CHAPTER II

LITERATURE REVIEW

2.1 Design

Landa (2014) stated that graphic design is a form of tool to communicate with the masses to deliver specific information/ data. Graphic design is done by arranging visual elements to describe and portray the message in mind. In general, graphic design is used in persuasion, information, identification, motivation, enhancement, branding, location, engagement, and conveyance. It comes in a variety of media such as print-based media, screen-based media, and environment-based media. In the process of graphic making, a designer must be familiar with the elements and principles of graphic design to create a cohesive project.

2.1.1 Design Elements

Design Elements are the raw materials to create a graphic design. The quality and quantity of design element production have a great influence on the result of the design as it is the building block of the project. According to Landa (2014) graphic elements consist of:

2.1.1.1 Line

A line is an elongated point that is used as a movement path in a visual tool. It can be only measured through length due to its small width. It has a certain value direction due to the composition of the point.

1) Types of Line

This element has various types based on the quality of varying angles, smoothness, consistency, and thicknesses.

a) Solid Line

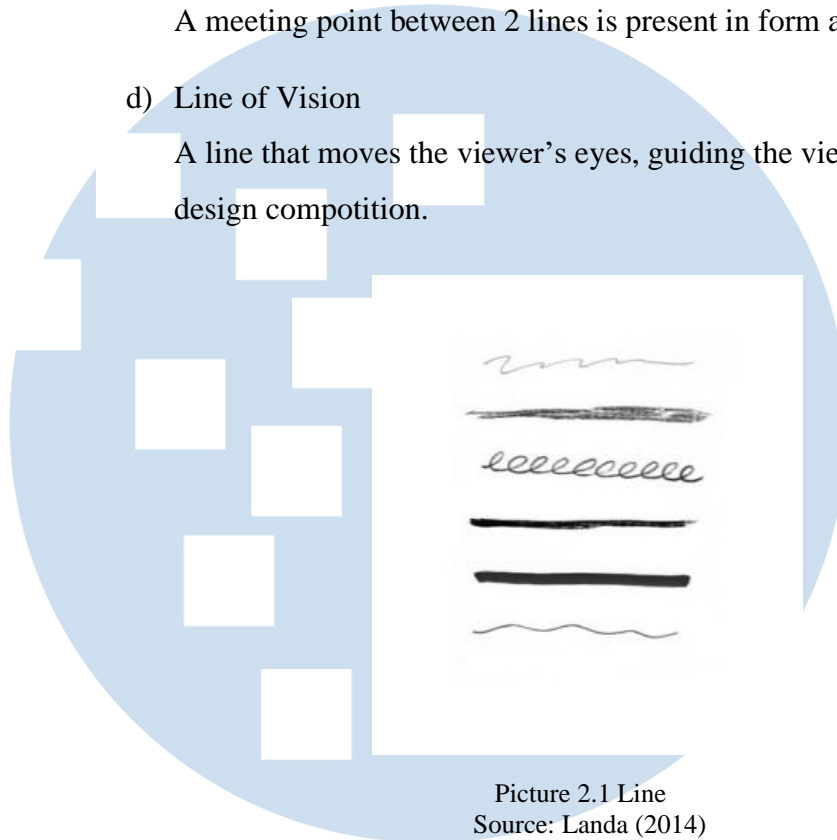This line has the characteristics of cleanness and apparent.

b) Implied Line

Short lines are recognized as a line unit.

c) Edges

A meeting point between 2 lines is present in form and colors.

d) Line of Vision

A line that moves the viewer's eyes, guiding the viewer in the design compotition.
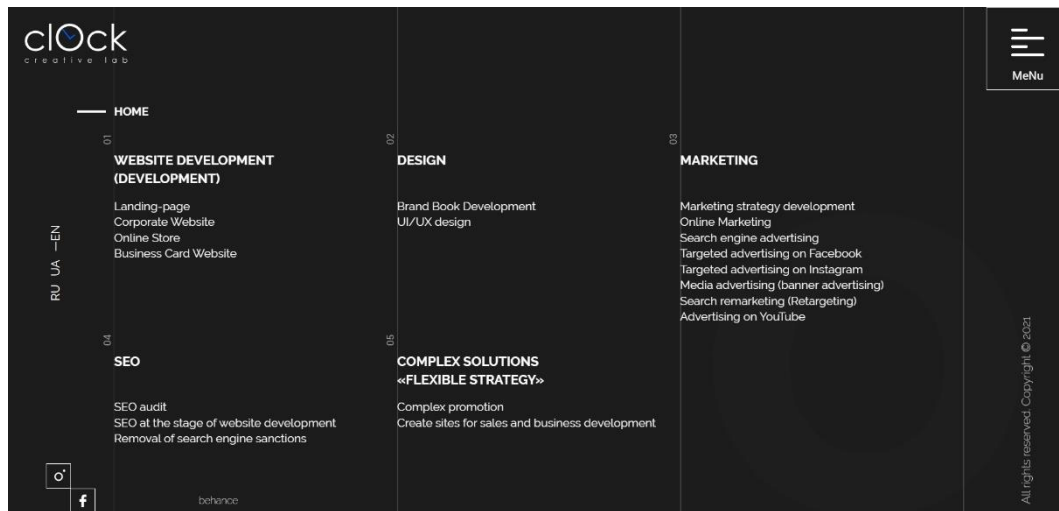

Picture 2.1 Line
Source: Landa (2014)

2) Function of Line

a) The foundation of form and angles in images, creating objects in the composition

b) Establish area within the design

c) A tool for composition layout

d) Actualize a line of vision

e) As a tool of creative expression

The application of line can be found in any interface design. One of the good usages of line in interface design can be seen in a design studio website called clock lab. In the navigation section, uses the line as an element of composition and establishes the area of text.

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Picture 2.2 Line application on Interface Design
Source: https://clocklab.design/en

2.1.1.2 Form

The area/area is defined by the closed line/path. The basic shape consists of 3 namely square, triangle, and circle. The three basic forms can be developed into a variety of forms as follows:

1) Geometric/rigid shapes, consisting of straight lines, and the angles and curves in them can be measured.

2) Curvilinear/organic shape, a natural shape consisting of curved lines, giving a natural impression.

3) Rectilinear shape, a form created from a linear path or edge.

4) Irregular shape, a collaborative form between linear and wavy lines.

5) Accidental shape, a byproduct of random action

6) Non-objective forms, pure forms created without any reference from nature

7) Abstract shape, a shape modified in a way to produce a certain expression of certain messages.

8) Representational form, identical to the visual of nature so that it represents a meaning or object.
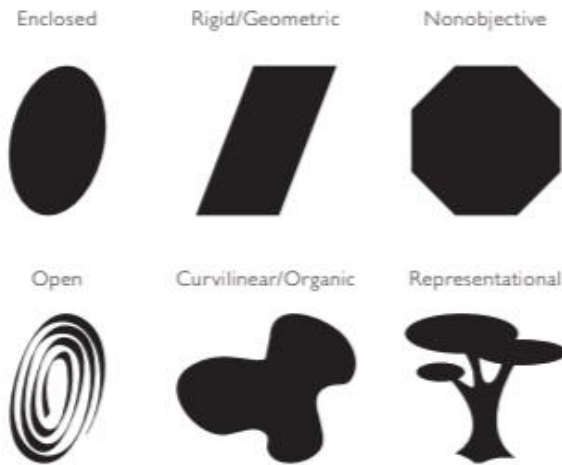
Picture 2.3 Form
Source: Landa (2014)

In interface design, the variety of shapes is commonly found in forms of geometric shapes or rectilinear shapes due to its clarity and familiarity to fulfill the need for functionality. The application of geometric or rectilinear shapes can be found in social media such as Facebook.
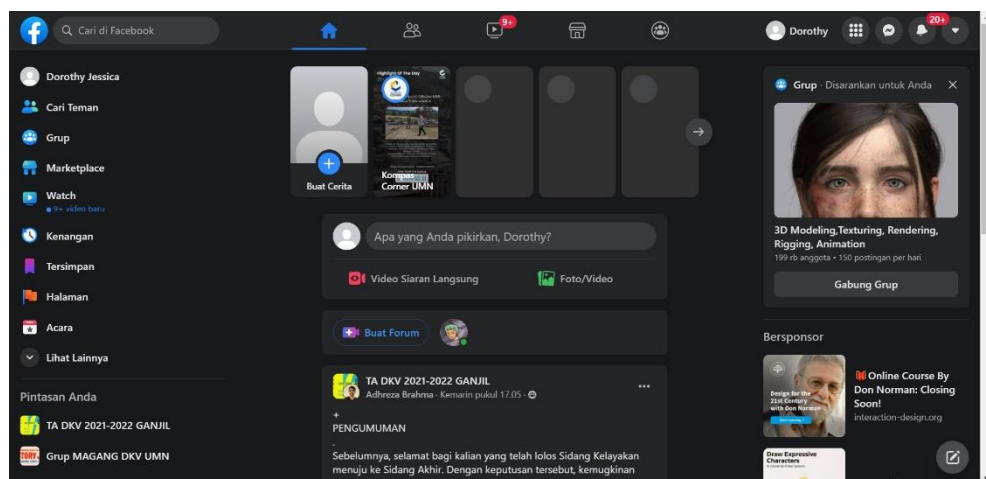
Picture 2.4 Rectilinear Shapes Application on Interface Design
Source: Facebook.com

Although interface design revolves around functionality, it doesn't eliminate the opportunity of other shape's applications. Other kinds of shapes

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are usually found as a decorative element within the interface such as this website below.

