UNIVERSITY STUDENTS' PREFERENCES FOR CLASSROOM WALL COLORS

MAHMOUD FARHAT

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UNIVERSITY STUDENTS' PREFERENCES FOR CLASSROOM WALL COLORS

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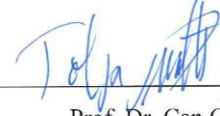
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MAHMOUD FARHAT

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FOR

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IN

INTERIOR ARCHITECTURE

Title of the Thesis: **University Students' Preferences for Classroom Wall Colors**

Submitted by **Mahmoud FARHAT**

Approval of the Graduate School of Natural and Applied Sciences, Çankaya University

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Prof. Dr. Can ÇOĞUN

Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

_____

Assist. Prof. Dr. İpek MEMİKOĞLU

Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.
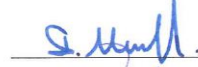
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Assist. Prof. Dr. Ufuk DEMİRBAŞ

Supervisor

Examination Date: 15.06.2017

Examining Committee Members

Assist. Prof. Dr. İpek MEMİKOĞLU	Çankaya Uni.	_____
Assoc. Prof. Dr. Nur AYALP	TOBB ETU	_____
Assist. Prof. Dr. Ufuk DEMİRBAŞ	Çankaya Uni.	_____
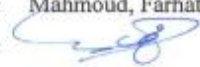
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ABSTRACT

UNIVERSITY STUDENTS' PREFERENCES FOR CLASSROOM WALL COLORS

FARHAT, Mahmoud

M.S., Interior Architecture Department

Supervisor: Assist. Prof. Dr. Ufuk DEMİRBAŞ

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At the present time, all seek to achieve psychological and physical comfort for students at all stages of their education, because most of universities use white color to paint the walls of the classroom. The aim of this study is to analyze the color used in the classroom in terms of preference and other favorite colors of students in the universities, in other words, to understand the usability of the white color within the classrooms. A questionnaire was administered to the student in Çankaya and Atılım universities. The results of the study indicated that the majority of the students do not prefer color used in universities (white) but there are other colors better than it, such as light blue and beige. These colors increase the educational attainment and creativity among students through the positive effects of these colors on the feeling of the students inside the classroom. The study suggests using alternative colors for white to increase student activity and reduce problems caused by colors in the classroom.

Keywords: Classroom, Color, Color Preference, University

ÖZ

ÜNİVERSİTE ÖĞRENCİLERİNİN SINIF DUVAR RENKLERİ İÇİN TERCİHLERİ

FARHAT, Mahmoud

Yüksek Lisans, İç Mimarlık Anabilim Dalı

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Günümüzde, öğrencilerin, eğitimlerinin her seviyesinde psikolojik ve fiziksel rahatlığa erişmesi amaçlanmaktadır. Bir çok üniversite, sınıf duvarlarını beyaz renge boyamıştır. Bu çalışmanın amacı, sınıflarda kullanılan renkleri üniversite öğrencilerinin tercihlerine ve diğer sevdikleri renklere göre analiz etmek, diğer bir deyişle sınıflarda beyaz rengin kullanılabilirliğini ölçmektir. Çankaya Üniversitesi ve Atılım Üniversitesi'nde öğrencilere bir anket sunulmuştur. Çalışmanın sonuçlarına göre, öğrencilerin çoğunluğu, üniversitelerde beyaz rengi tercih etmemektedir, açık mavi veya bej gibi renkler daha iyidir. Bu renkler, sınıf içerisindeki öğrencilerde yarattığı pozitif etkiler aracılığıyla eğitimsel kazanımı ve yaratıcılığı arttırmaktadır. Çalışma sonuçları, öğrencilerin faaliyetini arttırmak ve sınıflardaki renklerin sebep olduğu problemleri azaltmak için beyaza alternatif renkler kullanılmasını öneriyor.

Anahtar kelimeler: Sınıf, Renk, Renk Tercihi, Üniversite

ACKNOWLEDGEMENTS

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1. INTRODUCTION

At the beginning of the twenty-first century, educational institutions and teaching systems began to investigate ways of transforming educational settings into an integrated learning environment, where student are stimulated to acquire high scientific skills and a positive level of educational attainment, while increasing innovation and creativity (Alfit, 1996). To achieve these goals, it is important to provide a good physical learning environment in the classroom. In order to raise the students' performance to the required level, one of the most important elements of the environment that has an active role in the classroom is color.

As we all know, color is a central part of our daily lives and has both positive and negative effects on the behavior and mood of the person. In addition, color has an effect on the psychological state of the person in negative or positive way, depending on the color preference of a person and the place where he spend most of his time. Color must be studied in detail so that people can choose colors that are appropriate to a space and its function and that will be beneficial to the behavior and mood of person and/or people within.

Recent studies have confirmed that the correct use of colors increases the concentration, activity, and understanding from 55% to 78% (Al-Baghdadi, 2015). The study and design of colors inside the classrooms or study halls are important points to be considered in order to develop and increase the scientific and educational level within schools and universities, as well as reveal the appropriate colors to be used in classrooms, to maintain the psychological stability of the students in the classrooms in which students spend most of their time.

All of these issues fall under the topic of planning and design process for different spaces and this space is the environment occupied by human beings. As we know color is a powerful element that influences interior design, it is also known that the use of colors in interior spaces and complex buildings without the guidance of

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sufficient scientific expertise, and knowledge of the scientific basis can cause unwanted psychological effects within these spaces, as well as the occurrence of many negative experiences leading to a result much different than what was initially intended.

In order to avoid all these defects, we must define color, the concept of color and its theories, as well as the scientific basis for the use of colors and the functional and aesthetic effect of these colors as the interior space components. This study examines the effects of colors in one of the most important spaces that are educational spaces, and the reflection of color on the users in the space from several aspects such as physical, psychological and physiological effects.

To maintain a clear understanding of this issue, two educational settings, Çankaya University and Atılım University have been selected to conduct a research study in the departments of Architecture and the Interior Architecture of the two universities. Through this study, it is aimed to determine the colors that have a positive impact on students in the classroom.

1.1 Research Problem

In many countries around the world, most people do not focus on the color and the type of paint used in classrooms or design studios; sometimes the focus is only on the aesthetic aspect of colors, and most of the classrooms are painted randomly without any previous study. This causes a lot of problems for the students in the classroom, including, failure in courses, lack of focus and slow information absorption. It has been confirmed through several experiments and studies that color has a significant role in increasing understanding, awareness, and focus in the classroom (Jalil, Yunus & Said, 2012).

Moreover, it is important to focus on the impact of color on the mental state and the absorption capacity of the student, and the problems can be summarized under the following topics:

- The spread of white color dramatically and significantly in various schools and universities, and also some of these schools and universities are using the white glossy (oil), which is not valid for use in the classroom because it gives a strong and intense reflection of the light, which rays are harmful and cause stress to the eye (Engelbrecht, 2003).

- The selection which is not based on scientific study of colors inside the educational spaces and especially inside classrooms sometime cause psychological problems for students.

- The lack of knowledge the negative impacts of colors on the psychological status of student by the operators who work in the companies and institutions related to paint the educational spaces.

- Study the colors in terms of beauty only.

- The lack of knowledge the colors which have positive effect on increasing the focus of the students and thus, they will fall in other color which has negative effect on the student

Another aspect of the study is to study the use of white color since the dramatic use of white can be overwhelming and there are some researchers who believe that there are colors that have better effect than the white color (Ahmed, 2010). When we choose colors that are not suitable for educational spaces such as classrooms and that are not favored by students, it may increase feelings of concern, complaints of eye strain, impaired concentration and activity, etc.). Through research, it can be possible to minimize or eliminate all together the problems that may be caused by inappropriate choice of colors and provide students psychological comfort in educational spaces.
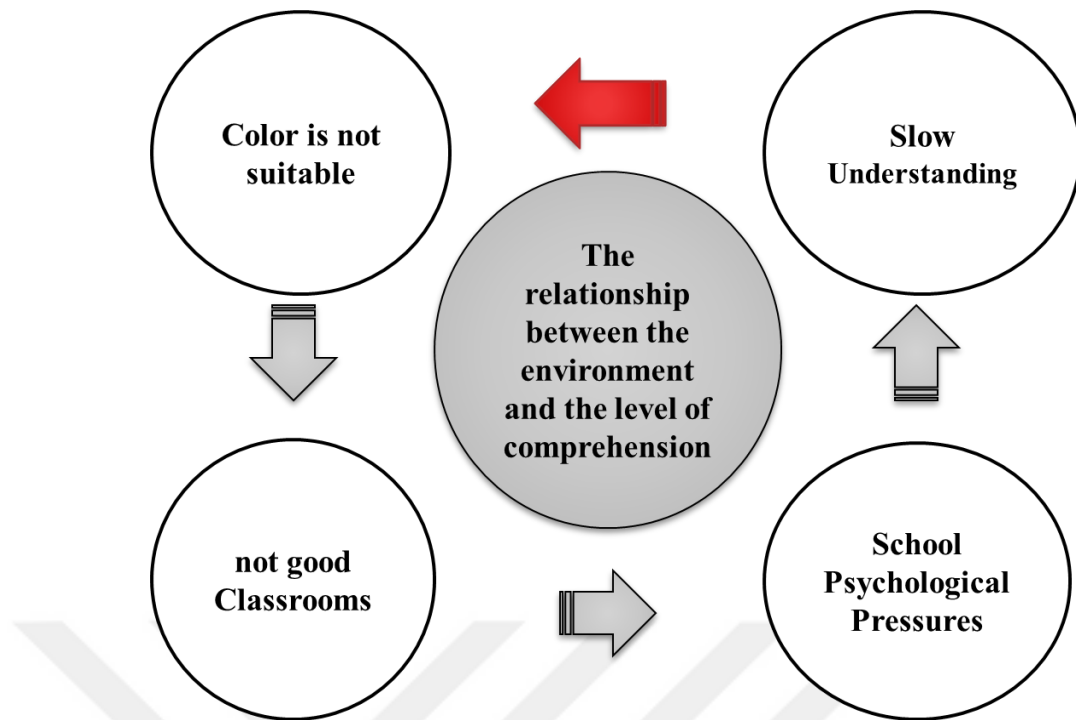
Figure 1: The relationship between the environment and the comprehension level with not suitable color (Alfit, 1996)

1.2 Importance of the Study

The findings of this research is anticipated to make it easier for companies and institutes that build educational settings such as schools and universities when choosing the colors to be used in the classroom with minimal effort and more accuracy, as well as the avoidance of choosing colors solely based on aesthetic purposes.

After gaining knowledge and an understanding of color through this study, any color used in classrooms can be analyzed, and the work of companies and institutions responsible for the work can be evaluated. This research can become a future reference for colors that could be used in educational settings particularly classrooms.

1.3 Structure of the Study

The thesis consists of six chapters. Chapter one is the introduction that explains the importance of the research methods especially in the educational institutions in general, the goal of the study, the problem for which this study was conducted and structure of thesis. Chapter two deals with studying the colors and their theories and some basic concepts about colors to give a general thought about colors and their definitions. As well as, this chapter explains the color philosophy and its relationship with lighting.

Chapter three studies the color effect on the environment and interior design and factors help on selecting the color in the interior spaces and the relationship of color with different cultures. Chapter four focuses on studying the color in the educational spaces such as kindergarten and basic, intermediate and higher education. As well as, it focuses on defining the educational classes, their types and some studies about the colors of the educational classes. Chapter five is the case study in which the site, participants and the procedure are described. In addition, the results are evaluated and discussed. Chapter six is the conclusion where the main results of the research and suggestions for future work are stated.

2. COLOR THEORY

Color theory is the practical guidance for integration of specific colors, which is a set of terms that are used to create harmonious color combinations, it occurs when you use any two colors of colors unlike each other on the color wheel, or three colors equally spaced around the color wheel (Pile, 2003). Theories of color depend on the variety of color and is associated with the design and application of concepts as well as with the color associated with visual perception theory in humans.

The philosophy of physiological and psychological color concepts include:

Primary colors: primary colors are divided into three colors as red, blue and yellow. These colors are specified by the recipe and give us when mixed with each other recipes another color, and consists of primary colors of two types (Pile, 2003).

- Printable colors (printers primaries): It consists of red, yellow, blue
- Light colors (light primaries): It consists of red, blue and green.

Cool and Warm Colors: In the 19th century, colors were divided into cool and warm colors, according to the sensation or impression that comes from a sense of a person who looks at these colors. The blue color and its derivatives are cold colors and the red color and its derivatives are warm colors. There are other colors that are not cold or warm colors called "neutral color" such as the white and black (Winnie, 2003).

2.1 Basics of Color

Now we know how our eyes and brain respond to all visible wavelengths, where the beam passes as white light through the prism and as it disperses, the light will move to different wavelengths that represent different types of colors, we can identify areas that dominate the visible spectrum of red, orange, yellow, green, blue, indigo, violet, through different wavelengths (see Figure 2; Day & Rich, 2009). "The narrow band of energy that the human eye can detect extends from 380 nm at the red end to 760 nm at the violet end. Sunlight produces all color wavelengths. When human eyes

interpret the wavelengths of light reflected from an object, they see color" (Day & Rich, 2009, p.84)
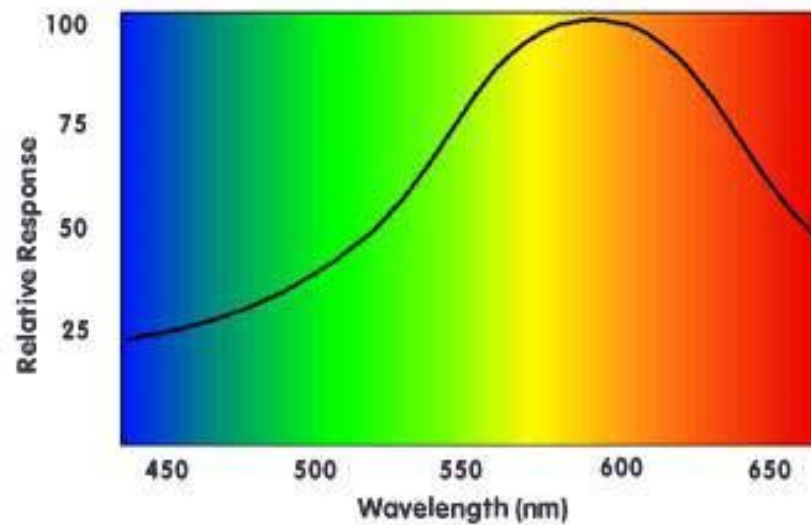
Figure 2: Wavelengths of colors (Hayder, 2013)

The color is a sense that does not exist without light, and the sun is composed of different colors of the spectrum, colors have different wavelengths that are longer for the red end of the color spectrum and shorter at the end of violet. Each color has a different energy. The eye sees the color of the reflected light, because the light if any object fell on the part of the light absorbed by the object and the other part is reflected (Lynnay & Huchendorf, 2007). As well as the color is the perceptual result of light in the visible region of the spectrum, which has wavelengths in the region (400 nm) to (700 nm), the incident on the retina (Lynnay & Huchendorf, 2007).

