Research Paper

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Investigating on the Interior Space Quality Affecting by Light and Color

Architecture

KEYWORDS : Space quality, Roman Atria, Daylight, Color Preference

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ABSTRACT

Users are at the core of contemporary building concepts and therefore interior design and space quality. There are some distinctive factors defining space quality such as; form, texture, light and colour. Subsequently, space quality is related with psychological description of color. Different lighting techniques help to rise people's sense of comfort, to mold identity and cut costs simultaneously. However, domestigating daylight via different surfaces is an ancient technique prevailing in Roman architecture. They used of atrium for domestigating sunlight. It usually includes a large space that was a distinctive part of ancient Roman dwellings. It was providing natural daylight and organic ventilation to the interior spaces with its basic functions. After modernity in architecture, they have some large windows and/or a glazed roof . In resent centuries of development, benefits of atrium can be identified in environmental, economic and architectural aspects. The atrium provides: lighting, ventilation, heating, cooling into the interior spaces. Some examples such as Roman atrium that are shown in this paper. The availability of daylight via atria considered in four models and alternatives after defining the rate of light penetration. It should not be forgotten that it is impossible to use of sunlight in nights. So, this paper investigated about LED lighting features for lighting interior spaces at nights. Providing colorful lighting by LED enhances its performance according to people`s preferences. Finally, different people`s preferences of color has been investigated to show which space can be advisable for different persons with different characteristics.

introduction

There are some distinctive factors defining space quality such as; form, texture, light and colour. Subsequently, space quality is related with psychological description of color. Different lighting techniques help to rise people's sense of comfort, to mold identity and cut costs simultaneously.

Atria have different roles in urban, architecture, space and climate. Its urban role is can be clear to understand while considering about cityscape. The public performance of atria highlights in urban due to cityscape [1]. Secondly, atria can perform as an architecture element. Albeit it can include a vast domain in architecture but its iconic feature had considered in this study. This part of atria performance depends on conceptual designing. So, it did not analyzed as its practical performances [2]. Then, its climate role is mentioned here. For example; it is useful for balancing the temperature in summer and winter. In winter, designing environments with some distinctive materials or forms as a stimulus could provide different temperature qualities. Anyway, the atrium provides: lighting, ventilation, heating, cooling into the interior spaces and also in the other hand, causes an integration and correlation in space between inside and outside of building, and also between building and city.

In the last role of the atria, this paper considered its special role. Space in architecture depends on architect`s concept and users requirements. So, the architect can control the activities within these areas in order to provide the process obvious to the users. For example, the Roman atria act well. It was the central part of the buildings in order domesticating natural light into building.

Atrium plays an effective role where daylight can be introduced into the internal areas. There are three limited areas in the buildings with atrium regarding to the daylight that have mentioned in the last part of this paper. Also, different alternatives of atria formation presented there.

It should be mentioned that using of sunlight in nights is impossible. So, this paper investigated about LED lighting parts for lighting interior spaces.

Providing colorful lighting by LED enhances its performance according to people`s preferences. different people`s preferences of color has been investigated to show which space can be advisable for different persons with different characteristics. For example; ; 35 percent of Americans prefer to choose blue as a favorable color but its color type and percentage can change among other nations.

Designing with daylight

Natural light enhances architecture by improving the ways that people reduce reliance on electricity. Analysis of the effects of natural light is precise. It shows how sophisticated manipulation of natural light could create drama without sacrificing the sensitivity required in lighting valuable exhibits.

The Romans implemented sunlight as a material like stone and brick. They did define sunlight as a material to enhance space.

For example: they brought daylight and fresh air homes by courtyards in Pompeii.

Subsequently, light became an internal material and no longer focused on the periphery," Pittsburgh architect Gerard Damiani says;

Daylight becomes a private element of the homeowner that he/she can share it with guests like a piece of furniture or other equipment.

