Chapter IV

Materials developed for teaching the course on color and form.

4.1 Introduction

This chapter presents the materials developed by the investigator in teaching the course in Color and Form for Design Education. Organization of the materials is in the order in which instruction was carried out by the investigator.

Color is one of the most important elements in communication. In design education learning about all aspects of color becomes very vital. By having a clear understanding of how sociological and cultural implications affect the meaning of color; a designer can put it to right use to achieve effective communications with target audience. Another important aspect is the knowledge of the science of color which is important in learning the interactions of colors and how colors behave in different backgrounds. While developing a structure for teaching the course Color and Form in Design Education a set of teaching learning materials were developed. The materials developed comprised of instructional devices; lecture, slide shows, assignments, surveys and presentations of the work.

A continuous feedback on the work was given during each session as each assignment done by students was presented to the class on a day to day basis. This gave an opportunity to improve upon the understanding of each student on color and form.

So during the course it was a day- to- day progress in work which was expected, not just the final product. So in a way here the process itself becomes the product. That is both the product and the process are important and considered for evaluation.

The criteria of evaluation of assignments were given to the students so that they could evaluate themselves. A faculty member associated with the course and who was not directly involved in teaching the course was also involved in evaluating and giving feedback to the students. This chapter presents the materials developed by the investigator in teaching the course in Color and Form for Design Education.

4.2 Instructional pattern at NID

In NID the course happens in week units. Color and form course is allotted two week units. During the class a week unit consists of five working days .Duration of each session varies as per the requirement of the session. It completely depends on the nature of work in each session. Usually the instructor gives guidance and feedback to the students on a continuous basis. If necessary the student and the faculty stays back even after the class hours and continue the work. There is no other course happening

during the time. So the entire two week units including holidays are fully dedicated to the course. On the last day of the course the students submit all the work done during the course and the evaluation and final feed back also happens on the same day.

4.2.1 NID's evaluation system

The evaluation system at NID remains same for all the courses. And this is customized as per the parameters. NID has adopted `learning by doing' as a method of teaching and learning design and therefore, the learning that takes place at NID has a unique character. The outcome of the whole process is a `Design Professional' who is expected to significantly contribute to the society's design needs as well as will take society ahead Evaluation or grading does not refer to student evaluation and assessment only but it also refers to evaluation and assessment of the success or failure of the teaching and learning methodology involved. The evaluation or grading refers to the qualitative and quantitative merits of the student's performance in terms of the product, process and the personality. Formative Evaluation or grading

At NID as the practice goes on, formative evaluation is done at the end of every semester by the juries for each course. A formative evaluation or grading is done by the course teacher for a specific course when the course is over.

From evaluation and grading point of view all the learning at NID is divided into five categories depending on the **`Learning Objectives'** as follows:

1. Exploratory Learning
2. Comprehensive Learning
3. Specialized Learning
4. Enrichment Learning and
5. Research

All the courses taught at NID can be divided into these five categories depending on learning objectives of these courses. The evaluation or grading is done in these five categories separately since the evaluation parameters vary from category to category depends the learning outcome. So at the end of each course the teacher fills up an evaluation or grading form relevant to the specific course. These forms also contain a column for qualitative evaluation in the form of remarks

From cognitive psychological point of view now it is well established that any grading system should consists of at least three domains, namely, Cognitive, Psycho-motor and Affective Domains. Therefore, all the evaluation criteria are reorganized and modified into these three domains and rephrased as `Cognitive Skill', `Studio Skills' and `General Attitudes'. However, taking into account the special importance of creative ability in design education, an additional domain called `Creativity' Domain is also included. A generic template of all the domains

of evaluation and their parameters is developed after reviewing the latest findings in the pedagogy. Each form for evaluation is a subset of this generic template. The generic template is given in the appendix.

4.3 Course Content

In the light of investigator's experience of teaching the course and as well as discussing with the faculties; The investigator looked into the existing content of the course on Color and Form and re-designed as per the requirement of Design Education. In the process the investigator looked in to the course contents, methodology of intervention and evaluation criteria. The instructional strategy is developed after observing the earlier courses and studying various aspects color used in design and design education.

After developing the course the investigator has validated it by consulting other faculty members from NID and experts in the field of Design Education.

The course abstract is given to the students before the commencement of the course. It contains the following informations.1, Course title.2, course code (used for computerized evaluation).3, Course category. There are four categories of courses conducted at NID. They are comprehensive, exploratory, research and specialization.4, usual time of occurance.5, Duration of the course in week units. A week unit is five working days.6, Credits allotted for the course.7, Prerequisites if any. 8 Relevance of the

course in the discipline. 9, Objective of the course.10, Course contents.11, Methodology .12, Evaluation criteria. Entire course contents and evaluation criteria, both earlier and refined are incorporated as follows.

4.3.1 Earlier Course Contents for the course color and form

The format in which the course abstract is given to the students is as follows

Course Title	Color and form
Course Category	Comprehensive
Usual Time of Occurrence	Semester I
Duration	2 Week Units
Credits	3.0
Prerequisites	Elements of Design
Relevance	The knowledge and understanding of color and its properties leads to conscious application of the same in the appropriate context.
Objective	To familiarize the students with the theory, perception, science, language and application of color.
Course Content	Color theory and basics like color wheel, primary and secondary colors, etc. Interaction of colors. Color and form. Color application.
Methodology	Presentations. Periodic lectures. Assignments. Group discussions and feedback.
Evaluation Criteria	
1 Cognitive Skills	25% Weightage
Understanding: Comprehension: Analysis: Synthesis Communication Decision Making	Ability to perceive meaning and think. Ability to understand concepts, remember and articulate them. Ability to dissect the design problem, concepts or issues into small parts, differentiates, experiment and question. Ability to collect and compare data and compose, formulate, plan and propose a solution to the design problem or concepts. Ability to transmit, impart or share information. Use of methodological thinking for deriving conclusions.
2.Studio Skills	40% weightage
Precision: Improvisation: Sensitivity: Internalization of Skills Dexterity:	Level of accuracy. Ability to perform extempore. Response to distinctive and subtle features, details and variations of material, tools and medium. Complete absorption of skills. Physical capacity to handle material, tools and medium.
3.Design and Creativity Skills	15% weightage
Originality:	Generation of ideas that are not imitations.

Design Principles:	Adherence to the principles of design viz. balance, rhythm, etc.
Elements of Design:	Exposition of elements viz. color, line, form, texture, etc.
Visualization:	Ability to visualize and articulate in the form of visuals.
Form:	Sense of form and structure/ space/ Layout
4.General Attitudes:	20% weightage
Commitment	Ability to morally dedicate to something.
Teamwork	Efficiency and ability to effectively combine activity of a group.
Punctuality	Punctuality in class/ work submission, neatness, and sense of quality.
Neatness	Ability to be tidy and methodical, elegantly simple, well-proportioned, brief clean and pointed.
Curiosity:	An eager desire to know.
Motivation	Self-initiative, concern and motivation

4.3.2 Content for the course on Color and Form and the Evaluation Criteria developed by the investigator

The format in which the course abstract is given to the students is as follows

Course Title	Color and form
Course Category	Comprehensive
Usual Time of Occurrence	Semester I
Duration	2 Week Units
Credits	3.0
Pre-requisites	None
Relevance:	
1. The knowledge and understanding of color and its properties leads to conscious application of the same in the appropriate context. 2. A single color can have different meanings in different culture. A conscious awareness is very important for a designer to understand the meaning of color in different cultures. 3. Understanding the laws of design can lead to faster solutions to design problems. The law of color is a gateway to better understanding of behavior of color in relation each other. 4. Since color is a derivative of light understanding of the science of light is very important in understanding color.	
Aim:	
To develop the skill of application of color. To understand the theories of perceptions, science and language of color. To develop understanding of psychological, sociological, geographical, contextual and cultural meaning of color. To develop sensitivity towards the implications of appropriate use of color in design for maximum communication.	
Objective:	
1. To train the students in the skill of color application 2. To acquaint them the history, science, theory, language, perception, of color 3. To help them understand the relation ship of color with gender, psychology, geographical aspects, context, and culture. 4. To help them understand the aspects of universal and contemporary symbolism and associated meaning in color.	