Picture 2.5 Curvilinear/organic shape on Interface Design
Source: https://www.happinessabscissa.com/

2.1.1.3 Color

Color is the element of design that is highly dependent on light. Consists of three aspects which are hue, value, and saturation. Hue refers to the name of the color while value refers to how light/dark a color is. The value aspect consists of shade (addition of black), tone (addition of gray), and tint (addition of white). While Saturation refers to the brightness/saturation of a color.
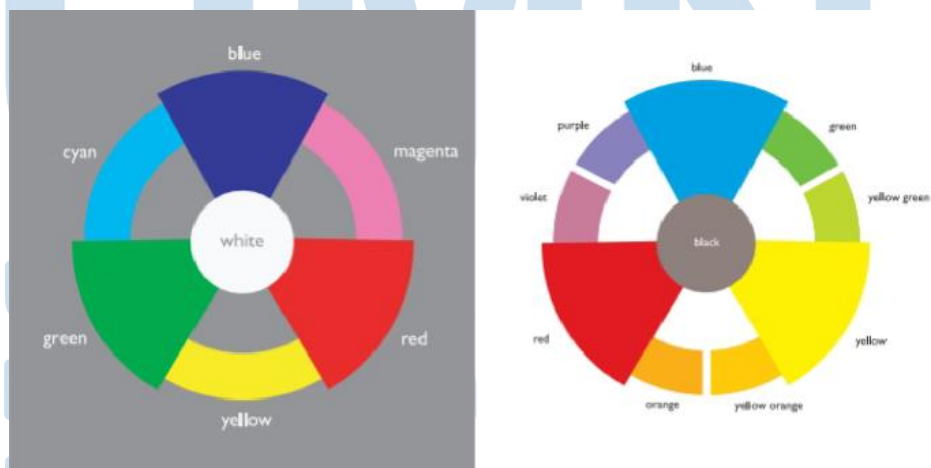
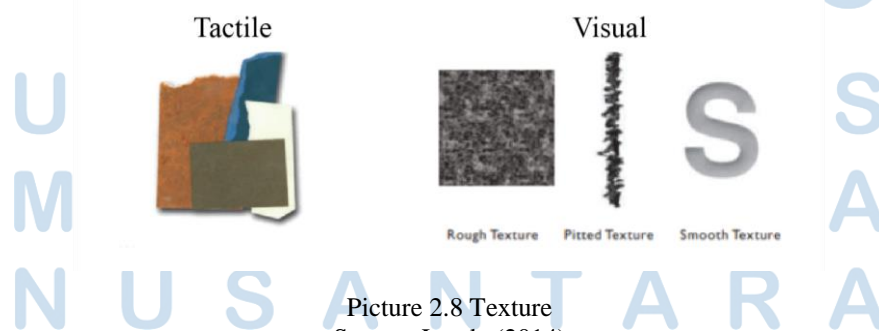Picture 2.6 Color
Source: Landa (2014)

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Color application within a User Interface design according to Malewicz and Malewicz (2020) is determined by the theme of the design to create a cohesive identity. It is noted that user recognizes a design not by individual color composition, but the message from the color impression.
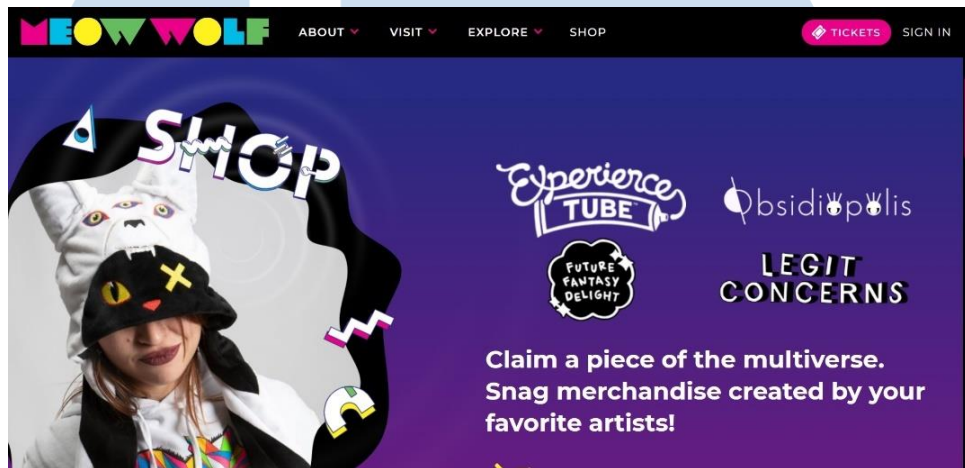
Picture 2.7 Color Application in Interface Design
Source: https://meowwolf.com/

2.1.1.4 Texture

Texture represents the visual surface quality when it is detected by the sense of touch. In the aspect of art, texture consists of tactile and visual textures. Tactile textures have a visual quality that evokes the sense of touch. It can generally be found in embossing, debossing, stamping, engraving, and letterpress printing products. Visual texture refers to hand-created textures (drawing, painting, photography, and other image-making methods) that are inspired by actual textures.

Picture 2.8 Texture
Source: Landa (2014)

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The lack of use of textures in interface design is generally the opposite of the same trend as the previous color. However, when used, generally the texture is used on the background with a fairly smooth texture.

Picture 2.9 Texture Application on Interface Design
Source: https://revelationconcept.com/

2.1.2 Principles of Design

Principles of Design act as a guide to composing a design. As the mastery of design elements creation and the accurate application of the principles of design aligns, the design will be more effective than before (Landa, 2014).

2.1.2.1 Format

This principle is a predetermined agreement between designers. This principle organized the media use in design, determined based on the purpose of designing a project.

Picture 2.10 Format
Source: Landa (2014)

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As technology progresses with more new media, more new formats have been released. However, as it is commercialized, a common format can be found amid these new formats. According to Statcounter (2021), the most common format worldwide in desktop, tablet, and mobiles by November 2021 is dominated by 1920x1080 ppi. Thus, more user interface is commonly found in this format.

2.1.2.2 Balance

This principle is created based on even distribution of the visual weight of the design elements within the space given in the composition. The visual weight within the composition is affected by the layout and color of the element design in the composition.

1) Symmetry Balance

Balance was created due to the equal distribution of visual weights. This balance is achieved by mirroring visual elements to one central axis to create a reflection.
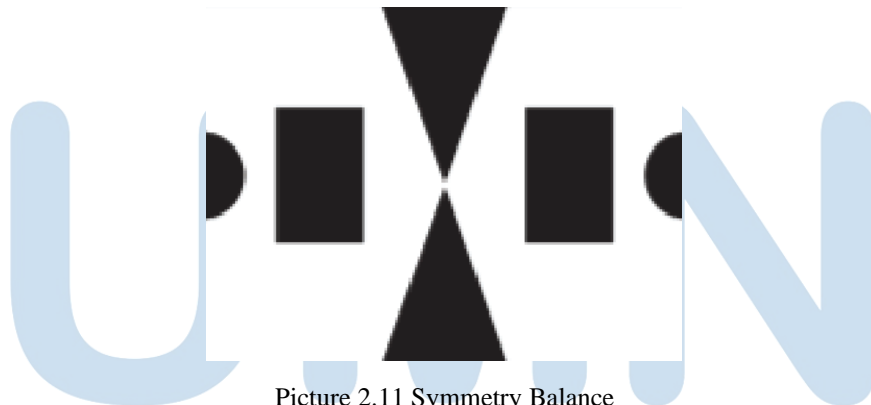
Picture 2.11 Symmetry Balance
Source: Landa (2014)

2) Asymmetry Balance

Balance is created with equal distribution without mirroring the visual elements, rather through planning every possibility of composition within the space to create the same balance effect.
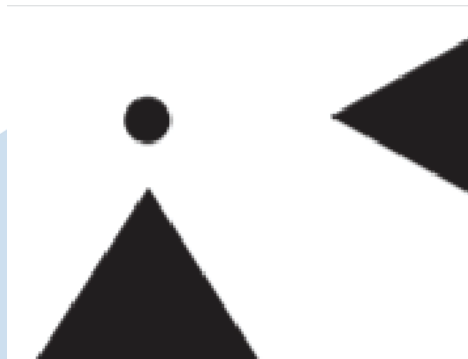
Picture 2.12 Asymmetry Balance
Source: Landa (2014)

3) Radial Balance

Symmetry balance with two central axis, creating a focus effect on the center of the composition.

