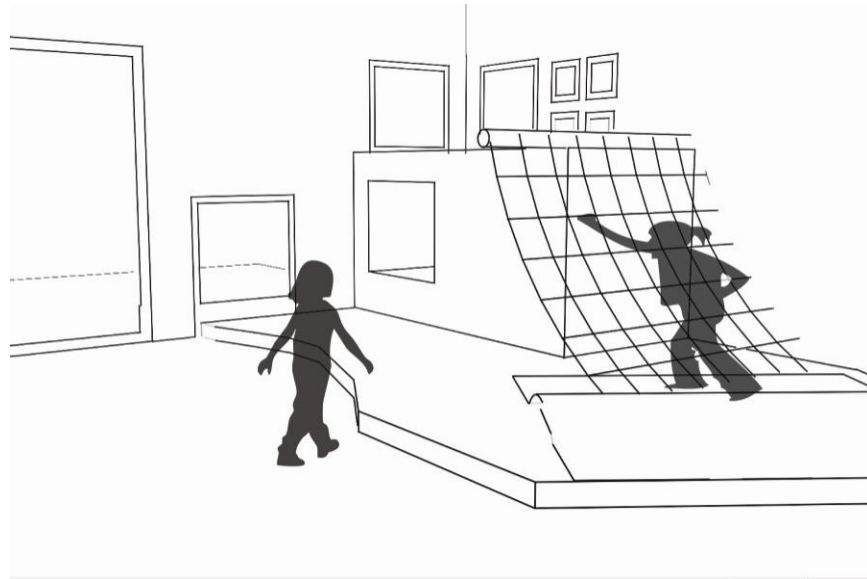
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[59] Anita Rui Olds, 285.

Figure 55 Indoor dynamic movement

Outdoor Learning Environments:

One of the best ways to encourage multisensory learning and movement is through access to nature. All five senses are fully engaged outside and open space and naturally occurring earth formations unsurprisingly encourages dynamic movement. From looking at a flower, to tasting a fruit, to feeling the roughness of bark or the smoothness of a river stone, nature provides almost unlimited opportunities for multisensory learning. Access to outdoor environments is very important for young children. Having physical and visible access to the outdoors is promoted by several pedagogies. The outdoor classroom is a valuable resource for preschool learning. Sensorial learning is at its peak outdoors.

- o Utilize landscaping as a method of creating playgrounds . The outdoors naturally encourage movement. Boulders and tree root systems are perfect for climbing on and learning balance, as illustrated in Figure 56 .

Figure 56 Punahou School, climbing and jumping rock.

Logs and stumps make great platforms for climbing and balancing on, then jumping off. Wood chips are a good soft landing surface for places where jumping off will be encouraged. Encourage vibrant movement through the creation of dynamic grade changes including rolling hills, depressions and plateaus in the site plan, as illustrated in Figure 57 and Figure 58.

Figure 57 Punahou School, landscape as playground by utilizing rolling grade changes, boulders and layered vegetation.