5. To understand the appropriate use of color in a design problem and conscious application of the above theories.	
Course Contents:	
1. Color theory, Physics of colors and basics like, primary and secondary colors. Color harmony, Color and space, Contexts of color 2. Seven color contrasts, Color mixing, color wheel, Color sphere and color star 3. Color preferences of people. Color experience with individuals. The subjectivity of color 4. Color :culture, gender, Psychology 5. Color interaction 6. Color and form, Impression and Expression of color, Composition and relative proportion of color 7. Color in art History, Color as language, conscious applications of color	
Methodology:	
1. Presentation, Lectures and discussions 2. Research ,Survey and data collection 3. Assignments, Group discussions, Critique on assignments group and individual feedback	
Evaluation Criteria	
1.Cognitive Skills	**20% weightage**
Knowledge **Information** **Understanding** **Application:** **Analysis** **Communication**	Theoretical or practical understanding of the subject Ability to recognize, associate and organize the data and experiences. Ability to perceive meaning and think Ability to relate theoretical concepts to practice through demonstration, illustration, interpretation and design solution. Ability to dissect the design problem, concepts or issues into small parts, differentiates, experiment and question. Ability to transmit, impart or share information (verbal/written/visual/persuasive)
2.Studio skills	**30% weightage**
Exploration **Precision** **Sensitivity** **Skills Explorations** **Fluency**	Ability to inquire or investigate thoroughly in order to learn or discover. Level of accuracy or degree of refinement. Response to distinctive and subtle features and variations of materials, tools and medium. Ability to find variations on skills of tools/ materials/media in order to learn or discover with thorough practice. Easy command over the tool/material/media.
3.Design and creativity skills	**30% weightage**
Originality **Visualization** **Content** **Form**	Generation of ideas that are not imitations. Ability to imagines and articulates in the form of visuals Communicative/experiential or expressive quality/substance of product/creation Sense of composition and arrangement of components/parts
4.General attitudes	**20% weightage**
Attentive Commitment Punctuality Neatness	Ability to apply one's mind with concentration and care. An ability to morally dedicate to something Adherence to time agreed upon. Ability to be tidy and methodical, elegantly simple, well-proportioned, brief clean and pointed

4.3.3 The major changes introduced in the existing syllabus by the investigator

The investigator has introduced some changes in the syllabus in order to suit the current requirement of the course in Design Education. The methodology of teaching the course was also changed for imparting better understanding of the subject to the students. These changes are incorporated after discussing the same with the senior faculties and from the experience of teaching the same course in the previous years.

At NID there are some courses which are a continuation of some other courses. In those cases the students have to undergo the previous course to attend that particular course. In this way the students will be attending the course with some previous knowledge. In recent times NID has introduced post graduate program in design where the students are coming from different backgrounds .So the competence level and previous knowledge varies from student to student according to their background. The investigator has removed the prerequisites which was given in the earlier course abstract of the color and form course.

The course abstract is given to the student before the commencement of the course. Investigator has modified the "Relevance" in the course abstract to give a better clarity to the student. "Aim" and "objective" in the course abstract has been re worked in order to clarify the purpose of teaching the course to the students.

"Course contents" and "Methodology" have been modified to incorporate all required aspects of color and form for Design Education as discussed in chapter 1

Evaluation criteria and the weightage to each parameter chosen have been changed to suit the nature of the course.

4.4 Pre Intervention Assignment

The course instruction was preceded by a Pre Intervention test. It comprised of an assignment and a questionnaire. The purpose of the assignment was to understand the previous knowledge and competence level of the student in color and form. That is to understand their skill of application; knowledge of color symbolism contextual applications, appropriate usage of color and how consciously they were using the color and the questionnaire consisted of objective and descriptive questions. The purpose of questionnaire was to get a background of each student's understanding regarding color and its application from a designer's point of view.

4.4.1 The assignment

The first part of the Pre Intervention test was in the form of an assignment and is stated as follows:

Make an abstract composition on a given format (10" x 12" size) with poster color on any one of the subjects given below.

1. Humor
2. Anger
3. Happy
4. Pain

After making the composition, justify in writing your use of color in the composition. (Kindly turn to Chaptor.5 for details.)

4.4.2 The questionnaire

The purpose of questionnaire was to get a background of each student's understanding regarding color and its application from a designer's point of view.

Once the assignment and questionnaire were completed, all students displayed their work in the class, and each student was asked to present their work and explain their understanding regarding the usage of color in the context of their work. This gave the investigator a much clearer picture about their present level of understanding.
(Refer to appendix--- for the students' questionnaire.)

4.5 Intervention

The intervention was carried out in five sessions. Each session had specific topics which are mentioned as units.

4.5.1 Session I

Unit 1: Color theory, Physics of colors and basics like, primary and secondary and Tertiary colors, Color harmony, Color and space, Contexts of color Impression and Expression of color.

4.5.1.1 Learning Objectives of this session were:

1 Students will be able to explain Physics of color

2 Students will be able to demonstrate and draw Primary, Secondary and Tertiary color through an example

3 Students will be able to show one example of Color harmony

4.5.1.2 Instructional strategies employed

1 Lecture cum demonstration on science of color

2 Visual presentation in the form of a slide show

3 Teacher student interaction and feed back

4 Assignment

5 feedback

4.5.1.3 Procedure

The session, started with discussion of different aspects of color and the different areas in which color plays a role.

Some aspects of color are:

The science of color, theory of color, reproduction technology, printing industry, chemistry, photo chemistry, biology, medicine, physiology,

psychology, symbolism, creative art, poetry, theology, philosophy, nuclear physics, classical physics.

4.5.1.3.1 Physics of color and light

Color is the attribute of visual experience that can be described as having quantitatively specifiable dimensions of hue, saturation and brightness.

How do the human eyes see color?

Color is typically seen when a color stimulus acts upon the receptors in the eye which induce a set of activity in the nervous system which ends in color responses.

Color stimuli represent the first steps in seeing color; color stimuli comprise the physical or stimulus aspect of a situation producing color. A stimulus is considered to be any change in external or internal energy that give rise too excitations of the nervous system sufficient to arouse a response in the person concerned. An object such as a colored paper that is seen or a sweet substance that is tasted, is often called a stimulus but is more properly called a stimulus object.

The object color is defined as the color perceived as belonging to an object.

The usual initial stimulus for color is light. Light is defined as radiant energy capable of saving as a color stimulus.