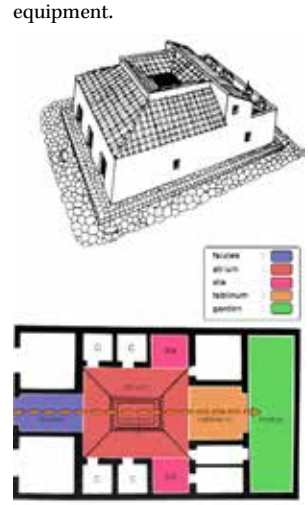


Figure1

The Typical Roman Atrium House with a Peristyle [3]

Providing visual comfort is an essential point of space that needs a large amount of artificial lighting that means wasting fuels [4]. Then, atrium can play an important role where sunlight can be introduced into the internal areas [5]. Daylight comes into building, and its intensity decrease toward going interior spaces gradually [6]. There is some difference between designing techniques in buildings with and without atrium. Generally, there are three limited areas in the buildings with atrium focusing on the daylight such as; minimum daylight or core of the building partial area or middle parts and maximum daylight area or exposed area.

Also, there are two areas in the buildings with atrium such as; exposed area and middle part as shown in figure10.

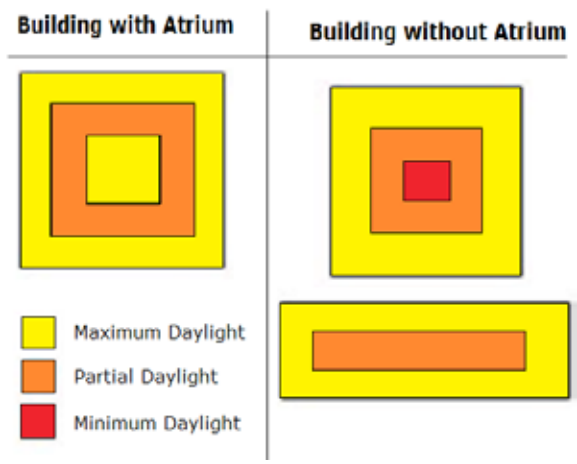


Figure 2
Availability of daylight

Atrium formation may include a large alternatives but it has classified into four classes including linear, attached, centralized and semi-enclosed as drafted in Figure 11[7]. All the mentioned types of atria has special thermal performance.

According to the mentioned figure, atrium surrounded by spaces in its centralized class. It illustrates the most effective performance of atria because the place where the atrium orientated around is the core of the space with minimum daylight rate. It should be mentioned that at least one aspect of atrium is not surrounded in semi-enclosed type of atria. So, the efficiency of centralized type is more than semi-enclosed type. On the other hand, the form of attached class is like linear type of atria [8].

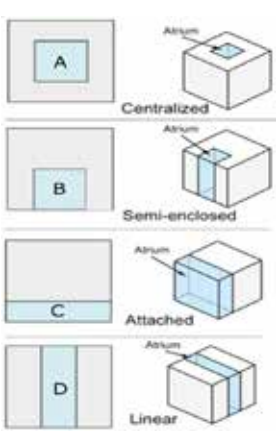


Figure 3
Atria types

Attached type of mentioned atria is closed just from one aspect. On the other hand liner atria are located between two aspects. Attached and semi-closed types operate like each other, and the most effective point in their efficiency is their orientation technique according to the sun directs. It means Southern aspect in northern hemisphere.

Daylight may be informative while generation of architectural forms. It has been a celebrated tool in highlighting cultural, contextual and experiential regard in architectural design. Exploring this concept, the dissertation assesses and re-interprets spatial, sensorial and form-giving characteristics using religious buildings as a forum [9].



Figure4
Natural Daylight (Isha Anand 2010)
LED Lighting Idea

LED light is flexible to compare of daylighting. İt can be applied to various uses and provide so many benefits specially in night when there is no sun [10].

It should be mentioned that LED lights can be made into different shades and colors but daylight is not flexible as that. It can be designed according to different spaces depending on the mood or ambience.

For example; LED lighting can make the space warm or cool. Also, it can be dimmed or brightened as it desired. There are so many possibilities in the interior decorating with LED lights.



Figure5
Dim Space with LED (http://seekayem.com/)

Lighting techniques in interior designing can be creative by adding LED lights in the different spaces such as: living room, bedroom, or even in the saloons. LED lights can be useful to do the spaces to make it more stylish, relaxing in nights.