Large expanses of fairly flat open green space encourages running. Soft non-compacted ground covering such as sand, gravel, soil, or wood chips encourage digging. Trees with low wide spreading branches encourage climbing, hanging, and pulling. Low sloping vegetation facilitates crawling and crouching. All of these elements can be combined to create a dynamic play area, as illustrated in Figure 59.
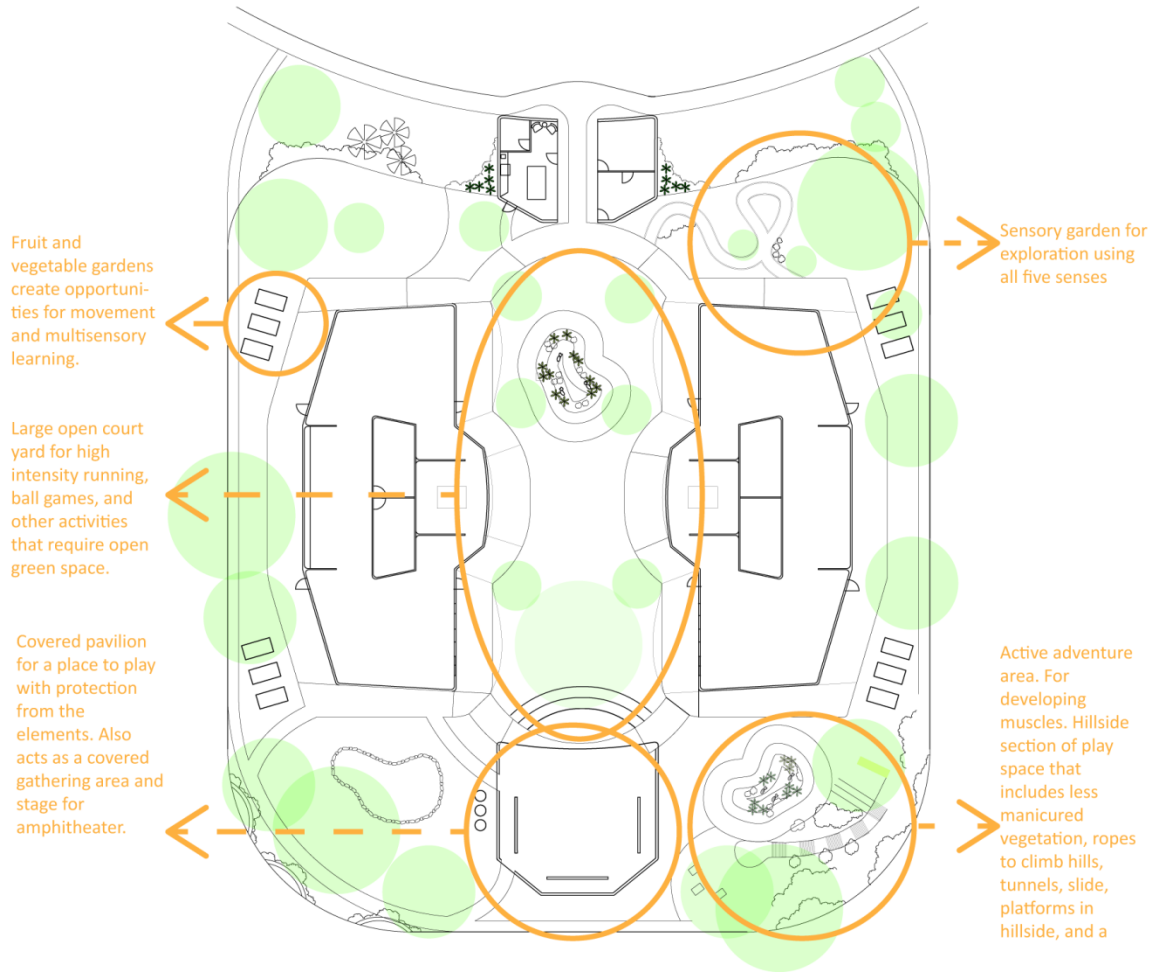
Fruit and vegetable gardens create opportunities for movement and multisensory learning.

Large open court yard for high intensity running, ball games, and other activities that require open green space.

Covered pavilion for a place to play with protection from the elements. Also acts as a covered gathering area and stage for amphitheater.

Sensory garden for exploration using all five senses

Active adventure area. For developing muscles. Hillside section of play space that includes less manicured vegetation, ropes to climb hills, tunnels, slide, platforms in hillside, and a

Figure 58 Outdoor learning environments that encourage dynamic movement

Active Adventure Area

Trees and smaller vegetation for climbing and sculpting spaces.

Uneven terrain and grade changes, composed of compacted dirt, stones and other natural materials

Hillside for rope climbing, rolling and sliding

sunken trampoline for jumping

Figure 59 Landscaping elements combined to encourage dynamic movement

o Gardens are highly interactive learning tools that teach children about plants, food, life-cycles, responsibility, cause and effect, investment, time, environmental stewardship and countless other lessons, as illustrated in Figure 60 and Figure 61.
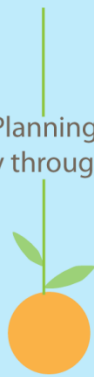

Figure 60 Punahou School, growing food in garden

Figure 61 Punahou School, learning through gardening

Fruits: Planning design interventions that encourage Creativity through exploring, creating, and connecting.

Creativity

Fruits

Creativity

Creativity is one of our greatest tools in any learning environment. Fostering creativity allows people to become problem solvers and to see things from angles other people may not see. This section discusses strategies that may be implemented in an early childhood education facility to encourage creativity. Planning for creativity can be itself a creative activity. Designers and educators are encouraged to think outside the box when it comes to interventions to encourage creativity and to use this guide as jumping off point to a creativity adventure. This section is divided into three sections, exploring, creating, and connecting.