Color is also defined as a value which is determined in a particular item or material through the reflected light of it, or is a physiological effect resulting from the impact that occurs in the retina when it receives the reflected light of a particular surface, so the color is a sense that does not exist outside the nervous system of man (Damlkhe, 1983). From the physical point of view, everybody or shape is colorless, and the true color of any surface cannot be seen, until light falls on it. The color is determined by a set of criteria, it can distinguish color, namely:

1. Hue recipe color: this trait from which to distinguish colors from each other or between color and another, and when you mix two colors with each other, these characteristics change (see Figure 3).
2. Color value: Value is the relationship between color and color shining dark, and the change from shining to dark or dark to shining. For example: light green and dark green.
3. Saturation: It usually depends on the intensity of the color, or the amount of intermixing of the color is white or black (see Figure 4; Pile, 1997).
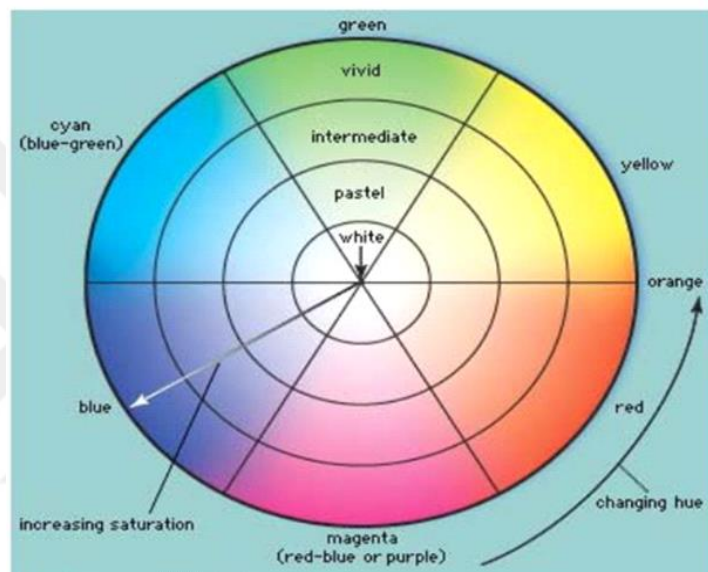
Figure 3: Saturation of color and character (Pile, 1997)
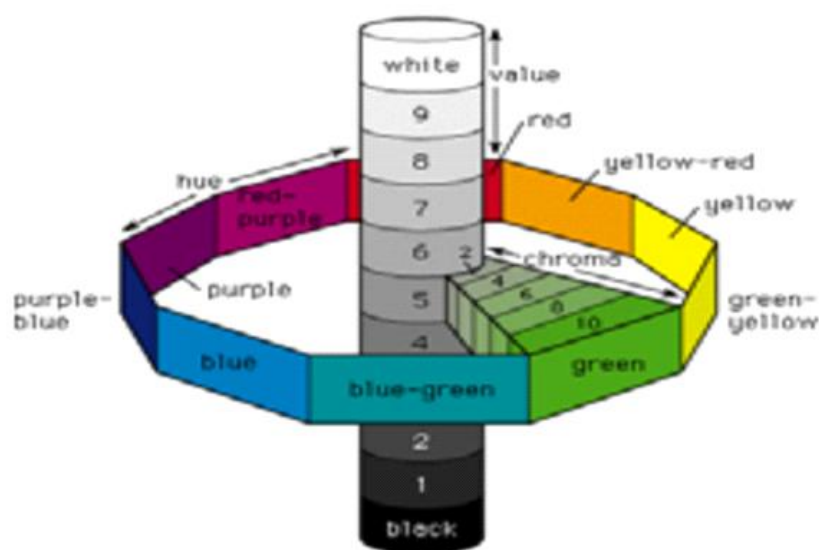
Figure 4: Color saturation and capacity (Pile, 1997)

The definition of color from a psychological point of view expresses emotions and feelings, which complements our lives with joy and pleasure, as well as giving us a treatment in some cases. Color is considered as the melody and rhythm that makes life beautiful. Colors move mood and sense, and the color is a mainstay of civilization in the present day because civilization today is the civilization of the image, and the image-based range of colors (Al-Sawaf, 2012). Hayder (2013) indicates that

> "For a long time colors remained without any attempt to subject them to measuring. This is due to the fact that the sensory aspect was stronger than the objective aspect in this matter. But the discoveries of scholars and those involved in this field enabled them to arrive at an objective fact; that the harmonic color system is one of life's natural phenomena, which can be realized in laboratories" (p.54).

Most people respond to the harmonious use of color as pleasing parts of the whole. As in music, color harmony provides that what we see is not boring and free of chaos in terms of organization and select ion of color. The use of uniform colors signifies the beginning of freedom of expression point in the color design. The combination of the guidelines for color and the freedom of expression in color could be useful in the planning of color schemes, and is rarely used this homogeneity without modification in some things (see Table 1; Kentucky University, 2013).

Table 1: Guide for the use of color harmony

Type	Name	Description	Example
Related	Monochromatic	Uses one hue in varied values and intensities. Add textures and patterns to add interest	Pale, medium and dark blue
Related	Analogous	Three colors located next to each other on the color wheel. They all share a color. Offer more variety of interest yet appear unified.	Green, blue-green and yellow-green
Contrasting	Complementary	Hues located directly opposite each other on color wheel. Has contrast and sense of action; introduces both warm and cool colors. Create better harmony if one of the colors is lowered in value or intensity	Red and green; orange and blue
Contrasting	Split-complementary	Uses one color and the two colors on either side of the complementary color.	Red, yellow-green and blue-green.
Contrasting	Triad	Uses three colors that are equally spaced from each other on the color wheel. Almost any color combination can be used in developing color harmonies.	Red, yellow and blue

Light has an important role on the effect of color in interior space, as well as a major role in the effect of color on the person who uses it. This is because the difference in light intensity causes a change in the color value, whether they are strong or weak lighting. Also colored light has an effect on the color characteristic as we know that the color change when the fall of the last light it, provided that it is a different color.

In addition, the known color effect which are basic - secondary - neutral, have been instrumental in the inner emptiness lighting, so when you use light colors, these colors increase factor optical radiation, in the space (Figure 5).

Figure 5: Use of light color increases the spread of the light beam

In contrast, warm colors when used with the user's light, whether natural or artificial light, these colors give the necessary internal vacuum without any lighting dazzle light or strong reflections within this space, as in Figure 6 (Alrezag, 2008).

Figure 6: Use of warm colors and lighting enhances the value without dazzle (Alrezag, 2008)

The degree of color plays a big role on the reflection of light in its different forms, whether it is to increase the overall lighting space intended or decrease lighting, this change depends on the degree of the color used within this space, so the color of the walls, floors and ceilings and furniture have an impact on the lighting within the space preferably these colors are not shiny any space especially in educational spaces, also is not permitted to use bright colors on the walls of windows because of the great contrast with natural light (Al-Bayati, 2005).

Primary and Secondary Colors.

Primary colors are colors that cannot be created by mixing other colors. They are colors in their own right. The three primary colors are red, yellow and blue (Aves & Aves, 1994). Primary colors can be mixed together to produce secondary colors. By mixing yellow and red, orange is obtained; by mixing red and blue, violet or peurple is obtained; by mixing blue and yellow, green is obtained.

Cool and Warm Colors

Warm colors include the colors yellow, red and orange of the color spectrum, and are associated with fire, heat, sun, and warmer temperatures. They are also called hot colors. Cool colors include the colors blue, green and violet. They are called cool colors because they are derived from the color of the sky and the water, which suggest cold and cold sources (Pile, 1997).

Color Wheel

The color wheel covers blue, red and yellow, as well as secondary corresponding colors, which are green, orange and violet or purple, and tri-colors which are red-orange, red-violet, yellow-orange, yellow-green and blue-violet and blue-green (Figure 7).
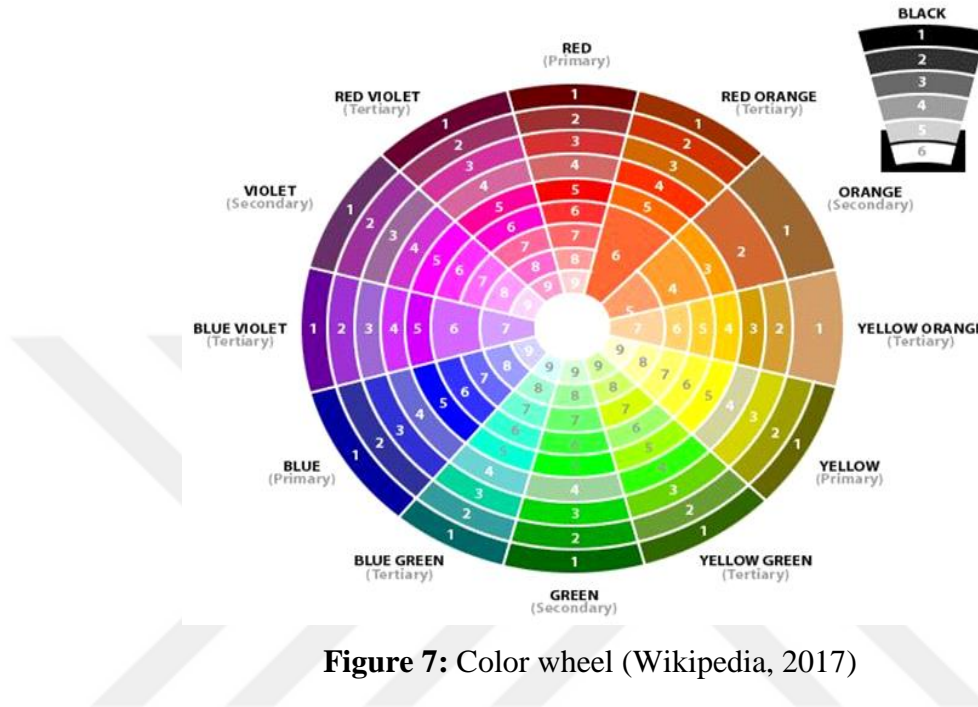
Figure 7: Color wheel (Wikipedia, 2017)

Most color wheels are based on three primary colors, three secondary colors, and the six intermediates formed by mixing a primary with a secondary, known as tertiary colors, for a total of 12 main divisions; some add more intermediates, for 24 named colors. Other color wheels, however, are based on the four opponent colors, and may have four or eight main colors (Wikipedia, 2017).

Color Contrast

Color contrast is clear between the severity of colors with each other, or is the difference in color density compared to another color, and this disparity has many forms, including:

- Variation primary colors: This type is stronger compared to other types of variation in color.
- Sub-contrast colors: In this type of variation is the degree of variation of less than primary colors, the contrast here is second-class.

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- Variation various colors: be less degree than other species, and have this kind of third-rate, as well as there are discrepancies between the other colors are included, according to the color value or by the value of color saturation.

In addition, there is a discrepancy between cool colors and warm colors (Pile, 1997). The intended contrast is a visual phenomenon spread, as we note in the lower forms of the white space in the black box like a space larger than the truth, and vice versa, as seen in Figure 8.

Figure 8: Color variance

The value of the contrast and color saturation chromatography can be seen in Figure 9.

Figure 9: Contrast according to the color value

As we can see in Figure 9 the grey area in the white box is lighter than the area in the black box. As well as in Figure 10 below, the grey area tends to color to the color box you are (Shawki, 2001).
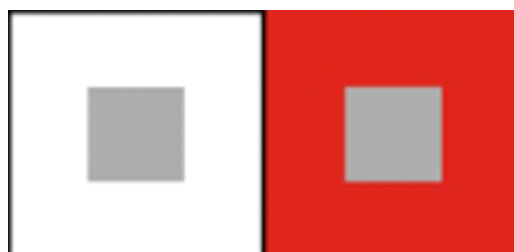
Figure 10: Contrast according to the color value with different color

Main types of major contrast are:

- Contrast depending on the color value: using the color groups, such as yellow, green, red or blue, red and violet.
- Contrast at one time: occurs when the eye is in need of another color to create a balance within the eye, which is necessary to balance the visual and stability.
- Contrast extension: This type is linked to the relative size of the area by two or more colors.
- Contrast light dark: You can get this kind using white color with black color.
- Contrast supplementing: happens when you mix two colors complementary to produce white.
- Contrast of the cold and warm colors: a sense of personal respect for the environment, which consists of bluish green or reddish-orange color.
- By Contrast Saturation: it is the Contrast between the color of dim light and color, and depends on the degree saturation of color (Alnasser, 2013).

2.2 Color Systems

The human eye can differentiate ten million colors (Fehrman & Fehrman, 2000). For differentiating color from each other fairly accurately, color systems were developed. However, a single color system cannot be truly inclusive as color is a huge topic. Munsell color system, NCS, CIELAB and RGB color model are the most widely used color systems in different research areas.

Munsell Color System

The Munsell system was originated by the artist A. H. Munsell in 1905 and it is one of the most widely used color systems (Hunt, 1987). There are ten major hues in the hue circle of the Munsell System that appear in an order (clockwise) (Agoston, 1987). Five principal hues are red, yellow, green, blue, and purple. Five intermediate hues are yellow-red, green-yellow, blue-green, purple-blue, and red-purple the Value (V) notation is defined on a scale from 0-10 and refers to the lightness of perceived color much as the luminance factor (Agoston, 1987).

The physical samples were arranged to form an atlas and Munsell Books of Color were established by visual means. It displays approximately 150 color standards arranged in slots on charts for forty different hues. It is used by color-scientists in government and industry throughout the world. In development and specification of color designs and communication of color information between sales, engineering and production departments, the Munsell notations and color standards are used (Judd & Wyszecki, 1975).