Picture 2.13 Radial Balance
Source: Landa (2014)

This principle can be found in interface design. However, due to the rectangular nature of the interface format, the radial balance is rarely found. The common balance type found in interface design is symmetry balance due to its accessibility of the layout process as well as the familiar hierarchy.

2.1.2.3 Visual Hierarchy

Visual hierarchy is a principle that defines graphic elements according to a hierarchy of meaning. To create a visual hierarchy, the composition of element design must achieve a sense of emphasis. Through emphasis, the visual hierarchy also directs the visual flow that should be noticed first.

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Various techniques to create emphasis through isolation, placement, scale, contrast, direction-pointer, and diagrammatic structure.

1) Emphasis through Isolation

This emphasis is created by secluding a piece/group of elements farther away from the majority of the visual elements into the centerpiece of the composition.

2) Emphasis through Placement

To achieve this kind of emphasis, the designer must place a certain element to a certain placement favored by certain-targeted viewers. Placement commonly used are the foreground, top-left corner, and center.

3) Scale

Creating this emphasis can be done by modifying the scale of a certain element so the spatial depth perception is in effect.

4) Contrast

The usage of two properties of visual elements at different extremes creates a focal point. This effect can be found in a composition like a black triangle in between light-colored circles.

5) Direction and Pointers

This emphasis is created by using objects with the value of direction such as arrows to direct the viewer's eyes.

| Isolation | Placement | Scale | Contrast | Pointers |

Picture 2.14 Visual Hierarchy
Source: Landa (2014)

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6) Diagrammatic structure

Using the emphasis based on the structures found in nature and human creation.

a) Tree Structure

A hierarchical structure that branches into descending information visually mimics the anatomy of branches. This kind of structure is found in mind maps.

b) Nest Structure

Utilizing space as it uses layers to determine the hierarchy of a structure. This technique is found in Diagram Venn.

c) Stair Structure

A composition technique that visually organizes information ascending and design like stairs.

Picture 2.15 Diagrammatic Structure
Source: Landa (2014)

2.1.2.4 Rhythm

This principle relies on the timing of composition. It plays with the interval between variables of the visual elements. In the making of a rhythm, repetition and variation are used just like music creation. Repetition established consistency while variation established modification in element's variable intervals.

2.1.2.5 Unity

Unity created by natural human perception of the relationship between objects is called the Law of Perceptual of Organization. The law of perceptual consists of similarity, proximity, continuity, closure, common fate, and continuing line.

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1) Similarity

Categorizes in the same group based on shared characteristics in visual elements.

2) Proximity

If objects were to be composed in a relatively small distance, natural human perception correlates the objects in the same category

3) Continuity

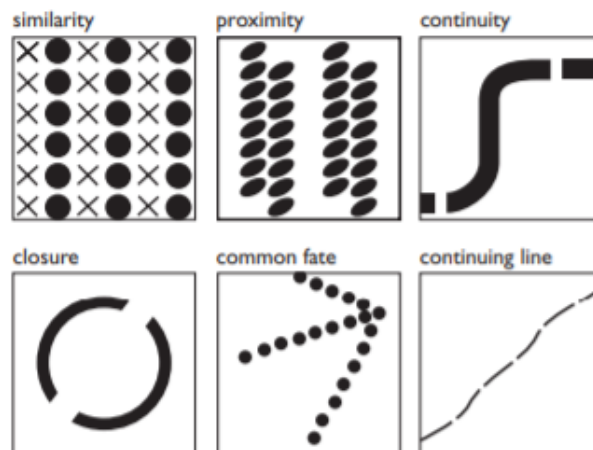Perceive relationship between objects that creates a visual path.

4) Closure

Natural human perception produces an object from individual elements in the composition.

5) Common fate

Categories in the same group are based on the direction value of the element.

6) Continuing line

A strong perception of line that creates line whether it connects or breaks.

Picture 2.16 Unity
Source: Landa (2014)

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2.1.3 Color

According to Sherin (2012), a color is an abstract object created from variations in the wavelength of light. This element is a strong material for design to convey a message to the audience due to the interpretation within the color itself. Color consist of the aspect of color, color combination, and color grouping through palette making.

2.1.3.1 The Aspect of Color

To master the manipulation of color, the designer must be familiar with the aspect of the color. Color consists of 4 aspects: hue, saturation, color temperature, and value.

1) Hue

    The color spectrum known to the human eye is highly dependent on the frequency of light. From this spectrum, some colors are basic colors that create other colors called primary colors (red, yellow, and blue).

2) Saturation

    This aspect refers to the clarity of a hue in a color. The less strength of the hue in the color is referred to as the desaturated color.

3) Color

    Color temperature is based on measuring the color of the flame temperature. With the measurement of color temperature, the hue is split into two based on the temperature, namely cool tones (green and blue) and warm tones (yellow and red).

4) Value

    Dark light on color. This aspect can be detected easily using grayscale. Usually used to strengthen emphasis and hierarchy in a design.

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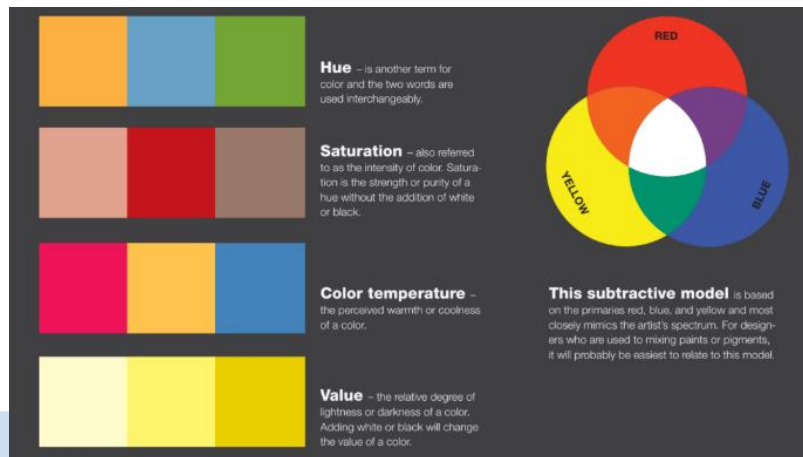
Picture 2.17 Color
Source: Sherin (2012)

2.1.3.2 Color Combination

By knowing color theory, designers can create color combinations that are harmonious with one another in a work. A designer is visually facilitated through the presence of a color wheel in navigating colors. Through the color wheel, designers can find out things like the following.