Another important characteristic of lighting with LED is its variety of colors. Color is effective on space perception and providing colorful lighting by LED will enhance its performance.

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Figure 6
LED Lighting (http://www.archicentral.com/)

Color and Space Perception
Spatial dimensions and colors are basically visually conveyed. Their perception and experience is partially independent. Factually, principled architectural comprehension supply for some rules about the influence of colors on dimensions of perceived room.

Generally, desaturated, cool and light colors are considered to enhance the experience of spaciousness.

Whereas saturated, dark and warm colors have contrary effects. These features fit the qualitatively phenomenon of color perspective.

Color has been implemented to create feelings of spaciousness. As regards, how men are affected by different range of colors motivation varies among persons. For example; 35 percent of Americans choose blue and green followed by (16%). Purple with 10% has sand in third stage and red 9% absorbed the minimum rate.[11]

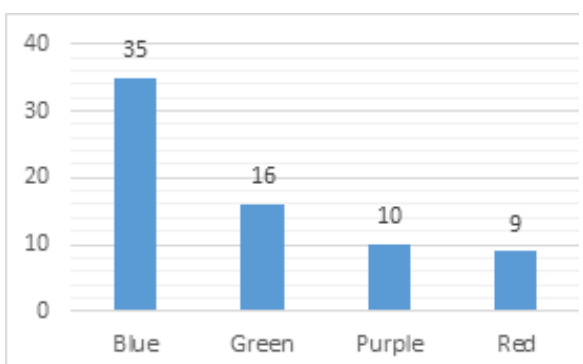


Figure7
American preference of Color

That has proven that color preference depends on ambient temperature. People who are cold prefer to be surrounded by warm colors like red and orange but people who are hot designate cool colors like green and blue. Academic research have shown that women prefer warm and men prefer cool colors.



Figure8 Joyful Warm Cool Colors

Some other studies have asserted that cultural background has a big role on color preference of people. Also, they show that people from the same region irrespective of race will have the same preferences. So, one district can have different priority than another district. Different country or a different area of the same country regardless of race.

Children's color preferences can be changed or vary for their pleasant and comforting but adult`s preference is usually not variable. As it mentioned colors can affect mood but studies do not consent on precisely which moods are excitation by which colors exactly.

Despite of cultural differences there are cross-cultural similarities regarding to the emotional level of people associated with different colors. To instance, red perceived as strong and active, blue is weak and dormant.

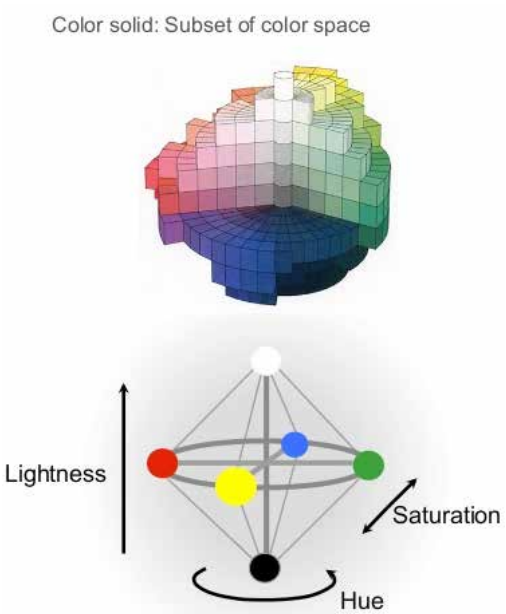


Figure9
Psychological Description of color
Conclusions
Color and light effect the spaces quality but it depends on people preference.

Atrium is a Roman element that is one of the most effective elements in order to use of daylight and absorbing passive solar energy. Implementing atria in buildings means using renewable

solar energy for lighting during days and also using or saving passive solar energy in winter.

The most effective factor in their efficiency is their orientation according to the sun directs (southern aspect in northern hemisphere).

LED is best option for lighting in nights because it is cheap. Also has different colors that makes controlling space quality more practical and economical.

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