Natural Color System (NCS)

NCS has been developed as an implementation of the Ewald Hering opponent color system conducted in the nineteenth century (Judd & Wyszecki, 1975). According to Hering color system the hues red, yellow, green and blue are unique hues because they cannot be described in terms of any combinations of other colors (Hunt, 1987). Together with white and black, these four unique hues make six basic colors that constitute one additional color pair white and black (Hunt, 1987). NCS is the recognition of six psychological primaries that are six basic colors of hering color system: yellow, red, blue, green, white and black (Judd & Wyszecki, 1975). Also in the NCS, colors are defined by the relative amounts of the basic colors that are perceived presented by percentages (Hunt, 1987).

To conclude, NCS can be used by people with no particular knowledge about color and with no previous experience on color specification or color measurement (Agoston, 1987). It is the only color system in the psychology domain; all the descriptions are directly related to the properties of color percepts.

RGB Colour Model.

RGB color model is based on creating colors by mixing various proportions of colored light. The mixing of colored light is called additive color mixture. Three basic colors are producing white light: red, green and blue (Raskin, 1986). Mixing red, green and blue light not only creates a white or colorless light but also, by varying the intensities of colors almost any other color can be obtained (Helen, 1983). However, if the red beam is stronger than the green or if the green is dimmed

an orange will result. If the green color is stronger than the red, than it will produce a yellow-green mix (Pile, 1997).

The white that is produced by three additive primaries can be tinted by increasing or reducing one of the three colors. In RGB color model, the primary colors are red, green and blue. In between each primary color is a secondary color that is the mixture of two primaries and two tertiary colors that are the mixtures of a primary and a secondary color. The secondary colors are yellow, magenta and cyan. The tertiary colors are orange, yellow-green, cyan-green, cyan-blue, blue-magenta and red-magenta (Dekel, 2016).

2.3 Psychological and Physiological Effects of Color

Color is an old notion that humans knew about and color has many meanings for communities that are different from each other, it also has different meanings for individuals. Therefore, the color harmony between the colors with each other may not have one effect on all of the individuals. This effect differs from one person to another and from one place to another (Nazir, 2002).

As we all know the knowledge of color existed in various ancient civilizations. This included the Islamic Arts (Islamic architecture - metal artifacts - textiles - ceramics and sculpture, etc.) that showed the way to Muslim artists in creating beautiful art of Arabic calligraphy and its output consisting of lines Islamic Arab various kinds of pens and different colors according to the civilizations that passed by ancient and modern Islamic civilization (Kamel, 2002).

Umayyad was their motto white color because this color has a good feeling for the majority of the illiterate. The Abbasids was their motto black color, black was the preferred color for most of the population and a symbol of freedom and peace as well as the Alawites was their motto green color, and so we find that the color has been used in all areas of the arts in various civilizations in order to express the beliefs and cultures and on the human psyche in particular (Shaikhani, 1988).

The psychological impact of color is defined as raised electric magnetic radiation of light on the human mood and behavior, this effect causes a reaction psychological and physical, and this effect varies with age, gender, and culture, as well as there is a big difference between the color psychology, color psychology, as the science chromatography self-psychological characteristics associated with the mood in general, and the color psychology it can be understood only expresses the color (Wright, 2008). Color is an important part of many different science and research (such as art, architecture, health, etc.) so you can know the color from several different directions, and the definition of the color psychologically different from the definition color physiologically (Frank, 2006).

Color effect may be changed from the psychological effect to the physiological effect of the part or group of parts of the body. There are cases of disorder that occurs from the red color, and the impact of the alarm caused by the yellow color, as well as the dampening effect resulting from the green, all these effects are psychological effects (psychological), this does not mean the use of color only in the walls, but can be used in lighting or furniture (Cohen, 2004).

Psychological effects are divided into as direct effects and the indirect effects:
Direct effects are effects that clearly show a person like behavior (fun, sadness, etc.). The third-party influences directly, they vary according to the person, for example, the orange color represents heat and warmth, and the objective it means fire and sunset (Shirzad, 1985). Scientists develop a set of rules to coordinate the colors within the architectural spaces, so as to facilitate the knowledge of the psychological impact of colors within the space of using this space.

According to Al-Baghdadi (2015) under the theme color effect on the psychological state of the pupils and students, indicated six colors coordinating rules for the psychological impact of colors;
A. First Rule: This rule is based on the use of only one color, chooses any color desirable to have such red - yellow green and then changed his grades and density and distribution within the architectural space by function type.

B. Second Rule: is based on the use of primary colors, using these colors equal standards and grades, so as not to overshadow the color to another color, and can use a neutral color for flooring like white color.

C. Third Rule: is based on the use of colors in the color synchronizing circuit, this method of the easiest ways to make the architectural space is more in tune and gives more space in the design.

D. Fourth Rule: is the adoption of this rule is to mix two colors of the primary colors (red-yellow-blue), when integrating these colors we get the secondary color, this color complements the color that did not enter into such blending (orange complements blue).

E. Fifth Rule: this rule reflects the mixing of a complementary color or a secondary color with the color that enters in the composition of this color cmos, for example, blending orange color with red or yellow.

F. Sixth Rule: is the use of contrasting colors with each other in combination with each other, this method gives positive results are guaranteed (Al-Baghdadi, 2015).

Scientists have discovered that when light energy entering the body, it stimulates the pituitary gland, leading to the secretion of certain hormones, these hormones lead to a change in the physiological processes of the body, and therefore can direct control over thinking, mood and behavior (Kerkoz, 2004).

Color is a key element in the design process, because it has a role and influence psychological and emotional human whether this has a positive impact or a negative, as well as warm colors give us a sense of a beautiful, cold colors give us a sense of calmness.

Considerations in Color Selection

Responses to color are both scientific (physiological) and emotional (psychological). Studies related to physiological effects have shown changes in blood pressure, eye strain, and brain development (Engelbrecht, 2003; Morton, 1998). For example, exposure to red causes the heart to beat faster, an increase in blood pressure, and a heightened sense of smell. In contrast, blue causes a slower pulse rate, lower body temperature, and reduced appetite (Engelbrecht, 2003).

Psychological responses to color include changes in mood and attention (Engelbrecht 2003; Mahnke, 2006). The brain releases a hormone which affects moods, mental clarity, and energy level when color is transmitted through the eyes (Engelbrecht, 2003).

A number of studies have explored the impact of color in the classroom (Engelbrecht, 2003; Gaines & Curry, 2011). Findings are inconsistent in determining the optimal color choices in learning environments. Therefore, the following information serves to provide functional guidelines and explain the importance of color in the classroom. Studies conducted by Shabha (2006) and Gaines (2008) explored the impact of visual environmental stimuli for students in a special needs and general education schools. Teachers were surveyed and determined that visual triggers (including lighting and color) in classrooms have an adverse effect on the behavior of students with disabilities. Some of the behaviors observed included staring at light sources, repetitive blinking, moving fingers in front of the eyes, and hand flapping. The outcome of these behaviors may lead to poor concentration, communication, and social interaction.

Additionally, studies have shown that personal applications of color can improve academic performance. A study conducted by Stahr, Harleman and Billger (2004) found that students showed improved control of attention and motor processes when using colored paper. A control group of students did not exhibit a significant improvement when using colored paper.

Educational spaces are one of the most important spaces that should be the focus of colors hand more than others, both in this research or in process and applied life, and as we all know that educational spaces differ from each of several aspects of the most important functional activity of each space. In addition, another important point that must be taken in account in the buildings or educational spaces are the age of the person who occupies the space, (youth, adult, senior), in general, the educational and cultural voids preferably contains a set of harmonious colors with each other, where to cause the dispersion of the mind, such as violet color which does not favor its use in these places, but the use of colors lead and give an incentive for the mind and

increase the sense of comfort and calm, and give more opportunity to reflect and brain activity (Hamouda, 1977).

Figure 11: Using muted and comfortable colors (Emory College, 2010)

In most educational and cultural spaces using color grading light, to give some kind of warmth, as well as avoid the white surfaces that cause severe and impressive light reflections, causing anxiety, as well as one of the important things that must be introduced to avoid the use of large variation in color and especially in classrooms and libraries.

The second account of considerations in which the internal color space selection for any void are aesthetic considerations, one of the basics that are related to color to give the beauty of space and then give the final image quality interior design of the void. Aesthetic foundations determined by fine influences that gives them the beauty of the color of the void through the relationship between color and between space and space, form and light inside this void, and the most important color aesthetic foundations that give color profile within the internal void following (Gelam, 2000).

- Balance chromatography: is the value that achieve a balance in the art form of the space within the inner void by properties owned by color, achieved this balance by giving two values for onetime equal in effect, according to a correlation that balance forms that make up the interior design. This concept is determined by achieving the effect of depth and breadth, weight and others within the same space, light colors are lighter than dark colors, and the dark color gives a sense of depth and dimension,

unlike light colors they give a sense of broad and proximity, as well as cold colors lighter than warm colors.

- Chromatography rhythm: appears when repeated design elements within a void, and this is a repetition and make a beautiful model shows the importance of rhythm in space, occurs rhythm of color characteristics that give the void several specifications (depth- widened weight -etc.), where the value of the color and the contrast between the cool colors and warm sort of rhythm perception within the space gives the person or the person vacancy for this space is happening (blank) a sense of comfort and happiness, or tired and sad, (positive or negative sense), according to the colors used within this space.

- Movement: the art form depends on changing the visual field of a vacuum, meaning designs put characteristically then the distribution of colors with different designs are suggesting movement through visual perception process. This design also depends on the color mode and characteristics in terms of the change in the distance or the dimension or value, and can be seen through the visual sensation and feeling in a vacuum, and this feeling depends on two things namely, the color and composition of elements within the void (Dbs, 2008).

2.4 Usage of Color in Interior Design

The color as visual element has great importance role to affect the perception of the views and reflexion, through color we may feel a sense of beauty of internal design and to express as well the function of our space. Color is a physical phenomenon that has a central source is light, and it determines the three basic dimensions as follows:

- Hue: attribute of color, or the name of the color, such as the basic colours, when it blended it gives us all other colors
- Color value: the color value through which the colour reflects on the failing light, and it can be lighter or dark.
- Color density: The degree of intensity and concentration of color, and this is changing its this attribute or its value using pigments or by the effect of the failing light (Kassim, 2005).

During the analysis stage of any architectural space, whether internal or external space must be designed to study the factors that will affect the choice of colors in space, including:

1. Proposed use of space
2. Volume of space
3. Preferred direction of space
4. The time and the type of people that occupy this space
5. The time of day in which to use this space and the type of activities that occurs in those times
6. Current colors surrounding space
7. Preference for the color used by users for this space (Cheung, 1997).

The project, the designer will present the interior design of the agency that he will be using, and the ways for presenting should be the clear and accurate to avoid any misunderstanding, this presentation may also include the paintings of the design as a sample with all finishes related displayed in an organized manner, these paintings purpose of his presentation is to explain the concept of color and the connections between its different components.

The evolution of the color system: is a system like all other designs, that are repetitive processes, and involves a cycle of analysis, and evaluation. The starting point may be to get completely an arbitrary design, but the final must stand and reflects on the standards that are the basic for architectural designs in their natural form, whether it is good or not.

The internal space: by the knowledge of color and its psychological effects or using the dimensions of space should be easier to the designer to control the location that is aiming to serve the functions and the type of activity within the space, e.g. color in the sitting room for family activities are varied, and prefer to use quiet colors that help you relax and sleep.

According to Mshaal (2005), the effect of color within space is divided into two types:

Type I: organic influence (physiology), any color effect on the member directly from human organs, such as the degree of the blue effect to calm the nervous system of the human person, and the impact of the use of the color red in increasing blood pressure, because it causes an increase in heart rate.

Type II: the psychological impact (psychology), a sensory impression as giving a sense with a capacity of place when using the tones light for blue pure, and rest and relaxation for grades green color, fun and activity for grades orange color, has the effect of a particular color from one person to another varies The use of the yellow color when gives some sense of vigor and vitality and fun and others gives a sense of reluctance and discomfort and anxiety (Mshaal, 2005).

Well there are some things that need to be introduced to the designer, such as chromatography organization that achieves good design for any space, this regulation requires a set of requirements in order to achieve the desired goal, including (Mshaal, 2005).

- Chromatography regulation acceptable, this point is considered a personal theme and respect Palmsamm.
- It should express the color for the desired purpose, by making some tests on a particular color within any space.
- Chromatography organization, bringing to the attention, through color and light Contrast value, because the pure color draws attention more than a dark color with light intensity taken it into account in the design.
- In chromatography organization considered (unit) of the important things must be considered and introduced, and it does not mean that all colors are identical, or be of the same colors, but must hold a general organization a sense of continuity and satisfaction, especially in spaces that need to plug in them (Kassim, 2005).

2.5 Misuse of Colors

Choosing the right color to paint the walls and ceilings of any space is one of the basic conditions for the consistency of interior design, this choice must be in advance, but there are some common mistakes committed by others when selecting the color of the space. Most people are not aware of the effect of color within the space, some of the problems that are seen (Alwatan, 2015):

1. Random color choice: often lead randomness in the selection decisions to a number of problems within the architectural space, and this makes the space undesirable for the user.

2. Use a large number of colors: the use of a large number of colors in the same architectural space is difficult to understand, and causes interference to the brain and scattered focus, and often this plan fails. It is preferable not to use a number of colors in the same space, but have one color that is dominant in the space.

3. Contradiction in color: the contradictions in good colors add a lot of positives, but when we want to add these contradictions within the space, you must preserve the value of color and similarities between them, so that the difference in the value of color is acceptable and comfortable to the eye.

4. The use of dark colors: dark colors used in confined spaces makes it boring and more narrow place, so dark colors are used in the wide open spaces of big places, and only when necessary, in addition prefer to use light color on these colors.

5. The contrast in colors: the great variation in colors creates stress and anxiety, especially in big places, so dominant colors are used in the bright and dark space.

6. Use colors: Use cool colors in places where the weather is always cool, and vice versa, cold colors need some warm touches to keep the air and feeling balanced within the space.

In addition, there are a lot of people or professionals in the field of paint who fall into many mistakes when selecting space, including color:

- Not taking into account the element of light, because light significantly affects the color.

- Mix many colors within the same space, causing the lack of harmony.

- Dissonance between space areas, so that the colors are not consistent with each other, so must be study spaces before choose the color, so that the user does not feel the inconsistency in the color space.
- The lack of comfortable spaces for the eye.
- The wrong use of the included color and luster (Alwatan, 2015).