1) The origin of colors

Color consists of 3 types, namely primary colors (red, yellow, blue), secondary colors (violet, orange, green), and tertiary. Primary colors are colors that are not related to each other. Secondary colors are color mixes between primary colors while tertiary colors are colors between primary and secondary colors on the color wheel.
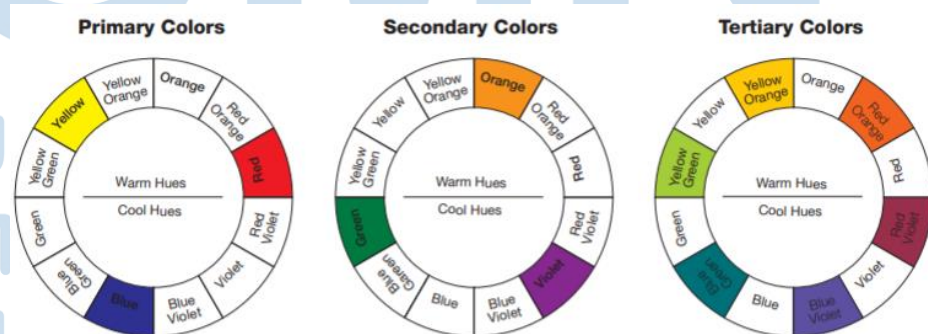
Picture 2.18 The origin of color
Source: Sherin (2012)

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2) Complementary

The relationship between 2 opposite colors, located on opposite sides of the color wheel. The opposite of 2 colors creates attraction and avoidance of both. This relationship applies to color when collaborated with a color that is still next door to its complementary pair.
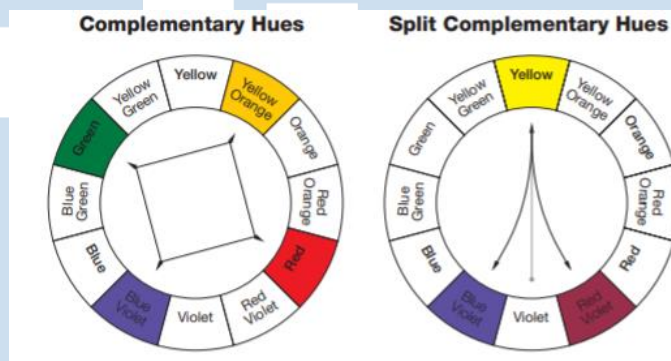
Picture 2.19 Complimentary colors
Source: Sherin (2012)
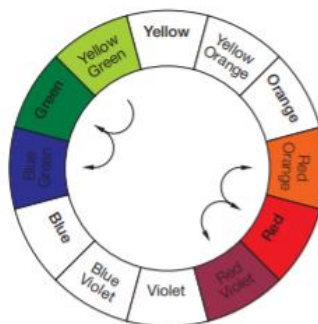
3) Other Color Combination

By knowing the relationship between colors, color combinations are created as follows.

a) Analogous Combination

This combination consists of primary colors with secondary and tertiary colors adjacent to the color wheel.
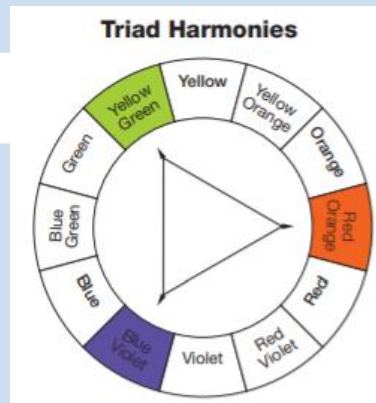
Picture 2.20 Analogous Combination
Source: Sherin (2012)

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b) Triad Harmonies

This color combination consists of three main hues within the tertiary colors. This combination is a pact to give color combinations other than primer and secondary colors.

Picture 2.21 Triad Harmonies
Source: Sherin (2012)

c) Tetrad Combination

This combination consists of 4 colors, using two pairs of colors with complementary relationships.
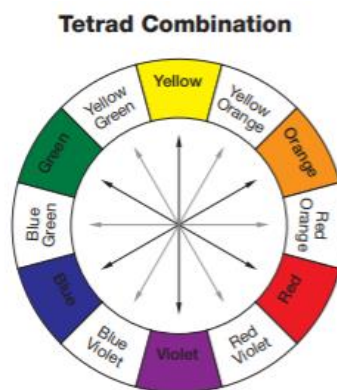
Picture 2.22 Tetrad Combination
Source: Sherin (2012)

2.1.3.3 Color Palette

In the design process, a designer experiments with groups of colors to achieve a harmonious relationship between them. A color palette consists of

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3 colors, namely dominant (main color), subordinate (supporting color), accent (the color that stands out). The color palette is selected according to the message you want to convey. Below is a method for applying the color palette:
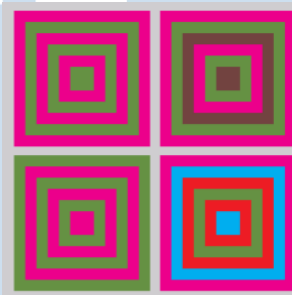
1) Repetition or reoccurrence

    Using several colors repeatedly so that the colors are easily recognizable as a unitary identity of a design.

Picture 2.23 Repetition Color Application
Source: Sherin (2012)

2) Progressive

    This method applied the progressive color variations from dark to light.
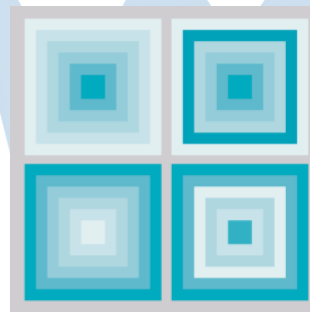
Picture 2.24 Progressive Color Application
Source: Sherin (2012)

3) One-Color Palette

    By using one hue as the main color used in the design, this method complements it with other elements following that color with variations in value and saturation.

Picture 2.25 One Palette Application
Source: Sherin (2012)

4) Two-Color Palette

This method of 2 hues with dominant and subordinate relationships.
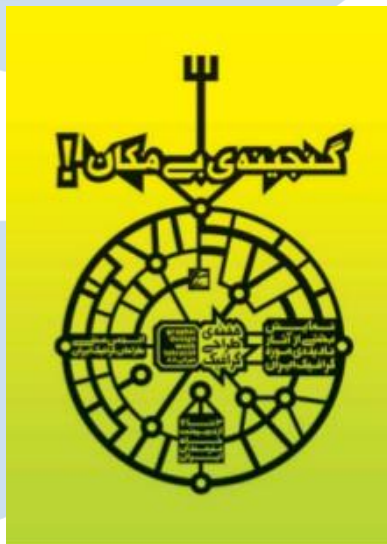
Picture 2.26 Two Color Palette Application
Source: Sherin (2012)

5) Black and White

This type of color palette uses neutral grayscale colors: black and white. This type of color palette is useful to create emphasis on the design.

Picture 2.27 Black and White Color Palette Application
Source: Sherin (2012)

2.1.4 Typography

A typeface is the design of a group of characters that are arranged consistently in a visual style. The typeface consists of letters, numbers, symbols, and accents. Typography has evolved from the use of metal relief into a collection of characters in a digital file (Landa, 2014).

2.1.4.1 Type classification

The typeface has several types based on the style created within human history, namely:

1) Old Style or Humanist
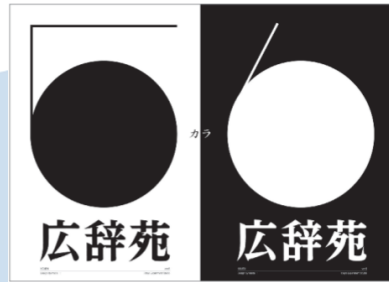
   Generally used to write letters using a large-edged pen. This typeface has serifs at the corners and thickening in some of the letter's anatomical frameworks. These characteristics are seen in Caslon, Garamond, Hoefler Text, and Times New Roman types.

2) Transitional

   This typeface is a reflection of the evolution of traditional to modern styles that occurred in the eighteenth century. This characteristic is seen in the Baskerville, Century, and ITC Zapf International typefaces.

3) Modern Typography

   This typeface is the most symmetrical type of the other types. It tends to be more geometric than the old-style typefaces, produced

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using a chisel-edged pen. These characteristics are seen in the Didot, Bodoni, and Walbaum typefaces.

4) San serif

A typeface that has no serif was found in the early nineteenth century. Some of these types have a variety of strokes sizes. This typeface has subcategories such as Grotesque, Humanist, Geometric, and others. Futura, Helvetica, Univers, Grotesque, Franklin Gothic, Universal, Futura, and Frutiger are categories into this typeface.

5) Slab serif

This type includes American Typewriter, Memphis, ITC Lubalin Graph, Bookman, and Clarendon. This typeface has a characteristic thickness and is straight.

6) Blackletter

Inspired by the gothic style found in the thirteenth century to the fifteenth century. Distinctive with thick lines and curves. Examples of this typeface are Textura, Rotunda, Schwabacher, and Fraktur.

7) Scripts

The typeface is identical to handwriting, generally italic and connected. Some examples of this type are Brush Script, Shelley Allegro Script, and Snell Roundhand Script.

8) Display

This type can easily be any typeface. To fall into this type, the typeface is primarily used in large sizes, such as title texts.

2.1.4.2 Web type basics

According to Landa (2014), To complete a website the typeface used in the design has to meet certain criteria such as:

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1) Legibility and Readability

   a) Typeface must have high clarity in the form of letters.

   b) Use medium-sized strokes, avoiding excessive thickness

   c) Maximum paragraph 12 lines

   d) Using a contrasting color on the typeface against the place of text

   e) The size of the typeface adjusts the screen used

2) Voice and Branding

   The typeface must reflect on the identity of the design, related and supports the existence of the design.