Light comprises one small part of the electromagnetic spectrum of radiant energy, which also includes radio and television waves, infrared rays, ultra violet rays, x-rays and gamma rays

Radiant energy is released in bundles or quanta which may be thought as traveling in waves of different lengths and heights but at the same speed, about 186000 meters/sec. in air. Activities induced by a color stimulus in the receptors of the eye and their attached nerves represent the second step in seeing color and comprise the physiological aspect of a situation producing color. Visual receptors are the parts of the eyes that are stimulated when light passes in to the eyes; they are contained in the retina

The optical system of the eye, directs in coming light through the eye to the point where the receptors may be stimulated. The receptors system of the eye lies in the retina and is concerned with conscious color responses.

The activity set off in the nervous system by activity in the receptors completes the physiological circuit needed to see color. Conscious responses represent the third and final step in seeing color and comprise the basic psychological aspects of color.

When we look at the understanding of an experience in brain, the experience can be broadly categorized into three major sections:

Visual experience

Auditory experience

Other experiences. (Kinesthetic, gustatory and olfactory.)

And when we look at visual experience it can be divided in to three kinds .They are; Color, duration and extent.

In this, the duration is seen as fluctuation, flicker, sparkle, glitter and movement. And the experience of extent can be seen as size, shape, location texture, glare transparence & number.

And the color is experienced into three ways that is hue, saturation and brightness. So the experience of color happens on three axis that is hue, saturation and brightness.

Physics of color

In 1676 Sir Isaac Newton using a triangular prism, analyzed white sunlight in to a spectrum of colors. A spectrum contains all the hues. These colors are produced by refraction. Color results from light waves of a particular kind of electro magnetic energy. The human eye can perceive light of wavelength between 400 & 700 milli microns only.

Each hue can be accurately defined by specifying its wavelength or frequency.

4.5.1.3.2 Basic color theories

After the discussion on physics of color; color theories are discussed. They deal with primary, secondary and tertiary colors and additive colors and subtractive colors they are:

1. Primary Secondary and Tertiary.
2. additive colors
3. subtractive colors
4. harmonious colors
5. complimentary colors
6. analogous colors
7. Warm and Cool colors etc.

During the lecture a slide show with examples of the above mentioned theories as visuals are shown and discussed it in detail. The slide show is presented in the CD.

4.5.1.3.3 Primary colors .Red, yellow, and blue. With these three colors (and black and white) all other colors can be made. The primary colors themselves cannot be made by mixing other colors

Secondary colors - Those colors that are created by the mixture of two primary colors in approximately equal proportions. The secondary colors are orange, violet and green.

Tertiary colors - Those colors created by the mixture of an adjacent primary and secondary color. The tertiary colors are named by combining the names of the two parent colors, with the primary element listed first:

Example: orange + red = red-orange

Other tertiary colors are yellow-orange, yellow-green, blue-green, blue purple, and red-purple. Primary + secondary = intermediate

4.5.1.3.4 Subtractive color and additive color

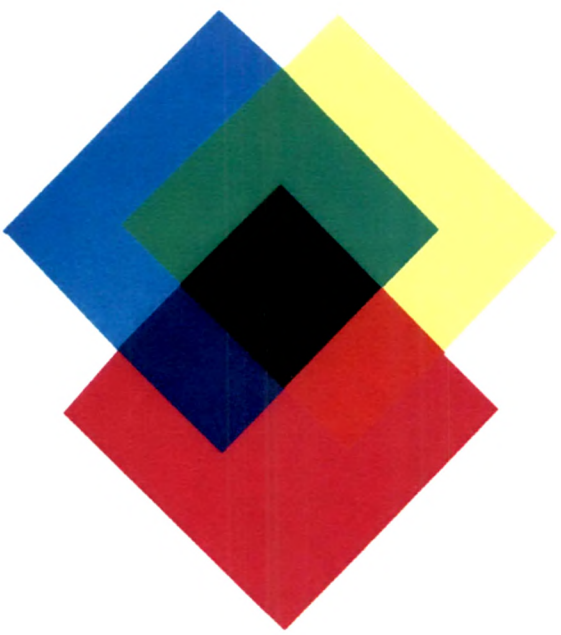

Figure 2. Subtractive color

Colors resulting from absorption are known as subtractive colors. The colors of objects are chiefly subtractive colors of this nature. A red vessel looks red because it absorbs all colors of light and reflects only red. All the painters' colors are pigment colors as they are governed by the rule of subtraction. When complementary colors are mixed in certain proportion, the subtractive resulting is black.

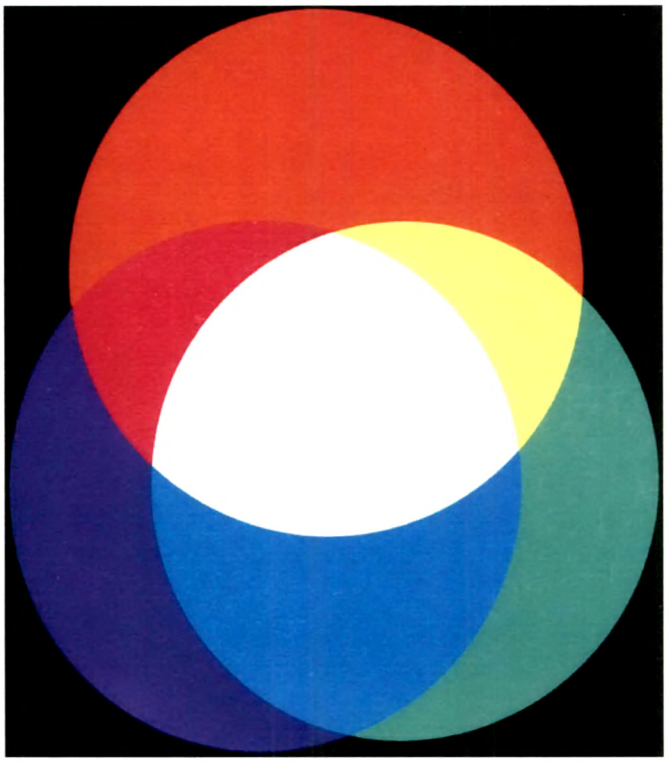

Figure 3. Additive color

The additive color system involves light emitted directly from a source, before an object reflects the light. The additive reproduction process mixes various amounts of red, green and blue light to produce other colors. Combining all three primary colors produces white. All image capture devices utilize additive color system to gather the information needed to reproduce a color image. These devices include digital cameras, flat bed scanners, drum scanners, video cameras, television monitors and computer monitors.

Additive colors involve use of colored lights. It starts with darkness and mixes red, green and blue light together to produce other colors. When combined the additive primary colors produces the appearance of white

4.5.1.3.5 Harmonious colors

A group of colors whose effect is pleasing is called harmonious. Harmony is achieved mainly by keeping colors in order

4.5.1.3.6Complimentary colors

Two kinds of colored light whose mixture with each other yields white are called complementary colors. If we isolate one hue from the prismatic spectrum for example green and collect the remaining colors red, orange yellow, blue, violet with a lens, the mixed color obtained will be red, i.e. the complementary color of the green we isolated. Each spectral hue is the compliment of the mixture of all the other spectral hues

4.5.1.3.7 Analogous colors

This color scheme involves the use of colors that are located adjacent on the color wheel. The hues may vary in value. The color scheme for this site is analogous, with the colors varying only slightly from each other.