3. COLOR EFFECTS IN THE INTERIOR ENVIRONMENT

Color is an integral part of the interior environment or of interior design, so it is important to consider color and its impact on the interior environment, whether educational or not, whether physiological or psychological effects (Soma, 2013). The primary goal of the study of color in the interior and exterior spaces is to equip a professional architect so that s/he can use any color in the space effectively, as well as to be used as a guide or reference for the use of color in architectural spaces.

The goal of interior design is to be able to change the influence of emotions for the better, and as we all know, color and light are the key factors in environments that can affect human condition. We all know that color and light have a strong effect on the psychological and physiological state of a person. It includes psychological responses to color changes in mood and attention (Engelbrecht, 2003).

Colour is a flexible and powerful design element. It plays an essential role in design and it touches everything. Colours work as a kind of language and serve as tools of communication between people and the things. It is important to consider the way people exist in different forms of relationships with the built or physical environment when colouring the buildings and associated environments (Smith, 2008). However, the colour scheme should not override the overall atmosphere. Careful settings of colour can make warm environments than they actually are or an appropriate usage can make cool environments to feel warmer (Danger, 1987). Therefore, colours should be used to give the right message to people through the built environment.

According to the opinions and observations of some of the theorists, and researchers believe that the effect of warm and cool color on the human being. The reaction given is similar to the color found in space, where the warm color than opening up to the outside, and the cold color makes a person more introverted (Varghese, 2001). By observing the results obtained by the researchers, color affects

the feeling of the people, as well as encourages the provision of good relations between the people and makes their lives better, in addition, color is a physical phenomenon that varies with the culture of the person or society.

3.1 Color in Educational Spaces

Educational spaces are the place or location where the student or the person meets the normal range of information that was not known, whether scientific or literary or sports information, etc., and these places or educational spaces vary according to the person type (student, reader, and researcher). In these years, human begins its educational tutorial from kindergarten, a period of pre-school, which is the first place that the child goes to after the house, then the student moves to the primary and secondary school and then university level, which gives the student more than a place to take the information, such as classroom, the public library, the university library, as well as within the university laboratories and external laboratories, and private architecture atelier and others. All these spaces need a good design study, so that the student can take the information and activity easily and without anxiety and tension. The most important things that have a positive or negative impact on the student in the classroom, or a researcher inside the library or the lab, are the colors.

Color is a powerful design element that produces profound psychological and physiological reactions. Studies have shown a relationship between color preferences, emotions, and academic performance in students (Gaines & Curry, 2011). There are some students especially those with a lack of attention or psychiatric disorder that are more sensitive to color within the educational environment as a result of the sensory and visual responses they own (Freed & Parsons, 1997). Generally, children of pre-school age of primary prefer warm colors, and high school students prefer cold colors (Engelbrecht, 2003).

Banaschewski and colleagues (2006) in Germany conducted a study about colors with students who suffer from a disability confirmed that these students have the distorted capacity to differentiate the color, depending on this study the conclusions have been put on the responses of physiological and psychological reaction. The

results showed adverse physiological changes in blood pressure, brain growth and eye strain (Morton, 1998). Red color causes a rapid heartbeat, increased blood pressure, while the blue color leads to a slow pulse rate, low body temperature and decrease in appetite (Engelbrecht, 2003). Some of these responses will be for a temporary period, others continue for a long time (Morton, 1998).

The research conducted by Torrice and Logrippo (1989) revealed that active children prefer environments that contain cool colors, and non-active children prefer environments that contain warm colors. There is evidence that color may impact learning outcomes of students (Gaines & Curry, 2011). Findings in the area of color preferences for learners, some children attracted to bright colors, while others are overwhelmed by the stimulation. It is stated that color stimulation in the learning environment improves attention and motor processes, resulting in better academic performance (Gaines & Curry, 2011). A study conducted by the United States Navy, showed a 28% drop in accidents with the introduction of color (Engelbrecht, 2003). However, white and off-white business environments resulted in a 25% drop in human efficiency. Monotone environments created restlessness, excessive emotional response, difficulty in concentration, and irritation (Engelbrecht, 2003).

The learning environment has a critical role in the development and progress of human societies, as well as instill in students the values and good behavior and activity that is consistent with the community, and in this era, education has become an educational environment and has a big role in the student's education. Fahmy (2007) defined the learning environment as a collection of conditions and external physical and human factors that surround and affect his speed and effectiveness of learning.

Abdullah (2007) states that the school climate or school environment is one of the variables which in turn determines variables such as student grades in exams, as well as sometimes leading to a student's absence. As stated before, color is one of the important elements of the educational environment, and has a big role in changing the learning environment from worst to best, or vice versa, so it must be studied how

to improve this environment by following a few tips offered by the researchers in this area.

The book by Abdullah (2007) provides some advice and guidance regarding the improvement of instruction environment, through the experiments that carried out by the researcher, and his research in the field of color, the most important of these tips include:

- Preferably use warm and bright colors in the pre-school classes (kindergarten).
- Use cool colors in the upper classes, as well as in the middle classes (secondary) for their ability to help focusing.
- Libraries prefer to use pale green color to create a calm and focus.

Also, Mahnke and Mahnke (1996) included some guidelines and tips that should be used when choosing the right color for any type of spaces. They are:

- Maximum difference percentage in brightness shall not exceed 1-3% between the ceiling and the walls.
- Ratio of the brightness in the interior space in general is from 1-5% in order not to affect the eye strain; this limit is to be done in all spaces of the school frequently visited students on an ongoing basis.
- The colors of the walls must be in this border in order to have an appropriate impact on the student in terms of reflection and shimmers.

Color in Kindergartens

Barrett and Zhang (2009) showed that the preferred and common colors for age groups between 5-12 years in the classrooms are red, orange, yellow, green as well as there are colors is a favorite for kids in the classroom are gray, black, white, violet, where the colors large areas in the classroom ceilings, walls, floors as well as small spaces such as seats, panels and bulletins boards. Researchers, designers, architects, who take care of children, choose these colors inside childrens' classrooms. As well as through their recommendations to integrate natural colors with each other within the space of children, because children like participation of all colors within their own single space, and these colors will be spread over different parts of the space such as ceilings, walls, floors, furniture (Read, 1997).

Choosing the right colors to paint classrooms, is one of the most important and necessary things that the architect and designer must be aware of the effects caused by these colors (Al-Baghdadi, 2015). Al-Baghdadi (2015) showed that the favorite color was brilliant orange to paint the classroom, because it is more colors that send vigor and vitality in the hearts of the students, and the school year always comes in the winter; this color gives the student a sense of warmth and comfort in the classroom.

Table 2: Colors results within the educational space in general (Adler, 1996)

Hue, Value, Strength	Properties	Results
Light Colors	Receding Moves away from the viewer Restful	Spaces appear larger Spacious feeling Light airy feeling Objects appear lighter Objects appear larger Objects appear further away
Pale Colors (Tints)		
Cool Colors		
Dark Colors	Advancing Moves toward the viewer More active	Cozy feeling Areas appear smaller Objects appear closer Objects appear heavier Objects appear smaller
Intense Colors		
Warm Colors		

Engelbrecht (2003) indicates that the classroom that all of its walls are the same color may cause some anxiety and fatigue for students, according to the researcher, the wall behind the teacher must be in different color, such as degrees of green or blue color, and the purpose of this change is to relax the student's eyes.

Higher Education

When the color selected in the classroom on a scientific basis, the color that is used in the classroom have several pros to increase activity in the classroom, including:

- Increased activity and productivity: conducted several experiments on the coordination of color in educational environments, these studies and experiments confirmed that colors have increased the activity of students within the school

environment by about 25% of what it once was (Birren, 1997). This study also confirmed that the improvement of the learning environment through color increase mental stimulation and focus for a long time.

- Determine the path: the uses of color in the school increases illustrate the space by creating space helps to distinguish the important elements and objects within the educational space.

- Relieve eye strain: Eye strain is a medical illness, resulting from increased light on the eye, and produces this stress reduction in the focus, this color has a big role in reducing eye strain by coating the walls of the classroom colors helps the eye to relax, as well as stimulate student on the activity and reduce blood pressure on the brain (Engelbrecht, 2003).

In addition, a lot of functions and tasks of the colors make the student more focused and active, and reduces laziness and anxiety. To discover the psychological effects of color inside the spaces of the campus in general and in the classroom in particular, Sevinc and Kelechi (2004) conducted comprehensive research on the impact of the colors within the universities. The study included undergraduate students and graduate students, and included most of the spaces within the university such as spaces of educational, recreational, sitting, etc., and the results of this study are as follows:
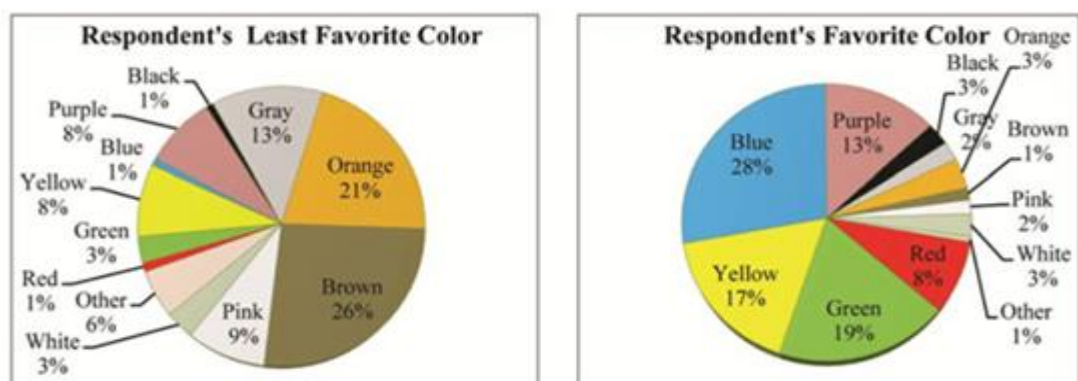
Figure 12: Statistical information about the participants (Sevinc & Kelechi, 2014)

This result is found consistent with the findings of Ching (2004) who concluded that the colors red, orange, and violet red, yellow, tend to incite a result of high blood pressure and breathing deep, and it has provoked a strong mood inside the space. In

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order to see the color effects within the university a study was conducted at the University of Leeds through personal interviews, and the results of the study indicated that the color green was quiet and enjoyable for students, taking into account external factors that reduce the psychological impact of colors (Harleman & Billger, 2004).

3.2 Classrooms

3.2.1 Definition of Classroom

Classroom is room that is prepared for education and teaching, this room exist in educational institutions in general, including public schools, private, universities, companies, and others (Clabaugh, 2004). Most of these rooms (classes) are equipped with a white or black board, and some advanced classes are equipped with computers, maps, paintings, etc., and these classrooms should be very comfortable (psychologically - physically) such as air flow, temperature, furniture, class size, color and other, because the student has the right to learn in a good learning environment free of noise and confusion.

In addition, there should be a range of facilities that are necessary within the educational environment or a school like green squares, stadiums, restrooms, etc. and importance must be given to the classroom, all of these components are done in different forms of learning environments (kindergarten, schools, universities, colleges, etc.) In addition, the viewing angles should be suitable for all students; this comes through the season-dimensional design and shape (see Figure 13).
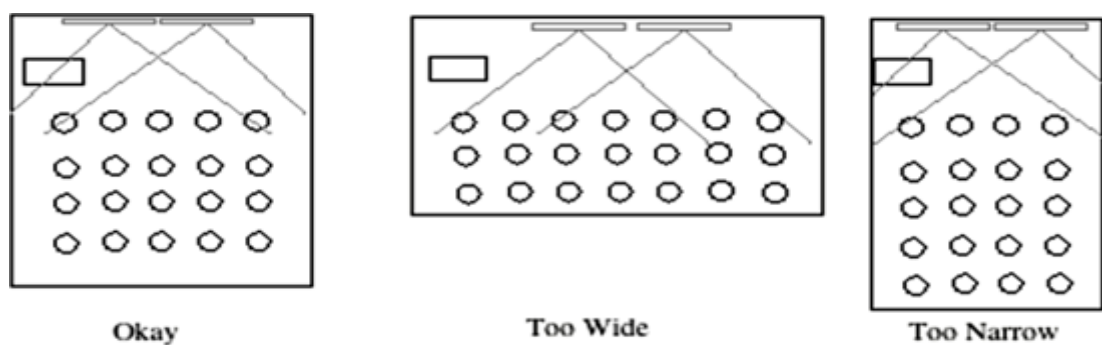
Figure 13: Viewing angles design (University of Maryland, 2004)

Refers to the need for there are no obstructions in the classroom, such as columns, and select the appropriate height of the ceiling of the classroom, as in Table 3.

Table 3: The height of the ceiling of classroom (University of Maryland, 2004)

Room Capacity	Optimum	Minimum
20-49 stations	12 feet clearance	8 feet
50-75 stations	12 feet clearance	10 feet

3.2.2 Types of Classrooms

University of California developed a special system for the management of the academic space, in this system the classroom is divided into several types according to shape, size, furniture type, the university acknowledges that the study can occur anywhere, whether in an enclosed space or in an outer space. However, this university aims to create a good learning environment and increases the level of psychological and physical satisfaction of student in the classroom (Thurnquist, 2003).

- **First type:** a large room used for the disciplines of academic universities, enough for about 200 students, is sometimes used for purposes other than educational, but in a simple way, it has the various means of presentation.

- **Second type:** a large room but smaller than the first one used for universities, this type is enough for 21-199 students, and it has the various means of presentation.

- **Third type:** an average size room, enough for 10-22 students, it is normal classrooms, sometimes used for meetings, have different shapes (rectangular, oval, circular), these forms give more activity between students and teacher interaction.

- **Fourth type:** room of remote learning, this kind of classrooms are used a little, and is equipped with speakers and various communication devices, which allows communication between the student and the teacher out of the room, as well as it is equipped with presentation means.

There are some key requirements that must be met in the classroom, which are often designed with the classroom, as described in Table 4.

