



**COLOUR AND CHILD:
USE OF COLOUR AS A FACILITATOR FOR
KINDERGARTEN ACTIVITY**

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Declaration

I declare that this dissertation represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this university or to another institution for a degree, diploma or other qualification.



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Introduction

The general notion that children 'like' colours and the mere liveliness of their character adults try to reflect by its use result in disastrous and alarming use of colour for children's spaces. It is evident in most play areas, kindergartens, nurseries etc. of our built environment. When the impact such spaces have on its primary users: children, is not comprehended, the activities of spaces suffocate from the lack of suitable ambience.

To overcome this gap between the use of colour and users wellbeing, kindergartens should be created with a thorough understanding of how colours can be used as a tool to generate and maximize the quality of spaces that facilitate the activities, satisfying the needs of children.

The Kindergarten is the place where almost all children form and develop their first impression of the built environment, outside their home. These special places for children have a unique ambience with regard to scale, form, textures, colours etc. The use of colour in pre school environments is accepted as a basic principle due children's unique development of perception and awareness of colour very early in childhood. This sensitivity makes colour a crucial issue.

Moreover,

"Colour is a constituent and it cannot be isolated from texture, surface, light and form."

Dudek, M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E & FN Spon, p.110.

Therefore, colour is an incompatible device that must be used with care.

Therefore this essay attempts to investigate how colours can contribute to the creation of apt ambiances of spaces within a kindergarten to enhance the quality of its activities, through which child development is stimulated.

The first Chapter, “Kindergarten: The Play House for Learning”, focuses on the required spatial quality of Kindergarten Architecture, based on the physical and psychological needs of pre-school children that generate the principles of pre-school education. Within its framework, the chapter runs through a vast array of fields from child psychology based philosophies of early childhood education to the elements of architecture, bringing together the concept of ‘Learning through Play’ and Kindergarten Architecture that facilitates it.

Scaling down to the spatial quality of colour in the second chapter, “Colour for Play”, the potential of Colour in forming and shaping the physical and psychological environment for play is examined. The dimensions, theories, physical and psychological attributes of colour are discussed, extending the study towards children. The chapter attempts to conclude with the exploration of means of harnessing Colour’s potential as a contributor to the creation of a stimulating Kindergarten environment for play.

The last segment of the dissertation, Chapter Three, “Colours at Play”, demonstrates the use of colour through Kindergarten case studies. The case studies employ the methods of observation and in depth interviews with teachers, parents as well as the students, both past and present to examine the effect on the users in relation to the means previously identified, by which colour can contribute to enhance the spatial qualities of a kindergarten environment to facilitate learning through play.



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Chapter One
**KINDERGARTEN:
THE PLAY HOUSE OF LEARNING**

Chapter One

KINDERGARTEN: THE PLAY HOUSE OF LEARNING

In search of the frontiers of Kindergarten Architecture, the opening chapter, 'Kindergarten: The Play House of Learning', sets off with the perception of the Kindergarten Concept of early education. Digging into the history of early childhood educational philosophy, from Plato to Montessori, it tries to form an understanding of the child psychological basis behind it.

Coming back to the recent times, the theories of pre-school education that are currently in practice are discussed, in relation to the Sri Lankan context, where the types of early educational institutions in existence are looked into along with the principles and objectives. The focus is then narrowed down to the basic learning concept of Kindergarten education: Learning through Play that is common to all early childhood education systems, but in various degrees.

The chapter reaches its climax at the latter segment, when Kindergarten Architecture becomes the highlight. Running through the defining process and the elements of architecture, where the elemental aspects of spatial quality are discussed, it reaches its final destination: understanding the spatial qualities for the facilitation of Learning through Play as the primary function of the Kindergarten.

The path of this chapter leads to the threshold to the domain of the vibrant architectural element of Colour; its vivacity is explored throughout the in following chapter: 'Colour for Play'.



1.1 Kindergarten – Introduction

The word ‘kindergarten’, German in origin, can be referred to as a metaphorical garden, of which children are like the growing plants. It came in to being with the German Educationist Friedrich Froebel’s (1782-1852) pre-education concept of Kindergarten, which identified children as a pure part of nature, thus, need to be nurtured carefully. In the exact words of Friedrich Froebel,

“Children, like budding Lilacs, should be placed in the tropical warmth of a greenhouse, to be nurtured through the cold winter months.”

Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E. & F. N. Spon, p.06.

This garden brings to mind analogies such as the Garden of Eden, portraying the innocence of Adam and Eve. Innocence is a characteristic most frequently associated with children and Ken Worpole suggests this kindergarten connection to as

“Early education takes the form of a garden, or a pre-lapsarian Eden, where virtue could grow untrammelled.”

Worpole, K. (2000), *Here Comes the Sun: Architecture and Public Space in Twentieth Century European Culture*”, London: Reaktion Books Ltd. p.73.

However, this term is also used as a common phrase to refer to pre-school educational institutions in general, without restricting to a particular educational system. It will be used in both contexts, in general and specific terms, in the following content:

Pre-school education can be identified as environments that are created to support the development of children between three to five years of age.

“ ..pre-school education...used to refer to group settings for children between three and five years which are deliberately designed to stimulate and support their mental, physical, emotional, linguistic, social etc. development.”

Palihakkara, D.W., Premaratne, R.M. (2004), *Principles of Pre-School Education*, Nawala: Open University of Sri Lanka. p.36.

The importance of pre-school education in childhood can be discussed in many ways. To begin with, the development of the child's personality is triggered through it. The habits and attitudes acquired by children in this stage of learning are deep rooted in nature and its effects can be identified even in primary and secondary education. Above all, the cultivation of curiosity and creative power of thinking, improvement of communication skills and the broadening of social contacts are a few basic benefits pre-school children are entitled to.

1.2 Philosophy of Kindergarten Education

Throughout the history of educational philosophy, many philosophers and theorists have contributed to the development of theories on early childhood education, the results of which the children of today experience in their pre-school years.

All these theories are based upon the child's psychological background, researched and interpreted in many ways from time to time through the methods and resources of scientific thinking available.

1.2.1 Evolution of Early Childhood Education Philosophy

The evolution of early childhood education can be traced back to the 4th Century B.C. when the Greek philosopher Plato stressed the criticality of the first five years of a child's life to his education along with the emphasis on play and rhythmic movement for the child's physical growth, strengthened later by Aristotle's ideas on training good habits and cultivating good attitudes in children.

John Amos Komensky (Comenius) of the 16th Century, was known as the first "liberator of the Child" for his ideas of child centered education, put forward the notion that children should get learning experiences through their sensory organs by activities within their natural environment. He expressed the child's great need for love and security and the importance of the mother's role as a teacher, initiating the concept of home based early childhood education as well as the pre-school system.

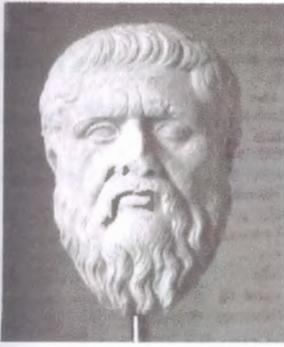


Plate 1

Philosophers of early education (I) : Plato, Aristotle and John Amos Komensky

Source: <http://en.wikipedia.org/wiki/Phylosophy.html>

He was followed by another “Liberator of Children”, Jean Jacques Rousseau (1712-1778) who wrote the revolutionary book “Emily” on education. He strongly believed that nothing should be imposed forcibly on the child. He had suggested learning methods such as active learning through experience and the enjoyment of work as ‘Play’. This is expressed in his saying “work or play are all one to him, his games are his work, he knows no difference.” The four phases of a student’s development as described by him are as follows:

1. Infancy – Portrayed by habit and the framing of emotions
2. Childhood - Portrayed by necessity and training of senses
3. Boyhood - Portrayed by utility and the training of the intellect
4. Adolescence - Portrayed by morality

Therefore, the training of emotions and the senses was regarded as of utmost importance in early childhood education.

John Heinrich Pestolozzi (1746-1827) was influenced by the ideas of Rousseau, but was focused on child centered education through a more scientific psychological framework. Psychologists such as Herbart and Piaget were inspired by his theories.

Form the association of Pestollozi, through teaching in one of his schools, Fredrich Froebel (1782-1852) began his contribution to the early childhood education. Froebel believed that childhood is a period with its own interests, values and creativity and that ‘Play’ is the characteristic activity of childhood.

Froebel's emphasis on 'Free Play' and the liberty of the child, practiced in the pre-school system 'Kindergarten' established by him, laid the foundation to most of the early childhood education programs in existence today.



Plate 2

Philosophers of early education (II) : Jean-Jacques Rousseau (1712-1778) , Fredrich Froebel (1782-1852) and Maria Montessori (1870-1952)

Sources: <http://en.wikipedia.org/wiki/Rousseau.html>

<http://www.infed.com/froebel.html>

<http://en.wikipedia.org/wiki/Montessori.html>



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Coming back to the recent times, Educationist Maria Montessori (1870-1952) focused on the necessity of sensory learning, skill development, the use of materials and comfortable class room environments for children. Although Montessori Method overpowered Froebel's Kindergarten System with time, due to the enhanced efficiency, speed and readiness of children in work, it is criticized for the neglect of the social aspect of child development and restricted freedom for imagination.



Plate 3

Maria Montessori with her pre-school children

Source: <http://en.wikipedia.org/wiki/Montessori.html>

1.2.2 Theories Currently in Practice

The notion that from the beginning of life intelligence is fixed and its development pre-determined was overruled by revolutionary studies carried out by psychologists such as Wellman and Piaget during the latter half of the twentieth century. Their researches led to the discovery that children's IQ levels can be changed when exposed to enriched environmental experiences such as nursery schooling and that a maximum level of intellectual development can be achieved through a proper match between new experiences and present structures, resulting in assimilation and accommodation.

These findings have contributed to the enhancement of the quality of pre-school education as structured stimulating environments for cognitive and skill development.

Systems of pre-school education have been in the priority list of Education in Sri Lanka from the early 1940's. The Kannangara Report of 1943 and Jayasooriya Commission Report on education in 1961 suggest the establishment of early educational institutions for children, but until 1986, such institutions were not under any governmental regulations or quality control. It was overcome by the affiliation of powers to the Ministry of Women's Affairs and Childcare to enhance the quality of pre-schools and to give equal access to all in a National level.

Experts on various fields, such as psychology and education, categorize these institutional programs that provide children with care, stimulation and education outside their homes, as Kindergartens, Nursery, Montessori, Head Start etc.

1. Kindergarten

Portraying the 'Garden of Children' idea, Kindergarten is an early educational system for children, which focuses on the 'natural growth' of children similar to that of garden plants that need careful nurturing. Founded by one of the most influential educational theorists of the world, Freidrich Froebel, the child centered approach adopted in the Kindergarten became the back bone of modern pre-school education.

Play and the cultivation of children's spiritual feelings were given priority, making Play and Dance the educational tools for the development of their imagination.

The objectives of Kindergarten education cover a large extent of child's development including social skills, sensory and motor development and achievement motivation.

Some of the objectives are as follows:

- Friendliness and helpfulness in the children's social circle
- Ability to solve problems based on individual activities and group relationships
- Achievement of sensory motor coordination
- Understanding basic concepts necessary for later learning
- Appreciation of beauty in all forms
- Social development and self awareness
- Development of creative ability

Source: Palihakkara, D.W., Premaratne, R.M. (2004), *Principles of Pre-School Education*, Nawala: Open University of Sri Lanka. pp.37-38

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2. Nursery Schools

Having a recent history than the Kindergarten system, Public Nursery schools have been established in 1919. Mostly working on a non-profit basis, Nurseries began to flourish in Universities, churches, homes etc. in the 1920's.

Commonly featured objectives of Nursery Schools can be identified as follows:

- Socialization of the child and the use of Fantasy Play - To promote the child's sensory motor and emotional development.
- Rapport between the teacher and the child - To bring out self confidence, security and spontaneity within the child
- Creation of a learning environment as free as possible from restrictions and directions
- Activation of good parental relations

Source: Palihakkara, D.W., Premaratne R.M. (2004), *Principles of Pre-School Education*, Nawala: Open University of Sri Lanka. p.38

Organized and free play is believed to help the child understand himself and his capacities. Apart from that, Play is considered as a medium through which aesthetic and self expressive activities can be affiliated.

In order to keep the teacher-child relationship in good form, nursery schools limit each nursery group to a maximum of twenty students with a minimum of two teachers to care for each group. The teachers are only guides, selecting music, materials for play or art activities and forming discussion.

3. Montessori

Established by Maria Montessori, the Montessori Method of early education is a philosophy that combines both the psychological concepts and pedagogical techniques. Her belief in creating an environment based on love, care, co-corporation, patience, self control and responsibility has been attempted by the creation of a prepared environment, which is a core element in this system.

The development of children's skills for them to be able to care for themselves and property is the basic aim the system tries to achieve through the activities mentioned below:

- Practical life exercises and Occupational skills – Ex. Carrying and using objects, buttoning, folding linen etc. as practical life skills and sweeping, washing, brushing as occupational skills
- Sensory exercises – Sensory discrimination skills and concepts
- Didactic exercises – To understand shape, size, colour, texture, temperature etc.

Source: Palihakkara, D.W., Premaratne, R.M. (2004), *Principles of Pre-School Education*, Nawala: Open University of Sri Lanka. pp.39-40

Fantasy Play of the Kindergarten has been substituted in the Montessori system by the organized activities that contribute to self discipline and the course of work.

It is important to note that these systems do not exist in their purest forms in the present situations as their founders have originally initiated. They have evolved through time to suit the social and educational requirements of the modern day.

The two key systems of early education used in Sri Lanka are as follows:

1. Nursery and Kindergarten Method
2. Montessori Method

The Nursery and Kindergarten Method is a combination of the Nursery and Kindergarten Systems of pre-school education.

The management of Pre-school education in Sri Lanka can be identified under three basic sectors:

1. State Sector



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- Pre-schools managed under the Departments of Social Services, Fisheries, Women's Affairs and Protection and childcare, Local Government etc.

2. Voluntary Organizations

- Sarvodaya
Mahila Samithi
Religious Organizations
Samurdhi Movement
Social Welfare Trust Organization (Pre-schools in the Estate Sector)

3. Private Sector

- Private Educational Organizations or Individuals (Mostly Montessori System Adopted)

Source: Palihakkara, D.W., Premaratne, R.M. (2004), *Principles of Pre-School Education*, Nawala: Open University of Sri Lanka. pp. 54-57

The newest trend of most private sector pre-schools of the Montessori System to become members of the Association of Montessori International (A.M.I.). Although a pre-school's affiliation to the A.M.I. is regarded as a quality assurance in the affluent urban society, its benefits are restricted for only a handful of young lives compared to the pre-schools of the state sector and most voluntary organizations that practice the Nursery and Kindergarten method, that touches the lives of millions of children nation wide with no lesser quality of education.

1.2.3 Learning through Play

Among the two major early education systems that exist in the country, the Nursery and Kindergarten Method will be focused on for further discussion. This selection has been done on the basis of common ground, for its wide spread usage throughout the country and the application of the concept of Learning through Play in its purest form, without restricting children's behavior to an ordered format.

The Nursery and Kindergarten Method, adopted as a combination of the two systems mentioned above, practice the concept of Learning through Play as the main activity of a pre-school curriculum, as mentioned under the objectives of each type of pre-school.