4.5. 1.3.8 Warm Colors: Colors such as red, yellow, and orange. These colors evoke warmth because they remind us of things like the sun or fire.

Cool Colors: Colors like blue, green, and purple (violet). These colors evoke a cool feeling because they remind us of things like water or grass. A color wheel based on the primary, second and tertiary colors are explained.

4.5.1.3.9 Color Wheel

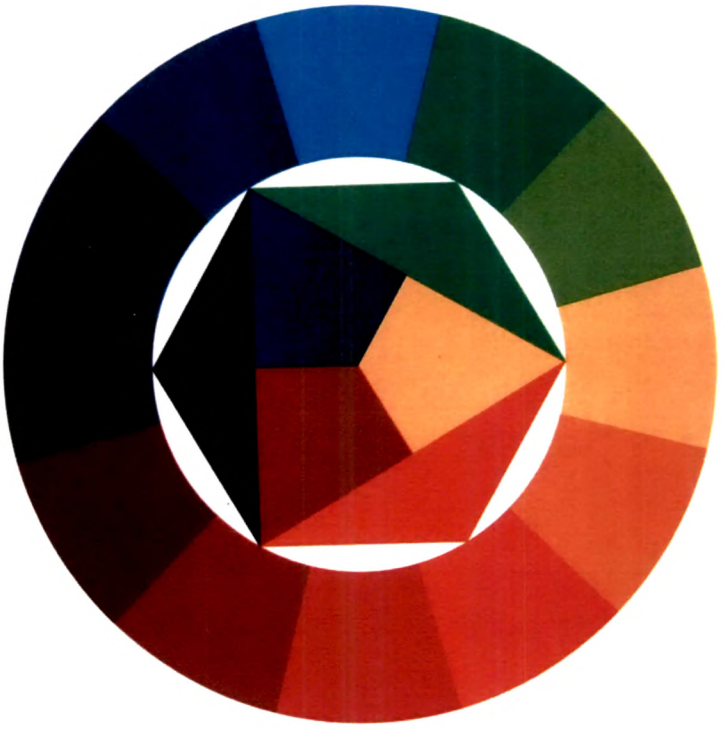

Figure 4 Color wheel

Color wheels show how visible colors are related. Primary, secondary, and intermediate colors are organized on a circular chart. Color wheels help artists remember how to mix and think about pigments.

Color wheels are based on color theory, which is based on the physics of light. There are two common types of color: additive color and subtractive color

Additive color refers to the mixing of colors of light. The three primaries in light are red, blue, and green. When all of the colors of the spectrum are combined, they add up to white light. Subtractive color refers to the mixing of colors of pigment, such as paint or the ink in your computer's printer. This type of color is what is used in the art and design world.

When learning basic color theory, students typically use familiar colors like red, yellow, and blue. Printers' primaries—yellow, cyan, and magenta—are typically used by professional designers and printing presses.

4.5.1.3.10 Relative proportions of color

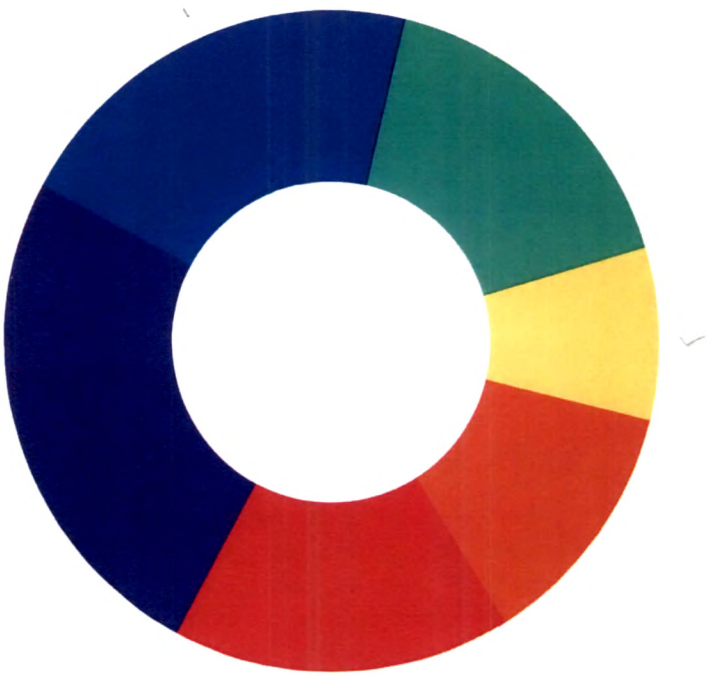

Figure 5. Harmony wheel

Once the color wheel is made in order to create a harmony in the wheel, the relative proportions of colors are explained and showed. The relative proportions are based on the theory that cool colors recede and warm color comes forward.

Relative proportions were shown based on all colors.

And the relative proportions of complimentary color to create harmony

4.5.1.3.11 Hue, intensity and value

Another aspect of color is hue, intensity and value

Hue

Hue is that attribute of a color by which we distinguish red from green, blue from yellow, and so on. There is a natural order of hues: red, yellow, and green, blue, purple. One can mix paints of adjacent colors in this series to obtain a continuous variation from one color to the other. For example, red and yellow may be mixed in any proportion to obtain all the hues from red through orange to yellow. The same may be said of yellow and green, green and blue, blue and purple, and purple and red. This series returns to the starting point, so it can be arranged in a circle. Munsell called red, yellow, green, blue and purple "principal hues" and placed them at equal intervals around this circle. He inserted five intermediate hues: yellow-red, green-yellow, blue-green, purple-blue and red-purple, making ten hues in all. For simplicity, he used the initials as symbols to designate the ten hue sectors: Red, Yellow Red, Yellow, Green Yellow, Green, Blue Green, Blue, Purple Blue, Purple and Red Purple.

Intensity

Intensity is about the purity or brightness of color. It's relatively easy to spot intense colors: Lacquer red, lemon yellow and cobalt blue are examples of intense red, yellow and blue. Low-intensity colors are by comparison quiet and subdued. Brick, gold and cadet blue are low-intensity versions of red, yellow and blue.

Intensity is an important color concept because, more than value or temperature, it sets the mood in a color scheme. Intense colors are fresh and vivid, while low-intensity colors are quiet and understated.

Value

Value indicates the lightness of a color. The scale of value ranges from 0 for pure black to 10 for pure white. Black, white and the grays between them are called "neutral colors." They have no hue. Colors that have a hue are called "chromatic colors." The value scale applies to chromatic as well as neutral colors.

4.5.1.3.12Complimentary colors and its degree of neutralization

Pictures depicting compliment any colors and its neutralization was shown and explained. Value and intensity charts are shown. These charts are self explanatory in terms of showing the intensity of each color and its degree of purity on a grid.