Fruits

Exploring

In order to develop creativity and imagination, children must be provided with open-ended opportunities and loose parts. Open-ended opportunities include providing children with materials and spaces that do not have predetermined meanings and labels attached to them. These items may be manipulated, and changed to represent many different meanings. These loose parts and malleable spaces that can be shaped, combined, dissected, and repurposed are critical to an environment that encourages creativity.

Indoor Opportunities:

- o Use level changes to provide children with different perspectives. Risers, platforms, steps, lofts, stages, sunken seating, and pits can be used in the classroom to vertically (up or down) change a child's view.

- o Implement moveable space dividers for malleable spatial organization. Steady, but light-weight dividers, that children can move safely, can be used to mold spaces and define play boundaries. This type of flexibility may also be applied to the overall classroom organization to allow teachers to keep their classrooms flexible to meet ever changing needs. Utilize furniture on wheels and multipurpose equipment like shelving that also acts as a space divider, as illustrated in Figure 62.

Figure 62 Utilize moveable spatial dividers and rolling furniture

- o Hooks and clips can be used to hang and connect pieces of fabric which may be used as spatial dividers and shapers.

- o Large blocks and boxes are excellent materials to build imaginary worlds and explore novel ideas.

- o Although seemingly obvious, an important aspect of encouraging creativity is providing different types of manipulatives, construction materials, and loose parts to be used by the children during play. Make sure the materials are available in easy to access places like low shelves, and see-through containers like baskets or jars.

Outdoor Opportunities:

Nature provides countless opportunities for creative exploration. Naturally occurring loose parts are readily available. Utilize landscaping, and gardening opportunities to enrich children's outdoor creative experiences.

- o Utilize natural materials for level changes for different perspectives (up or down) such as, tree root systems, stumps, hills, piles of sand or dirt, boulders, or holes and depression in the earth.

- o Constructive materials are naturally occurring elements in nature:

  Sand especially when combined with water is an excellent construction material.

  Soil is great for digging, piling and shaping.

  Stones and pebbles in a dry river bed may be stacked, piled, built with, and repurposed.

  Sticks may also be stacked, piled, repurposed and used as building materials.

  Hearty vegetation can provide leaves to be played with, and nooks and dens to be discovered.

  Bioswales provide rocks, gravel, and soil to build with as well as creating drainage opportunities, as illustrated in Figure 63 and Figure 64.

Figure 63 Punahou School, bioswale

Figure 64 Punahou School, bioswale close-up

Fruits

Creating

Including an atelier space in the design can be a rewarding creative outlet for any preschool program. The atelier is a special place in a learning environment. An integral part of the Reggio Emilia approach, "the atelier is a workshop for children's ideas that manifest through the use of many materials[60]." It is a place specially set aside for children to investigate their queries in depth through the use of different materials. In the workshop a child may use materials to express themselves, display their knowledge, invent, and explore, as illustrated in Figure 65. The atelier workspace offers children the opportunity to spend extended amounts of time transforming a project through different layers of exploration, research, and iterations. Various materials are offered to the child on easily accessible shelves, and in clear or open containers that welcome children to use the materials at will.

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[60] Lella Gandini et al, ed, *In the Spirit of the Studio* (New York: Teachers College Press, 2005), 17.

Figure 65 Children creating with different materials in the atelier

Generally, an atelier will contain six major stations, although this may vary. Typically there is a painting materials area, a mixed materials area, a clay station, a textile art area, a graphics area and a documentation station. The room should also include horizontal and vertical working surfaces, like a sturdy table, easels, or wall space. The space should feel open, accessible, and welcoming. An example floor plan diagram of atelier layout and explanation of the stations can be seen in Figure 66 and Figure 67.