The founder of the Kindergarten Method, Fredrich Froebel, points out that Play is the characteristic activity of childhood.

“As Froebel believes that play is the purest and the most spiritual activity it becomes the inner representation of inner necessity and impulse. It gives joy, freedom, contentment, inner and outer rest, peace with the world and it holds the sources of all that is good.”

Palihakkara, D.W., Premaratne, R.M. (2004), *Principles of Pre-School Education*, Nawala:

Open University of Sri Lanka. p.27

Not only did he believe that it brought joy and much more to the child when engaged in play, he believed in a pure inner spirit they possessed that could be kindled through play.

“He believed that children had an utmost mystical understanding of the innate truths of life, and that spirit can be reawakened by playing games which had symbolic meaning.”

Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E & FN Spon, p.47

Thus, his belief has led to the use of Play as the primary method of interacting the child and the environment. He was supported by a history of educational theorists that shared the common idea shared by educationists such as Plato, Comenius and Rousseau, that learning should come in the form of play.

Furthermore, it has been stated by James McConnell in *Understanding Human Behavior* (1989) that studies have revealed the fact that children may learn as much from ‘seemingly-random’ play as from classroom learning.

Play gives children the opportunity to get first hand experience through exploration, investigation, manipulation and interaction with the environment. Thus, they discover things and become motivated to take risks and challenges to explore the world further, in order to understand more of the world.

The seemingly simple act of Play can be sub divided into a range of types and stages. The basic types of Pre-Social and Social play can be described as developmental stages of which the child moves upward from one to the other as in Piaget’s ‘Developmental Stages’.

1. **Pre-Social Play** : The type of play that infants engage in, playing with their own hands and feet, bells and rattles, teddy bears and dolls at the age of about six months
2. **Social Play** : The play that occurs later with the development of intellectual stage from pre-operational to operational, being more complex and social in nature. Play becomes ‘social’ with the interaction of other people in the activity, apart from objects.

The social stage of play can be separated into three segments: Free Play, Formal Play and Creative Play, according to the attributes of the activities they involve.

1. **Free Play** : The easiest of all types of play for the children, involving physical play activities with other children, allowing the children to learn to tolerate minor frustrations and control their tempers.
2. **Formal Play** : Play that involves formal rules, which can be very flexible at times, such as 'cops and robbers', which is adopted by children when they become more verbal.
3. **Creative Play** : Defined as the 'High Point' of all types of play by Piaget, that is of most value to the development of the child since the child learns to manipulate symbols rather than objects in this type of play.

Apart from the qualities of the activity involved, play can be categorized in relation to the level of social interaction it offers. A Kindergarten curriculum encourages several types of play, looking at it from a social perspective as follows:

1. **Associative Play** : The act of children playing with each other, communicating, sharing materials and activities in an unorganized pattern, without an overall goal
2. **Corporative Play** : The act of children organizing themselves in a group, with a common goal or purpose and a group centered purpose
3. **Solitary Play** : The act of children playing alone, independently, of their own interest
4. **Parallel Play** : The act of playing beside each other with similar materials, but not with each other
5. **Onlooker Play** : The act of watching others play, asking questions and giving suggestions, without joining in

Source: Tranter, P., (2003), "Children's Environmental Learning and the Use, Design and Management of School grounds." *Children, Youth and Environments*, <http://colorado.edu/journals/cye>

Any activity of play can be viewed in different stages of complexities of activity.

- Stage One** : Simple exploration or manipulation of play material - Feeling sand, Pouring water back and forth, scribbling with colour pencils etc.
- Stage Two** : Symbolic Play - Use of objects as symbols for some other object. Known as the Preoperational Stage by Piaget, very frequently used by kindergarten children
- Stage Three** : When Kindergarten children are able to interact in Corporative Play, their Games have flexible, frequently changing rules, devised by themselves

Source: Tranter, P., (2003), "Children's Environmental Learning and the Use, Design and Management of School grounds." *Children, Youth and Environments*, <http://colorado.edu/journals/cye>

In order to have effective Kindergarten programs, Spontaneous Play is encouraged, with a rich environment of possible play activities. The teachers play the role of guides, suggesting, interacting, adding or changing the materials available etc., without restricting the children's behavior.



Plate 4

Children's Behavior: in the classroom
Activities in solitude and in groups



Plate 5

Children's Behavior: outdoors

Activities of Play can be categorized in terms of the type of Development it contributes to as follows:

	Type of Development and Play Activities involved	Description of Development
1.	<u>Physical/Motor Skill Development</u> playing on fixed structures, participating in structured games, using free equipment (e.g., bats/balls)	The natural way through which children's bodies develop Improvement in coordination, bone and muscle growth, strength, agility and endurance essential to a healthy childhood and later life.
2.	<u>Social Development</u> talking with others, watching others, reading, daydreaming—Could include onlooker activities and unoccupied behavior when children demonstrate a marked absence of focus or intent - could include children staring blankly into space or wandering aimlessly	social and emotional development through activities where children must play with others, share and cooperate, respect other views, express their ideas, feelings and needs without the constant mediation of an adult. The time when a child constructs identity and “tries on” to see which identity fits. Children learn to negotiate their own self in relation to others, and interact with their peers. It allows children to acquire the social skills and emotional well-being essential to normal development.
3.	<u>Cognitive Development</u>	Discover, explore and develop an understanding of the environment around them Through exploration and experience of the social, physical and natural environment they become familiar with the patterns and systems of life and the interconnectedness of these with themselves.

Source: Tranter, P., (2003), “Children's Environmental Learning and the Use, Design and Management of School grounds.” *Children, Youth and Environments*, <http://colorado.edu/journals/cye>

Play, therefore, being a stimulant of physical, emotional, social, intellectual and cognitive development of the child, plays a great part as the key element of early childhood education or learning.

1.3 Kindergarten Architecture

“...no other art is so intimately connected with man’s daily life from the cradle to the grave.”

Rasmussen, S. E., (1964), *Experiencing Architecture*, Cambridge, Mass.: M.I.T. Press, p. 14.

Architecture can be defined in many ways, similar to a work of art. Whatever the definition may be, as Steen Eiler Rasmussen states, the intimate connection architecture has with the human being throughout life is undeniable. This intimate connection is born of the silent supportive role it plays as a back drop in the drama of life and is deepened through its ability to facilitate and encourage human activity.

Steen Eiler Rasmussen goes on to describe this form of facilitation:

“The architect works with form and mass..., his is a functional art. It solves problems. It creates tools or implements for human beings and utility plays a decisive role in judging it.”

Rasmussen, S.E., (1964), *Experiencing Architecture*, Cambridge, Mass.: M.I.T. Press, p. 09.

Function is so great a part in architecture that it is identified as the fundamental of architecture itself.

“...insofar as purpose is the essence of architecture, architecture is its material manifestation.”

Frankl, P., (1962), *Principles of Architectural History: The four Phases of Architectural Style, 1429-1900* translated by O’Gorman, J.F., (1982), Cambridge, Mass.: MIT Press, p.158 in Johnson, P.A., (1994), *The Theory of Architecture: Concepts, Themes and Practices*, New York: Van Nostrand Reinhold, p.80.



Therefore, the existence of Architecture is undoubtedly for the sole purpose of facilitating and encouraging human activities, drawing out responses and communicating meaning.

1.3.1 Elements of Architecture

The basic elements of architecture, manipulated for the creation of environments serving its purpose, are Form and Space. The interrelationship between these two elements is clarified by Francis D. K. Ching:

“Space constantly encompasses our being. Through the volume of space, we move, see forms and objects, hear sounds, feel breezes, smell the fragrances of a flower garden in bloom... Its visual form, quality of light, dimensions and scale, depend totally on its boundaries as defined by elements of form. As space begins to be captured, enclosed, modeled, and organized by the elements of form, architecture comes into being.”

Ching, F.D.K., (1979), *Form, Space and Order*, New York: Von Nostrand Reinhold, p. 108.

Thus, space is born through the elements of form. The importance of space is such that it is identified as the ‘ultimate destination’ that architecture has to focus on.

“Space is the most difficult aspect of architecture, but it is the essence and the ultimate destination to which architecture has to address itself.”

Sir Lasdun, D., (1977), *RIBA Journal*, September, p.367 in Johnson, P.A., (1994), *The Theory of Architecture: Concepts, Themes and Practices*, New York: Van Nostrand Reinhold, p.80.

In order to contain, space comes in to being and the quality of space becomes the primary tool that modifies the container to create the apt setting for each function. As Francis D. K. Ching points out in *Form, Space & Order*, qualities of space depends on the properties of enclosure of a space such as dimension, shape and configuration.

Properties of
Enclosure

- Dimensions
- Shape
- Configuration
- Surface
- Edges
- Openings

Qualities of
Space

- Proportions
- Scale
- Form
- Definition
- Colour
- Texture
- Pattern
- Enclosure
- Light
- View

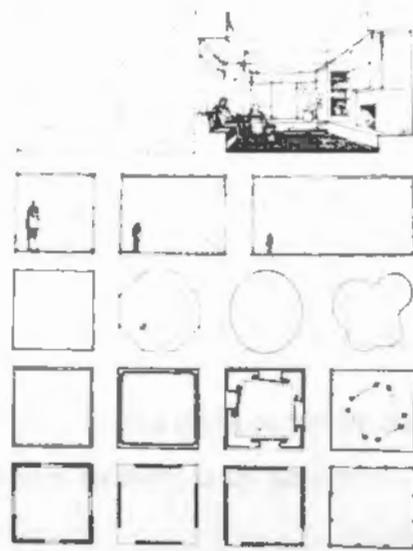


Plate 6

Qualities of Architectural Space

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Source: Ching, F.D.K., (1979), *Form, Space and Order*, New York: Von Nostrand Reinhold, p. 175.

1.3.2 Spatial Qualities for Learning through Play

A Kindergarten, as discussed under 'Kindergarten Educational Philosophy', facilitates the main function of Learning through Play. Therefore, its architecture should be created to accommodate this function. The essence of Architecture, being space, the spatial quality comes into the spot light, as the tool for creating the appropriate setting for the activity of Learning through Play in Kindergarten Architecture.

The quality of space required depends on the quality of activity, physical and psychological requirements of the users etc. The quality of the activity/ was approached upon in 'Learning through Play'. The child's physical needs are met with the range and intensity of activities and activity spaces available in a kindergarten.

Focusing on the psychological needs freedom receives much weight. The child centered education of the Kindergarten system encourages freedom for the child to explore the world on its own accord, and most of all, to be a child with a range of unique needs. The world he discovers and the hands on lessons he learns lasts a lifetime.

“If a child is not allowed to be a child, he will remain a child.”

Selmer-Olsen, I., (1993), ‘Children’s Culture and Adults’ presentation of this Culture”, International Play Journal, London: E. and F.N. Spon, vol.1, no.3, September, p. 201 in Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E. & F. N. Spon, p.06.

This beautifully brings out the child’s need for freedom to be a child; to have a childhood of fulfillment that trains them for adulthood. Therefore, freedom is the path to an inspirational childhood.

The security the child seeks for should be present simultaneously with the freedom they desire. These contradictory psychological states are explained by Psychoanalyst Bruno Bettelheim as follows:

“The child’s environment has to be organized in such a way that it not only transmits to him, on both a conscious and unconscious level, the assurance of being secure ...,but it also has to transmit to him the sensation that venturing into the outside world does not constitute a risk...”

Bettelheim, B., quoted by Annalia, G., (1992), *The Organization of Space in Services for Children*, Paper presented at European Seminar on ‘Space and Quality of Life for Children’, Madrid in Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E. & F. N. Spon, p.06.

Hence the ideal environment, fulfilling the child’s physical, social and psychological needs and contributing to his or her intellectual, social, linguistic, aesthetic and physical development, is that of sensual variety in light, colour, texture and sound, challenging and inspiring children. And it consists of spatial variety with quiet spaces for solitude and security, more opened social spaces for group activities and exciting outdoor spaces for exploration.

“It is the challenge of the nursery school architect to ‘celebrate’ early childhood by creating safe, reassuring and stimulating play environments”

Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E. & F. N. Spon, p.06.

The overall ambience of a Kindergarten environment should focus on Learning and Play as simultaneous, interconnected activities. The quality of space being that of Dynamic nature for stimulation of Play ought to integrate Harmony for concentration. The spatial quality of harmony through dynamism should be addressed by the architectural elements such as form, scale and proportion, colour, texture, pattern, light and view.

An example for the articulation of elements of spatial quality to create stimulating kindergartens is a design by Knafo Klimor Architects in Caesarea, Israel. The arrangement of pure geometric forms of wall planes capture dynamic spaces in between and allow the children’s minds to wonder, imagining them as a herd of elephants, a large insect or even a space ship.



Close to Nature:

Kindergarten in Caesarea, Israel

The Architect Knafo Klimor explains:

"...in the kindergarten there is an opening to nature, to the blue of the sky and the beige of sand.

There is an immediacy between inside and outside”

Plate 7

Source: “Creative Kindergarten”, http://www.architectureweek.com/2003/0813/design_1-1.html, (August 13, 2003)

The openings that draw the views indoors and pull them outdoors, creates an intimate connection between the spaces and the environment.



Plate 8

Light- the Multiplier of Form and Colour: Kindergarten in Caesarea, Israel

“The natural contrast between light and shade creates a new range of form and color. Two-dimensional architecture will eventually create a richer composition of color, which, in turn, will enrich the child's experience.”

Source: “Creative Kindergarten”, http://www.architectureweek.com/2003/0813/design_1-1.html, (August 13, 2003)

Natural light can become a very powerful tool, when it comes to enhancement of spatial qualities. The Kindergarten in Caesarea, Israel and the Kennebunk Elementary School in Auburn, Maine are fine examples for its manipulation.



Views at Ground Level:

In the design of the Kennebunk Elementary School in Auburn, Maine, its users, the children have been given priority, bringing the window sill heights close as possible to the ground to give them the privilege of viewing the outdoors, as adults do, without effort.

Plate 9

Source: Schibsted, E., “A Kid’s Eye View”, <http://edutopia.org.com>, (June 2006)

The lowered window heights of 24" to 26" can allow the space by the window to be used as activity space against the wall. Therefore, the activities can have a pleasant bright setting and may be a focus for the activity, with a view of the outdoor environment at close proximity.



Plate 10

Spirit of Light:



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Natural illumination harnessed in the single story construction of Kennebunk Elementary School in Auburn, Maine, energizes space and brightens moods. The brightness of natural light floods into the corridors (common spaces) from the sky lights above and spreads into the classes arranged around it.

Source: Schibsted, E., "A Kid's Eye View", <http://edutopia.org.com>, (June 2006))

Apart from being architectural elements enhancing spatial qualities, natural light and views can become educational tools: changing light and the views of the outdoors can give clues to children on the passage of time and changing nature.



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Chapter Two

COLOUR FOR PLAY

Chapter Two

COLOUR FOR PLAY

Within the framework of Chapter One, Kindergarten: The Play House for Learning, the spatial needs of kindergarten architecture was discussed, with regard to the physical and psychological needs of pre-school children, based on the principles of kindergarten education.

The concept of 'Learning through Play' was emphasized as the key activity of the kindergarten, through which the child's physical, psychological, social and intellectual development is brought about.

Therefore, the spatial needs that are to be fulfilled through kindergarten architecture, to facilitate the activities, were discussed.