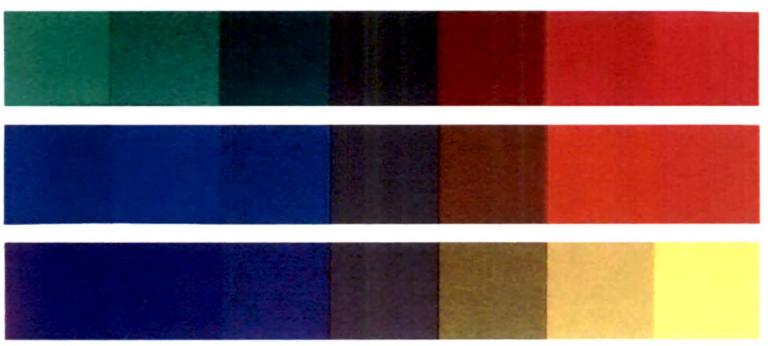

Figure 6. Complimentary colors and its degree of neutralization

To make this clearer, the concept of color sphere, and color star was introduced with diagrams and talks.

4.5. 1.3.13 Color sphere

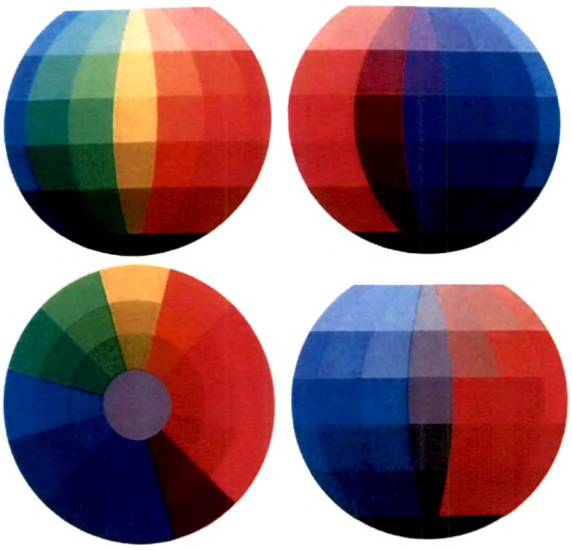

Figure 7. Color Sphere

After developing a 12 hue color circle from the three primaries yellow, red and blue to make the understanding clearer and to make the classification complete instead of a circle and sphere is adapted to plotting the characteristics and many fold properties of the color universe. The sphere is the elementary shape of universal symmetry. It serve to visualize the rule of complementariness, illustrates all fundamental relationships among colors and between chromatic colors and black and white. If we imagine the color sphere to be a transparent body, each point within which corresponds to a particular value, then all conceivable colors have a place. Each point on the sphere can be located by its meridian and parallel. For an adequate color classification, we require only six parallels and 12 meridians.

4.5.1.3.14 Color star

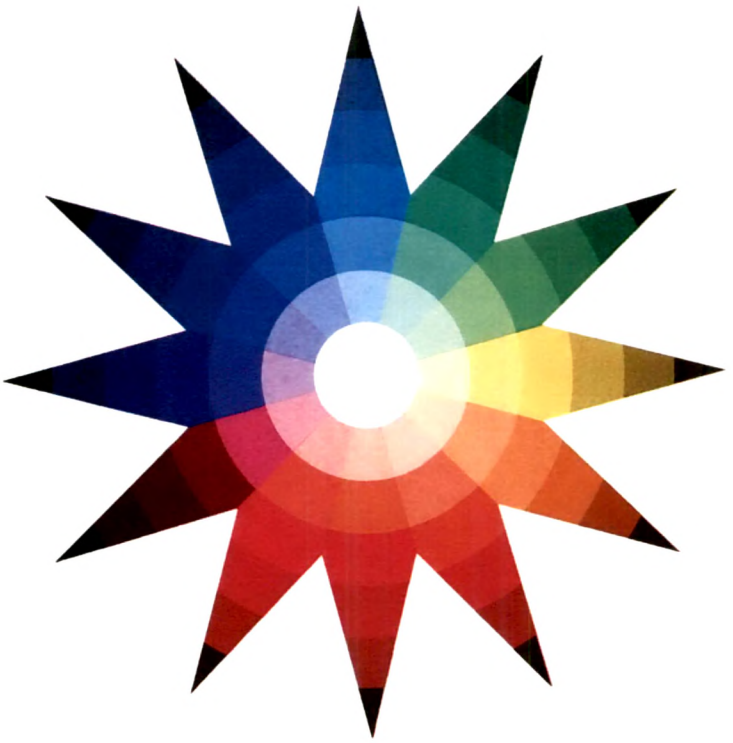

Figure 8 Color Star

Since we cannot reproduce the color sphere in three dimensions, the spherical surface is projected to a plane. If we see the color sphere from above, we see the white zone in the center, then the two zones of tints and then half of the equatorial zone of pure colors, viewing the sphere from below, we have the black zone in the center then the two zones of shades and then the other half the equatorial zone.

In order to see the entire surface of the sphere at once, we may imagine the darker hemisphere to be slit at the meridians and developed in the same plane in the lighter hemisphere. The result is a 12 pointed star. White is in the center, reading outward we have the zones and the two zones of shades with black at the extreme points of the star.

After the lecture and slide show the students were given the following assignments:

4.5.1.4 The assignments

Assignments were given to make their understanding of theory more clearly by doing it.

1. Make a color wheel showing the primary, secondary and tertiary colors.
2. Make a harmony wheel to make a harmonious color circle with 12 colors that is three primaries, three secondary and six tertiary colors.
3. Take any two complimentary colors and find out the relative proportion to make it a harmonious combination.

Students complete the work by working even after the class hours that are from 9.00 a.m. to 6.00 p.m. the students were given approx. 36 hours time to complete the above mentioned assignments. After finishing the assignments, they present the work to the class.

Criteria for evaluating the students work was:

1. Color application

Neat and patch free application of color in the given format.

2. Precision – Level of accuracy and degree of refinement.
3. Sensitivity – Response to distinctive and subtle features and variation of materials, tools and medium.

Feedback was given based on the criteria mentioned above for further refinement of the work.

The students were asked to show and discuss the work with the investigator after the refinement of the work. A teacher other than the investigator also was involved in the feedback session. The refinement continues till the student achieves the objective, through out the course.

4.5.2 Session II

Unit 2: The color contrasts

Color contrasts are the relation between each color which brings harmony or contrast amongst colors

4.5.2.1 Learning Objectives of this session were:

By the end of this session, the students will learn to use the below mentioned aspects of color to bring out the specific desired effect in a composition.

The students will be able to identify the seven color contrasts and point out this from a specified context.

They will be able to create an example of any one of the seven color contrasts by making a composition on a given format.

4.5.2.2 Instructional strategies employed

Lecture

Visual presentation

Slide show

Assignments

Peer feedback

4.5.2.3 Procedure

The session started with a lecture and slide presentation which explains the color contrasts. They are Contrast of hue, Light dark contrast, Cold – warm contrast, Complementary contrast Simultaneous contrast, Contrast of Saturation, Contrast of extension

We speak of contrasts when distinct difference can be perceived between two compared effects. When such differences attain their maximum degree, we speak of diametrical or polar contrasts. Thus, large-small, white-black, cold-warm in their extremes are polar contrasts. Our sense organs can function only by means of comparison. The same line is taken as short when the line compared with its longer. Color effects are similarly intensified or weakened by contrast.

When we survey the characteristics of color effects, we can detect seven different kind of contrast. These are so different that each will have to be studied separately. Each is unique in character and artistic value, in visual, expressive and symbolic effect and together they constitute the fundamental resource of color design.

Goethe, Bezold, Chevreul and Holzel have noted the significance of the various color contrasts. A systematical and practical introduction to the special effects of color contrast is essential part of course of instruction.