An atelier space allows students to work on projects longer without having to worry about cleaning up promptly to make room for the next activity. If classrooms share an atelier, it can be thought of as a shared project room and become a place for collaborative projects, that encourage child-initiated team work.
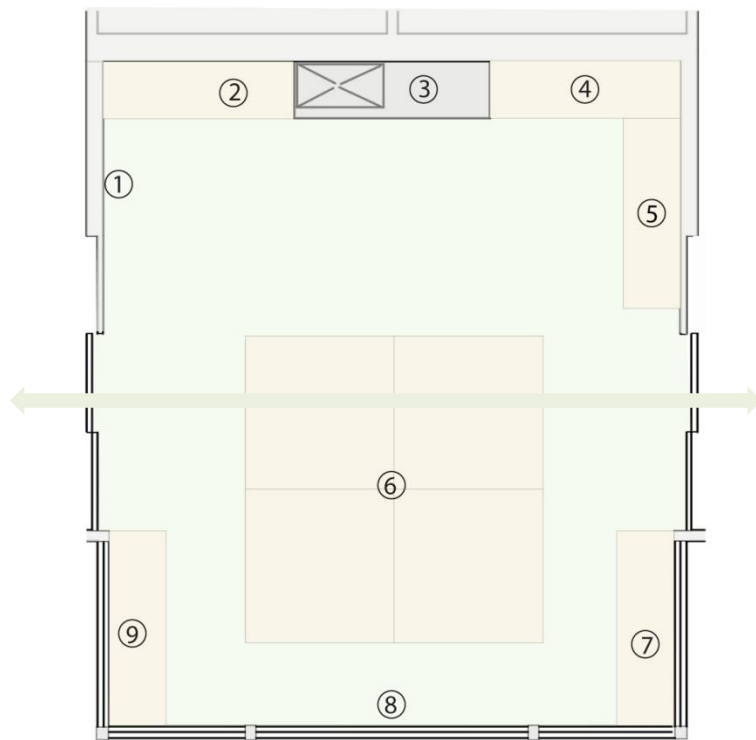
Figure 66 Atelier Layout Diagram
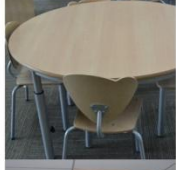
1		Large vertical painting and drawing surface
2		Painting materials: different types of paint and brushes.
3		Sinks and counter space
4		Clay materials
5		Mixed media materials: shells, wood, wire, beads, and various other materials.
6		Large, sturdy, child-sized tables and chairs
7		Textile art materials
8		Window wall for natural daylighting and encouraging classrooms to share their work with others.
9		Graphics and documentation materials: high quality markers, colored pencils, pastels, as well as digital documentation and manipulation technology like digital cameras, scanners, and computers.

Figure 67 Atelier layout diagram station descriptions

Fruits

Connecting

As discussed in Chapter 1, creativity is encouraged through a series of different connections that encourage different scales of independence and interaction. Provide children with opportunities to work through ideas and share them with different numbers and types of people. This section will discuss three connections internal/reflective connections, collaborative connections, and communal connections.

Internal/ Reflective Connections

Provide children with respites for quiet reflection where they can remove themselves from busyness and activity to rest and be still. These types of spaces include small private nooks, with comfortable or soft places to sit or lie down. These quiet spots might be under a loft or counter, under a fabric canopy, or in a cushioned window seat, as illustrated in Figure 68.

Internal/reflective spaces also include independent work spaces like small tables with just one chair provided. These types of spaces allow children to independently reflect, think, and imagine.
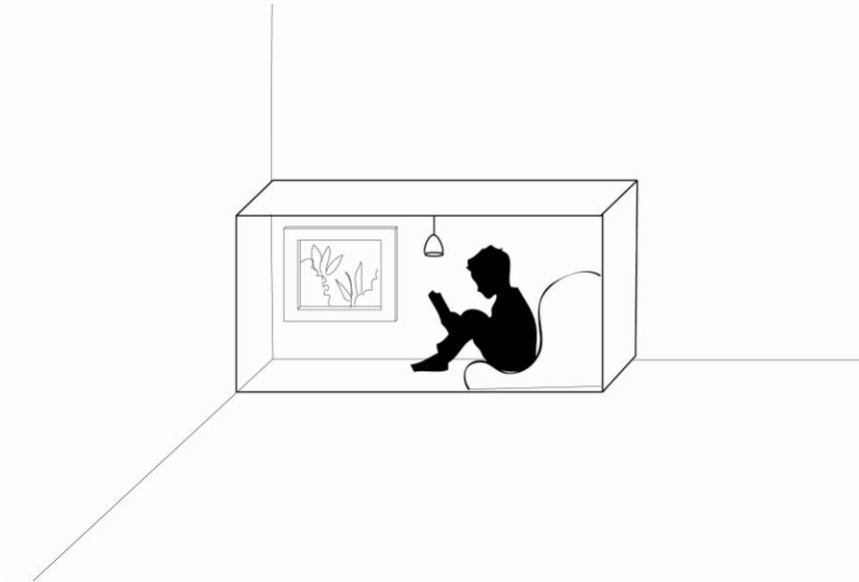
P a g e | 120

Figure 68 Quiet, reflective spaces

Collaborative Connections

Being able to work in groups to problem solve, discuss ideas, and work together is a great way to encourage creativity through collaboration. This can be accomplished by providing spaces for small groups to gather and work. This can be accomplished by providing tables of various sizes, with varying numbers of chairs, or creating zones that comfortably accommodate a certain number of children per activity.