Colour is a key component with the potential of manifesting the desired quality of space.



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This chapter, Colour for Play, attempts to explore the potential of colour in forming and shaping the suitable physical and psychological environment for play: the main element of kindergarten education.

It begins with a description of colour, from dimensions of colour: hue, value, intensity and temperature, its theories to colour appearance.

Later it moves on to describe the physical and physiological attributes of colour, regarding colour vision and perception, followed by the exploration of the psychology of colours. Colour psychology is dealt with regarding physical and emotional responses it generates, the spatial qualities it affects and the various colour schemes adoptable.

This segment will extend its study towards children, of how they perceive colours and are affected by it. Finally, the chapter attempts to conclude with the exploration of the means of harnessing colour's potential to be contributed to create a stimulating kindergarten environment for play.

2.1 Colour – Introduction

Colour is a phenomenon that occurs with the eye's detection of different qualities of light it receives. The different wavelengths of which light's constituent, waves of energy, travel are referred to as different qualities. An object appears a certain colour as a result of the mixture of wavelengths reflected from its surface.

A person's perception of colour depends on the level of illumination, media and technology used, quantity and the relationship it has with other surrounding colours as well as their experiences, memory, intelligence and cultural background.

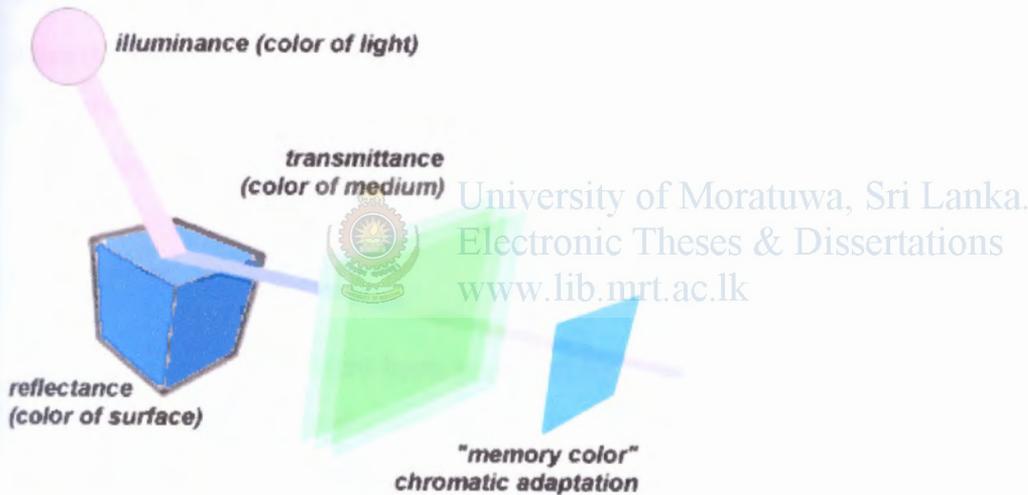


Plate 11
Perception of Colour

Source: <http://www.handprint.com/HP/WCL/colour.html>

Along with the kinesthetic experiences and touch, vision is a key sensory process that allows the human being to perceive their environment. Approximately 80% of the stimulation made by all senses is made by vision. The principle element in the visual stimulation is colour.

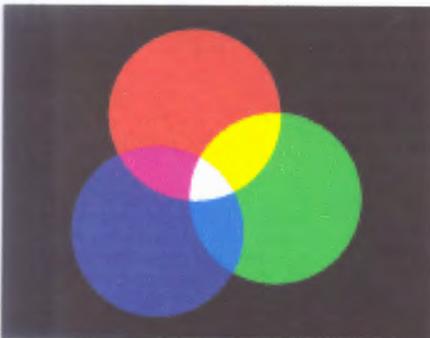
Therefore, colour is undoubtedly a major element or a tool in design of the physical environment.

2.1.1 Colour Theories

Over the centuries, scientific and psychological theories of colour have been developed, in order to understand the effect colour has on life. Beginning with the Greek philosopher Empedocles (492-431 B.C.) to Leonardo Da Vinci (1452-1519) who wrote “colours will appear what they are not, according to the ground which surrounds them”, and to Sir Isaac Newton (1642-1727) who discovered white light to be a mixture of spectral hues and invented the first colour wheel, colour theorists are on an on going mission to understand more about colour.

Until Sir Isaac Newton who identified that light was the source of colour sensation, all colour theorists including Aristotle speculated on light and colour vision as separate entities. The German poet Johann Wolfgang Von Goethe (1749-1832) was one of the pioneering thinkers to look in to the function of the eye and its interpretation of colour rather than the physics of light. His findings were published in his book ‘Theory of Colours’ in 1810, which incorporated his colour wheel and triangle depicting colour relationships.

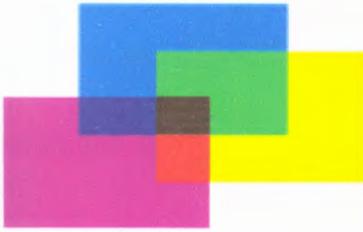
Various colour wheels have been proposed by theorists to show the relationship colours have with each other, beginning with Sir Isaac Newton’s concept of the Colour Wheel in 1666. The colour wheels are associated with three main types of colour: Additive Colour, Subtractive Colour and Partitive Colour.



Additive Principle of Colour Combining:
Refers to mixing of colours of light.
Three primaries in light: red, blue and green,
added up together, produces white light.

Plate 12

Source: “A lifetime of Colour: Study Art”, http://www.sanford-adventures.com/study/g_colourwheel.html



Subtractive Principle of Colour Combining:
 Refers to mixing of colours of pigment.
 Such as paint or ink.

Plate 13

Source: "A lifetime of Colour: Study Art",
http://www.sanford-adventures.com/study/g_colourwheel.html

For example the Pigment wheel can be used as a basis when using subtractive colour. The following are the definitions of Primary, Secondary and Tertiary colours according to the Pigment wheel:

1. Primary Colours : Red, Yellow and Blue



Cannot be made by mixing.
 Used in combination to form other hues.
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2. Secondary Colours : Green, orange and purple



Made by mixing two Primary colours together:
 Yellow + Blue = Green
 Red + Yellow = Orange
 Red + Blue = Violet

3. Tertiary Colours : Yellow-orange, red-orange, red-purple, blue-purple, blue-green and yellow-green



Made by mixing a primary colour with a secondary colour.

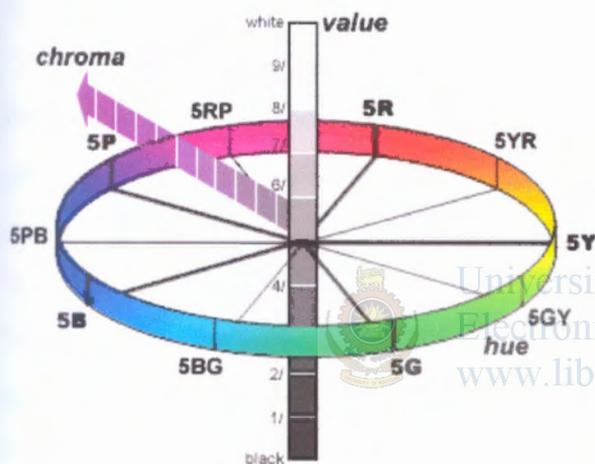
Plate 14

The Pigment Wheel

“The primary hues attract the eye; they are the most stable and the most easily recognized of the hues, and they offer the greatest contrast.”

Feisner, E.A. (2000), *Colour: How to Use Colour in Art and Design*, London: Laurance King Publishing, p.35

The Partitive colour system is based on the reaction that colours have as a result of being placed by each other. The principal Partitive Colours of Yellow, Red, Green, Blue and Purple are based on the afterimage perceptions that are produced by them. The Munsell Colour Wheel and Tree are derived from this colour system.



3-D Diagram of Munsell's Colour Tree (1905):

Based on Hue, Value and Saturation (Chroma) of colour, the tree has ten vanes: 5 primary and 5 secondary colours of Munsell's Colour Wheel

Plate 15

Source : “McEvoy, B., “Colour Vision: Modern Colour Models”,
<http://www.handprint.com/HP/WCL/wcolour.html>, (January 08, 2005)

Colour Harmony is an important principle in arrangement of colours. Harmony can be interpreted as a pleasing or appealing arrangement of parts, may it be music, poetry or colour. A harmonious visual experience engages the viewer and creates an inner sense of order or balance through the experience.

When harmony does not exist in a visual experience, it is either boring due to its plainness, making the viewer disengaged or chaotic due to being overdone, making the viewer too confused to focus. Therefore, it has to have a logical structure that produces visual interest and a sense of order.

2.1.2 Dimensions of Colour

Colour can be discussed through four properties or dimensions. They are as follows: Hue, Value, Intensity and Temperature.

Hue

Hue is the identification or name of a colour. The hue name is actually the term used to describe a particular wavelength. A pure hue is one that has no white, black, gray or compliment in it. A colour may be a pure hue, a mixture of hues, a neutral (black, white or gray) or any combination of these.

Primary hues attract the eye, being the most stable and easily recognized, and offer the greatest contrast. All other hues are perceived in relation to primary hues.

Value

Value implies the lightness or darkness of a hue. A specific hue's value can be altered by adding white or black, which results in a colour 'tint'. White is the lightest value and on the other hand, black, the darkest. Gray, with the middle value is neither black nor white. A colour is a pure hue with no black or white. Pink is a 'tint' of red, in other words, a lighter value of red.

Value has the ability to define space and the form of objects in four ways:

- Two dimensional form's appearance as a solid due to shading
- Creation of pattern and texture
- convey emotion
- give definition and emphasis

Since value differences can provide contrast, patterns and textures can be created. With the change of values, the patterns and textures can be altered from subtle to obvious.

Sharp contrast implies precision, firmness, objectivity and alertness while close values creating lesser contrast creates a sense of vagueness, softness and haziness. Dark compositions can be associated with fear, mystery and darkness and are quiet and subdued, while clarity and optimism is implied through light compositions.



Light value

Composition made up of tints display an overall light value



Medium value

Composition made up of a balance between tints, saturated hues, and shades.



Dark value

Composition displays mostly shades

Plate 16

Value in Composition



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Source: http://www.worqx.com/colour/contrast_dominance.htm

Intensity (Saturation)

The degree of purity of a hue is defined by intensity. It is a comparison between how bright it is compared to light or how dull it is compared to dark. All pure hues are fully saturated since they contain no white, black or complimentary hues. Without a hue present, its intensity becomes zero. We may perceive this achromatic colour as gray.

Intensity contributes in affecting spatial feelings. With the increase of intensity, the colour appears closer to the viewer.

Temperature

Temperature refers to the 'warmth' or 'coolness' of a colour. It has been revealed that some colours increases human body temperature slightly by stimulation and that some help to decreases it by relaxing the person.

Warm hues are most commonly related to the hue red. For example, yellow, yellow-orange, orange, red-orange and red-violet are all warm colours, of which red-orange rates the warmest. These hues attract the eye more rapidly than cool hues. Hues that are of visually advancing or 'active' quality are usually warm, saturated, light value hues.

Cool hues, related to blue, are hues such as yellow-green, blue-green, blue and blue-violet. The coolest hue is blue-green. Green and violet are hues that are neither warm nor cool. Cool, low saturated, dark value hues tend to be "passive" and visually receding.



Active and Passive Hues:

Visually Active and Passive hues demarcated on the Colour Wheel.

When placed against passive hues, active hues appear to advance and vice versa.

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Plate 17

Source: <http://www.worqx.com/colour/combinations.htm>

Colour temperature is a relevant concept, since a hue's temperature changes depending on the hues adjacent to it. For example Red appears more brilliant and larger against Black than White. When surrounded by Orange, it seems lifeless but it is brilliant in contrast with the Blue-Green.

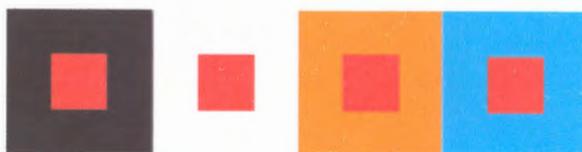


Plate 18

Colour in Context

Source: <http://www.colourvoodoo.com/colour/context.htm>



2.1.3 Colour Appearance

The appearance of colour depends upon the three variables of light, surface and texture.

Colour can be identified as light made visible through interaction with surfaces of all kinds. These surfaces, may it be opaque or translucent, make colour visible. The pigmentation of the surfaces determines the colours to be absorbed, transmitted and refracted. The light may be natural, as sunlight or moonlight, or artificial as filament or fluorescent light. Light can be controlled by orientation, alignment and the use of artificial sources.

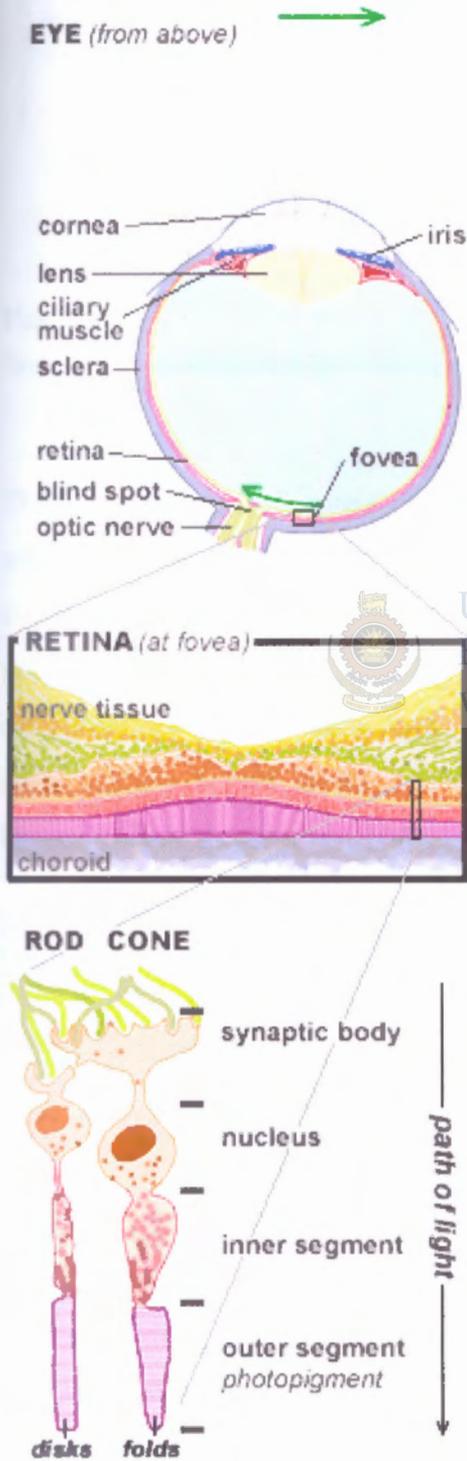
The size, shape, texture and pigmentation of the surface contribute to the colour appearance.

The distance from which objects and spaces are viewed can change the appearance of colours. White is visible from long distances and bright reflective yellow, being an advancing colour, is used in sea rescue services. On the other hand, red is a colour that darkens quickly with distance.

2.2 Physical, Physiological & Psychological Aspects of Colour

Colour can be discussed in two basic methods or points of view, objectively and subjectively. It can be viewed objectively through matters of chemistry, physics and physiology and subjectively through concepts of psychology.