2.1.5 Grid

To communicate properly the message to the design project, a designer must be able to organize information as effectively and efficiently, ensuring the message delivery success. A grid system is also used to layout the elements of the design, adding interesting placement within the composition. This organization can be achieved by using a grid system. In a grid system, there are elements of grids and types of grid layout (Graver and Jura, 2012).

2.1.5.1 Elements of Grid System

To utilize the grid to a maximum result, it is essential for designer to be familiars with the elements of grid. Elements of the grid system consist of margin, flowlines, columns, modules, special zones, and markers. Each of the element functions as follows.

1) Margin

   This is the outer part of the grid which is a negative space from the edge of the layout to the content. It serves as an emphasis tool for the content.

2) Flowlines

An imaginary line which is a guide is used to navigate across the page. It is also functions as a guideline for horizontal element layouts.

3) Columns

A vertical constraint with a specific height that used to create a certain area for contents. It comes in specific size and amount inside the grid to guide the contents in the design.

4) Modules

An area inside the grid which derived from the cross between a column and a horizontal column to form a unit area of the box.

5) Spatial Zones

An area that is consists of modules or column combinations that is created for certain content.

6) Markers

Determine the areas of the information such as folios, running heads, icons, and so on.
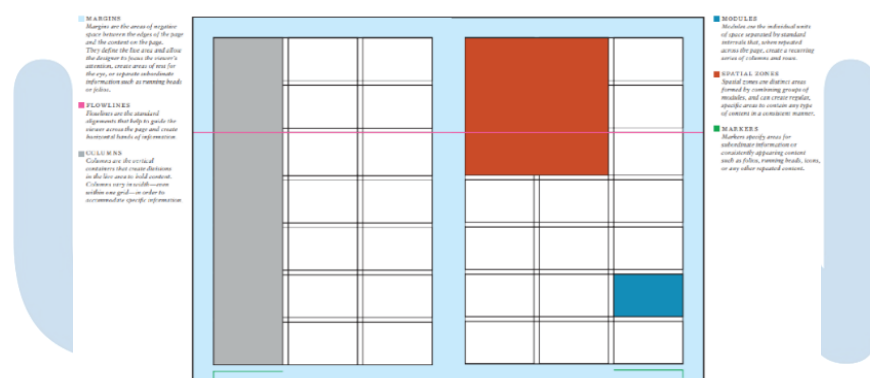
Picture 2.28 Grid Elements
Source: Graver and Jura (2012)

2.1.5.2 Types of grids

The Grid consists of various types based on the amount of area used in the composition, the priority of the information grouping, and the layout based on the typographic element.

1) Single column

A simple grid with no separation between information. Because of its simplicity, this grid relies on setting margins and typography.
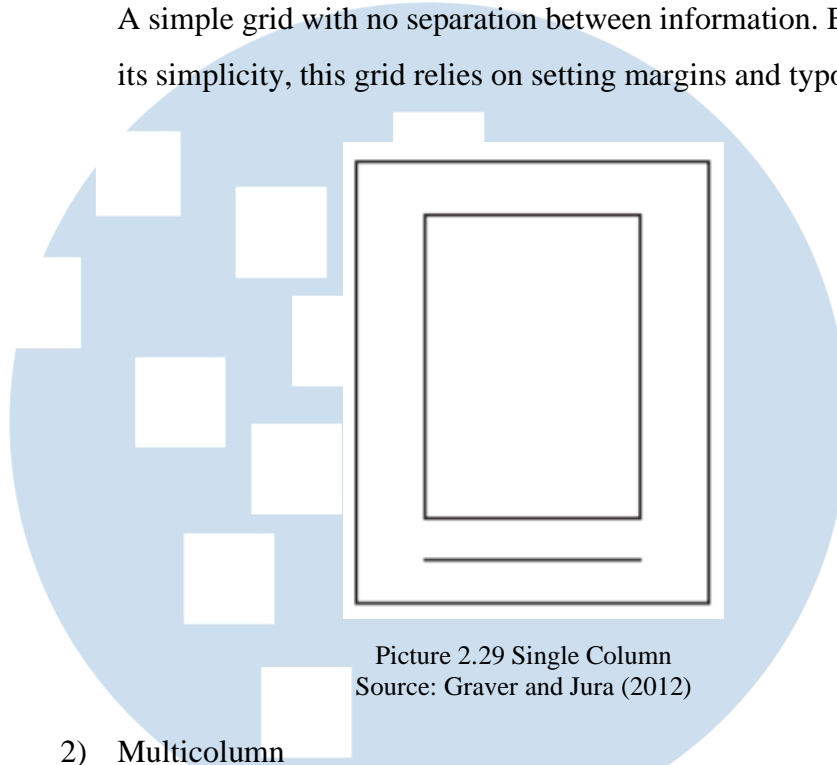
Picture 2.29 Single Column
Source: Graver and Jura (2012)

2) Multicolumn

A grid that has multiple columns, adjusting to the needs of various information layouts. The width of the column may vary. Between columns, there is a spacing called the gutter, which helps the shaping of the column.
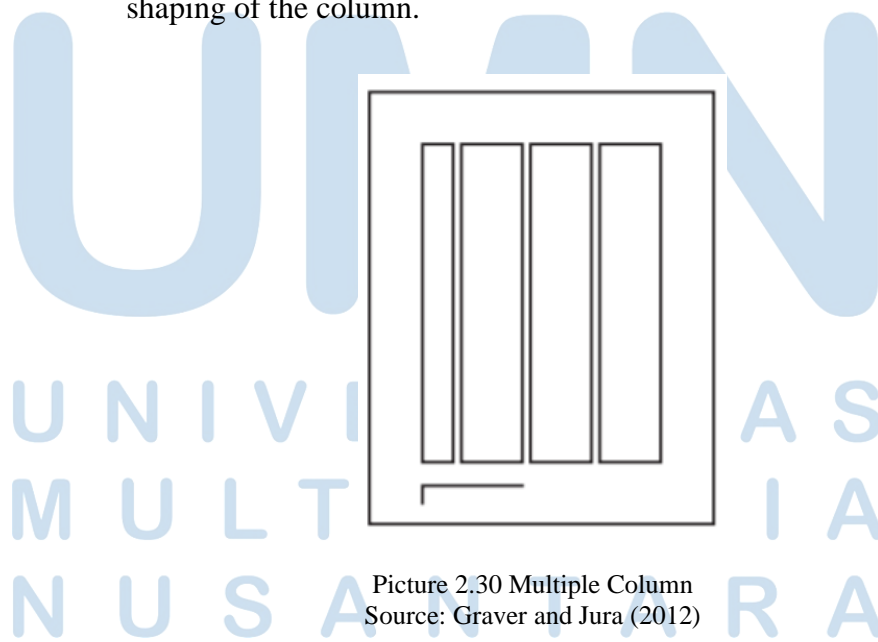
Picture 2.30 Multiple Column
Source: Graver and Jura (2012)

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3) Modular

This grid consists of columns and rows, creating a reference space layout called the modules. This type of grids is suitable for components such as charts, tables dan so on. Usually seen in newspapers.
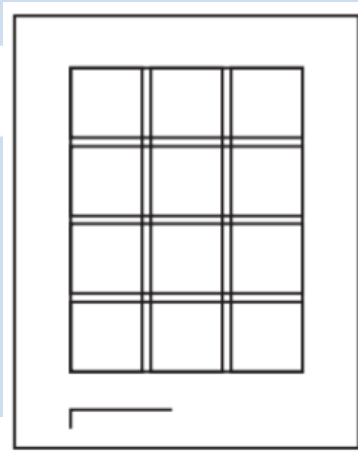
Picture 2.31 Modular Grid
Source: Graver and Jura (2012)

4) Hierarchical

Intuitive placement is based on the hierarchy of the components within the layout. Due to its nature, this type of grid is a more organic process than other grids. This grid is usually used in packaging, poster, and websites.
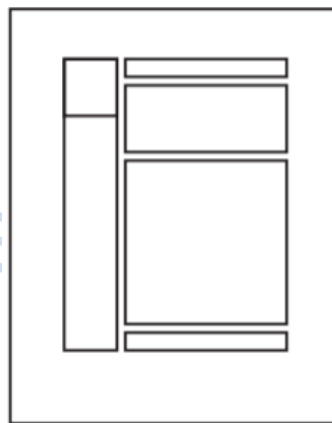
Picture 2.32 Hierarchical Grid
Source: Graver and Jura (2012)