Table 4: Classroom Requirements (Department of Health Bureau of Emergency Medical Services, 2010)

Setup Style	Space per Person	Notes
Type I Classroom: General	17 – 22 square feet	Allows for use of rectangular tables that are 6 or 8 feet long and 18 inches wide with 2 fee per person and 3.5 feet between tables as the minimum for comfortable set. When using 30-inch tables ‹add 1 square foot per person to these figures. Always use the larger area per person when the speaker is on the long wall ‹ since this set is less efficient.
Type II Classroom: 60 People or less	22 to 23 square feet	As noted above.
Type III Classroom: Practical Skills Classroom	25 Square feet	Variables must be considered dependant upon what type of skills are being taught and the amount of student participation at any one time.
Type IV Classroom: Computer and/or Distance Learning Classroom	30 to 40 square feet (dependent on use)	For use of individualized computer or laptop workstations ‹30 to 40 square feet is required. For use as distance learning for generalized lectures ‹all requirements for types I and II must be followed.
Type V Classroom: NYS BEMS Final Practical Skills Examination Facility	100 square feet per practical skills testing station	For use of the NYS BEMS Final PSE
Type VI Classroom: NYS Written Certification Examination Facility	Approximately 31 square feet per candidate.	For use of the NYS BEMS Written Certification Examination

In 2012, Montana State University prepared a complete and comprehensive guide on classroom design, in this manual all higher education research were reviewed and different forms for the classroom by the shape, size and the furniture in the classroom were identified as follows:

- Loose sitting classroom: It is most common in various countries around the world, and gives a flexible space for movement, and requires daily

maintenance, such as the seats are returned to their place, enough for about 50 students, as in Figure 14.

Figure 14: Loose sitting classroom (Montana University, 2016)

- Seminars classrooms: it is classrooms that are enough for about 8-25 students, and be in a circle or rectangle shape, as shown in Figure 15.

Figure 15: Seminars classrooms

- Conferences classrooms: classrooms that are like conferences room, enough for about 8-25 students, there are often reserved space for meetings inside this kind of classrooms.
- Cooperative classrooms: this has become the most popular type in most countries, because it gives a chance to experience living with the audio technologies, this kind are enough for about 8-25 students, as in Figure 16.

Figure 16: Cooperative classrooms

- Fixed seating classes: the seats are fixed to land, and are often the seats in an arc within the space, and sometimes the class like a ramp or runway for there to be a field of vision, enough for about 40 students or more, as in Figure 17.

Figure 17: Fixed seating classroom

- Halls: are great spaces for presentations and meetings, high-altitude, enough for more than 100 students, as in Figure 18.

Figure 18: Lecture hall (Montana University, 2016)

Table 5: Shows the size of the classroom by type (Montana State University, 2016)

Square Feet per Station	Maximum Capacity	Room Type	Anticipated Furnishings
27 to 33	20	Classroom Seminar	Movable Tables and Chairs
28 to 30	12-18	Classroom Conference	One Large Table and Chairs
17 to 28	45	Classroom Loose Seating	Tablet Arm Chairs
22 to 25	45	Classroom Loose Seating	Movable Tables and Chairs
25 to 27	45	Classroom Fixed Seating	Fixed Table and Moveable Chairs
18 to 22	200	Auditorium	Fixed Seats with Tablet Arm
25 to 30	200	Auditorium	Fixed Table with Movable Chairs

3.3 Guidelines for the Selection of the Classroom Color

As indicated befor color plays a big role in any space, so the designer must be aware of the effects of color and then looking at how to choose the perfect color for the walls of the classroom. Some guidance on how to choose the color of the classroom according to previous studies and research are summarized in the following points:

1. Previous studies have shown that routine and normal learning environments may expose the student to the anxiety and inability to concentrate, so I preferred to use the correct colors in schools and universities to be satisfactory learning environment for all students, and more positive as much as possible, this does not mean coating all the classrooms in the same color, but you must choose several colors within the institution to be more comfortable and relaxed for students so as not to feel bored

2. How to choose the color of the walls of the classroom or any space is an important decision, so you must choose the color of the walls is not the point of the aesthetic view, but from a functional view, because the mood is very important in all facilities and especially educational facilities, it is important to understand how it affects the color the mood so we can choose in the most positive way.

3. Lighting has a very strong relationship to color, so you should not use very bright colors inside the classroom, especially the classes that have large windows or a direction against the sun's rays, as well as strong artificial lighting increases the glare inside space which leads to the absence of focus and increased anxiety.

4. Seasonal emotional disorder, especially in winter, it has a bad effect on learning, so refer to the lack of exposure to the sun and natural light, studies have confirmed that this type of disorders affect about 20% of people, especially in areas above the Latitude (40) such as (Canada), this disorder leads to depression and lack of productivity. This is why it is best to use colors close and similar to the colors of nature in painting classrooms and corridors within the educational environment.

5. As we all know that the house is dedicated to relax and reduce stress, so we find everyone is trying to make the house colors are more comfortable and relaxed for the whole family, as well as in the school because it is the second home for the child, you should take care of the school just like the house, in addition to some other influences that express education and give privacy to the school and the classroom, so that they are more susceptible to the students in the stages of the study and a student loves his school like his home.

6. Observe all that eye problems when students are in the stages of study increase each year, so the researchers are advised that the teaching wall (the wall behind the teacher) dissenting from the other walls, colored, or be a little darker than the other walls, because the student is always focusing on the front wall, the eye as well as take notes from top to bottom, and with repetition and color difference effects on the eye strain, but when the study wall is a little bit dark that reduces eye strain.

There should be a variety of colors at school and be distributed to all the facilities, as well as the colors must be in different kinds of cold and warm, bright and dark, according to the size of the windows, direction and lighting used in space, because the color has a strong relationship with lighting.

3.4 Studies about the Color of the Classrooms

Throughout history, the colors have an important role in people's lives and still to this day, and these colors have been associated with habits, treatment, celebrations, and others. in addition to the effect of these colors on the body, the soul, and the mood. Some of these colors have joy and pleasure for the person, and some have anxiety, boredom and confusion for the person, as well as some suggest warmth and the other suggesting cold, and others.

Mshaal (2005) confirmed that the colors indicate the person's tendencies, as well as to his mental state, where many of the research confirmed that there is a strong relationship between the favorite colors of the human person and his psychological condition. Most psychiatrists also confirmed that the two colors (blue, green) affect positively on the human, because they lead to the stability of mental state and to get rid of anxiety and tension, perhaps this rule came from the divine wisdom in the creation of the universe; the creation of the heavens and the sea is blue, and the creation of plant color is green (Mshaal, 2005).

Scott (1998) confirmed that there are several references with a strong and broad relationship with regard to the learning environment, including lighting color, decorations, furniture and class size, all of these things sensual variables affect the student in the classroom, whether positively or negatively, and what concerns us here in this research is the color and its effects in the classroom, as well as what are the colors that favored by students, according to the researchers point of view (Warner, 2000). Researcher also confirms that there are some colors will be more suitable than others for classes, because they reduce the fear and anxiety, and strengthen the sense of comfort, some of these colors are beige, light green, blue, and also affirms, that the colors in the walls of the classroom, unfortunately, does not reflect the creativity and did not take into account the psychological feeling of the student, but only talk about the aesthetic side of colors.

Joseph (2009) has an opinion on this subject where he sees that the educational environments in general affect the creation of the psychological atmosphere that helps to teach students and helps creativity and build a strong generation working on

the renaissance of the community and increases the rate of progress of this society, so here show the importance of the educational environment and the need for attention. The researcher says, "Many researchers believe in the importance of color in the educational environment and its impact on the learning ability of students, researchers have preferred in this area, both of the bright yellow and green comfortable, as basic colors for educational spaces." (p.45)

As well as the use of warm colors and lighting intensity leads to several not good factors for the student, some of these effects: muscle tension, trouble breathing rate, the turmoil in the heartbeat, irregular blood pressure, and the effect on brain activity. At the same time, the use of cool colors with dim lighting has adverse effects such as muscle relaxation and drowsiness. On this subject, has been tested with 98 students from universities students about color preference within the educational spaces, and the main colors (red, yellow, blue) and secondary colors (green, purple, orange) and neutral colors (white, gray, black) were selected. The results showed that the main colors obtained the largest number of positive responses, then the secondary colors, followed by neutral colors, as well as the green color raised emotions in a positive way, such as relaxation and comfort more than others, while the color white has made a large number from the neutral colors, but in some times the student may feel bored, as well as associated with gray color with negative emotions such as sadness, fatigue, and depression (Kaya & Epps, 2004).

Another experiment was also conducted a group of students at the College of Engineering (Middlesex University) in the UK. In this experiment, primary colors, secondary, and neutral colors (white, gray, black) were used. During this experiment, changing the colors of the walls and floor were changed at various intervals in different environments. The aim of this study was to get the colors of a comfortable learning environment for students, all these tests were conducted at the same time (midday) with the unification of all tracts classroom and is a rectangular shape, and after analysis of this study and put the answers in special tables the results were as follows:

Blue colors, white, light green are the colors that got the largest number of votes of both sexes male, female (Ballast, 2002). These colors light blue, white, green brought satisfaction for students in general, and when they were asked to order the colors based on their preference, the preference for light blue and white got a high positive, for female students more than male, as in Figure 19 (Saleeb & Dafoulas, 2010).
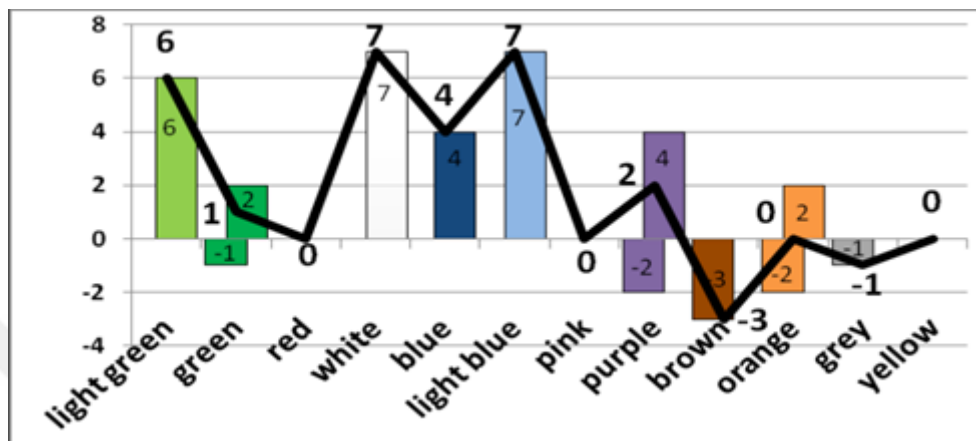
Figure 19: Female colors preference (Saleeb & Dafoulas, 2010)

In addition, the final result was the preference of three colors light blue, white, light green for male and female (Saleeb & Dafoulas, 2010; see Figure 20).

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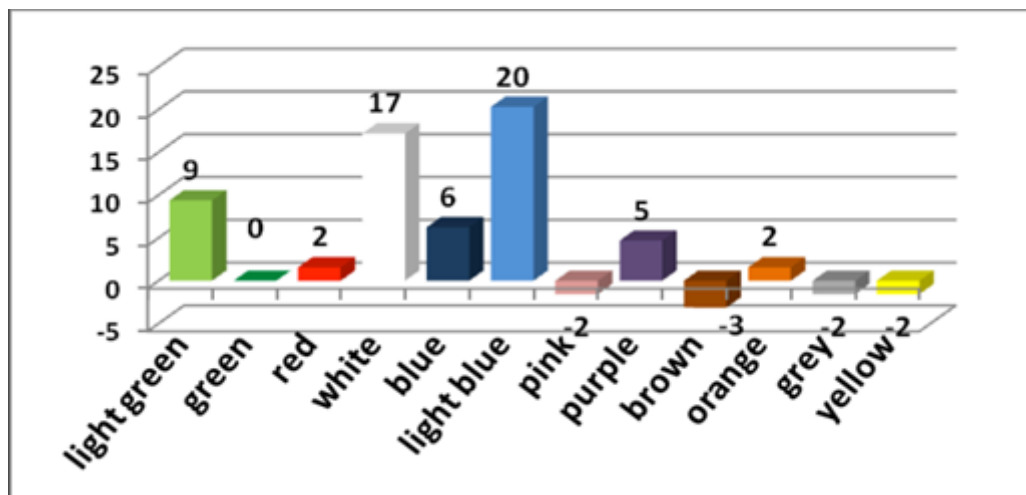
Figure 20: Male and female color preference (Saleeb & Dafoulas, 2010)

Through previous studies and researches and the findings of this research, the best colors in the classroom through which we can increase the activity and concentration,

will come out with a new generation that is more active and with strongest results. In order to build the education spaces on a good and right basis. By a simple and cheap factor which is color. This simple factor has a large and wide benefit to the community, in present and in the future.

Rim and Yoon (2015) assert that:

> "With such results, one can deduce that, rather than making efforts to change the classroom environment with wall decorations, desk arrangements, or classroom lighting, a higher level of student performance can be achieved by simply changing the color of test sheets and textbook pages. The study results prove that color changes can positively influence students' learning outcomes. In the future, in addition to the inclusion of colored test sheets and textbook pages, we can expect to see a variety of studies that will contribute to improvement in learning outcomes" (p.16).

3.5 Color and Culture

Unlike any other language, color is the only language that does not require any words just like music; it is also strange how color is used in the symbols and signs in all parts of the world. Northern Europe yellow color expresses deception and cheat, while in China it reflects the Empire (Yu, 2014).

Color is one of the most important things within the interior spaces, which greatly affect positively or negatively, as well as the use of color varies from one place to another or from one country to another, thus it is necessary to determine the psychology of each culture so that we can use color properly, for this purpose must designed to determine the relationship between color, culture, sex, emotions and behavior before you start the process of determining the colors within any space (Nezhad & Kavehnezhad, 2013). There are some colors and its meaning depends on nationality, race, and cultural views matter. The color blue was the favorite color and graining in most cultures in general. In the Jewish religion, the sacred color was studies (Nezhad & Kavehnezhad, 2013).

In Islam, the color green is the favorite color, the color has been used in the ceremony, is the orange color (weddings, and all people entering the joy and pleasure expressed in green. Al Harbi (2010) indicates that the nature of learning human to be

a culture about the colors, making the human mind is linked to specific colors, sometimes involving the culture of different peoples, for example, the white color that symbolizes joy and serenity, reverse black color that symbolizes the grief and mourning (Al Harbi, 2010).

Yu (2014) indicates that:

> "In spite of individual differences in the interpretation of colors, ancient civilizations worked out conventionally determined forms of color symbolism, usually as part of a search for basic principles with which to organize a world of multiplicities. Thus, the primary colors were frequently associated with divinities, the elements and the directions. For the ancient Mayas of Central America, the directions east, north, west, and south were associated with red, white, black, and yellow, while in ancient China east, south, west, north, and center, with blue, red, white, black, and yellow. Religion often overlaid this with other significance. To the Buddhist, yellow is the color of humility, hence its use in the monk's saffron robe. In Christianity, white represents the pure conscience" (p.50).