2.2.1 Physiological Aspects of Colour



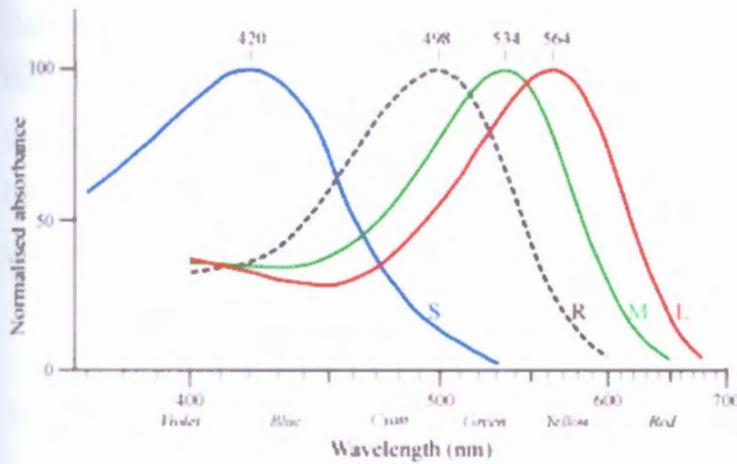
The human eye separates visual tasks into four levels of structure: the optical eye, the retina, the photoreceptor cells, and the photo pigment molecules. The Optical Eye is simply a camera equipped with a lens to focus light onto a photosensitive surface in its dark interior, in the same way a camera focuses light onto film.

The human eye identifies colours by the varying sensitivity of the retina cells to the different wavelengths of light that is captured by the eye. The three types of colour receptor cells or cones are known as short-wavelength, middle wavelength and long wavelength cones. They are most sensitive to the colours we perceive as violet, green and yellowish-green respectively.

Plate 19

Perception of the Eye

Source: <http://en.wikipedia.org/wiki/colour>



Cone and Rod Responses:

Normalized typical human cone responses (and the rod response) to monochromatic spectral stimuli

Plate 20

Source: <http://en.wikipedia.org/wiki/colour>

These three types of cones send three signals to the brain, based on the level of stimulation received at each point or location of the visual field. These signal values, known as Tristimulus Values, are simultaneously given at all times. Therefore, it is not possible, for example, to stimulate only the long-wavelength cones, since the other cones are stimulated by the same light to a certain degree. This unique reaction makes it possible for a human to distinguishing about 10 million different colours, making the human 'colour space' a vivid one.

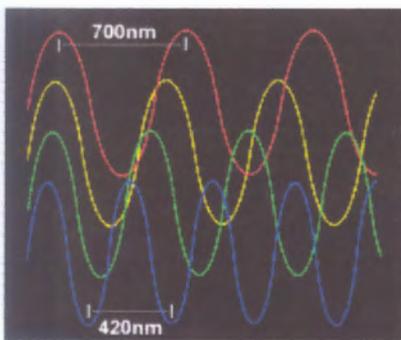


Plate 21

Wave Lengths of Light

Source: <http://en.wikipedia.org/wiki/colour>

The rods, which are the other type of light sensitive cells in the eye, work when there is not enough light to stimulate the cones. Being almost dysfunctional in bright light, the rods contribute to creating a monochromatic view of the visual picture in dim light, the cones being under stimulated.

Colour processing of the retina's output is arranged differently thereafter. It is believed that the colour information is transmitted out of the eye by three opponent processes or channels, each consisting of the cones' outputs: the red-green, the blue-yellow and the black-white "luminance". This system reveals why reddish-green or yellowish-blue cannot be perceived and predicts the colour wheel.

Perception of Colour

Since vision is the most predominant sense out of all human senses, the visual stimulation plays a key role in enabling humans to perceive or understand the environment.

"What sensory organs and experiences enable human beings to have their strong feelings for space and for spatial qualities? Answer: kinesthesia, sight and touch"



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Yi Fu T. (1977), *Space and Place: The perspective of Experience*, London: Edward Arnold Ltd., p.12.

Therefore, as infants, restricted to basic movements and sight, colour is one of the first stimulations that it receives of the environment.

Children learn to perceive colour as a separate sensation with the development of abstract concepts and language skills. These colour sensations are perceived in two ways: as attributes of objects and as a separate sensory phenomenon.

In the first method, which is a natural and normal process, what is perceived is not based up on the true appearance of the colours but faintly tinted with our experience and visual memory. Therefore, it is more based upon what we have learnt rather than upon what is actually seen.

The perception of colour as a true sensory view, on the other hand, is mostly done by artists and those who work and are associated with colours. Thus, the 'objective' prevails in most common situations.

Perception is a process of selection.

“The visual process is one of scanning. The eyes move, and so do the head, neck and the body, gathering images like the frames of a moving film. From these images and other sensory impressions gathered simultaneously the scene is constructed in the light of information already stored in our visual memories, redundant or unnecessary information being filtered out.”

p.33, Lancaster M. (1996), *Colourscape*, London: Academy Group Ltd.

Many factors such as the surrounding of the object, lighting condition and its surface texture, media and techniques, relationship to other colours present and, most importantly as well as subjectively, memory and culture affect our perception of colour.

2.2.2 Psychological Aspects of Colour



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Colours have an effect on human feeling and behavior. The psychology of colour refers to the study of such effects related to colour.

Colour psychology and colour symbolism have different views on colour. For example, the colour of danger in psychological terms is yellow and black, but is red symbolically. Green, symbolically meaning envy in many cultures, is associated with balance in colour psychology. However, only the psychological side will be discussed in depth.

Human responses for colour are subjected to cultural cues and or the innate behavior based on human characteristics. Thus, colour responses can be classified as follows:

Behavioral responses - learned from cultural cues.

Physical responses - innate responses thought to belong to all humans.

Emotional responses - either learned or innate.

However, it is believed that certain reactions are common to most persons and that psychological affects are accompanied by common physiological effects. Colour consultants or practitioners associate hues in the red area of colour as 'warm' and as being exciting and active, while those in the blue and green range 'cool' and as being soothing and passive. Physiological tests support this theory by the results such as the increase in bodily tension and the stimulation of the automatic nervous system by red hues while tension is released by 'cool' hues.

Furthermore, studies have revealed the link between colours and specific responses such as the ability of Blue rooms to increase Weightlifters performance through enhancing their power of concentration, of yellow rooms that make babies cry more often and Baker-Miller Pink (drunk tank pink) that calms prisoners. Thus, it is evident that a significant impact can be made on the users by using appropriate colours in the environment.

Colours can have an effect on taste and smell because of a phenomenon known as synaesthesia. This condition of the senses' interaction with each other, results in situations such as the evoking of other sensations by seeing a colour. For example, seeing green may be reminiscent of grass and yellow may induce a sour taste.

Moreover, it has been revealed that patients' response to medication can have a positive effect when the colours correspond with the medication. Blue; a 'calm' colour, is effective for a sleeping pill and red for fast relief.

In a study conducted by Rikard Kuller suggest that gray and sterile rooms have a negative effect on its occupants than colourful and complex ones, increasing their heart rates and stress reactions, more in men than women.

Each colour has the potential of having both a positive and negative psychological effect on people when used in their environments. The colour combinations are a decisive factor that imposes its positive and negative attributes.

The psychological primary colours of red, blue, yellow and green are related respectively to the body, mind, emotions and the balance between them.

The following is a compilation of the basic colours with their fundamental psychological properties:



Red is a powerful colour, having the longest wavelength. Its attribute of appearing to be nearer than it is makes it possible to attract attention, although it is not the most visible colour. Its effectiveness is proven by the in traffic lights used worldwide.



Positive Psychological Effects:

Having more physical effects, it is able to stimulate and raise the pulse rate, under which effect one may feel that time is passing faster than it actually is. This is an attribute of 'warm' colours. It is associated with the masculine principle and is known to encourage the 'fight or flight' survival instinct.

Negative Psychological Effects:

It has the potential of creating aggressive demanding and behavior as well as irritation, impatience and discomfort.

Plate 22

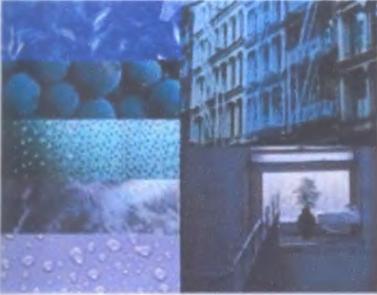
RED



Blue has more effect on the mind than the physical side of the human being. It is a soothing colour. Many researches have identified it to be the most preferred colour.

Positive Psychological Effects:

Clear thought and concentration can be stimulated with the use of stronger blues. Lighter and softer blues are for calming the mind. Aqua Blue is a calming colour that is suggestive of the ocean.



Negative Psychological Effects:

Cold, unemotional and unfriendly qualities may appear in environments with the composition of application etc. Deep blue gray is one such colour that can give harsh and cold effects, used in overwhelming quantities. Blue, being a 'cool' colour, can slow down a person's perception of time

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Plate 23

BLUE



Has a relatively long wavelength and is essentially stimulating, mostly emotionally. Therefore, psychologically, yellow can be identified as the strongest colour,.

Positive Psychological Effects:

The suitable yellow can uplift the spirit and self-esteem. Confidence and optimism is conveyed.

Negative Psychological Effects:

Overwhelming amounts of yellow or the wrong tone in relation to the colour scheme may give rise to fear and anxiety.



Plate 24

Yellow



Green enters the eye in a way that no adjustments are required to receive it. Thus, it is restful. It is the colour of balance, as it is at the center of the spectrum.



Positive Psychological Effects:

Creates a feeling of comfort, relaxation, calmness, and space, lessening stress, balancing and soothing the emotions. Dark green is helpful for lessening emotional uncertainty.

Plate 25

GREEN

Negative Psychological Effects:

May give a feeling of laziness if too much is applied



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Having the shortest wavelength, it is associated with time, space and the cosmos.

Positive Psychological Effects:

Highly introvert qualities reflected. A powerful psychic colour, associated with the right side of the brain, stimulating imagination, sensitivity and spirituality.

Negative Psychological Effects:

Strong psychic influences can bring negative effects.



Plate 26

VIOLET



Positive Psychological Effects:

As a combination of yellow and red, its stimulation and reactions are both emotional and physical. Minds can be focused on food, warmth and shelter etc. that are of physical comfort.

Negative Psychological Effects:

Warm orange used with black suggest feelings of deprivation. Excessive orange reflects playfulness and the lack of intellectual values.

Plate 27

Orange

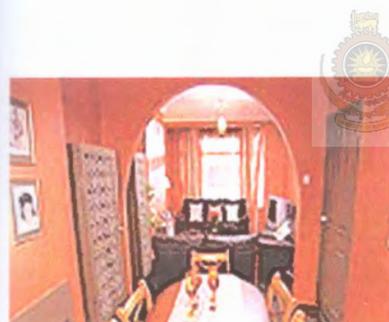


Plate 28

Brown

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Positive Psychological Effects:

Consisting of red and yellow, with a large quantity of black, it has acquired the same seriousness of black, but in a warmer and softer way. Solid and reliable colour, quietly supportive.

Negative Psychological Effects: Heaviness

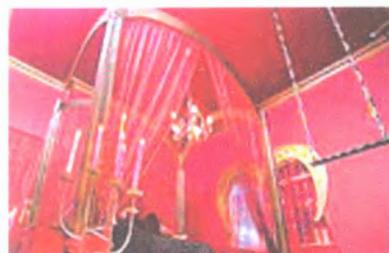


Plate 29

Pink

Positive Psychological Effects:

Being a tint of red, it can have physical effects, but is more soothing and nurturing than stimulating.

Negative Psychological Effects:

Excessive use may be physically draining and emasculating.

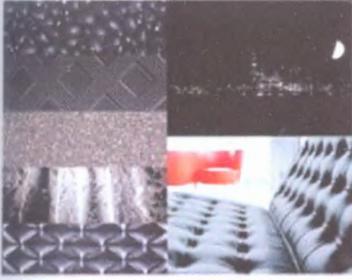


Plate 30
Black

Positive Psychological Effects: Communicate absolute clarity and a perception of weight and seriousness. Works well with white.

Negative Psychological Effects:

Can become suppressive. The absence of light can be frightening, especially for children.



Plate 31
White

Positive Psychological Effects:

Clean, hygienic and sterile. Gives a heightened perception of space.

Negative Psychological Effects:

Sterility can be of negative affect. White on warm colours may look garish or gaudy.



Plate 32
Gray

Positive Psychological Effects:

Pure gray has no direct psychological properties.

Negative Psychological Effects:

However, the virtual absence of colour is depressing. With precise tone, it can have a dampening effect on other colours.

Source: http://www.benjaminmoore.ca/colours/principles_relationships.aspx

http://www.bbc.co.uk/homes/design/colour_colourpsychologyofcolour.shtml

2.2.3 Psychological Effects of the Dimensions of Colour

While specific colours or hues can have various effects on people, the dimensions of colour: value, intensity and temperatures, too have varying effects on the viewer.

Contrast in value creates precision and objectivity while the opposite, of using close values creates haziness, vagueness and introspection.

Darker compositions evoke feelings of fear, mystery and night. They can increase the size of an object, reflect space or infinity. Light compositions portray optimism and clarity. A relaxed and less demanding quality is implied by middle values.

Attraction increases with the increase of the intensity of colours used, suggesting activity.

Warm colours, such as red, increases human attraction to stimulations of the outside environment, excites and create high arousal levels, quickening muscular responses. Fast food restaurants, coffee shops etc. use these colours to excite the customers to come in, eat quickly and then vacate the table, allowing the next excited group of customers to use it. Apart from that, these colours are related with feelings of warmth, happiness and comfort.

Cool colours, such as blue, have the ability to slow down one's perception of time. They can have a passive, calm quality that can enhance the power of concentration and create peaceful and tranquil surroundings with the use of colours such as aqua blue. Environments can be made to feel harsh, cold and distant as well, in instances such as a space with extensive use of deep blue-gray.

Colour Schemes

The choice of colours used in a design can be identified as a colour scheme. Achieving harmony in a colour scheme is to have visual agreement of all elements of a space. Repetition, Similarity, Use of Tonality and Surrounding a colour with a Neutral colour are ways of achieving harmony.

Colour being the most common means of repeating, hue repetition can bring out a harmonious colour scheme, such as a Monochromatic Scheme.

Similarity can bring out harmony, but variety cannot be separated from it. Since pink is a tint of red, pink and red are similar, but the two colours are not visually similar. Thus, similarity can be added by using shades which are related to a parent hue, to achieve harmony. Analogous colour schemes have one hue in common, giving an effect of visual unity and calmness.

Tonality, by adding one colour to all the other colours of a composition, can bring out harmony even in the most diverse of colour palettes.

If two or more hues can be mixed to become gray, such hues are harmonious in composition. Therefore, harmony can be achieved by the use of a neutral hue as a surrounding.