Communal Connections

Children benefit from feeling like they belong to a larger community, and learning to socialize and share ideas within it. Children, parents, and children make up the primary social network in a preschool environment. Communal spaces that encourage creativity should be about sharing ideas and knowledge with people they do not get to regularly interact with in classrooms. This may come in the form of a puppet show, story teller or play. Sharing might also come in the form of a guest parent or community member who visits to show and tell the children about their job, culture, or special skill. Larger communal spaces such as shared play yards allow children to learn, interact, and socialize with children of different ages from different classes. It is important to design interventions that reinforce these key relationships through interaction in varying communal spaces.

Communal spaces to provide:

- At least one gathering area big enough for the whole school to gather for performances, celebrations, and any other assemblies. Ideally, the space should include a stage. This space may be indoors or outdoors, for example in the form of an assembly hall or and outdoor pavilion or amphitheater, as illustrated in Figure 69. It is advised that outdoor gathering spaces be at least partially protected from elements such as sun exposure or rain.

Figure 69 Amphitheater for communal gatherings

- Multipurpose spaces where two or more classes can gather to participate in learning activities together.

Chapter 5 Exploring Resources for Financing Preschool

When living in a state with one of the highest costs of living in the country, making ends meet can be difficult. In these tough economic times many families in Hawaii find it difficult to pay the hundreds of dollars per month in preschool tuition. In 2011 the average cost of childcare for a three to four year old child was $641 per month,[61] which is approximately $7,700 a year, or 11% of an average family's annual income. To put that amount into perspective, consider that it currently cost $5,592 for twenty-four credits (the equivalent of two full time semesters) at the University of Hawaii at West Oahu, a four-year undergraduate institution. If you do the math, that's more than $2000 less than the average yearly cost of preschool tuition. In order for this preschool prototype to be affordable, creative, low cost design solutions, as well as funding to supplement a manageable tuition must be secured. The funding must be multi-modal, meaning that the funding will need to be acquired through a combination of public and private grants, and include options such as recognition and funding as a charter school, partnerships with private entities, and family/community fundraising. Funding should be acquired in two basic categories: funding that goes directly to the school, and financial aid that supplements student tuition. The following section will describe financial aid resources including: referral agencies, free public preschool programs, public funding options and private funding options for direct to school funding, and for tuition funding.

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[61] "PATCH Hawaii's Child Care Resource and Referral Agency Report on AVERAGE Full-Time Monthly Rates by Ageand Facility Type as of June 2011," PATCH, accessed March 10, 2012
http://www.patchhawaii.org/files/content/community/stats/Data%20for%20Web%20Ave%20FT%20Rates%206.2011.pdf

Referral Agencies:

- **PATCH** is a non-profit childcare resource and referral agency in Hawaii. Their mission is to, "support and improve the quality and availability of care for the young people of Hawaii[62]."

Existing Free Preschool Program:

Head Start:

- A federally funded preschool program that provides free childcare to qualifying families. Priority goes to children who meet certain health disability and school readiness eligibilities. It is also a need-based program. Applicant income must meet federal poverty guidelines[63].

Programs to Subsidize Tuition Cost for Parents:

Available Public Funding:

- **Preschool Open Doors Program (POD)** is a statewide, state funded, early education and child care project. The project assists parents of three or four year old children pay for preschool costs. POD provides funding based on a families monthly gross income. In order to qualify for funding a family cannot make more than 85% of Hawaii's State median family income. POD gives funding priority to four year old children who come from at risk populations, e.g. homeless or limited or no English speaking abilities.[64]

Available Private Grants:

- **Pauahi Keiki Scholars** is a need-based scholarship program for preschool aged children three years and older. To the extent permitted by law, priority is given to children of

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[62] "About Patch," PATCH, accessed April 6 2012, http://www.patchhawaii.org/about_patch

[63] "About Patch."