The seven kinds of color contrasts are the following:

1. Contrast of hue
2. Light dark contrast
3. Cold – warm contrast
4. Complementary contrast
5. Simultaneous contrast
6. Contrast of Saturation
7. Contrast of extension

4.5.2.3.1 Contrast of hue

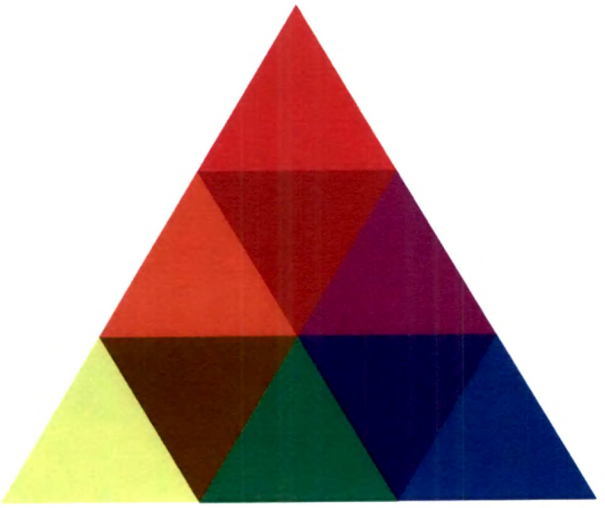

Figure 9 contrast of Hue

Contrast of hue is the simplest of the seven. It makes no great demands upon color vision because it is illustrated by the undiluted colors in their most intense luminosity.

Example: yellow / red / blue

Red / blue / green

Violet / green / blue / orange / black

4.5.2.3.2 Light and dark contrast

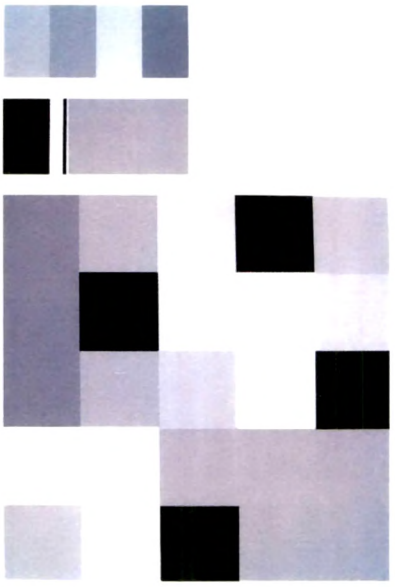

Figure 10. Light and Dark contrast

The phenomena of light and dark, both among white and black and gray and a many pure colors constitute light and dark contrast.

4.5.2.3.3 Cold warm contrast

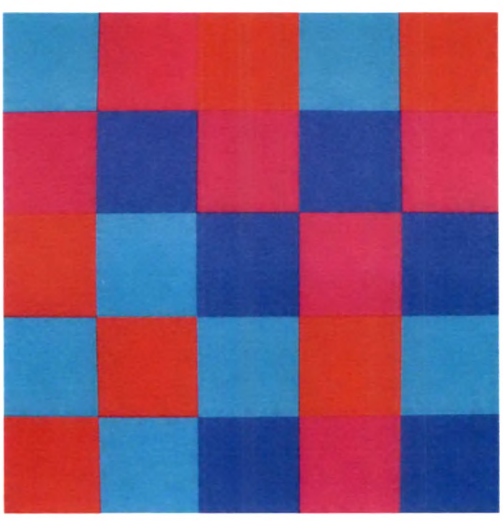

Figure 11. Cold and warm contrast

It is about identifying a sensation of temperature with the visual realm of color sensation.

The cold warm property can be verbalized in a number of other contrary terms

Cold – warm

Shadow – sun

Transparent – opaque

Light – heavy

Wet – dry

Rare – dense

Airy – earthy

Far – near

These diverse impressions illustrate the versatile expensive powers of cold – warm contrast. It can be used to produce highly pictorial effects.

4.5.2.3.4 Complimentary contrast

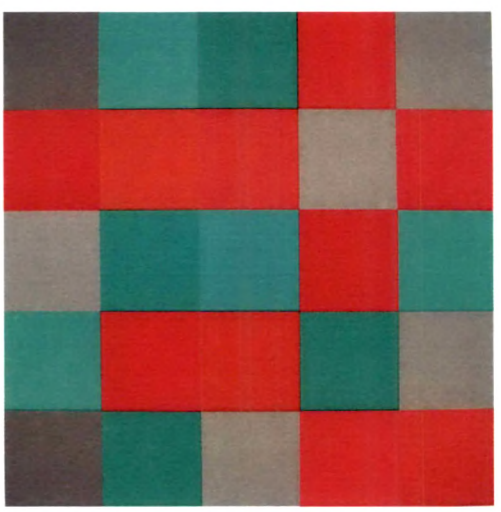

Figure 12. Complimentary contrast

We call two colors complimentary if their pigments, mixed together will yield white.

There is always a color complementary to a given color. In the color circle complementary colors are diametrically opposite each other.

4.5.2.3.5 Simultaneous contrast

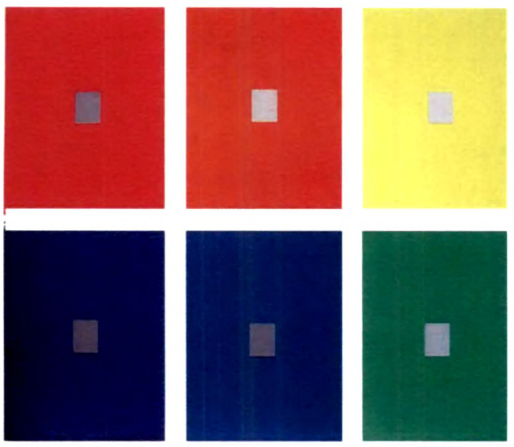

Figure 13. Simultaneous contrast

Simultaneous contrast results from the fact that for any given color the eye simultaneously requires the complementary color and generates it spontaneously if it is already present. By virtue of this fact, the fundamental principle of color harmony implies the rule of complementary colors.

The simultaneously generated complementary occurs as a sensation in the eye of beholder and is not objectively present. It cannot be photographed.

4.5.2.3.6 Contrast of Saturation

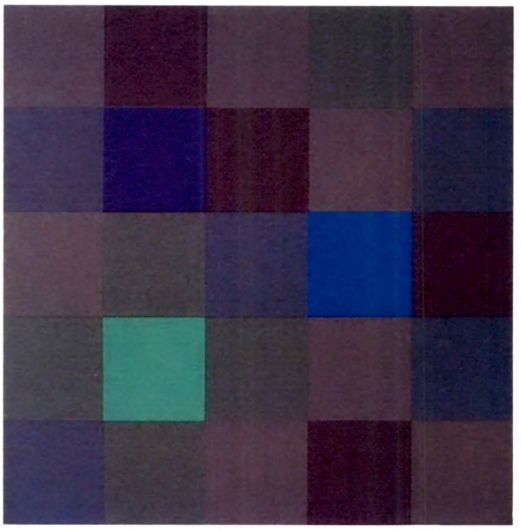

Figure 14. Contrast of Saturation

Saturation or quality, relates to the degree of purity of a color. Contrast of saturation is the contrast between pure, intense colors and dull diluted colors. The prismatic hues produced by dispersion of white light are colors of maximum saturation or intensity of hue.