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Colour Wheel Relationships

The choice of colour schemes can be explained in terms of the relationships the colours according to the colour wheel (pigment wheel). Following are some colour wheel relationships:

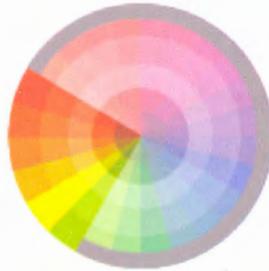
- Monochromatic
- Analogous
- Complementary
- Split Complementary
- Double Complimentary
- Triad

Colour Scheme Relationships on the Colour Wheel :



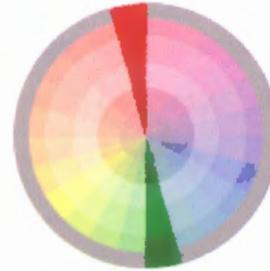
Monochromatic Relationship

Colors that are shade or tint variations of the same hue



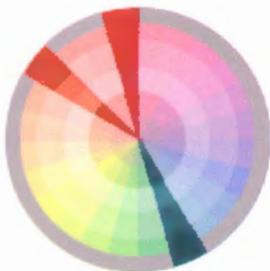
Analogous Relationship

Those colors located adjacent to each other on a color wheel



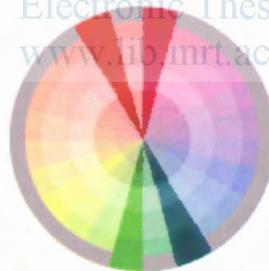
Complementary Relationship

Those colors across from each other on a color wheel



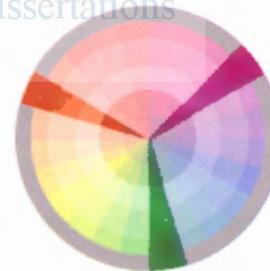
Split-Complementary Relationship

One hue plus two others equally spaced from its complement.



Double-Complementary Relationship

Two complementary color sets; the distance between selected complementary pairs will effect the overall contrast of the final composition.



Triad Relationship

Three hues equally positioned on a color wheel



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Monochromatic Schemes



Plate 34

Only the tints and shades of one hue are used. The value of the hue varies with the addition of pure black or white.

An extremely harmonious and restful visual effect can be achieved and subtle, depending on the range of values used. Such schemes express a feeling of unity, peace and harmony, while emphasizing spaciousness and continuity.

Analogous Schemes



Plate 35

Three of the colours of the colour wheel lying side by side are used. Soothing to the eye and most often has a soft quality.

By using one dominant and two additional colours, these colour schemes can produce a monochromatic effect as well. The scheme becomes most effective when the common hue is a primary hue and it becomes most harmonious at instances when it is the hue in the middle. It is not appropriate to have warm and cool colours combined.

Complementary



Plate 36

Two colours located opposite each other on the colour wheel are used. The pair is consisted of a primary and secondary colour. Compliments brighten and strengthen each other's colour when placed side by side.

Ex: Red & Green, Blue & Orange, Purple & Yellow

Best scheme for dynamic appearance with high visual interest.

Split Complimentary



Plate 37

A combination of one colour and the two colours on each side of the first colour's complimentary on the colour wheel.

Can allow one to dominate, with the other two adjacent colours used for visual contrast.

Triad Schemes



Plate 38

Colours at equal distance on the colour wheel are used. May include tints and shades. Can create 'bold' colour schemes.

Full strength astounding combinations are not necessary for affectivity. Quieter values of one or more of the colours can be effective in creating harmony.

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Source: <http://www.paintquality.com/diy/content/newsletters/index.html>

The colour schemes' impact of contrast is of varying levels. They can be arranged in the following order of decreasing contrast: Complimentary, Triad, Split Complimentary, Analogues and Monochromatic.

More over, Nature too can be an inspiration for colour schemes. The colours that exist together in nature can become harmonious colour schemes, no matter where such colours fit in technical analysis.

Plate 39

Natural Colour Schemes

Source: "Colour Theory-Colour Matters"<http://www.colormatters.com/body.htm>



Spatial Effects of Colour

If a hue is lighter at its maximum saturation, it appears larger than the hues that turn darker. Yellows and oranges are such lighter colours as opposed to blues and purples. Expanding colours seem closer to the viewer than those with contracting qualities. Therefore, in general, warm colours appear closer than dark colours.



Plate 40

Colour can visually change a space's perception of size. Expanding colours makes spaces look closer to the viewer making it seem intimate and smaller, while cool colours does the opposite



Plate 41

Patterns and textures of colour too can have an effect on the perception of spatial dimensions.

Perception of space can be altered through pattern, For example, vertical strips on walls can make the space look heightened.



Plate 42

Texture can give depth to the surface.

Texture is an important element of design that can add interest and style in any room. Use decorative techniques such as sheen striping or stippling which provides a variegated appearance and gives depth to the surface.

Source: <http://www.paintquality.com/diy/content/newsletters/index.html>

2.2.2 Psychological Aspects of Colour-For Adults and Children

The connection between colours and objects begin to be perceived from infancy. Although they are only attracted to the lightness and the brightness of objects at these early stages, they distinguish colour as a separate sensation only with the beginning of the development of language skills and abstract concepts.

Up to six weeks of age, infants experience black and white or light and dark. Then onwards, till two months they begin to perceive other colours, especially bright colours, beginning with red.

Below two years of age, children are able to match objects by the shape rather than colour. Between two and four and a half years of age, there is an increase in the number of children that tend to match objects by colour. However, it decreases continuously into adulthood because of the influences of the cultural environment they grow up and live in.

“...as our culture increasingly demands the training in practical skills that rely more heavily on shape than colour, the priority given to colours normally decreases continuously into adulthood.”

Lancaster M. (1996), *Colourscape*, London: Academy Group Ltd., p.33

They are able to learn colour names between the ages of two and five years and girls learn them faster than boys as they develop language skills faster than boys during early childhood.

Children's preference to colours changes with age. After about 10 years of age, most children's favorite colour changes from red or pink to blue. This can be explained as a process of growing up and gaining the ability to perceive different hues of mood.

The following are results of a study carried out by Heinrich Frieling of 10,000 children on the varying colour preferences with age:

- Ages 5 - 8
Preferred: Red, orange, yellow, and violet
Rejected: Black, white, gray, dark brown
- Ages 9 - 10
Preferred: Red, red-orange, and green-blue
Rejected: Gray, dark brown, black, pastel green and blue
- Ages 11 - 12
Rejected: Black, white, gray, olive, violet, and lilac
- Ages 13 - 14
Preferred: Blue, ultramarine, and orange

Source: Maynard, P. (HMC) "CASH WORKSHOP Color Psychology" <http://www.cashnet.org/resource-center/about.html>, (March 6, 2001)



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Colour preference is closely associated with gender, with most girls showing preference to hues such as pink, violet and lavender while boys tend to prefer black and other dark colours.

Moreover, it is expressed, in Faber Birren's 'Light, Colour and Environment' that children respond more to warm colours, whereas adults' response is more towards cool colours.

In a research conducted to study and compare the colour effects on adults and children, the following findings had been made:

- Red is a colour that makes adults angry yet children calm.
- Yellow and blue were two colours both parties agreed upon as being 'happy' and 'calm' respectively.
- Children feel more intensely towards colours than adults, since generally, children are more emotional.

Furthermore, it had been revealed that children seem to be more sensitive towards colours than adults. The mean difference between the intensity level felt by children and adults had been 1.03. The study had reasoned out that children's general tendency to be more emotional and the fact that adults' emotions on the effects of colour are pre conceived could be the reason behind it.

Many researches have confirmed the connection between colour and moods or emotions. It can be seen clearly with children if one understands their moods and try to relate it with the graphical expressions they make with colours, since they do not possess sufficient language skills to communicate otherwise. Therefore, colour becomes an essential tool for self-expression for children.

“...having listened to a fairytale with a happy end, children get drawing with a yellow pencil. And after some sad story they tend to use dark brown colours.”

“Children and Colour-Self Expression,” <http://www.rin.ru/psychologyofcollors.html>, (January 2006)



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A study, conducted by the Auburn University and Oregon State University, on the impact of space and colour in the physical environment on pre-school children's cooperative behavior has revealed that the differentiation in ceiling height and or wall colour were related to the changes of cooperative behavior among them. Thirty pre-school children had been used in groups to experience four different spatial conditions for the study. Therefore, it is evident that colour of the environment can directly affect pre-school children's behavior.

2.3 Colour to Achieve Spatial Quality for Play

As discussed in the first chapter, kindergarten children receiving a pre-school education, learn primarily through play, being active through out the learning process. This child-centered learning process allows children to be involved in activities that cultivate curiosity and creative thinking abilities, expand language as a communicative ability and broaden social contacts by interacting with peers.

Other than during nap time in the kindergarten, the children are engaged and are encouraged to be involved in robust activities.

One of the primary objectives of kindergarten education is to provide the child with exposure to the environment.

Therefore, use of colour in kindergarten architecture has to

- facilitate play, preparing the physical as well as the psychological environment for the activity
- enhance environmental stimulation, especially of the natural environment
- make spaces places, that children can relate to as their own
- and advancing one step further, make those special places of childhood memorable for a lifetime

“Buildings... are expected to be much more than forms following function.

They are symbols comforting or otherwise, of the places we live in. “

Lancaster M. (1996), *Colourscape*, London: Academy Group Ltd., p.33.

In this instance, it is essential to look at kindergartens as comforting, stimulating environments for their primary users: the children. Comfort to the eyes of the parents or the teachers or even the passers-by should not be the main concern.

In order to achieve these objectives, the attributes of colour, such as its dimensions, theories, physical and psychological properties, mentioned earlier in the chapter can be utilized.

2.3.1 Use of warm-bright colour schemes

“Recommended for Preschool and Elementary:

Warm, bright-color scheme reduces tension and nervousness.

Light salmon, soft warm yellow, pale yellow-orange, coral and peach.

Colours of opposing temperature as accents. Child's need for hued color intensity not satisfied by drawings pinned up on wall.

“Upper Grade and Secondary :

Soft and cooler hues help with concentration. Beige, pale green, blue-green.

Make front wall different color than side walls to suggested colors: Medium gold, green, blue, or terracotta relax student eyes when looking up from task.

Side and back walls: Beige, sandstone, and light tan.”

Maynard, P. (HMC) “CASH WORKSHOP Color Psychology” <http://www.cashnet.org/resource-center/about.html>, (March 6, 2001)

As discussed earlier, in Richard Kollar's studies etc., colourful environments reduce tension. Warm colours create cheerful and bright atmospheres.



Plate 43

Natural Warmth and Brightness:

An activity area of the Auroville Kindergarten, India, with warm natural hues of burnt brick and earthy brown floor surrounds the painted furniture of attractive colour

Primarily cool colours should be avoided in large quantities in colour schemes since the children may tend to become dazed, lazy and gloomy, not energetic and active to play and explore their environment. Apart from that, children's tendency to be afraid of the dark is a cue to avoid darker hues.

On the other hand, as mentioned above in properties of cool colours, the colour schemes suggested for upper grade and elementary schools are those with the ability to create a calming effect inducing concentration.

2.3.2 Use of harmonious colour schemes

Complimentary, Split Complimentary and Triad colour schemes are appropriate for these stimulating play environments, due to their dynamic, visually contrasting and 'bold' qualities. But these have to be carefully planned, so that harmony is achieved and distracting contrast is avoided, especially when using Complimentary colour schemes.

"A learning environment (should be) designed with elemental stimulus of primary forms and warm but not over-excitabile colours."

Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*,
London: E. & F. N. Spon, p.110.



Plate 44

Source : "Winner - Bubblecture Maihara Kindergarten, Shiga, Japan ",
<http://www.childreninscotland.org.uk/images/award/winner.htm>

Monochromatic Colour Scheme:

The monochromatic hues of the natural timber finishes of the Bubblecture Maihara Kindergarten, Shiga, Japan creates a harmonious environment



2.3.3 Use of colours to create a 'Children's Place'

There is a difference between the terms 'Space' and 'Place' that needs to be clarified. Space is only a mere commodity; four walls, an entrance and windows. But 'Place', as Kevin Lynch has stated in 'Image of the City' (1961), is about identity and meaning. Therefore, a Place for a child would mean a sense of Identity, ownership or belonging: a space with meaning.

The mystical spirit of children celebrated in the kindergarten concept and the pre-educational principle of 'Learning through Play' adopted in the nursery system, demand for kindergarten spaces that are animated to stimulate the power of imagination. Within these inspirational, mystical environments, children build their own fantasy worlds, making them active in play, while they passively develop skill of learning, communication etc.

“The best kindergartens synthesize faultless functional criteria with an almost mystical sense of wonder for the children using them.”

Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*,

London: E. & F. N. Spon, p.08.

Colours can be utilized to create intimate, child scale spaces of larger volumes or vice versa. Some lighter hues, as discussed earlier, expand space, while darker shades reduce the scale in perception. This phenomenon can be used along with patterns and textures when applying colours, to make the spaces feel warm, relatively intimate and child scale, rather than overwhelmingly unreachable or unimaginable. The degree of attachment a child develops to a place is reflected upon the interaction he generates with the environment, thereby affecting the opportunities for learning.



Plate 45

Animated forms for the imagination:
Kindergarten in Caesarea, Israel
The colourful forms attract the
children's imagination

The Architect Knafo Klimor of the Kindergarten in Caesarea, Israel explains:

“The outer walls are rendered in bright colors and carved into shapes that spark the children's imagination for storytelling. The three elephants on the outside walls might also serve, for instance, to illustrate the story of the three bears. On the interior walls, the elephants metamorphose into hippos, turtles, and other animals.”



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Source: “Creative Kindergarten”, <http://www.architectureweek.com/2003/0813/design1-1.html>
(13, August 2003)

However, the child's relationship of preference or attachment to the Kindergarten during pre-school years is only the tip of the ice burg; the inner feelings that are brought about with this relationship goes far deeper to reach the conscious and subconscious mind to last for ever as memories of childhood.

“...the experiences and the images of early childhood are the most deeply scored and enduring.”

Dudek M. (1996), *Kindergarten Architecture: Space for the imagination*,
London: E. & F. N. Spon, p.09.

Therefore, creating a ‘Children's Place’ not only influences the child's development during Kindergarten, but fills the mind with captivating memories of childhood to last a lifetime.

2.3.4 Use of Natural light for life

The senses have a tendency of detecting changes in stimulation rather than constant outputs. Thus, their function is at its best based on the gradual environmental changes. These environmental changes can be affected by the use of natural light and colour.

“Best Environment:

Colors in changing degree of lightness, temperature (warm and cold) and intensity. As in nature our senses expect to be somewhat stimulated at all times. An environment that is unchanging or static is not natural. Monotony induces anxiety, tension, boredom, fear, and distress.

1. Supports building function and tasks involved.
2. Does not produce over or under-stimulation.
3. Does not provoke negative emotional and physiological effects.

A building should not have color for colors sake, instead appropriate colors that benefit the occupants of the environment.”

Maynard, P. (HMC) “CASH WORKSHOP Color Psychology”, <http://www.cashnet.org/resource-centre/about.html>, (March 6, 2001)

Apart from having physical elements and their properties, such as colour and texture, ordered to give a feeling of excitement and avoid monotony, the natural environment’s ever changing quality can be captured, portrayed or reflected and incorporated into kindergarten.



Calling of the Outdoors:

The corridors of Bubbleecture Maihara Kindergarten, Shiga, Japan, flooded with sun light

Plate 46

Source : “Winner - Bubbleecture Maihara Kindergarten, Shiga, Japan
“, <http://www.childreninscotland.org.uk/images/award/winner.htm>



Plate 47

Rooms with Radiance :

Interior of Auroville Kindergarten, India, with light allowed to penetrate into the space, creating an ever changing mystical space



Plate 48

Mystical Outdoors:

Court yard of Auroville Kindergarten, India, gleaming with spots of light penetrating through the green roof above

The strongest natural element for this purpose is the sun. As a tropical country, with the abundance of sunlight, that penetrates through all possible natural and built surfaces to the ground, with changing value, intensity and temperature throughout the day, its animated enough to give life to all.