In another test, subjects from four cultures (Japan, People's Republic of China, South Korea and the USA) were asked to state which one of eight colors was most closely associated with 13 words often used to describe consumer products. The results indicate some similarities and some dissimilarities across cultures. All four cultures associate blue with high quality and red with love. Purple is associated with expensive for subjects from Japan, PRC, and South Korea. In contrast, respondents from the United States associate purple with inexpensive. Black is consistently associated with expensive and powerful across cultures (Bortoli & Maroto, 2001).

The color represents words and phrases, and expressions have a very strong function because it is an important part of communication between different cultures, if we were to know these words and vocabulary which represents the customs, traditions and culture, it is difficult for us to understand the cultural connotations among states and countries, so we should increase our interest in uniting the difference in color between the states and get an understanding of the history of language and social customs, also we should reach to find the differences and similarities of the same color between different cultures historically been (Guimei, 2009).

Consumers believe that color is important for certain types of products. Color matters the most for self-expressive products in Germany such as clothing, shoes or sneakers, backpacks or hand bags, watches, hats, house paint, bathing suits and sun glasses. When it comes to products used for functional purposes, (also called utilitarian products) such as computers, cell phones, digital cameras, game systems, umbrellas, school supplies, tooth brushes and mouth wash, color is not as important. Color is most important for products that we wear very often and use to express ourselves. We also spend more time considering and trying these types of products before a decision to purchase is made (Akcay, 2013).

3.4.1   Color in Libyan Culture

The Arab community has the ability to distinguish eleven basic colors besides the blue, and yellow which are green, black, pink, blue, brown, red, yellow, purple, gray, white and orange. Through different periods and cultures, the black and white colors are the most used colors in the whole world and in different cultures and times. Moreover, the most used colors at the Arab cultures are black and white colors and they can be distinguished easily. The terms of color has a different meaning at the Arab and Libyan people which can be explained below:

White (Abiath)

The basic representation of the white color is the nature color (Hasan, Al-Sammerai, & Kadir, 2011). Extended meaning is pure, clean and clear. Peace in Arabic culture, the peace denotes to the war end. So, if the army holds the flag with white color, this means that it displays the settlement and peace. Also, the white color is the color of the wedding where the bride wears the white color which signifies another inspired meaning to this color.

Black (Aswad)

The color of black hair and black eye represent the main representation of the black color. The black color represents negative meanings and things which are not favored to be seen due to the lack of transparency or the light in the dark such as the dark

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night (Hasan et al., 2011). In the Arabic culture, the black color refers to the funeral. Moreover, in the Arab countries, women wear the black dress to express their grief.

Green (akhthar)

The third developed color in the Arabic culture is the green color. In the Islamic culture, the green color represents a traditional color. Furthermore, the green color denotes to the goodness and truthfulness meaning. Green offerings maturity, young, vigorous, youthful and good sign (Hasan et al., 2011).

Red (Ahmar)

The rose with red color and the blood is the main representation of the red color (Hasan et al., 2011). The red color has extended meanings such as the love and passion. Moreover, the positive is the characteristic of the red color in the Arabic culture.

Blue (Azrak)

The nature color represents the main representation of the blue color (Hasan et al., 2011). In addition, there are another meanings associated with the blue color such as the illness and death. Moreover, the eyes that take the blue color refer to the envy and jealousy.

3.4.2   Color in Turkish Culture

As it is stated before, the meaning of color differs from one culture to another. Consequently, the colors in the Turkish culture hold different meanings. At the following step, the different color and their meaning for each one of them in the Turkish culture are described.

White color

The justice and power are the main symbolism of the white color. As well as, the white color refers to the integrity and trust sense (Çeken & Yildiz, 2015). Because of the white color denotes to the power and justice at the ancient Turkish people, it can be said it is the mother color for the other colors. Genghis Khan was wearing the

white color because he thought that this color represents the presidential color. After the marriage, the Turkish women wear the white scarf because they thought that it refers to the joy (Yardimci, 2014).

Red Color

The war and fight are main symbolism of the red color. In addition, the red color at the Turkish culture denotes to the enthusiasm and ability. While at the Anatolia, refers to the Prophet Ibrahim and may peace be upon them (Yardimci, 2014).

Blue Color

The blue color at the Turkish culture refers to the symbol of sky and the word mavi which denotes to the blue color in the Turkish culture is back to the Arabic language. Moreover, the blue color denotes to loyalty, friendship and love. Therefore, the color has been used during Ataturk era in the education sector (Yardimci, 2014).

Green Color

The green color has special importance at the Muslim people as it denotes to the vegetables and fruits where the tree colors become green one time in a year. Also, the number of greening trees denotes to the tree age (Yardimci, 2014). The health, abundance and Fertility are the main symbolism of the green color (Çeken & Yildiz, 2015).

Black Color

The lost and fear are main symbolism of the black color at the Turkish culture. Since the storms come from the north, the black color at the Turkish culture refers to the north. In addition, the black color has different meanings in the Turkish culture including the color of land. As well as, in the Anatolia, the word (kara) denotes to the lack of luck. Furthermore, the black color denotes to the death, mourning and sadness and Turkish women wear the black color to refer to their sadness (Çeken & Yildiz, 2015).

4. UNIVERSITY STUDENTS' PREFERENCES FOR CLASSROOM WALL COLORS: A CASE STUDY

4.1 Aim of the Study

This research aims to investigate the purpose of color within classrooms and educational spaces. And how we can take advantage of these colors in previous spaces. After attaining knowledge of the psychological and physiological effects of colors, it is possible to see the positive and negative effects of the colors and use the good side of them. Previous research findings indicate that red tends to increase perspiration, excite brain waves and raise the blood pressure, pulse rate, and respiration. Noticeable muscular reaction or tension and greater frequency of eye blink result (Adler, 1996). Blue tends to have a reverse effect by lowering blood pressure and pulse rate. Adler (1996) showed that colors have positive and negative effects in interior spaces in general, in this research the effect of color on the students within the educational space in particular are considered.

After achieving the above objectives of this research, will be possible to achieve an efficient learning environment in the classroom educational institutions in general. This environment, in turn works to motivate students to learn, focus and participate more. One of the most important points of this research study is to determine and gain an understanding of the colors that are appropriate for classrooms and educational spaces, in terms of the negative and positive impact they have on the mood and psychology of the students. The importance of this research is to provide a guideline for the proper use of colors in educational spaces and thus improve the following aspects for students.

- Improved information absorption capacity.
- Longer time spans in the classroom without feelings of anxiety.
- A sense of comfort and reassurance.
- Increase in the ability to focus on the subjects and understand what is being taught.

- Provision of a good learning environment to enable the acquirement of higher skills.
- An increase in the attachment of the student to the classroom, thus raising the educational level of the students.
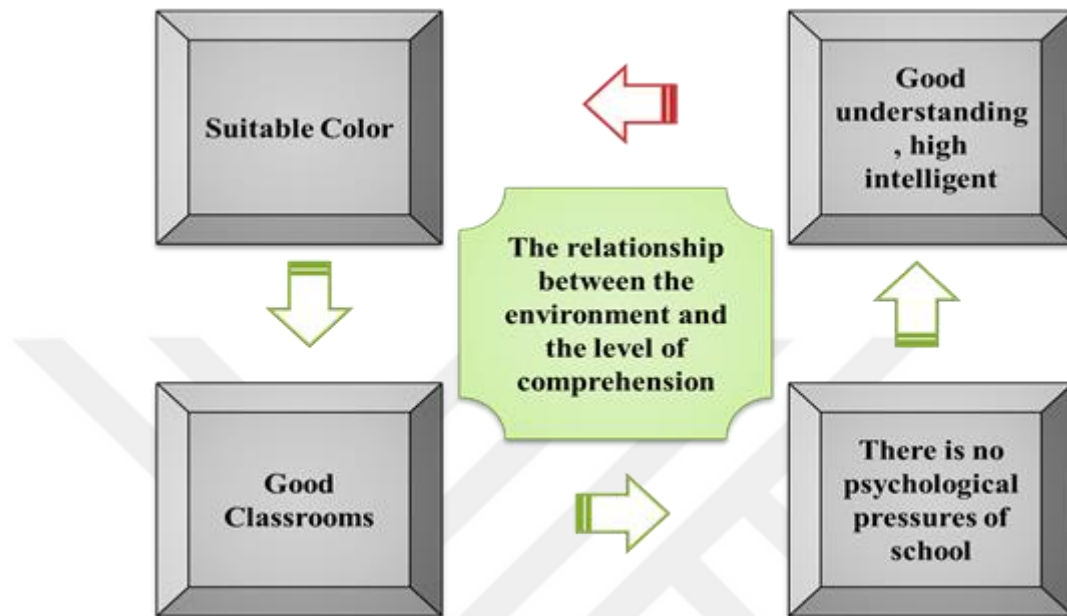
Figure 21: The relationship between the environment and the comprehension level with suitable color

It is also aimed through this research to achieve a set of goals that will improve the learning environment in general, these benefits include:

- See the positive effects of color on the mental state of the student within the educational space, and thus know the right choice of colors in the classroom.
- Knowing the negative effects on the mental state of the student within the educational space, thus avoiding choose the wrong color in the classroom.
- Avoid choosing the colors based on the aesthetically side only, especially within the educational spaces that are of the most important spaces.
- The possibility to use this research as a reference for researchers and readers, as well as for companies and institutions responsible for the establishment and coating educational institutions.
- Easy to choose colors that have a positive impact, to paint classrooms, educational spaces in general.

- The elimination of the problems that occur within the educational spaces, especially, because of choosing appropriate and inappropriate colors (have negative effect on student and researcher) or minimize these problems as much as possible.

4.2 Method of the Study

All or most of these stages take place within enclosed spaces of various shapes and sizes, and these are the spaces that should be focused on due to the role they play in the lives of, the people who occupy them. The main occupants of these spaces that are the ''students'' should be given all means of comfort since they are the future of the society, in which they live. Since these spaces are of importance, it seems necessary to conduct an accurate study on the elements that affect students in the classroom. This study focuses on color as an integral element that has a profound effect on the students' mood in the classroom.

The research study employed a questionnaire obtained from the students of two different departments of two universities. The two universities addressed here in the study are Çankaya University and Atılım University both are in Ankara - Turkey. Departments of Architecture and Interior Architecture from the two universities participated in the study, since the students of these two departments were familiar with the subject, and the study of spaces or interior spaces. The research study utilizes previous studies on colors and their effects on interiors especially educational spaces Soma, 2013; Sevinc & Kelechi, 2014; Jalil et al., 2012).

Description of the research method:

Initially a pilot study was conducted where 60 colors and their tones were showed to students and were asked to select their preferences for classroom environments. Following the pilot study, the top choices of the students were selected for the case study.

The number of students participating in this survey was 190. Students are male and female from two nations that are Turkish and Libyans. All the interviews were conducted face-to-face, according to the following plan.
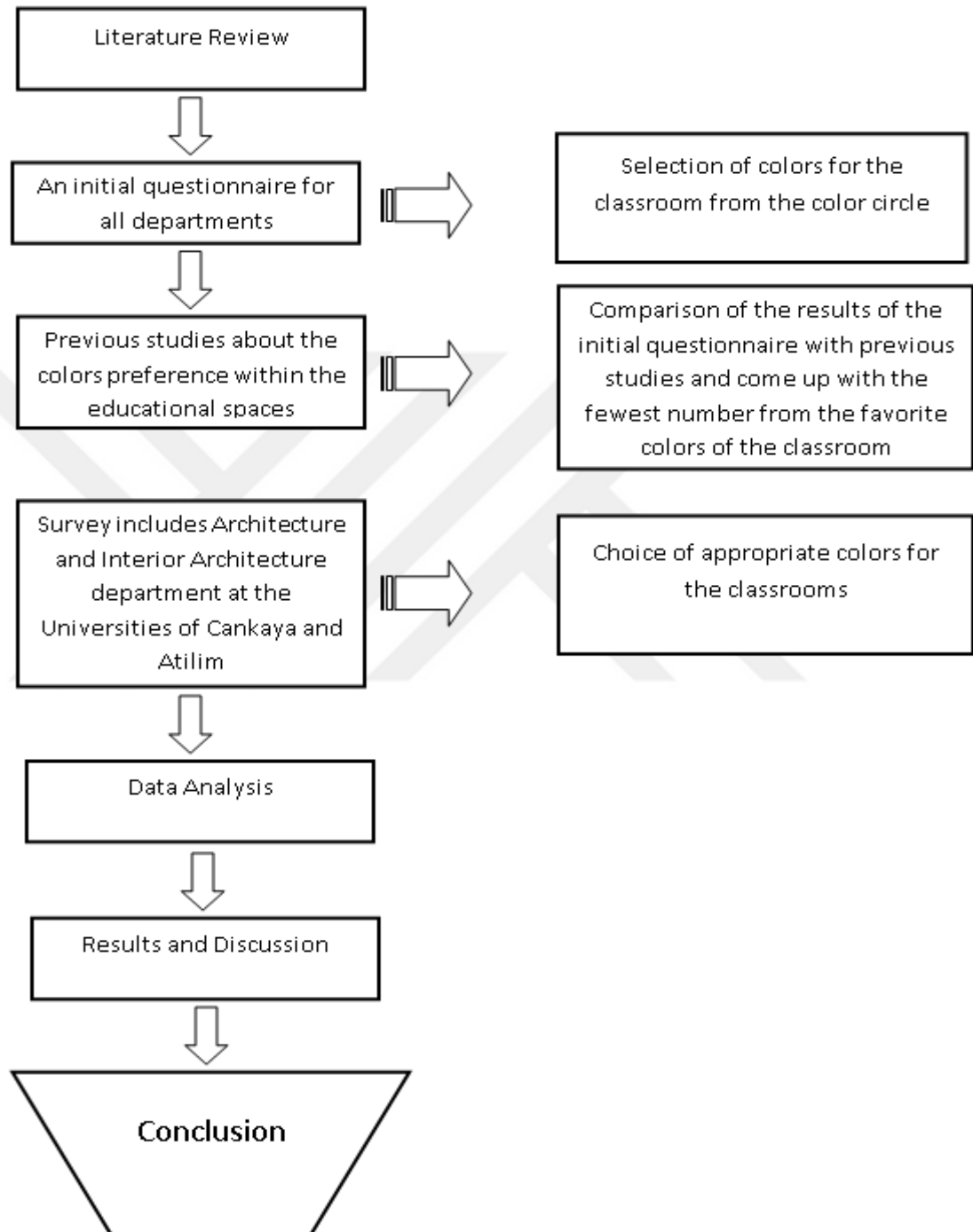
Figure 22: Work flow of the study

At the beginning of the interview, students were informed about the imortance of the survey, then they were asked to choose their favorite color through the pictures shown in the questionnaire. Students participating in this survey were from various departments of Çankaya University, (Computer, Law, Management, Architecture, Interior Architecture, Mechanics, Economics, Psychology and Construction), and were at various levels of study, BSC, MSC, PHD.