4.5.2.3.7 Contrast of Extension

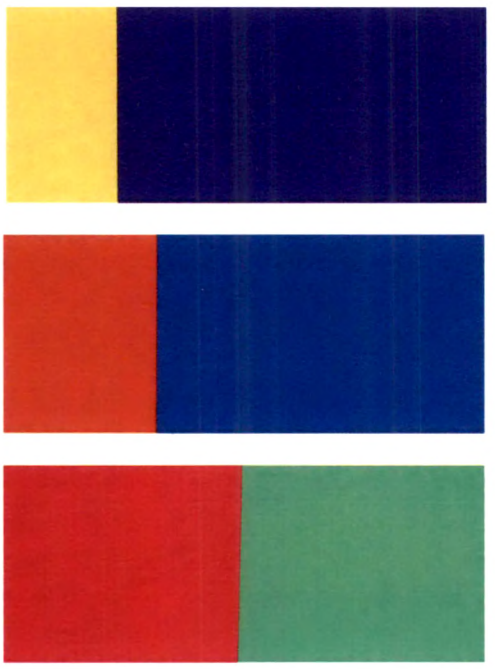

Figure 15. Contrast of Extension

Contrast of extension involves the relative areas of two or more color patches. It is the color contrast between much and little or great and small.

Colors may be assembled in areas of any size. But, we should inquire what quantitative proportion between two or more colors may be said to be in balance, with no one of the colors used more prominently than another.

Each of the above mentioned aspect is explained to the students by showing examples from paintings.
After finishing the slide show and lecture the students were given two assignments.

4.5.2.4 The assignments

1. Identify any of the above mentioned color contrast from nature. Create any one of the color contrasts by simplifying the example you found from nature. A picture, photograph, direct visual from nature can be used as the reference material.

Then simplify the picture and paint it on a paper in order to give emphasis of the chosen color contrast.
36 hours was given as a time for doing it.

2. Take any two complimentary colors and put them on a line with 2 inch width height and five inch length. Then step by step reduce the length by half and paste the colors alternatively.

Once the assignment was done, the students presented their work in the class and a feedback was given based on the following criteria:
Since the presentation is made to the entire class, a peer feedback was also done. Team learning was fostered by having a group to reflect on the feedback. Since each student is (write more on peer feedback) working on a different dimensions of the assignment, peer observation and feedback helped to enrich and expand the experience of the students.

4.5.2.5 Criteria of evaluation:

1. Knowledge: Theoretical or practical understanding of the subject.
2. Understanding: Ability to perceive meaning and think.
3. Exploration: Ability to inquire or investigate thoroughly in order to learn or discover.
4. Precision: Level of accuracy or degree of refinement.
5. Originality: Generation of ides that are not invitations.
6. Content: Communicative / experiential or expressive quality / substance of product / creation.

4.5.3 Session III

Unit 3: color preferences of people in relation with culture, gender, geography and Psychology

4.5.3.1 Learning Objective

By doing through this session, the student will learn that there is a definite influence of gender geography age, economic background etc. on the color preference of people.

4.5.3.2 Instructional strategies employed

Lectures

Survey and reporting

Discussion

A summery of the lecture is as follows.

Different cultures have different meaning for the same color. Let us take the evolution of the symbolism of green in Western culture: In Celtic myths the Green man was the God of fertility. Later in the millennium, early Christians banned green because it had been used in pagan ceremonies. Nevertheless, as evidenced by the 15th Century wedding portrait, by Jan VanEyck the color green was the best choice for the bride's gown because of its earliest symbolism. Of note is the continued symbolism attached to the color in the latter part of this century. Anyone who chooses a green m & m (an American candy which contains an assortment of different colored chocolate sweets) is sending a somewhat

similar message. Green has been reinterpreted by late 20th century American culture to signify a state of heightened sexuality in this specific situation. Green was a sacred color to the Egyptians representing the hope and joy of spring. Green is a sacred color to Moslems because when we look at the land which Islam was originated; green is the color of oasis, which is the hope and life in a desert land. Japanese Emperor Hirohito's birthday is celebrated as "Green Day" because he loved to garden .In this case Japan is a country where land is very scarce. So a garden is one of the biggest luxuries. This explains the culture specific meanings to a color. Universal symbolism: But apart from this there are certain meanings which are not region or culture specific .These symbolic meanings are universally accepted for example green is associated to Nature and freshness in any part of the world irrespective of the region. Now in the contemporary context we have another symbolism which is derived from issues and other concerns .For example the same color green is associated to ecologically beneficial aspects of the world. When we say "green" it means it is eco friendly," green design "refers to environment friendly design.

What we see and interact with is in color, includes both natural and built environments. About 80% of the information which we assimilate through the sense is visual. However, color does more than just give us objective information about our world-it affects how we feel. The presence of color becomes more important in interior environment, since most people spend more time inside than outside. Is there a gender

difference in response to color? Although findings are ambiguous, many investigations have indicated that there are differences between genders in preferences for colors. Early investigations done by Guilford (1934) on the harmony of color combinations found that a person is likely to see balance in colors that are closely related or the opposite. Guilford also found some evidence that more pleasing results were obtained from either very small or very large differences in hue rather than medium differences, with this tendency more frequent in women than men. A review of color studies done by Eysenck in early 1940's notes the following results to the relationship between gender and color. Dorcus (1926) found yellow had a higher affective value for the men than women and St. George (1938) maintained that blue for men stands out far more than for women. An even earlier study by Jastrow (1897) found men preferred blue to red and women red to blue. Eysenck's study, however, found only one gender difference with yellow being preferred to orange by women and orange to yellow by men. This finding was reinforced later by Birren (1952) who found men preferred orange to yellow; while women placed orange at the bottom of the list.Guilford and Smith (1959) found men were generally more tolerant toward achromatic colors than women. Thus, Guilford and Smith proposed that women might be more color-conscious and their color tastes more flexible and diverse. Likewise, McInnis and Shearer (1964) found that blue green was more favored among women than men, and women preferred tints more than shades. They also found 56% of men and 76% of women preferred cool colors, and 51% men and 45% women chose bright colors.

In a similar study, Plater (1967) found men had a tendency to prefer stronger chromas (color) than women.

More recently, Radeloff (1990) has found that women were more likely than men to have a favorite color. In expressing the preferences for light versus dark colors, there were no significant differences between men and women; however, in expressing the preference for bright and soft colors, there was a difference, with women preferring soft colors and men preferring bright ones.

Color choice is very specific to one's personality. Color has been used for the study of one's personality. Once the color choice is made, the personality can be studied .Luscher has made an in depth study in this area.

Color and geography

The living environment affects the liking and disliking for color .For example people from Arabian countries mostly uses green as their flag color because the color green contrasts with the general back ground of the landscape which is yellow ochre of the deserts. In the case of Kerala where the land is full of greenery and the people are dark in complexion, the most preferred color for the traditional dress is off white, which contrasts with both the nature and body color. Another example is Rajasthan where the landscape color is dry ochre and the dress color is

bright reds, blacks and yellows. These examples show the general preference of color and geographical conditions of the place.