“Stimulation must be gradual, as dramatic fluctuations can be over-stimulating to older children or, at worst, frightening and disorientating to younger children.”

Dudek, M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E & FN Spon, p.90.

Such stimulation can be achieved through the exposure of the colours of the play environment to the dynamism of the sun.

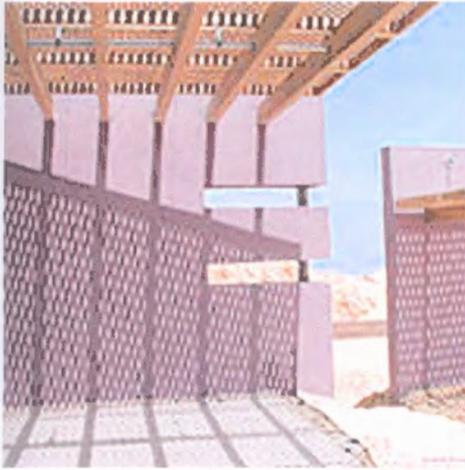


Plate 49

The phenomenon of the interplay of light and shade:

Kindergarten in Caesarea, Israel

The architects use the contrast between light and shade to extend their range of form and color.

The Architect Knafo Klimor of the Kindergarten in Caesarea, Israel explains:

"We place our design in such a way as to create new architecture: the natural contrast between light and shade creates a new range of form and color. Two-dimensional architecture will eventually create a richer composition of color, which, in turn, will enrich the child's experience."

Source: "Creative Kindergarten", <http://www.architectureweek.com/2003/0813/design1-1.html> (13, August 2003)

The ultimate aim of applying these tools of colour is to make a stimulating environment for the child in the activity of Learning through Play, contributing to the accomplishment of the Kindergarten objectives, as well as to create everlasting impressions of childhood in their minds.

"Architects, educationists and commissioning bodies should....be less timid in their approach to kindergarten architecture. This will ensure that the enchantment of childhood is amplified, and remains as a positive and potent memory for the individual to carry throughout life."

Dudek, M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E & FN Spon, p.90.



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Chapter Three
COLOURS AT PLAY

Chapter Three

COLOURS AT PLAY

The previous chapter, Colour for Play, has explored the prospective of colour, in creating the appropriate physical and psychological environment for play, through which children learn during kindergarten years, as discussed in depth in the first chapter, Kindergarten: The Play House of Learning.

Throughout the chapter, physiological and psychological attributes of colour were discussed, focusing on vision and the perception of colour, the generation of physical and emotional responses in both children and adults and the effect on spatial qualities, along with the various colour schemes adoptable.



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Taking into consideration the children's level of sensitivity towards colour, the spatial qualities desirable for kindergarten activities and the above mentioned attributes of colour, the chapter was concluded with the identification of four key elements that a kindergarten design colour scheme should have, in order to create a stimulating kindergarten environment for play.

This chapter, Case Studies: Colours at Play, concentrates on the study of selected kindergartens with regard to the use of colour, based on the four principles derived through the previous chapter.

It gives an overall view of the selection criteria of the case studies and describes the method of study through which data had been collected and processed, before presenting the case studies.

3.0 Selection Criteria and Method of Study

Three case studies have been selected to examine the use of colour as a facilitator for kindergarten activity: Play.

The selected Case Studies are as follows:

1. SOS Village Nursery, Piliyandala
2. St. Anthony's Nursery, Borella

These two kindergartens that have been subject to this study are all early education institutions that practice the Nursery and Kindergarten Method, where the focus is on the socialization of the child as well as the use of 'Fantasy Play' as the main learning tool in a learning environment that gives the child the possible maximum freedom from restraints and directions. Therefore, Play is an integral activity component in these selected kindergartens.



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Apart from being designed by architects, these case studies have been selected with regard to their colour schemes, which have been part and parcel of the original design that still remain original and true as the architect intended and the different design approaches evident in the schemes.

Further more, they continue to receive appraisal from all categories of society, from professionals such as architects to users such as pre-school teachers and past pupils, for its architectural significance.

The case studies have been carried out through the observation of the play activities of learning and the spaces that accommodate them, as well as through in depth interviews with pre-school teachers, parents, past students and the children themselves.

The observations and interviews have been based on the four principles identified in the previous chapter that generate stimulating learning environments through play in kindergartens.

The colour principles for stimulating kindergarten environments for learning through play are as follows:

1. Use of Warm-Bright Colour schemes
2. Use of Harmonious Colour Schemes
3. Use of Colours to Create a 'Children's Place'
4. Use of Natural Light for Life

Therefore, the case studies focus on identifying the application of the above principles and understanding the effect it has on its main users: the children.

3.1 Case Study One:

St. Anthony's Nursery, Colombo 08



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The St. Anthony's Nursery, Borella had been established more than thirty years ago, by the St Anthony's Church. It practices the Nursery and Kindergarten Method where children's imagination is given wings to fly, having Fantasy Play as the primary activity in the curriculum.

The nursery consists of Lower and Upper nursery classes for three to five year old children and Play Group for two and a half year old children. It houses about 200 to 250 children under the care of more than twenty pre school teachers.

The nursery is located along D. S. Senanayake Mawatha, a segment of the congested main artery Base Line Road. The highly urban neighborhood of Borella has given shape to it as an introverted box projected upon the site boundaries. The solid block nursery building stands beside the slender St. Anthony's Church, its governing body, complimenting it by its proportions, circular detailing as well as the colour scheme.



Plate 50

The 'Introverted Box':

The St. Anthony's Nursery facade with its cubic form and circular fenestration

Designed by Archt. Valentine Gunsekara, the building clearly reflects its creator's architectural language in many ways. The primary forms, the main element of his architectural language are kept intact in the exterior, rather than breaking it into planes as in most instances. However, the dynamism needed in a kindergarten environment is brought about within the interior

"...the very external demarcation had an unbroken strong primary form like at St. Anthony's Nursery....But in the double height void, the curved walls, the slender columns and the internal gardens create dynamism."

Rajapaksha A. (1998/99), "Valentine Gunsekara's Search for a Just Social Fabric and a New Architecture", *The Sri Lanka Architect*, Vol. 101, No. 21, p.23

His particular preference to curvilinear form is highlighted in the nursery as well, through the internal ceiling and floor planning, of the curved bridge and curving surfaces that demarcate the double height spaces and detailing of windows etc. The feminine curves have mellowed down the firmness and rigidity of the cubic and rectangular forms into gentleness to better suit the spaces for the children.



Plate 50

The 'Introverted Box':

The St. Anthony's Nursery facade with its cubic form and circular fenestration

Designed by Archt. Valentine Gunsekara, the building clearly reflects its creator's architectural language in many ways. The primary forms, the main element of his architectural language are kept intact in the exterior, rather than breaking it into planes as in most instances. However, the dynamism needed in a kindergarten environment is brought about within the interior

"...the very external demarcation had an unbroken strong primary form like at St. Anthony's Nursery....But in the double height void, the curved walls, the slender columns and the internal gardens create dynamism."

Rajapaksha A. (1998/99), "Valentine Gunsekara's Search for a Just Social Fabric and a New Architecture", *The Sri Lanka Architect*, Vol. 101, No. 21, p.23

His particular preference to curvilinear form is highlighted in the nursery as well, through the internal ceiling and floor planning, of the curved bridge and curving surfaces that demarcate the double height spaces and detailing of windows etc. The feminine curves have mellowed down the firmness and rigidity of the cubic and rectangular forms into gentleness to better suit the spaces for the children.



Plate 51

The Opened 'Lid':

The cubic form opened inward at its rear end to receive the filtered natural environment, from above



Plate 52

Dynamism Within:

Gentle curves, slender columns and internal gardens creating, through the dynamic space within the 'Box', almost a fantasy

The dynamism and the gentleness, created through the composition of forms in the nursery, are heightened with the use of an appropriate smooth and soft colour scheme.

“...Valentine Gunasekara was in constant search for...the architectural forms and elements that he could use to create an ‘informal’, ‘joyful’, ‘international’ order: in which the colour of the materials he chose would become a vibrant reiteration of these sensory impressions.”

Rajapaksha A. (1998/99), “Valentine Gunasekara’s Search for a Just Social Fabric and a New Architecture”, *The Sri Lanka Architect*, Vol. 101, No. 21, p.22

2.1.1 Warm- Bright Colours

The colour scheme used in the St. Anthony's Nursery is of neutral hues, of white on the ceiling and gray on the floor, and soft pastel colours on the walls. The pastel colours used are 'Baby Blue', Pink and Maroon.



Plate 53

From lightness to firmness:

The Colour Scheme – White and Bright ceiling with sky light, Pastel coloured walls spotted with pools of sun light and the gravity of the cement gray floor, balancing and bringing back to earth the ever sky rocketing spirit of children, from time to time.

Pink, although a tint of red has less saturation of it and maroon, although being a mixture of red, black and other hues it has become dark in value. Therefore, the overall colour temperature does not strongly give an impression of warmth.

However, there are attractive bright Yellow spots of colour, sprinkled on the walls as filters of some of the circular louvered windows. These help to throw in more excitement to the spaces, giving an identity to the spaces that can be sensed by the children, making them more vibrant, asymmetrical and warmer in appearance.



Plate 54

Spots of Gold:

Bright yellow filters of louvered windows scattered on the walls, adding character and vibrancy to the spaces

Further more, the ample amount of sun light that penetrates from the ceiling and the small and large openings on the walls all around substitutes for the warmth subdued due to the applied colour scheme. This effect can also be understood as an impact of colour appearance as well, when the colour of daylight and its effect on colours themselves is considered.



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The primarily used Pink, being a tint or a lighter value of Red and 'Baby Blue,' being a lighter value of the pure hue Blue, makes the entire colour composition light in value. The lightness or value difference of hues red and blue is small. Hence, the atmosphere created has become subtle, smooth implying clarity, optimism and a sense of freshness.



Plate 55

Spaciousness Enriched:

Low saturation of colours expanding space, already enhanced by the double heights, sky lights and openings

Since the intensity or the saturation of the colours used is low, the colours seem further away from the viewer, contributing to the quality of spaciousness in existence as an outcome of double height volumes, sky lights and vistas opening outdoors.

The Colours highlight dynamic forms of the spaces; the circles on the walls, the curves of the spiral staircase and handrails that wrap around sky lit boundless volumes and the slender columns that spring out and blossom on to the ceiling. Thus the colours enhance the dynamic pulse of the spaces, composed of animated forms.

Bright colours have contributed to the attraction of children to spatial elements that stimulate their power of imagination. Thus, Creative Play is stimulated, where imagination plays the major role, be it by Solitary Play or Cooperative. Walking across the sloping bridge or sitting in the classroom, bright colours constantly behold the eyes of the children, the dynamic forms being perceived at the second stage.

The attractive 'Spot of Gold' at the end of the bridge may become the pot of gold at the end of the rainbow or the moon rising over the mountain, or what ever they imagine it to be. The objective of giving them opportunity to imagine through the kindergarten environment is to develop their thinking ability through which they learn to associate ideas, people and objects in existences together accumulating cognitive development, as discussed in the first chapter.



Plate 56

Space for the Imagination:

Colours highlighting features that become abstract images for 'Fantasy Play'

2.1.2 Harmonious Colour Schemes

These pastel colours of 'Baby Blue', Pink and Maroon and are not primary hues, but mixtures of hues. Therefore, the colour scheme has reduced its tendency of becoming highly contrasting. This can be viewed in a positive light since excessive contrast tends to diffuse and distract the mind and break the children's concentration on the play activities that are underlined with the objective of learning. Moreover, excessive contrast can result in visual discomfort and stress, through the difficulty of focusing, making the child dislike the environment.

However, the space still remains animated with the variety of colour offered by pink and maroon, although in harmony through similarity, and the contrast of colour through pink and blue.



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Plate 52



Plate 57

Subdued Contrast (I) :

Primary hues avoided to create a more focused learning environment, keeping the excitement of the space intact

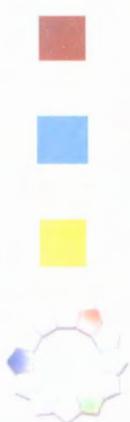


Plate 58

Subdued Contrast (II):

Baby Blue, Pink and Maroon against the white glow of the sky, giving a hazy yet focused ambience

Maroon, Blue and Yellow are arranged with equidistance in the colour (Pigment) wheel. This Triad scheme gives a dynamic effect to the space, but in a subtle way, without using its maximum potential as the second strongest contrasting colour scheme next to the Complimentary Schemes.



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Triad Colour Scheme:
Dynamic and vibrant quality achieved through three contrasting colours



Plate 59



Yellow Highlights:

Simple yellow filter on louvered windows brings a glow of life to the space and another door to the world of fantasy

The pink and blue hues are surrounded by neutrals gray and white in most areas of space. Therefore, the neutral surrounding effect makes the two colours more visually agreeable and appealing.



Contrast and Harmony:

Soft Pink and Baby Blue hues are surrounded by neutrals gray and white to create harmony between the hues.

They demarcate solids and voids, create a balance between the masculine and feminine, and above all, unite all elements together in a subtle manner, with the neutral hues in between.

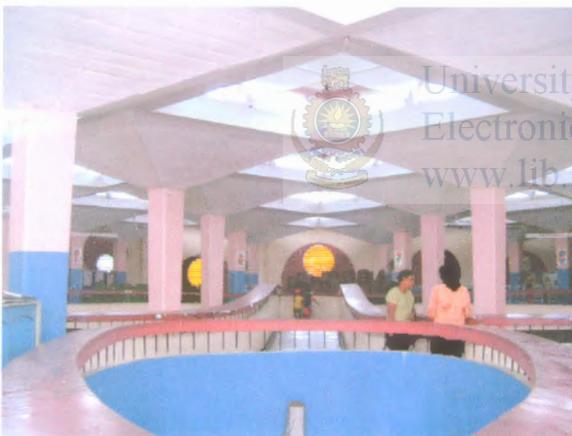
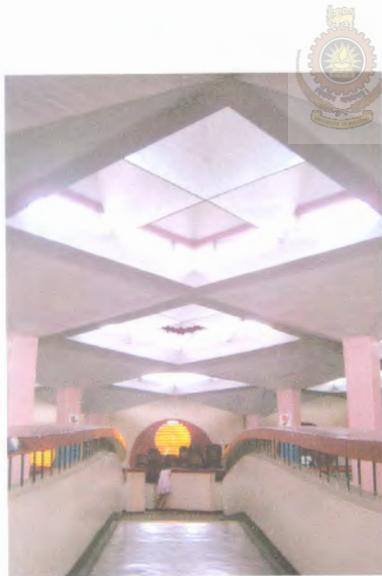


Plate 60

2.1.3 Creation of a “Children’s Place”

The ‘Learning through Play’ theory of pre-school education and the mystical and boundless spirit of children celebrated in the kindergarten concept that demand for a stimulating environment for play has resulted in the St. Anthony’s Nursery becoming a wonderful “Children’s Place” for it’s primary users.