Through this questionnaire three of the colors that were selected as the favorite in the classroom were determined. In addition to these, colors that had a big role on the activity and concentration of the students through previous research and modern for some researchers and scientific studies were chosen. The results can be seen in Figure 23.
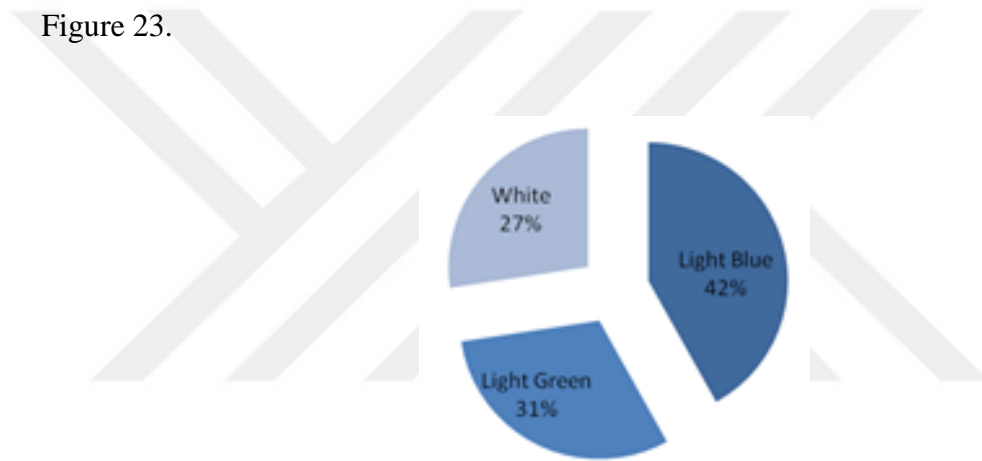
Figure 23: Color preference in the classroom

These colors have been chosen to serve as final questionnaire questions, which illustrate each color within the classroom through classroom photos designed by program (Sketch Up) to be the image closer to the truth, the classroom designed in these pictures according to the standard design of the classroom, which have been discussed in the third chapter, the internal classroom format has also been changed because not all classes have the same format and this idea gives more accurate results. The accompanying feeling for each color was also selected according to several studies as in the third chapter under the title "Studies about the Color of the Classroom". RGB color code that have been selected in this study as shown in Table 6.

Table 6: RGB color code

Colors Name	RGB Code
Light blue	#ADD8E6
Beige	#F5F5DC
Light green	#90EE90
White	#FFFFFF

4.2.1 Participants

The study was conducted with 136 students consisting of 126 Turkish students and 10 Libyan students. Also, 62 students study in Çankaya University and 74 students study in Atılım University, according to the following data:

Gender

The gender distribution of the students from Çankaya University and Atılım University are shown in Table 7. The majority of the students who participated in the questionnaire were female (55.15%).

Table 7: The gender of the students who participated in the questionnaire

Gender	No. of Students	Percentage	No. of Students from Çankaya University	No. of Students from Atılım University
Female	75	55.15 %	37	38
Male	61	44.85 %	25	36

Nationality

The nationality of students from Çankaya University and Atılım University and their numbers are shown in Table 8.

Table 8: The nationality of students according to the university

Nationality	No. of Students	Percentage	No. of Students from Çankaya University	No. of Students from Atılım University
Turkish	126	92.64 %	55	71
Libyan	10	7.36 %	7	3

As it can be seen in Table 8, a large percentage of the students who participated in the questionnaire were Turkish with percentage of 92.64% while the percentage of the Libyan students was 7.36%.

Department

The departments of students from Çankaya University and Atılım University and their numbers are showed in Table 9.

Table 9: The department of students according to the university

Department	No. of Students	Percentage	No. of Students from Çankaya University	No. of Students from Atılım University
Interior Architecture	75	55.15 %	31	44
Architecture	61	44.85 %	31	30

As it is seen in Table 9, a large percentage of students who participated in the questionnaire came from the Interior Architecture department with percentage of 55.15% while the percentage of the architecture students was 44.85%.

4.2.2 Description of the Site

Çankaya and Atılım Universities have been chosen as the settings for the case study of this thesis, because all of the classrooms and halls design have been painted with white color. Çankaya University is located in Öğretmenler Caddesi, Balgat/Ankara-Turkey (see Figure 24).
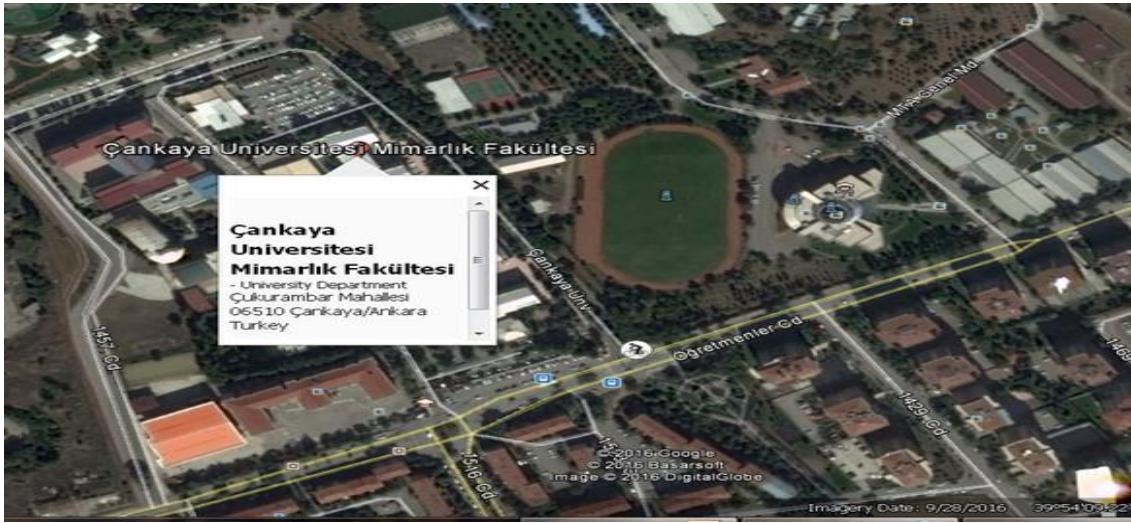
Figure 24: Location of Çankaya University

Figure 25: Classroom photos from Çankaya University

The pictures were chosen here from the front wall because the students' focus is most of the time on the whiteboard and the lecturer, and the focus on the rest of the

walls is very low, we can see a clear reflection on the front wall with white color which is not good for the student's eyes.

Atılım University is located on 250 acres of land in İncek one of the most recent and fastest developing residential areas of Ankara, 20 kms from the City Centre and 7 km from the motorway.

Figure 26: Location of Atılım University
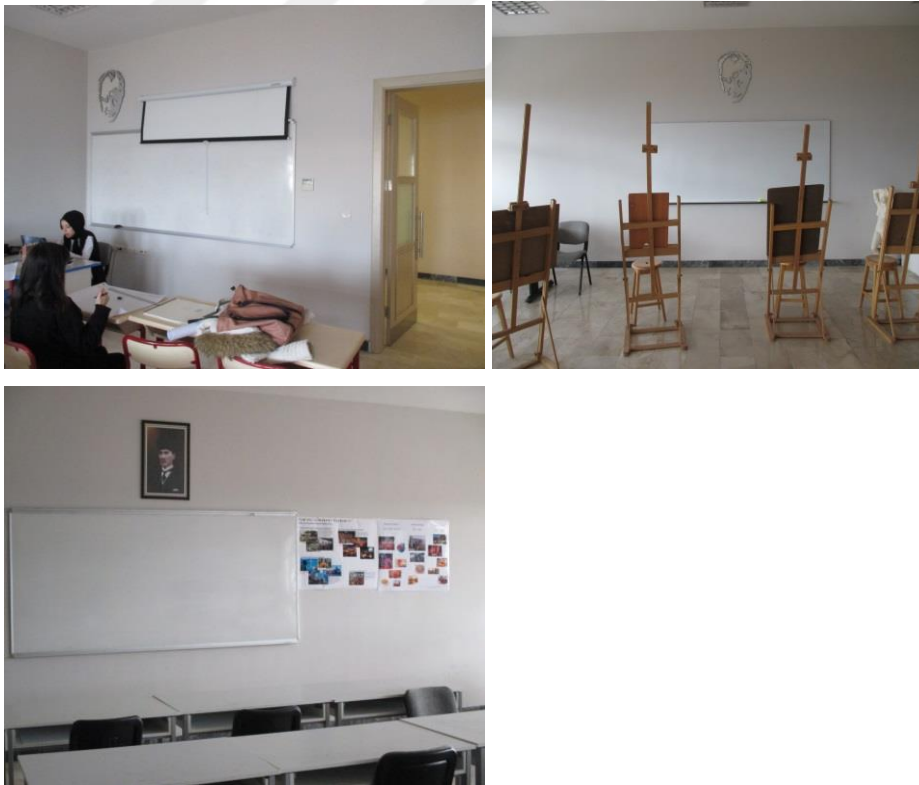
Figure 27: Classroom photos from Atılım University

Also, the pictures were chosen here from the front wall because the students' focus is most of the time on the whiteboard and the lecturer, and the focus on the rest of the walls is very low, we can see a clear reflection on the front wall with white color which is not good for the student's eyes.

4.2.3 Procedure

The questionnaire, which consists of 4 phases, was conducted on the 136 students from the deaprtments Architecture and Interior Architecture from the Çankaya and Atılım universities.

First phase: The same classroom images was displayed with various colors which were selected based on the results of the pilot study and findings of previous research on the colors preferred for educational spaces, namely light blue, light green, beige and white.

Second phase: In this stage each wall is studied alone, to see if there are some students prefer to have more than one color in the classroom or not.

Third phase: This is the phase where subjects are shown pictures through "three-dimensional glasses". All the previous images viewed in the second phase are reviewed through this "3-D glasses" and the speed that the images are displayed are controlled. During this phase the order of the colors in the classroom are arranged in order of preferences in the previous stage. This method is beleived to give more accurate results since it replicates a three dimensional interior environment giving the subjects a sense of how it actually looks in a real environment.

Fourth phase: If a student wants to experience more than one color within the same space, there are cutout images for each wall alone in various colors, so that students can design a classroom in any colors they want.

At the end, an analysis of the survey will be made and through this analysis the results obtained will reveal the colors that are prefered in the classroom and have a positive effect on the student, whether this effect is mental or psychological, helping them to concentrate on whatever activity is taking place and thus avoid all the problems that may occur in the classroom.

The limits of the study can be stated as:

Objective limits: the study sought to submit a proposal to improve the learning environment in the classroom to raise the educational level of students, through the study of an important element of the educational elements of the environment is a (color) to achieve a range of positive goals, such as increased activity, concentration, creativity, and gain skills in the classroom.

Spatial limits: this study was conducted in 2 universities (Çankaya and Atılım universities) in the Turkish capital / Ankara.

Temporal limits: the study was applied in the first semester (fall) of the year 2016-2017.

Human limits: the focus of this study was on university students from the departments of Architecture and Interior Architecture.

4.3 Results and Discussion

Feelings towards the blue color

The feelings of students towards the blue color from the two universities are shown in Table 10. The majority of the Atılım University students have described the emotion evoked by the color blue as "Quite" with a percentage of 47.30% while a large number of Çankaya University students described the feeling prompted by blue as "Effective" with a percentage of 11.30%. There is also another group of students that described the feeling towards the blue color as "Focus" with a percentage of 14.71% for Çankaya University and 10.29% for Atılım University students.

Table 10: Feelings towards blue for the Çankaya and Atılım universities

Feeling Towards Blue Color	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	43	28	15	31.61 %
Focus	34	20	14	25.00 %
Unfresh	5	2	3	3.67 %
Lazy	5	0	5	3.67 %
Quite	42	7	35	30.88 %
Worry	0	0	0	0 %
Comfort	7	5	2	5.14 %
Nervous	0	0	0	0 %

Feelings towards the beige color

The feelings of students towards the beige color from the two universities are shown in Table 11. The majority of the Atılım University students experienced the feeling of "Effective" towards the beige color with a percentage of 33.33%, while the majority of Çankaya University students experienced the feeling of "Effective" towards the beige color with a percentage of 66.66%. Furthermore, there is another group of students who felt "Quite" towards the beige color with a percentage of 8.09% and 8.82% for Çankaya and Atılım Universities, respectively.

Table 11: Feelings towards beige for the Çankaya and Atılım universities

Feeling Towards Beige Color	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	54	36	18	39.70 %
Focus	15	13	2	11.02 %
Unfresh	11	8	3	8.08 %
Lazy	8	5	3	5.88 %
Quite	23	11	12	16.91 %
Worry	6	0	6	4.41 %
Comfort	11	2	9	8.08 %
Nervous	6	3	3	4.41 %

Feelings towards the green color

The feelings of students towards the green color from the two universities are shown in Table 12. The majority of the Atılım University students have the feeling of "Effective" towards the green color with a percentage of 14.71%, while 15.44% of Çankaya University students have the feeling of "Quite" towards the green color. Moreover, Çankaya University students feel "Effective" towards the green color with a percentage of 10.29% and 13.97% of Atılım University students feel "Quite" towards the green color.