5) Baseline

This type of grid is based on the layout of the typographical elements which adheres to the alignment through the baseline of the information type.
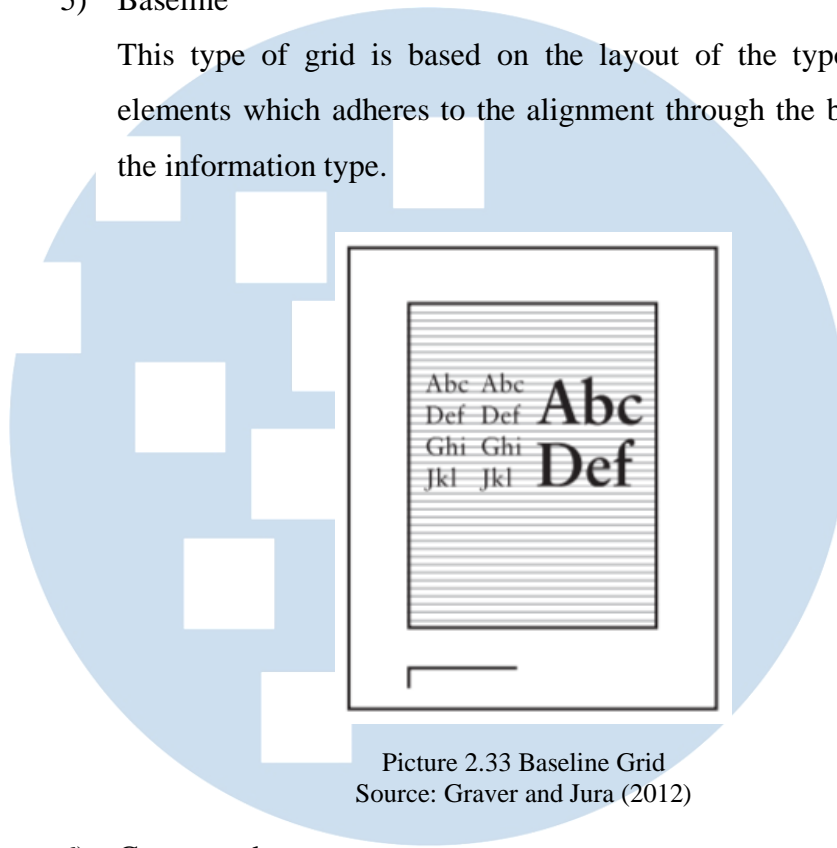
Picture 2.33 Baseline Grid
Source: Graver and Jura (2012)

6) Compound

This grid consists of multiple types of grids, cohabiting in one layout.
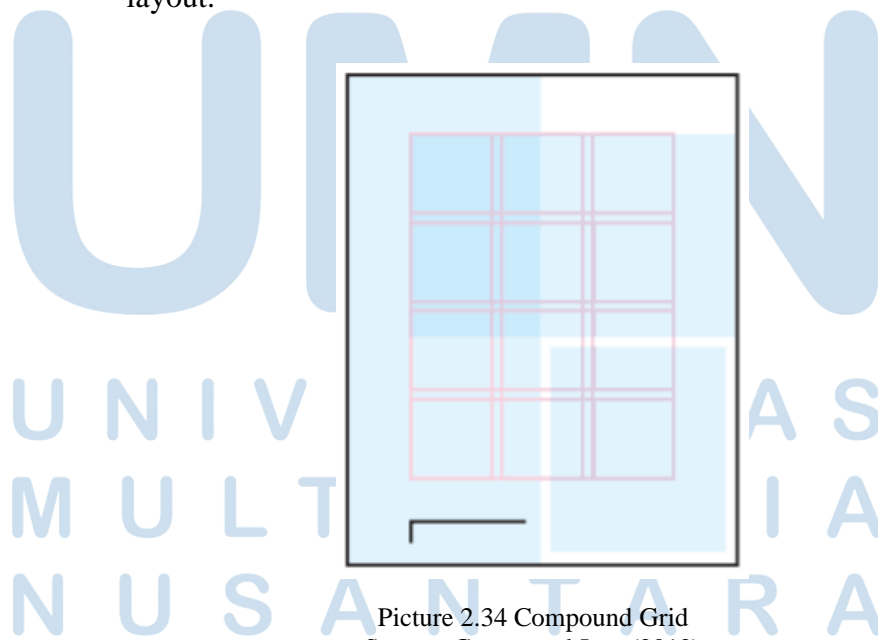
Picture 2.34 Compound Grid
Source: Graver and Jura (2012)

2.2 UI/UX (User Interface and User Experience)

In the design process of interaction design such a website or application with a user centered design, there are two disciplines which are UI (User Interface) and UX (User Experience). These two discipline are heavily related to one another but different from each other.

2.2.1 UI (User Interface)

According to Lal (2017), User Interface is a visual guide for the user on a digital platform that serves to signal back the process behind the scene. In designing a user interface, several aspects must be considered, such as:

1) Minimum Design

   The interface design is priorities to the topmost 20 percent of the system. Visuals are also arranged with the determination of colors and layouts so that the display is consistent.

2) Simplicity

   The interface must be simple and clear so that the user can focus on the flow provided.

3) Accessibility

   The interface can adapt to varieties of media and user groups (such as the disabled, elderly, and individuals with low literacy levels).

4) Feedback

   The interface provides an overview of the trade-offs and progressively reports on events happening behind the scenes to give the contest to the user.

5) Forgiveness

   For users to be comfortable with the interface, there must be discretion on the user's action to some error degree. To create this discretion, the designer must provide features such as undo. In addition, it must have required commands to prevent errors.

6) User-Driven

The user-directed design will rely on user reactions. The interface gives the user a great deal of influence in the system. In addition to that, it also provides room for customization and personalization.

User Interface which is usually found in applications and websites has basic elements (Malewicz & Malewicz, 2020). These elements consist of:

1) Screen

The screen is a space for an interface design to be displayed in technologies such as laptops, tablets television, and others. To create an interface, a designer must be able to recognize the size of the screen beforehand. The size of a screen is determined by a unit measurement called ppi (pixels per inch). There is no absolute size for a design as there will be always new update on screen sizes based on the new technology products.

2) Grid

Grid is based on lines and space that is the backbone of the design layout. This element of user interface maps out space in the design, creating a guideline for design hierarchy. In the implementation of a grid, there are two types of grids: Fluid Grid and Fixed Grid.

a) Fluid Grid

This grid type adapts its size to the screen size, it stretches to the width of the screen. While the margin and gutter of the grid maintain their size, the column stretches to the screen size.

b) Fixed Grid

As the name suggests, this type of grid maintains its size in any kind of screen size. Due to it, there will be empty spaces on the screen on the sides. This type of grid is compatible with websites and news portals. It is suggested that this type of grids stretches not over 1400 px to maintain the legibility and readability of the design.

In creating a grid, certain measurements are used in the process. There is two common unit measurement used in grid design which is 10-point grid and 8-point grid. These two measurements determine the base value of measurements. The margins and the gutter multiplied the measurement with the base value the types grid unit suggests.

As the whole design obeys the grid, effectively, the objects inside certain components have an independent grid. Inside those components, it should have the same grid system. However, the value of the grid may differ as the component group is smaller than the size of the screen.

According to Malewicz & Malewicz (2020), the is a certain method that is flexible to be used in the layout process called red square. This method is using a group of squares in base size unit multiple with a progressive colors combination is used to determine the spacing between objects inside the grid system. The progressive colors in the method are used to identify the sizes. The darker the square the higher value of the width and the height of the square.
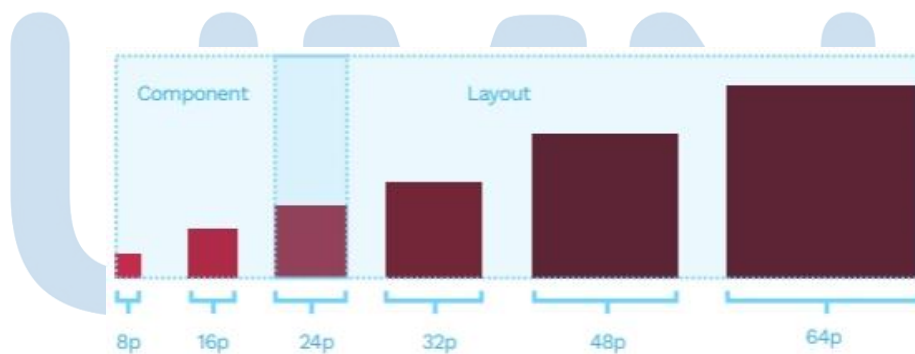
Picture 2.35 Red Square Method
Source: Malewicz & Malewicz (2020)