[64] "Preschool Open Doors," PATCH, accessed April 6 2012, http://www.patchhawaii.org/families/paying/preschool.

Native Hawaiian ancestry. The scholarship is funded by Kamehameha Schools and allows children to attend preschools outside of the Kamehameha School's system[65].

- **Queen Liliuokalani Scholarship**

Programs to Subsidize Preschool Operation Cost and Start-up:

- **Investing in Innovation ($150 million total grant money available),** is a federal program, which provides grants and invest in the creation and expansion of innovative programs and practices that help improve children's achievement. This grant gives preferential treatment to early childhood education programs. As stated in its guidelines, **"**The Secretary may give competitive preference to applications for projects that would implement innovative practices, strategies, or programs designed to improve outcomes for young children with high needs from birth through third grade by enhancing the quality of early learning programs.[66]**"**
  More specifically, the grant supports, "programs whose efficacy should be systematically studied. An applicant must provide evidence that the proposed practice, strategy, or program, or one similar to it, has been attempted previously, albeit on a limited scale or in a limited setting, and yielded promising results that suggest that more formal and systematic study is warranted. An applicant must provide a rationale for the proposed practice, strategy, or program that is based on research findings or reasonable hypotheses, including related research or theories in education and other sectors. These requirements mean that applications for Development grants do not require the same level of evidence to support the proposed project as is required for Validation or Scale-up grants."[67]

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[65] "Pauahi Keiki Scholars-Preschool," Kamehameha Schools, accessed April 6 2012, http://apps.ksbe.edu/finaid/preschool/pauahi_keiki_scholars.
[66] Federal Register / Vol. 77, No. 37 / Friday, February 24, 2012 / Notices," Federal Department of Education, accessed March 28 2012, http://www.gpo.gov/fdsys/pkg/FR-2012-02-24/pdf/2012-4357.pdf

[67] "Federal Register / Vol. 77, No. 37 / Friday, February 24, 2012 / Notices," Federal Department of Education, accessed March 28 2012, http://www.gpo.gov/fdsys/pkg/FR-2012-02-24/pdf/2012-4357.pdf

- **The Harry and Jeanette Weinberg Foundation** provides funding to organizations who provide services for financially disadvantaged individuals and families. One of the grant programs they run specifically funds educational programs. "The Harry and Jeanette Weinberg Foundation aims to build economic self-sufficiency through education grants and other funding for child and family development so that those assisted are able to participate in society as self-supporting adults.[68]"

Volunteers:

In order to keep cost down and foster a proactive family approach to a child's education, volunteerism should be strongly encouraged. Parents will be encouraged to actively participate in the education of their children. There will be a mandatory number of hours required by each family per quarter year. Parent and other community volunteers will also be instrumental in the construction of the preschool itself.

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[68] "Education, Children, Youth & Families," The Harry and Jeanette Weinberg Foundation, accessed April 22, 2012, http://hjweinbergfoundation.org/program-areas/education-children-youth-families/

Chapter 6: Staffing Considerations

Staff to Child Ratio:

Hawaii State Licensing laws require a staff to child ratio of 1:12 for three year old children and 1:16 for four year old children.[69]

Paid Positions:

Director (1) - The director should hold at least a bachelor's degree in early childhood development or early childhood education. The National Association for the Education of Young Children (NAEYC) accreditation requirements do not specify that the bachelor's degree be in early childhood education or a related field, but directors must complete at least 24 credit hours of coursework in, "early childhood education, child development, elementary education or early childhood special education that addresses child development and learning from birth through kindergarten[70]." In addition, they should be knowledgeable about creative arts, and business management. The director should possess strong communication and organizational skills. The director is responsible for the overall coordination of the program.

Clerical Assistant (1)

Program Coordinator (optional position if funding permits)

Office Manager (optional position if funding permits)

Teachers (4) - Teachers should hold at least a bachelor's degree in early childhood development of early childhood education. NAEYC accreditation requires that 75% of teachers on staff have at least a Child Development Associate degree (CDA); be working towards an associate's degree or higher in early childhood education or a related degree; or hold an associate's degree or higher in a degree unrelated to early childhood education and have a certain amount of experience

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[69] Hawaii Administrative Rules. Title 17. Department of Human Services. Sub-title 6. Benefit, Employment and Support Services divisions. Chapter 892.1. Licensing of Group Child Care Centers and Group child Care Homes. §17-892.1-18.