The spaces within are full of infinite possibilities for wonder and imagination for the child. From the cement gray floor that spreads out into the internal courtyard on one end and spirals upwards, to reach the valley and hillocks of the clouds above on the other, to the celestial ambience of the sky lit ceiling giving glimpses of the heavens beyond, the space within the ‘Box’ is a paradise for the imagination.



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Plate 61

Beyond the Sky :

Celestial ambience of the roof lights over the curved bridge, for the infinite imagination of the child

The lines, circles and curves that compose this wonderland are brought to life and made visible through colour. As mentioned earlier, children are attracted to colours than to forms. Therefore, primary forms of colour are very appealing to children. Since there is always attachment where there is preference, attachment contributes to the making of Place from Space.



Plate 62

Legibility through Colour:
Definition of class room space simply by coloured furniture; the Pink Class and the Blue Class



Plate 63

Colour - The Life of Form and Space:
Colours highlight exciting forms and framing dynamic spaces



Plate 64

Identity of Place:
The Blue class with the 'Moon' in the corner

The children's attraction and the fondness to spaces and objects in a kindergarten environment can be traced in their memories much later in their adulthood. Most past pupils of this nursery, who are now adults, have fond memories of their favorite spaces and activities in kindergarten, such as the ramped bridge of the upper floor in the centre of the hall and how they used to race toy cars over it in 'smashing' speed.

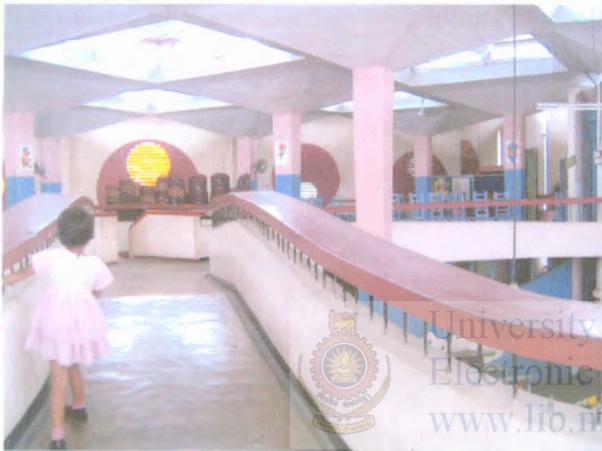


Plate 65

Bridging Time:

The ever popular feature of the kindergarten, The Bridge, still remembered by many with childish grins and light hearts.

2.1.4 Natural Light for Life

The St. Anthony's Nursery design has not only used its colour scheme to enhance the quality of space, but has harnessed the most powerful source of energy, sunlight, that changes value, intensity and temperature through out the day. This animated effect of sunlight has the power to generate ever changing lighting conditions that transform the ambience of space it self with it, while contributing to the change of the colour appearance.

The introverted 'Box' has its internal rear facade completely opened out in to a courtyard, allowing one fourth of the enclosure to be exposed to natural light. The light that bursts in touches and transforms all surfaces and volumes, allowing the children to sense nature's subtle changes in a big way. Through this, they are constantly in touch with nature, exploring and understanding its mysteries through self observation.

This close physical contact with nature is also used by the teachers as a tool to make children aware of the natural environment and its interesting phenomena such as the rain, wind and the passing of time and the change of light and shadows with it. Such learning exercises come in the form of games or songs that the children enjoy taking part.

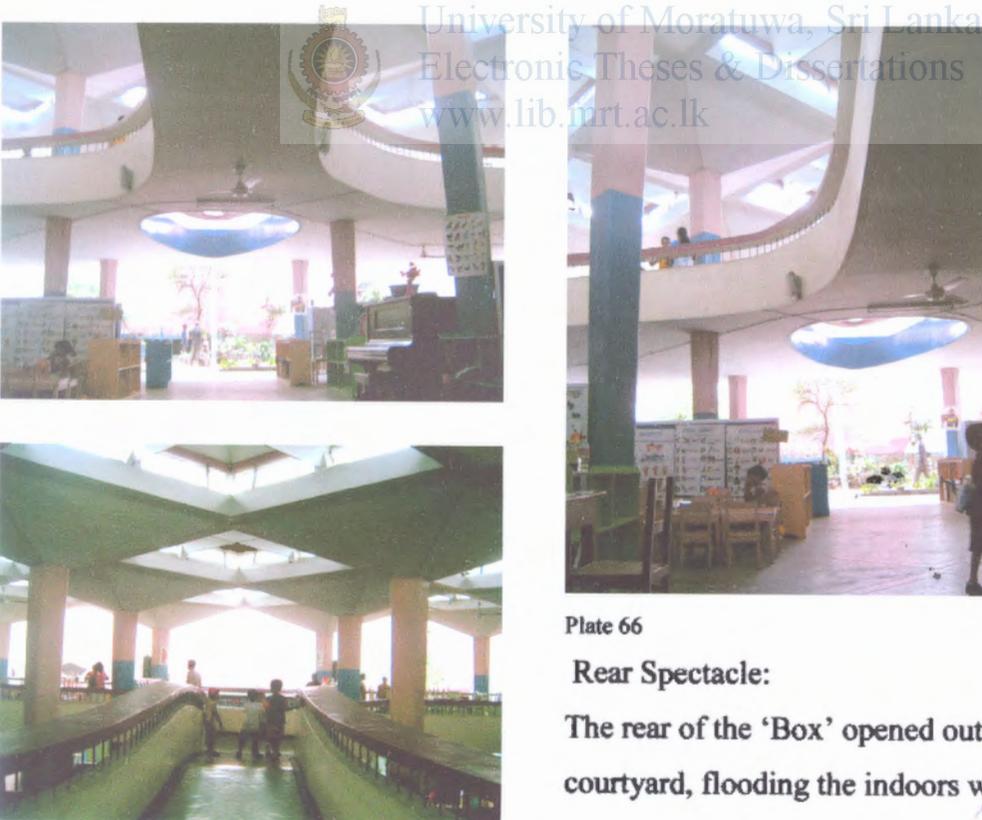


Plate 66

Rear Spectacle:

The rear of the 'Box' opened out to the courtyard, flooding the indoors with light



The most impressive element of all, not only to the children, but to the adults as well, is undoubtedly the ceiling that is lit up as a spectacular kaleidoscope of light. The streaks and pools of light create a motif of almost neutral hues that change from Bluish Gray to Golden Yellow throughout the morning hours.



Plate 67

Kaleidoscope of Light:

The sky lights of the ceiling that creates a dazzling, ever changing motif of light

Adding further delight to the spiritually uplifting spatial quality, patches of light in many shapes and sizes penetrate in to the 'Box' through slits and niches on the walls, casting playful pools of light and shadows on the planes. Their asymmetry makes the spaces more exciting. The portholes along the walls gleam with bright light reflecting the mood of light outside.



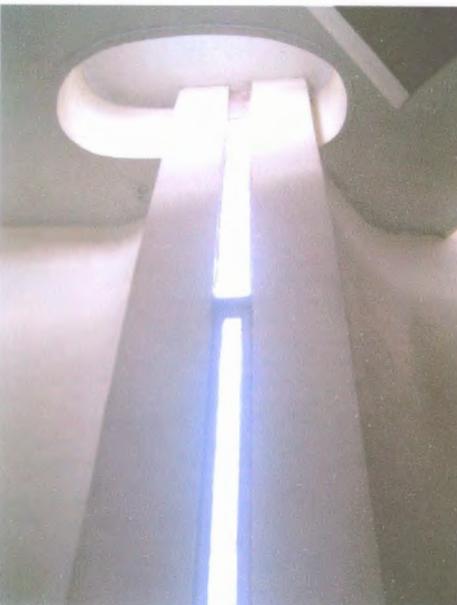
Plate 68

Pools of Light:

Gleaming streaks and spots of light penetrate in to the spaces through sky lights and openings on the walls, adding the vibrant hue of day light in to the colour scheme.



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The St. Anthony's Nursery's fluidity and movement is inherent in its forms, conveying it into its spaces as well. This quality is animated by colour: dark maroon beams and spots against soft pastels of blue and pink, vibrant yellow surrounded by deep maroon and the neutrals white and gray as a unifier. It all comes together in the formation of a mystical wonderland for the children's imagination.

Therefore, it is evident that the St. Anthony's Nursery has employed colour in order to create and enhance its quality of space, composed of an array of dynamic forms, with the main focus on the creation of an environment that stimulates Creative Play: the 'High Point'.



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3.1 Case Study Two:

SOS Village Nursery, Piliyandala : Home Away from Home

The SOS Village Nursery in Piliyandala had been established in 1983 as a part of the SOS Children's Village built in 1981. This Children's Village is the first of the many such villages in Sri Lanka established to care for orphaned children by the SOS Children's Villages International, founded by Hermann Gmiener.

The Nursery and Kindergarten Method of early education is practiced in this kindergarten as well, allowing the children to actively learn through the act of play.

The nursery consists of Lower and Upper nursery classes for children above three years of age and four years of age respectively and Play Group for those above two and a half years of age. The nursery currently accommodates 165 children of which 77 are from the Children's Village.



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It is located in a suburban laid back setting in Piliyandala, to the South East of Colombo. Designed by Archt. C. Anjalendran, this setting has resulted in the design of a series of simple single storey buildings scattered amidst the green of nature. It gently blends in to the surrounding through the exposed natural quality of the materials, the proportions and the geometry of spaces that freely flow in and out of the building.

“...a fairly simple building with a formal plan in which groups of classrooms were arranged around internal courtyards and connected to each other on diagonal axes.”

Robson, D. (1998/99), “Three Villages in Sri Lanka”, *The Sri Lanka Architect*, Vol. 101, No. 21, p.64

The client being a non profit organization, the design has remained simple to meet the needs of low cost construction and easy maintenance.



Plate 69

Simplicity at its best:

Sensible structures with sloping tiled roofs connected through pathways creating courtyards

3.2.1 Warm- Bright Colours



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Its utilization of colour is focused towards the bringing out the natural colours of materials as much as possible, as apposed to the previous case study of the St. Anthony's Nursery.

This naturalistic approach has brought about a colour scheme that exposes the inherent shades of most of the building materials, such as black quarried stone of the exterior and some interior walls and the grey cement of the floors, which are dark as a whole, but adds a touch of brightness through the painted timber framed doors, window frames columns and rafters etc.

The colours of natural finishes are shades of gray; the black of the quarried stones on some walls and floor areas and the gray of the cement floor. This toned down, dark background breaths life to the painted surfaces, making them look more vibrant and attractive.

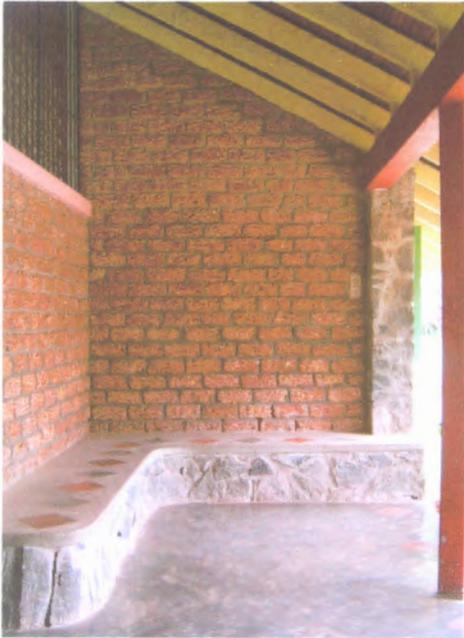


Plate 70

Bright White: The neutral hue white looks brighter, surrounded by darker neutral hue gray.
Warm Yellow: Kabook stone wall's warmth enhanced with yellow rafters above



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The primary hues of red, blue and yellow are seen very frequently, but in small, not so over whelming quantities. The large blue doors and the red window frames and network of rafters that run through the building are found in their fullest intensities, since they are primary hues.



Plate 71

Streaks of Colour: Small doses of primary colour on columns, doors and furniture against gray



The spatial quality of each class room differs mainly due to the wall finishes and the level of natural lighting that is allowed in to the spaces. The spaces with natural stone exposed wall planes competes to express a cooler dim feeling under which light, the children may seem less active. Only a fraction of the day light that falls on the dark walls get reflected and that too is of a cooler gray colour. But the overpowering effect of the red roof beams above null the cooler effect, making the space look warmer and dynamic.

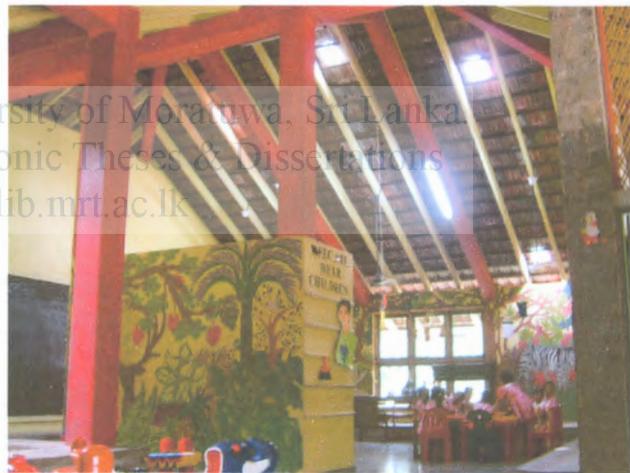


Plate 72

Cooler and Warmer:

The gray stone walled class room as opposed to that of white and yellow plastered ones, with the red roof beams and brightly coloured furniture

On the other hand, the painted walls create a warmer appeal itself, even with the neutral hue white on them, since it reflects the most amount of day light that falls on it. Therefore, the red roof beams enhance the warmth of the space, making it look smoother and brighter. The children seem to be in high spirits all the time in such class rooms.

The nursery is more like a house full of children, the difference being the substitution of normal living spaces with classrooms. The form of the house exists, but in a brilliantly colourful manner. Therefore, warmth is inherent in this 'house', even without colour. But the bright whites and the reds and yellows brightened with natural light make it feel warmer and cozier, because colour brings the spaces closer to the child.

However, it is not only the colours of the building itself that add to the brightness and life of the spaces. Going far beyond that, the vistas, which open out in to the internal courtyards and gardens beyond, capture views of the bright lush green natural environment, adding those colours to the colour scheme?



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Plate 73

Nature's Colour Pallet:

Natural elements such as trees of the surrounding become a part of the building's colour scheme through the vistas that capture them

3.2.2 Harmonious Colour Schemes

The overall colour scheme of the nursery is of a very strikingly dynamic quality with the use of primary colours in small quantities against vast amounts of neutral hues as discussed previously. It has created a rather outstanding contrast in the scheme.

The roof beams of bright red that spread its branches over the space and the yellow, red, blue, green and orange furniture of the class room are highlighted against the cement gray floor and the grey stone or white or yellow plastered walls. These primary colours, as discussed in the first chapter, attract the eye, being the most stable and easiest to recognize and offer the greatest contrast.