4.5.3.3 Procedure

The understanding of color preference of people is very important for design. It is very important to consider the user in designing for every design there is a user in waiting. In order to find out and learn the color preference of people, the students were given an assignment. The assignment was to conduct a survey in the city they were living to check the color preference. After the survey when they came with the results, the results were presented and discussed in the class.

4.5.3.4 Assignments:

Conduct a survey in the city to find out the color preference of people with reference to gender, geographical contexts, religion, age and economic background.

The students were divided into groups and each group had to take up one aspect and do the survey by questionnaire, photographing samples, interviewing people etc. And come out with data as a presentation. And a color palette had to be evolved from it if a color palette is exists.

A color palette is a set of most commonly used colors occurred in the particular context.

In the second assignment the students apply the color palette on a product to verify their findings.

The students were given 48 hours to do the survey and analysis.
After the completion of the work, students presented the work to the class and discussed. Since every group is working on different aspects; sharing of work culminated into team learning.

Some of the findings show that the market follows the most common color preference when a product is designed.
Children preferred bright colors, women preferred a color palette with pink and rose and lavender colors. Old people preferred light colors etc. This assignment clarified the fact that there are certain color preferences based on the above mentioned aspects. So it is very important to take those aspects in the consideration.

After the presentation, a feedback was given by the investigator based on the following criteria:

1. Knowledge: Theoretical or practical understanding of the subject.
2. Information: Ability to recognize, associate and organize the data and experiences
3. Understanding: Ability to perceive meaning and think.
4. Communication: Ability to transmit, impart or share information (verbal / written / visual / persuasive).

5. Neatness: Ability to be tidy, methodical, elegantly simple, well proportioned, brief clean and pointed.

Since the work is presented to the entire class, peer feedback also contributed to the learning. As each group is working on different aspects as mentioned, sharing of information adds to the knowledge base of each learner. Also each student gets first hand information and learns to analyze the data.

4.5.4 Session IV

Unit 4: Color Interaction

Interaction of Color is an experimental way of studying color and of teaching color. In visual perception a color is almost never seen as it really is as it physically is. This fact makes color the most relative medium in art. In order to use color effectively it is necessary to recognize that color deceives continually. First, it should be learned that one and the same color evokes innumerable readings. Instead of mechanically applying or merely implying laws and rides of color harmony, distinct color effects are produced through recognition of the interaction of color by making, for instance,2 very different colors look alike, or nearly alike. The aim of such study is to develop through experience by trial and error - an eye for color. This means, specifically, seeing color action as well as feeling color relatedness.

4.5.4.1 Learning objective

1. By going through this session the student will understand the interaction of one color to another.
2. The students will be able to articulate the behavior of color in relation to the background and for ground.
3. They will be able to create a minimum of one example of color interaction that is to make the same color look differently in different background or different color will look the same by the use of different backgrounds.
4. They will be able to create an example of transparency by applying opaque colors on paper.

4.5.4.2 Instructional strategies employed.

1. Lecture, 2. Visuals, 3. Slide show, 4. Assignment and feed back. 5. Peer feedback.

4.5.4.3 The procedure:

Colors appear differently in different background. For a designer finally what appears to the eye of the spectator is what matters. So to understand the aspects of color interaction is one of the most significant learning in color.

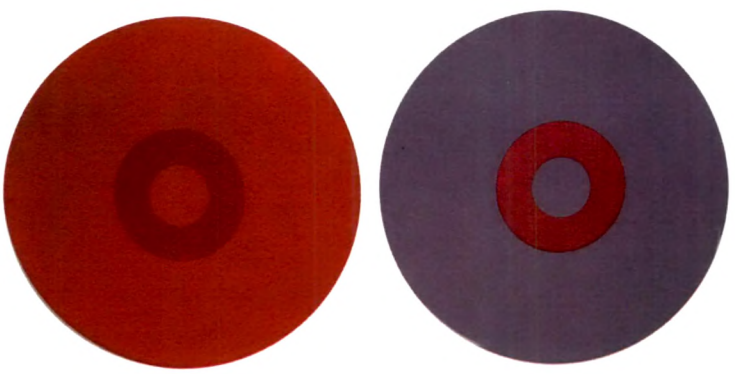

Figure 16. Color Interaction, Colors appear differently in different background

The session started with a lecture and slide show describing the following aspects of color interaction with examples.

4.5.4.4 Assignment:

Towards the end of the lecture and slideshow two assignments were given to make the learning clearer. The time given for this assignment was 36 hours.

1. Create minimum one example of color interaction where the color appears to be different as the background changes.
2. Create minimum example of color appearing to become transparent or translucent by applying opaque color..

   Each student's work is presented to the entire class once they finished doing it and a feed back was given based on the following.

4.5.4.5 Criteria for evaluation:

1. Understanding: Ability to perceive meaning and think.
2. Exploration: Ability to inquire or investigate thoroughly in order to learn or discover.
3. Precision: Level of accuracy or degree of refinement.
4. Originality: Generation of ideas that are not imitation.
5. Content: Communicative/experiential or expressive quality/substance of product / creation.

Peer feed back also helps in team learning. Students were asked to refine their work as per the feed back given to individual students.

4.5.5 Session V

Unit 5;-Color and form, Composition and relative proportion of color, Color in art History, Color as language, conscious applications of color

4.5.5.1 Learning objective

1. By going through this session the students will be able to produce example of the role of color in creating form.
2. The students will be able to use hue, tint, shade & tone or different hues with different values to create a form on a flat surface by the application of color.
3. The students will learn about Color in art History, Color as language, conscious applications of color

4.5.5.2 Instructional strategies employed.

1. Lecture, slide show, assignment and feed back, peer feedback

4.5.5.3 Procedure

The session started with a lecture on color and form, a brief description of the lecture is as follows.

By the end of the lecture followed by a discussion and assignment was given to ascertain the learning of color and form from the session.

4.5.5.4 Assignments:

1. Create the illusion of a cube on a hexagon with equal sides with the use of color.
2. On a similar hexagon create the illusion of spaces which goes in or coming out with the use of colors. The constraint is while creating the illusion line or space created cannot go beyond the physical boundaries of the original hexagon.

24 hours was given to complete the assignment.

Once the assignment is finished, the students present the work in the class and feed back is given on the following criteria.

1. Exploration: Ability to inquire or investigate thoroughly in order to learn or discover.
2. Precision: Level of accuracy or degree of refinement.
3. Visualization: Ability to imagine and articulates in the form of visuals.
4. Form : Sense of composition and arrangement of component /part
5. Content: Communicative/experiential or expressive quality/substance of product/creation.

Seeing each others work enhanced the learning as every one was trying to do different combinations of colors and shapes to achieve the objective.

After the feedback session, the works were further refined.

4.5.6 Post Intervention Assignment

After all the sessions, a post intervention test was administered which was of similar in nature of the pre intervention test.

The post intervention test assignment was in the form of an assignment and is stated as follows:

Make an abstract composition on a given format (10" x 12" size) with poster color on any one of the subjects given below.

Create a composition on any one of following themes:

1. Mystic
2. Chaos
3. Elegance
4. Calm

After making the composition, justify in writing your use of color in the composition

The students were asked to reflect on their learning while submitting the post test work.

All the works done during the course were submitted.

The essence of the reflections were recorded by the investigator by writing it down and presented in the next chapter.

Focused group discussions were done by dividing the entire batch in to four groups to consolidate and articulate their learning and share their experience of learning on this course color and form.