[70] "Candidacy Requirements Related to Staff Qualifications," accessed March 25, 2013, https://www.naeyc.org/academy/pursuing/edquals/candidacy.

working in a preschool. The amount of time varies based on whether the preschool is NAEYC accredited or not.[71] Strong interest and knowledge in creative arts including, but not limited to, fine arts, performing arts and/or music should be strongly encouraged.

Teacher's Aides (5) - Teachers' aides should possess a two year degree (or equivalent relevant credits if simultaneously pursuing bachelor's degree while working). NAEYC accreditation requires that at least 50% of all teachers' aides on staff have a CDA, or are working on their CDA[72]. Candidates with strong interest and knowledge in creative arts including, but not limited to, fine arts, performing arts, and/or music are ideal.

Financial Aid Counselor (1) - Financial Aid Counselor (FAC) should have strong communication skills, organizational skills and research skills. The FAC will be responsible for helping parents find and navigate through financial aid forms and requirements, in order to help families receive the maximum financial assistance possible.

Full Time Custodian (1) - Custodian will be responsible for keeping facilities sanitary as well as performing basic building maintenance and simple repairs.

Cook (1) - Cook should specialize in healthy, nutritious meals and integrate produce acquired from school gardens into meals. Knowledge or specialization in certain cultural foods is also preferred.

Kitchen assistant (1) - abilities to assist cook in preparation and execution of meals. Also should be able to perform most of cook's responsibilities in their absence.

Unpaid Positions:

Parent Volunteers (60-100) - One parent/adult family member (grandparent, aunty, uncle, older sibling etc.) is required to volunteer a certain amount of time in the school per quarter.

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[71] "Candidacy Requirements Related to Staff Qualifications," https://www.naeyc.org/academy/pursuing/edquals/candidacy.
[72] "Candidacy Requirements Related to Staff Qualifications," https://www.naeyc.org/academy/pursuing/edquals/candidacy.

Community Volunteers/Education Partnership – Partnership between colleges and high schools with early childhood education programs to provide field experience and internship opportunities.

Volunteer Elders retired - elders from nearby senior living community would be invited to volunteer at the preschool to share their knowledge

Guest Teachers- professional artists from the community will regularly participate in school day activities

Conclusion

Creating an enriching preschool environment is a multi-modal process consisting of many variables and components. Traditional preschools that focus primarily on teacher-only disseminated knowledge and over stress school readiness and academic rigor are missing elements that create a healthy, well rounded environment for young children. The holistic health of the child should be the primary goal of early childhood education programs. Through multi-disciplinary research on child development theory, creativity science and existing progressive preschool models, it can be understood that one way to move away from a model of over-bearing academic rigor and sedentary learning, is to design facilities that encourage whole-body learning and creativity.

Before whole-body learning and creativity can be achieved, an overarching system of harmony must first be in place. A harmonious environment is essential for children to learn effectively. Two large parts of encouraging harmony in a preschool plan is encouraging stakeholders to have clarity in their values and goals, and to plan interventions that allow the space to be as decipherable as possible. Children must feel safe and comfortable in a space before they are open to learning. Interventions to address these issues are vital to a holistic learning environment.

Whole-body learning is a term that makes reference to the fact that children are sensorial and experiential learners that are using their whole-bodies to learn. Whole-body learning can be achieved through interventions that encourage multi-sensorial learning and movement. Multi-sensorial learning recognizes that all five of children's senses are engaged in information gathering and an environment can be planned to support learning through each sense. A learning brain loves exercise, and interventions to encourage movement should be planned both indoors and outdoors.

Creativity can be encouraged by implementing interventions that facilitate exploring, creating, and connecting. Exploring refers to opportunities that allow children to explore their own imagination through open-ended opportunities and loose parts. Open-ended opportunities include providing children with materials and spaces that do not have predetermined meanings and labels attached to them. Creating refers to interventions that allow children to create

through the use of different materials for the purpose of deeply investigating a query. The idea of creating is fully supported with the implementation of an atelier to the preschool environment. Connecting allows children to exchange ideas with others. Different forms of connections should be supported: internal connections for reflection, collaborative connections for small group exchange, and communal connections for large group socialization and sharing.

Evidence from multi-disciplinary research on child development, creativity science, and existing progressive preschool models support conclusions that learning environments designed with interventions that facilitate whole-body learning and creativity are beneficial to young children's physical, emotional and mental well-being.

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