3) Objects

Objects inside a user interface are molded into a rectangular space. In this rectangular shape, the object has four elements consist of fill, border, outer margin, and inner margin.

a) Fill

The background used in the object can be a color, gradient, or photo. In an object, there can be more than one fill. The designer can mix the fill such as using a photograph with color on overlay mode.
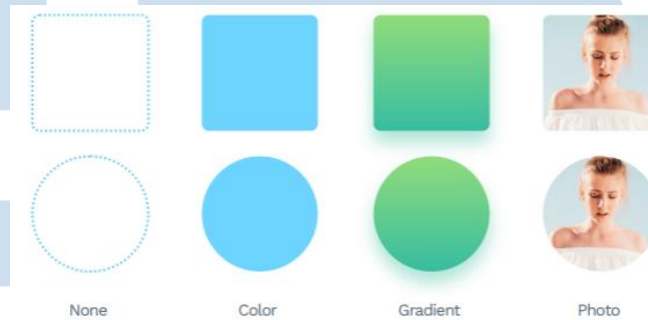
Picture 2.36 Fill
Source: Malewicz & Malewicz (2020)

b) Border

This structure is a line that surrounds the edge of the object. There are three types according to the align which is the inner border, the centered border, and the outer border. The inner border surrounds the object's edge from the inside while the outer border surrounds the outer side of the object's edge. The centered border is placed on top of the edge of the shape, cutting the border in half.
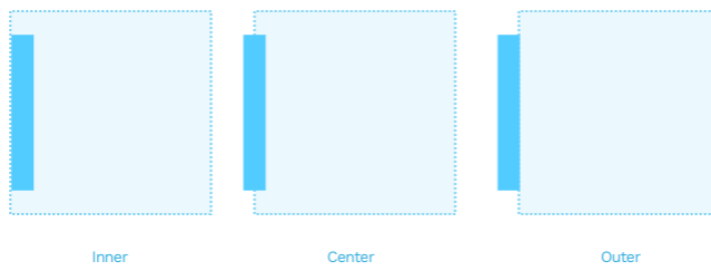
Picture 2.37 Border
Source: Malewicz & Malewicz (2020)

The border can vary its appearances such as dotted border, color, and weights. It also can modify the end and joint of an

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object. The ends can be modified into an open-end, flat end, and rounded end while the joints can be sharp, rounded, and angled.

c) Outer Margin

A space outside the object that determines the distance against the other objects in the design.

d) Inner Margin

A space inside the object determines the distance of inside objects from the edges of the object.
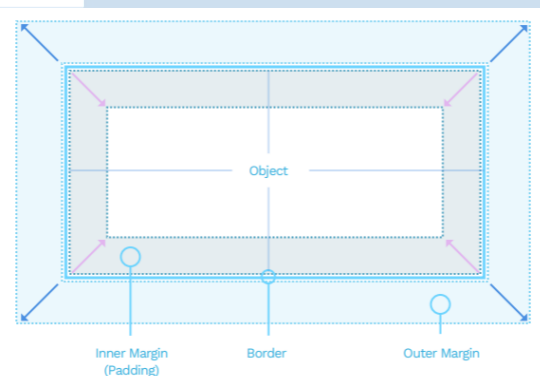
Picture 2.38 Inner Margin (Grey) and Outer Margin (Light Blue)
Source: Malewicz & Malewicz (2020)

4) Colors

The decision of color picking in a user interface is determined by the mood, the theme, and utility of the design. Due to those criteria, the impression of the colors must be kept in mind to convey the mood and the theme accurately as well as prevention of misunderstanding in utility. The impression of each color is due to the fact of the psychological and social background behind each color.

a) Blue

It is known as the color that expressed calmness and relaxation. It is also associated with trust, professionalism, experience, and wisdom. The color is commonly found in IT, finance,

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banking, health, and social media. Due to its impression, the color is most suited for background rather than buttons and accents. An alternative for blue usage on buttons or accents is to use the unconventional shade of blue.

b) Green

This color usually symbolized health, nature, calm, and relaxation. With varieties of shades, this color can express emotions such as harmony, stability, growth, security, and energy. This color as it is a cold color, similar to blue, is also used in IT, finance, and banking. However, it is also used in health, fitness, ecology, and food. As this color evokes positive emotion, this color is suitable for buttons and accents.

c) Red

This color is associated with positive and negative emotions. It can express energy, passion, strength, and love as well as danger, adrenaline, warning, and aggression. This color is commonly found in products for sports, food, and cars. In UI, red is usually used in negative/ value decreasing. This application can be found in error signs, warnings, or any negation button.

d) Yellow

This color is known for the impression of enthusiasm, self-confidence, happiness, optimism, and fun. However, it also can represent danger. This color is popular in food, sales, creative services, and art. Excessive usage of this color can cause discomfort as it strains the eye fast just like red. A lighter tint of yellows is suitable for the background while a higher saturated dan shade of yellow is perfect for accents.

e) Orange

This color is associated with youth, energy, creativity, fascination, and activity. It can also represent bad taste and

cheapness. This color is usually found in the food industry, sales, telecommunications, and children's products. As it is not associated with aggressiveness and risk, this color is very suitable for accents and buttons.

f) Pink

It is associated with women, motherhood, innocence, youth, romance, gentleness, naivete, childishness. Due to its feminine nature, it is used in women's and children's products such as cosmetics, fashion, female health, foundations, and non-profits. The darker the shade this color can be express maturity as it is suitable for advisory services. The higher tints of this color can be used as background while higher saturation can be used for accents.

g) Purple

This color symbolized luxury, power, wealth, secrecy, professionalism, wisdom, trust, high quality, and modernity. It's usually used in luxury goods and finance. Due to its friendly nature, it can be paired with many colors such as blue, green, orange, and yellow. It is advised not to use this color extensively, excessive use might have an overwhelming effect on the design.

h) Black and Shades of Grey

These colors are serious, formal, and emotionally neutral. It is also associated with elegance, minimalism, professionalism, and luxury. The excessive usage of these colors may invoke emotional depression.

Grey is commonly used in specific elements or areas of UI design like inactive icons or text fields. The lower the shade of grey, the less important the object that uses it. Lighter shades of grey are usually for lower-priority labels, explanations, and suggestions.

In using the color black, it is suggested not to use pure black due to its unnatural contrast. As an alternative, a designer can use darker black instead of pure black.

i) White

This color symbolized minimalism. It's associated with cleanness, clarity, sterility. It is commonly used by designers as backgrounds margins, cards, text boxes, and drop-down lists.

In taking to account the mood and theme of color, UI design must also pay attention to color accessibility. To achieve accessibility, the color components in the design must have enough contrast with each other. Ideally, the contrast inside the design is a 4-5:1 ratio. To know the ratio of the color contrast, it is suggested to check the colors with WCAG 2.0 scale. The higher the contrast the better accessibility the design has.

5) Icons

Semiotics is used to represent certain functions or statuses within the design. This element is usually found in a simplified version of common imagery. This is due to the needs of the user's quick understanding of the design. However, to create this element, a designer must research the user target as the semiotics used in the design may have a different meaning than what it's intended to convey.

Picture 2.39 Icons
Source: Malewicz & Malewicz (2020)

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6) Buttons

An interactive element is the trigger point of user actions within the design. The button can lead to many actions such as downloading, sending, canceling, and more. To get the attention of the user, the button design must stand out to be confused as a non-interactive element.

Picture 2.40 Buttons
Source: Malewicz & Malewicz (2020)

7) Forms

Forum is an interface input field that collects the user information to be saved in the design database. This is used in making purchases, creating a profile, and signing up for a newsletter. A common element found in forms is a text field, dropdown, button, checkbox, and radio button.

8) Modals and Pop-Ups

An element that appears when it's triggered by the user. It is commonly used for additional context to complete the user's need for information. This element includes pop-ups, overlays, and action sheets.

a) Pop Up

It is commonly used as a status indicator and confirmation inside the design to the user actions. An example of this type is a card that appears with confirmation questions before ordering things online.

b) Overlay

Usually, an overlay appears on the sides of the screen. It usually contains information that has low priority such as cookies on websites.

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c) Action Sheets

This type of component is a native component in mobile UI design. This component can include options, filter, sorting, sharing. Action Sheet example can be found in galleries when a user is picking which social media to share from.