Table 12: Feelings towards green for the Çankaya and Atılım universities

Feeling Towards Green Color	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	34	14	20	25.00 %
Focus	7	1	6	5.14 %
Unfresh	7	2	5	5.14 %
Lazy	7	6	1	5.14 %
Quite	40	21	19	29.41 %
Worry	5	2	3	3.67 %
Comfort	18	8	10	13.23 %
Nervous	18	8	10	13.23 %

Feelings towards the white color

The feelings of students towards the white color from the two universities are shown in Table 13. The majority of the Atılım University students have the feeling of "Quite" towards the white color with a percentage of 16.9%, while 8.82%, 8.9% and 8.9% of the students of Çankaya University have the feelings of "Quite", "Effective" and "Worry", respectively. Furthermore, 16.91% of the Atılım University students have a feeling of "Focus" towards the white color.

Table 13: Feelings towards white for the Çankaya and Atılım universities

Feeling Towards White Color	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	18	11	7	13.23 %
Focus	17	3	14	12.50 %
Unfresh	12	4	8	8.82 %
Lazy	8	6	2	05.88 %
Quite	35	12	23	25.73 %
Worry	15	11	4	11.02 %
Comfort	17	6	11	12.50 %
Nervous	8	6	2	5.88 %

Feelings towards the blue color when seen on the front wall

The feeling of students from the two universities towards the blue color when seen on the front wall are shown in Table 14. The majority of the Atılım University students and Çankaya University students have the feeling of "Effective" towards the blue color when they see it on the front wall, 19.85% and 27.21%, respectively. Furthermore, 8.9% of the Çankaya University students have the feeling of "Focus" and 15.44% of the Atılım University students have the feeling of "Quite" when they see the blue color on the front wall.

Table 14: Feelings towards the blue color on the front wall

Feeling towards blue color on the front wall	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	64	37	27	47.05 %
Focus	29	11	18	21.32 %
Unfresh	1	1	0	0.73 %
Lazy	1	0	1	0.73 %
Quite	29	8	21	21.32 %
Worry	2	1	1	1.47 %
Comfort	7	3	4	5.14 %
Nervous	3	1	2	2.20 %

Feelings towards the beige color when seen on the front wall

The feeling of students from the two universities towards the beige color when seen on the front wall are shown in Table 15. The majority of the Çankaya University students (19.12%) have the feeling of "Effective" and 16.18% of the Atılım University students have the feeling of "Focus" towards the beige color when they see it on the front wall. Furthermore, 15.44% of the Çankaya University students have the feeling of "Quite" and 14.71% of the Atılım University students have the feeling of "Effective" when they see the beige color on the front wall.

Table 15: Feelings towards the beige color on the front wall

Feeling towards beige color on the front wall	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	46	26	20	33.82 %
Focus	25	3	22	18.38 %
Un fresh	0	0	0	0 %
Lazy	0	0	0	0 %
Quite	42	21	21	30.88 %
Worry	1	0	1	0.73 %
Comfort	17	9	8	12.50 %
Nervous	5	3	2	3.67 %

Feelings towards the green color when seen on the front wall

The feeling of students from the two universities towards the green color when seen on the front wall are shown in Table 16. The majority of the Çankaya University students (23.53%) have the feeling of "Quite" and 13.97% of the Atılım University students have the feeling of "Focus" towards the green color when they see it on the front wall. In addition, 10.29% of the Çankaya University students have the feeling of "Effective" and 13.97% of the Atılım University students have the feeling of "Focus" when they see the green color on the front wall.

Table 16: Feelings towards the green color on the front wall

Feeling towards green color on the front wall	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	36	14	22	26.47 %
Focus	25	6	19	18.38 %
Un fresh	3	1	2	2.20 %
Lazy	2	0	2	1.47 %
Quite	46	32	14	33.88%
Worry	2	0	2	1.47 %
Comfort	14	7	7	10.29 %
Nervous	7	2	5	5.14 %

Feeling towards the white color when seen on the front wall

The feeling of students from the two universities towards the white color when seen on the front wall are shown in Table 17. The majority of the Çankaya University and Atılım University students feel "Effective" when they see the white color on the front wall (19.12% and 24.26%, respectively). In addition, Atılım University students have the feeling of "Focus" towards the white color when they see it on the front wall. In addition, 13.97% of the Çankaya University students have the feeling of "Focus" and 11.76% of the Atılım University students have the feeling of "Quite" when they see the white color on the front wall.

Table 17: Feelings towards the white color on the front wall

Feeling towards white color on the front wall	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Effective	36	14	22	26.47 %
Focus	25	6	19	18.38 %
Unfresh	3	1	2	2.20 %
Lazy	2	0	2	1.47 %
Quite	46	32	14	33.82 %
Worry	2	0	2	1.47 %
Comfort	14	7	7	10.29 %
Nervous	7	2	5	5.14 %

Preferred colors on all of the walls in the classrooms (by images)

The color that the students prefer to see on all of the walls from the two universities are shown in Table 18. The majority of the Çankaya University and Atılım University students prefer to see the blue color on all of the walls (22.06% and 26.47%, respectively). In addition, Çankaya University and Atılım University students also prefer to see the beige color on all of the walls (10.29% and 14.71%, respectively).

Table 18: Preferred color to be seen on all of the walls in the classroom

Preferred color to be seen on all of the walls	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Blue	66	30	36	48.52 %
Beige	34	14	20	25.00 %
Green	14	7	7	10.29 %
White	22	11	11	16.17 %

Preferred colors on all of the walls in the classrooms (by 3-D glasses)

Students from the Atılım and Çankaya Universities were asked which color they would prefer to see on all of the walls by 3-D glasses. The color that the students prefer to see on all of the walls from the two universities is shown in Table 19.

Table 19: Preferred color to be seen on all of the walls in the classroom (by 3-D glasses)

Preferred color to be seen on all of the walls	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Blue	71	38	33	52.20 %
Beige	28	9	19	20.60 %
Green	17	11	6	12.50 %
White	20	8	12	14.70 %

Preferred colors on the front wall of the classrooms

Students from the Atılım and Çankaya Universities were asked which color they would prefer to see on the front wall. The color that the students prefer to see on all of the walls from the two universities is shown in Table 20. The majority of the Çankaya University and Atılım University students prefer to see the blue color on the front wall (34.00% and 49.00%, respectively). In addition, Çankaya University students also prefer to see the white color on the front wall (31.00%).

Table 20: Preferred color to be seen on the front wall in the classroom

Preferred color to be seen on the front wall	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Blue	57	22	35	41.91 %
Beige	22	8	14	16.17 %
Green	22	14	8	16.17 %
White	35	20	15	25.73 %

Prefer to see classroom walls with the same color

Students from the Atılım and Çankaya Universities were asked whether they would prefer to see walls with the same color. The number of student who would prefer to see walls with the same color are shown in Table 21. The majority of the Çankaya University and Atılım University students prefer to see walls with the same color (33.09% and 30.15%, respectively). In addition, students who prefer to see walls with different color and their percentage according to the Çankaya and Atılım university students are 12.15% and 24.26%, respectively.

Table 21: Preference to see walls with the same color

Prefer to see walls with the same color	No. of students	No. of Çankaya University students	No. of Atılım University students	Percentage
Yes	86	45	41	63.23 %
No	49	17	32	36.02 %

The positive and negative impact of the colors that have been selected in this study can be seen in Table 22.

Table 22: Feeling towards to each color

	Impacts / Colors	Blue	Beige	Green	White
Positive impact	Effective	43	54	34	18
	Focus	34	17	7	17
	Quite	42	23	40	35
	Comfort	7	11	18	17
percentage		92.64 %	77.20 %	72.79 %	63.97 %
Negative impact	Unfresh	5	11	7	14
	Worry	0	6	5	16
	Nervous	0	6	18	11
	Lazy	5	8	7	8
percentage		7.36 %	22.8 0%	27.21 %	36.03 %

Table 23: Color preferences of different nationalities

Nationality	Blue	Beige	Green	White
No. of students	71	28	17	20
Turkish students	63	22	10	15
percentage	50.00 %	17.46 %	7.93 %	11.90 %
Libyan students	8	6	7	5
percentage	80.00 %	60.00 %	70.00 %	50.00 %

This study has been conducted in order to know the color preferences for students' in classrooms. The students that have been chosen for this field study are the students of Atılım and Çankaya universities. One hundred and thirty-six students were chosen in this study and most of them were in their preliminary studies and their ages ranged between 20-25 years old. The study has shown that there are 41.92% of the students who prefer the blue color on the front wall following by the white color with 25.73%, then the green and beige colors with 16.17% and 16.17%, respectively.

In addition, the study showed that 52.20% of the students prefer to see the blue color on all of the walls followed by 20.60% of the students who prefer to see the

beige color on all of the walls following by white and green colors 14.70% and 12.50%, respectively. Finally, 63.23% of the students preferred to see the walls with the same color followed by 36.02% of the students who do not prefer to see the walls with the same color.

5. CONCLUSION

Due to the over use of white color in the classrooms and educational studio inside Çankaya University in particular and in most of the other schools and universities that have been visited in Turkey or elsewhere and through the study in this subject, it has been found out that there is a clear variation and difference in color preference inside the architectural spaces in general.

Through this study, the researcher wanted to select certain colors that can be used to paint the walls of the classrooms. These colors must have positive impact on all of the students as much as possible. As well as through this study the researcher wanted to find an answer to some questions about the validity of the use of white color in most of the educational spaces. And what is the impact of this color on the mood of the students in the classroom. And does this choice was the result of a scientific study, or it is a random selection. And also, to know if the white color is desirable or preferred by the student or not.

After studying colors in depth and its impact on the students and the architectural space, and doing a field study that is conducted by the researcher in two universities in Ankara, Turkey, which are Çankaya University and Atılım University. It has been found that the white color, which is very commonly used inside classrooms, has several negative effects including stress and anxiety in both genders in the different departments that the study has been done in. While light blue color, which is not used in the classrooms spaces, almost has no negative impact at all, and has a major role in the activity, focus, and comfort for both genders, and these are the most important points in this research. The white color on the front wall has been studied alone, and all the results were generally near between preferring light blue color and white color. Males prefer light blue color more than females. If we look in general, the light blue is preferred on the front wall more than other colors.

Regarding the color of the other walls, the white color got the third place out of four colors, and that is clear through its negative impacts that cause stress and anxiety for many students. Light blue color was in the first place of preference that had a large proportion compared with white and light green. This preference was in all departments that participated in the study, and of both genders alike. The color beige was the second most preferred color, due to its positive effects on the students. The color white was the third preferred and light green was the last peferred color. In general, the white color is not preferred in the degree that makes it used in this form especially in the classrooms, because it has a high proportion of negative impacts such as stress and anxiety among students. These effects have an negative impact on the level of education for all students, which is the goal of this research, to improve the level of education by improving the educational environment using the element of color; therefore, it is preferred to light blue color or beige color instead of white color inside classrooms.

Various recommendations can be stated regarding the study:

- The color design for any space according to the color study, theories and effects.

- The color is determined according to the function of interior space that is required to be studied in terms of providing the best level of psychological comfort.

- The necessities of taking into consideration the psychological effect of colors especially in the educational spaces because they have significant role in increasing the educational level of students.

- The benefit of color must be taken in enhancing the educational environment through the chosen of color which has positive effect inside the spaces.

- According to the results of this research it is recommended to use light blue instead of white in the classroom

- It is advisable to conduct more studies about colors and its relation with the educational spaces in order to achieve the best educational environment that studentsand society in general can take benefit, such as repeating this work to as many students as possible in different places to increase the emphasis on the results of this research and spread this subject to the largest possible area of societies.

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APPENDIX

QUESTIONNAIRE

Questionnaire Photos

F.W.G

F.W.B

F.W.W

F.W.Be

A

F.W.G

R.W.B

B

F.W.Be

F.W.G

L.W.B

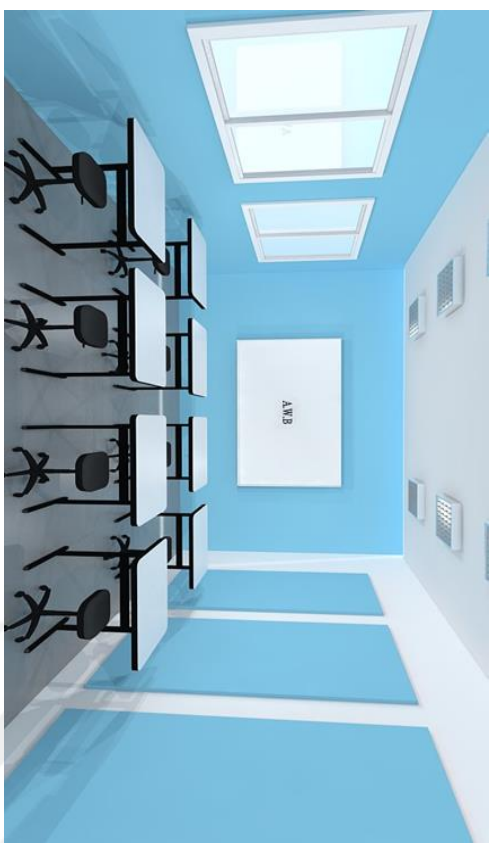F.W.Be

C

F.W.G

A.W.B

D

F.W.Be

Questionnaire

I am a researcher, Mahmoud Farhat, Master's student at the University of Cankaya, Ankara/ Turkey. I hope you help me get the information that is described below to complete my thesis, through the accurate answer to these questions. (Thank you for viewing and participation)

Gender	Male	Female	Nationality	Libyan	Turkish	Other	Degree	Bcs	MSc	PhD
-------			------------				----------			

University	Cankaya	Atılım	Department	Architecture	Interior architecture
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Age	15 - 25	26 - 35	36 - 45	More than 45
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1. Through pictures (**1**, **2**, **3**, **4**) What do you feel when you see these colors in your classroom?

No picture	The color	Feeling								
		Activity	Concentration	Idle	lazy	quiet	Anxiety	Comfort	Nervous	Other
1	Blue									
2	Beige									
3	Green									
4	White									

2. Through pictures (A, **B**, **C**, **D**) each one of them contains several images.
   - Choose your favorite color of each image.   (Just pick one)
   - Tick (/) under the feeling that the picture represents you.

No picture	picture code	Feeling								
		Activity	Concentration	Idle	lazy	quiet	Anxiety	Comfort	Nervous	Other
A										
B										
C										
D										

3. By three-dimensional glasses, arrange three pictures in order, starting with your favorite color.

Arrangement	the first image	The second image	the third image
picture code			

4. Would you prefer that all the walls of the classroom are the same color?   Yes ☐   No ☐

* If the answer with (no), you can choose your favorite color through the split picture.

Note: At this point I'm going to take a picture for the student's answer