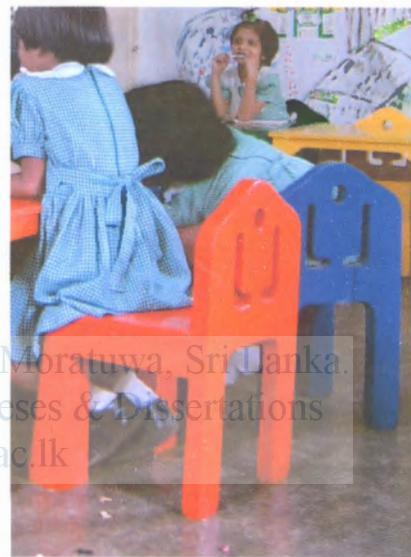
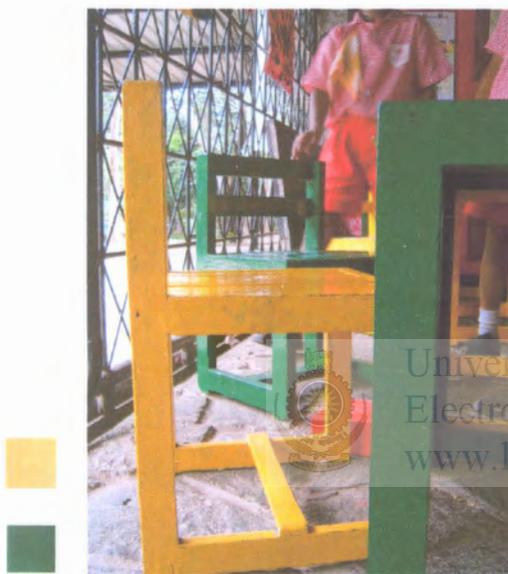


Plate 74

Colour against the Neutral:

Small quantities of primary and secondary colour
give life to the dullness of the walls and floor

However, being used in small quantities, they become the primary contributors to the lively and warm environment created, without an overwhelming and complex contrast created. Therefore, the spaces are fresh and vibrant to suit its young users and stimulate their play activities, yet ordered, to a lesser degree than at a primary or secondary school, since learning takes place through such play activities.



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Plate 75

Contrasting arrangements:

The furniture arranged to have contrasting effects through the grouping of complimentary colours such as blue and orange.

Coloured window of blue and orange and green window pane in contrast with orange

Apart from complimentary colours, which are the most contrasting, triad scheme have come together to form contrasting compositions, breathing life to the simple and ordinary geometry of the building. For example, the courtyard colonnade has been painted blue while the beams and rafters are yellow and red respectively.



Plate 72

Triad Contrast:
Red, Yellow and Blue, a
Triad scheme, contrasts
and animates the ordinary
building elements, around
the court yard

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The method of achieving harmony through the use of a neutral hue to surround a colour has been adopted in the colour scheme in some instances. The red windows are framed by a white plaster band that separates it from the dark gray wall surface, making the bright red brighter against white and the white more brilliant against the dark gray.



Plate 73

Red on White:
Red window framed by white
on gray wall, making the red
brighter and white brilliant.

Had the primary colours used were replaced by softer colours of lighter value, it would not be in harmony with the darker shades of gray of the exposed stone and cement. The two painted and natural elements would then clash in a disastrous way. Therefore, the use of high intensity primary hues has been a suitable method to unite all the different building elements together.

3.2.3 Creation of a “Children’s Place”

The ‘Children’s Place’ the SOS Nursery has created is of a relatively different kind, compared to the St. Anthony’s Nursery. There is a simple and realistic touch to the setting of this nursery which the children can relate to.

The single storey buildings with sloping tiled roofs and plenty of out door space or gardens is what these sub urban children are accustomed to and feel at home in. Thus the physical environment the children live in outside the pre school environment is similar in character to the nursery itself. In other words, it is like another home away from home for the children. Therefore, the children of the pre-school feel comfortable at their second home even during the first days of pre-school and begin to love and be attached to the place with the activities they do and the people they meet, including the new friends and teachers.



Plate 78

Home away from Home:

A homely environment of single storey buildings with tiled roofs and sprawling green gardens

The interiors are animated themselves, with simple and straightforward yet dynamic features such as the red and yellow roof structure that spreads its branches throughout the spaces and bright red and blue columns.



Plate 79

**Animated Spaces within Ordinary Structure:
Coloured building elements used to create
exciting entities for children**

Colourful motifs adorn the walls in some spaces while others remain plain, emphasizing the colourful roof above and the bright furniture of different shapes below. These elements are made attractive to children through the eye catching primary and secondary colours applied.

The children are exposed to a 'differently detailed' world of colour within an ordinary house like form, made of blue columns with white rings, scattered colour pieces of tile on the floor and red painted roofs. Among these, they develop special preference to spaces, a niche behind the blue door or a corner facing the red window in class, the dark trellis work in the lobby or the courtyard bench with a tile on it and these spaces remain special in long lasting memory.



Plate 80

Vibrant interiors:

Painted walls, tables and chairs of different shapes that make attractive and memorable spaces for children



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Plate 81

Minute detailing:

Embedded old tiles on built in seat of the courtyard and the cement floor

From the light spots that gleam from the roof above to the small details of tiles embedded on the cement floor, the children absorb spatial details of minute significance to adults, making the designed spaces of the nursery last a lifetime in their minds.

3.2.4 Natural Light for Life

The SOS Village Nursery has harnessed the dynamic quality of the sun to enhance the visual quality of spaces through the use of internal court yards, windows and sky lights of the simplest traditional Sri Lankan form.

The two buildings, linked by a roofed axial path, are concentrated around court yards. They not only provide a sound system of ventilation, but bring in to the building an ever changing natural colour pallet, that changes by the hour with the sun's intensity and orientation and daily with the new leaves that flourish and the old that perish.



Plate 82

The heart of the building:
The central court yard with its ever
changing natural colour pallet

The windows and large openings that have been generously placed allow plenty of daylight to flow in to the spaces, reducing the indoor outdoor separation and flooding the spaces with light. However, the small users of the spaces would have been able to benefit more if the window sills had been brought down to allow them a better view in seated position.



Plate 83

Flood of Light:

Spaces lit with day light through windows and large openings

Sky lights have been used in its simplest form as a transparent replacement for roof tiles. Simple it may be, but the enchanting spatial quality it has achieved is remarkable. Creating a wonderful attraction above and casting light spots below, the sky lights keeps the children's imagination busy with wonder.



Plate 84

Sky Lit Wonder:

Roof gleams with sky lights and compatible fluorescent lights beholding the children's eyes with wonder



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When the setting is homely and reassuring, the children become themselves: the children they are at home, the safe heaven. When its homely quality is enhanced, with the use of their favorite colours on their tables and chairs, the doors and windows and the roof above, the children love the place even more.

Although there are no abstract forms to stimulate the imagination purposefully created within the S. O. S. Village Nursery environment, the inherent qualities of the child, being at its maximum intensity in this homely environment, brings out all potential of childhood, including creativity. Therefore, colour has played an active role in bringing the spaces closer to the child's heart as a place or 'home away from home', for them to be as energetic and imaginative as they can be, passively encouraging them to be involved in all kinds of play, from Free Play to Creative, alone or as a group, continuously exploring, continuously learning.



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CONCLUSION

Conclusion

The content of this essay has taken the form of a quest, in search of the potential of Colour as a facilitator for the Kindergarten activity of Learning through Play. The pursuit began with the task of understanding The Kindergarten; its theories backed by educational and child psychology, variation of aims and objectives leading to categorization of institutions and most important of all, its architecture. It is then that the Kindergarten concept of 'Learning through Play' came into the limelight. Therefore, it was established that this concept was the main activity that has to be facilitated by Kindergarten Architecture.

The search was then focused towards the properties of colour, being an attribute of spatial quality which range from physical to psychological, and its capabilities explored. By linking the spatial quality desired of a kindergarten with the capacity of Colour in bringing out and enhancing the 'Dynamic yet Harmonious' ambience, four principles for the use of Colour were derived.

These four principles of the use of (1) Warn-Bright (2) Harmonious Colour Schemes (3) creating a 'Children's Place' and (4) the use of Natural Light to uplift the vibrancy were observed in the selected case studies of the St. Anthony's Nursery, Borella and the S.O.S. Village Nursery, Piliyandala along with the effect it has on its primary users, the children.

Building forms and spaces are highlighted by bright, attractive colours to bring out the dynamic quality, strengthened by the ever changing power of the natural light brought in, to stimulate an active playful environment. The outcome of chaotic, distractive colour combinations when using bright colours is avoided through the application of harmonious colour schemes that contribute to the concentration required for learning.

The four principles were apparent in both case studies, although in variant, yet in balanced scale and its effect on the users' was of a high positive degree, but in different ways. However, the two case studies, although under the principles of Nursery and Kindergarten Method, have approached the quality of space in a different light, due to the setting and the socio cultural background of the institution and the users.

The St. Anthony's Nursery, being located in a highly urban environment, is introverted in form. Its use of Colour, through the application of a synthetic colour scheme of a soothing Pink and Blue, with highlights of Maroon and bright Yellow, along with its array of natural lighting effects, composes a mystical world for the imagination. Thus, colour has been utilized to create and enhance the space as a direct stimulant of creativity, through which the quality of play is enriched and learning opportunities broadened.

On the other hand, the S.O.S. Village Nursery, focusing on creating a 'Homely' environment, utilizes colour in its most natural form, inherent in the materials: the grays of the cement floor and the stone walls, in combination with the bright primaries and secondary colours on furniture, fixtures and the roof beams. Going one step further, its extrovert form, as opposed to that of the previous case study, captures the natural and ever changing colour pallet of the environment through its wide open vistas. Hence, the colour scheme creates, for the children, an exciting home away from home, made especially for them. This mainly acts as an indirect stimulant to the activity of learning through play, through the direct contribution of creating an exciting homely environment.

Therefore, it is evident that the spatial quality of Dynamism, as a stimulant for Play; may it be Formal or Creative and Parallel or Corporative, and Harmony, as a stimulant for learning, can be achieved and enhanced simultaneously through the use of Warm-Bright, Harmonious colour schemes, that are enriched by natural lighting, as suited for each Kindergarten's physical, philosophical and socio-cultural environment. Thus, Colour confirms its competence, with both direct and indirect influence, in transforming the Kindergarten space in to a special 'Place' of childhood; its experiences shaping and its memories lasting a lifetime.



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BIBLIOGRAPHY

Bibliography

1. "A lifetime of Colour: Study Art",
http://www.sanford-adventures.com/study/g_colourwheel.html
2. "Children and Colour-Self Expression,"
<http://www.rin.ru/psychologyofcollors.html>, (January 2006)
3. "Colour Combinations", <http://www.worqx.com/colour/combinations.htm>
4. "Colour Context", <http://www.colourvoodoo.com/colour/context.htm>
5. "Colour Effects" <http://www.colour-affects.co.uk/psyprop.html>
6. "Colour Responses", <http://www.benjaminmoore.ca>
7. "Colour Theories", <http://www.colormatters.com/body.html>.
8. "Colour Theory-Colour Matters" <http://www.colormatters.com/body.htm>
9. "Colour: Psychology of Colour",
http://www.bbc.co.uk/homes/design/colour_colourpsychologyofcolour.shtml
10. "Colour", <http://en.wikipedia.org/wiki/colour>
11. "Fredrich Froebel", <http://www.infed.com/froebel.html>
12. McEvoy, B., "Colour Vision: Modern Colour Models",
<http://www.handprint.com/HP/WCL/wcolour.html>, (January 08, 2005)
13. "Psychology of Colour",
http://www.bbc.co.uk/homes/design/colour_colourpsychologyofcolours.html
14. "The Decorating Diva: Colour and its Psychological Characteristics",
<http://thedevelopingdiva.com/category/colour-psychology>
15. "The Psychology of Colour",
<http://www.huntedhamilton.com/colour/psychology.html>
16. "Winner - Bubbleecture Maihara Kindergarten, Shiga, Japan"
<http://www.childrenscotland.org.uk/images/award/winner.htm>



17. Bettelheim, B., quoted by Annalia, G., (1992), *The Organization of Space in Services for Children*, Paper presented at European Seminar on 'Space and Quality of Life for Children', Madrid in Dudek, M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E. & F. N. Spon
18. Birren, F., (1969), *Light, Color, and Environment*, New York: Van Nostrand Reinhold Co.,
19. Ching, F.D.K., (1979), *Form, Space and Order*, New York: Von Nostrand Reinhold.
20. Donenberg, N., "Color Psychology: Children vs. Adults" <http://jrscience.wcp.muohio.edu/nsfall01/finalarticles/Colourpsychology.html>, (April 19, 2002)
21. Dudek, M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E & FN Spon
22. Feisner, E.A. (2000), *Colour: How to Use Colour in Art and Design*, London: Laurance King Publishing
23. Frankl, P., (1962), *Principles of Architectural History: The four Phases of Architectural Style, 1429-1900* translated by O'Gorman, J.F., (1982), Cambridge, Mass.: MIT Press, p.158 in Johnson, P.A., (1994), *The Theory of Architecture: Concepts, Themes and Practices*, New York: Van Nostrand Reinhold.
24. "Colour : Contrast and Dominance"
http://www.worqx.com/colour/contrast_dominance.htm
25. Lancaster, M. (1996), *Colourscape*, London: Academy Editions
26. Linton H. (1985), *Colour Model Environments: Colour and Light in Three-Dimensional Design*, New York: Van Nostrand Reinhold Co.
27. Maynard, P.(HMC) "CASH WORKSHOP Color Psychology"
<http://www.cashnet.org/resource-center/about.html>, (March 6, 2001)

28. McConnell, J. V., (1989), *Understanding Human Behavior*, New York: Holt, Reinhart & Winston Inc.
29. McEvoy, B., "Colour Vision: Modern Colour Models", <http://www.handprint.com/HP/WCL/wcolour.html>, (January 08, 2005)
30. Palihakkara, D.W., Premaratne, R.M. (2004), *Principles of Pre-School Education*, Nawala: Open University of Sri Lanka.
31. Rajapaksha A. (1998/99), "Valentine Gunesekara's Search for a Just Social Fabric and a New Architecture", *The Sri Lanka Architect*, Vol. 101, No. 21
32. Rasmussen, S. E., (1964), *Experiencing Architecture*, Cambridge, Mass.: M.I.T. Press.
33. Read. M. A., Sugawara, A. I. and Brandt, J. A., (1999), "Impact of Space and Color in the Physical Environment on Preschool Children's Cooperative Behavior", *Environment and Behavior*, Vol. 31, No. 3, 413-426
34. Robson, D., "Three Villages in Sri Lanka", *The Sri Lanka Architect*
35. Schibsted, E., "A Kid's Eye View", <http://edutopia.org.com>, (June 2006)
36. Selmer-Olsen, I., (1993), 'Children's Culture and Adults' presentation of this Culture", *International Play Journal*, London: E. and F.N. Spon, vol.1, no.3, September, p. 201 in Dudek, M. (1996), *Kindergarten Architecture: Space for the imagination*, London: E. & F. N. Spon.
37. Sir Lasdun, D., (1977), *RIBA Journal*, September, p.367 in Johnson, P.A., (1994), *The Theory of Architecture: Concepts, Themes and Practices*, New York: Van Nostrand Reinhold.
38. Tranter, P., (2003), "Children's Environmental Learning and the Use, Design and Management of School grounds." *Children, Youth and Environments*, <http://colorado.edu/journals/cye>

39. Worpole, K. (2000), *Here Comes the Sun: Architecture and Public Space in Twentieth Century European Culture*", London: Reaktion Books Ltd.
40. Yi Fu T.(1977), *Space and Place: The perspective of Experience*, London: Edward Arnold Ltd



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