Picture 2.41 Types of Modal and Pop-Ups
Source: Malewicz & Malewicz (2020)

9) Navigation

This element is present to guide the user in exploring locations in the design. Navigation has three types based on its appearance which are visible, hidden, and contextual.

a) Visible

This type of navigation is displayed directly on the design which has multiple page choices. It is always present on the screen for the user to navigate. The location of the user currently in is different from the rest of the page for the user to identify.

b) Hidden

The navigation is not immediately visible as it is kept outside the screen. This type of navigation will appear when it's triggered by a button. Commonly designers use the "hamburger button" for this type of navigation.

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c) Contextual

This type of navigation is a flexible type of guide that can be found in active links and buttons according to the situation. By clicking active links or buttons within the design, a sub-page will appear on the page.

Picture 2.42 Navigations
Source: Malewicz & Malewicz (2020)

10) Animation

Animation in UI works as a change agent in the design that serves as a navigation aid, feedback, and decoration. Animations on UI objects can be changes in color, size, rotation, opacity, and place.

11) Language

The language used in UI design is based on the theme of the design the user chose. It will be placed in the text, adding personality to the design. This language style can also be determined by the user audience in mind.

2.2.2 UX (User Experience)

User Experience is the design consisting of solutions to create a suitable experience for the user. With a great user experience, it is possible to create loyalty and goodwill of the user towards a certain brand or business (Chesnut and Nichols, 2014). According to Garett (2002), to develop user experience, a designer must plan through five planes consist of:

1) The Strategy Plane

This plane involves the information of any individuals related to their objective to create a design strategy toward the experience design.

2) The Scope Plane

To maximize the experience, a scope is made to guide the design. This scope includes the scope of the feature and functionality.

3) The Structure Plane

An abstract structure was created to organize the information within the design. This plane is the raw placement for the user interface.

4) The Skeleton Plane

This consists of user interface placements, it settles the final placement of design objects.

5) The Surface Plane

The visual appearance of the design is filled with images and text that are ready to be interacted with by the user.
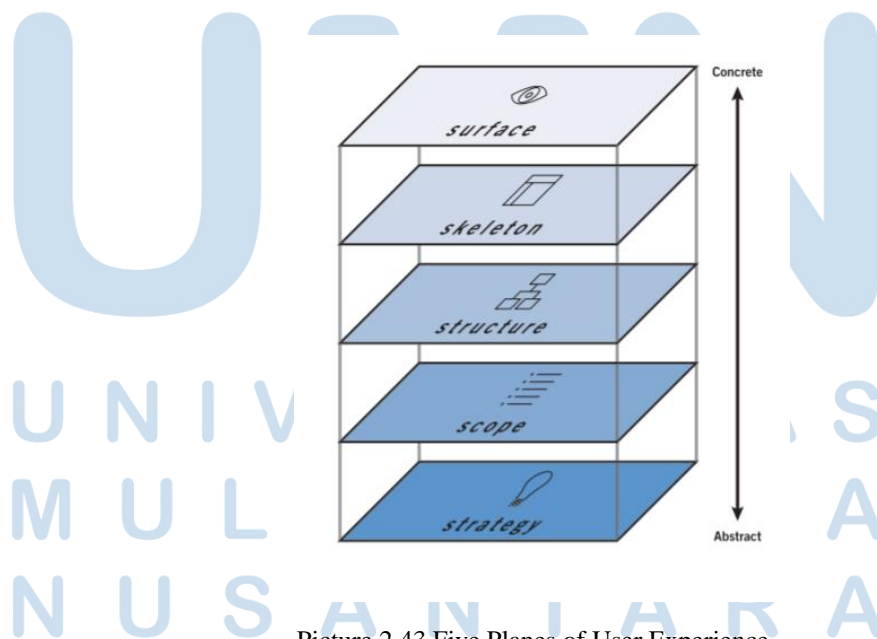
Picture 2.43 Five Planes of User Experience
Source: Garret (2012)

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After the planning of a user experience design is done, there must be an evaluation to define the quality of the project. According to Chesnut and Nichols (2014), there are 3 measurements to a great user experience:

1) Useful

   The experience must be aligned to the needs of the problem the user has so it solves the user's needs. For example, a university website can help prospective registrars find the major and faculty they are interested in.

2) Usable

   The experience provided the easiest with the most efficient dan effective ways to solve the problem for the user. With the same example, the university website arranges the faculty alphabetically. With this arrangement, the prospective registrar can find their faculty of choice easily.

3) Desirable

   A user-friendly experience gives a good impression of the design. This experience can stick in the user's head and possibly recommend university due to it.

2.3 E-learning

E-learning is an electronic learning activity that is based on the information spread on the internet such as youtube, Wikipedia, and others. From an academic point of view, e-learning is considered a package of activities conducted through electronic mediums. Usually, e-learning is constructed based on regular needs, adapting traditional systems into new media. E-learning consists of several types and elements (Elkins and Pinder, 2015).

2.3.1 The Types of E-Learning

Types of E-learning based on the role of the instructor, schedule of activities, and individual involvement in activities.

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1) Synchronous learning

These learning activities take place in real-time between the instructor dan student. This activity doesn't adhere to traditional location, meetings of a class can be conducted in different places. Examples are webinars and virtual classrooms.

2) Asynchronous learning

The activity is doesn't require the instructor and the student to be present in real-time. Because there is no real-time meeting, scheduling of learning activities becomes flexible for students. This type of learning has a low potential the social connection due to no live interaction but this characteristic gives the participant more focus on the material at hand.

3) Cohort learning

This is the combination of synchronous and asynchronous learning. There are specific times for the students to meet in real-time with the instructor for material discussion but the students will be equipped with the learning material online to have independent study sessions. It has a scoring system that is inputted by the instructor. Cohort learning is commonly found in universities such as the blackboard platform.

2.3.2 The Elements of E-learning

E-learning Elements consist of Interfaces, Text, Navigation, Interaction, Tests, and Media.

1) Interfaces

The visualization of the features and material within the learning system. It contains a basic illustration such as the brand element of the e-learning brand and features to conduct the learning activities.

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b) Text

This element is used as a context provider within the learning system, supporting the communication and material presentation of the learning process. In asynchronous learning, this element is relied on heavily for communication and audio narration support.

c) Navigation

This element helps the user to navigate the learning system. This element consists of a mouse cursor, a link, and a material selection menu.

d) Interaction

This element serves as a response to the user inputs and provides the information needed by the user. This element can be found in quizzes, where the student is given the correct answer after the input their answer.

e) Test

This element mimics a system of face-to-face learning activities, using traditional formats such as multiple-choice, true/false, essays, essays, and simulations.

f) Media

To provide the information within the learning system elements of the media are used aims to increase user engagement with the subject matter. The elements of media consist of audio, video, graphics, and animation.

a) Audio, an element that narrates to sound waves.
b) Video and Animation, an element in which is needed for audio-visual explanation.
c) Graphics, an element that compliments the material presented by the text, giving visual context to the information

According to Deane et all. in Pina (2018), to create E-learning, a designer must assess the environment of the design target. By assessing the target, the designer obtains the existence of e-learning and its design delivery perspective. With two pieces of information in hand, the designer can make a solid decision in the design based on the real situation of the design target.

2.3.3   Basic Assessment before E-learning Design

In creating e-learning for an academic institution, the designer must be aware of the status of the system. The various situation of the design target audience varies the process of the design as well.

2.3.3.1 New E-learning

With no existence of e-learning, the designer must research the environment of the design target. To build new e-learning, a designer must first identify and find the purpose of the unit, resources, budget, and stakeholders. With the information obtained from the design target, the designer has to build a team in consideration of the workload needed in the design process. With the correct team in the design, the e-learning might fulfill the needs of the target.

2.3.3.2 Modifying Existing E-learning

With the existence of the e-learning system, the designer must identify the system and the needs of the user. Assessment will be conducted to see if the system is still capable enough to provide for the needs of the users. If the e-learning doesn't serve well anymore, the redesign project will be considered.

2.3.4   Design and Delivery Perspective

In designing an e-learning two groups of people are involved; the Administrator group and the Academic group. In this section, the book discusses where the order of approach begins.

2.3.4.1 Academic Arm

This design and delivery are mainly based on the perspective of the academic department. This perspective focused on achieving the best outcome of a learning experience. To realize the new e-learning system, the result of discussion with the academic department is communicated to the administrative department to get feedback and permission to operate.

2.3.4.2 Administrative Arm

This design and delivery stem mainly from the perspective of the administrative division. This perspective focuses on the resource within the company. After the agreement with the administrative, the design is given to the academic to get feedback from the academic perspective.

2.3.4.3 The Mixture of Academic and Administrative Arm

This design and delivery are a balanced mixture of both perspectives of the division. It is hard to manage but is possible to create a better result than the other design and delivery.