

# Colour preferences and awareness of home makers on the role of surface reflectance in enhancing lighting performance in interior space

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## ABSTRACT

Light and colour are integral part of every residential interior. The present study was carried out to study the lighting, colour preferences and colour perception of house wives/ female respondents of residential units. A sample size of 60 female respondents from residential units was selected by purposive cum random sampling procedure from Jorhat district of Assam. Data were gathered by interview cum observation method. An attempt was made to identify the awareness of the respondents on the role of surface reflectance in enhancing lighting performance in interior space. An awareness scale was developed to determine awareness of the respondents on the role of surface reflectance in enhancing lighting performance in interior space. Finding pertaining to colour preferred and applied in selected activity areas reflected that majority of respondents preferred and used off white colour in walls of both living rooms (75%) and kitchen (81%). Maximum respondents (70%) preferred and used off white colour in floors of living room while in kitchen 60 per cent preferred and used brown colour in floors. In both living room furniture (80%) and kitchen cabinets (46.6%), respondents mostly preferred and used brown colour. Awareness of the respondents on the role of surface reflectance in enhancing lighting performance in interior space was found to be average. Employed and highly educated female respondents had high awareness on the role of surface reflectance in enhancing lighting performance in interior space.

## INTRODUCTION

In interior of residential spaces, choices regarding the colour and lighting are very important or afforded a high priority. Light and colour are integral part of every residential interior and their interaction is fundamental for interior design as the art of forming and organizing space. This understanding includes several aspects like preferences, perception etc. which calls for a

multidisciplinary approach. In interior space both colour and light are equally important. Colour is the design element that appeals to us, emotionally and psychologically and is considered the most powerful tool in the hands of the designer who looks for the new that moves with the time and futuristic vision. It humanizes the space, makes it welcoming and creates a sense of space, scale and meaning and makes the space come alive. Colour depends upon light to make them visible. Light is the most

vital element of design, for what if there is no sight. It is an energy that makes people see objects and distinguish colours. In the absence of light all objects are colourless and they exist as a shade. The light and colour is interlinked with each other in such that when light falls on an object its surface will absorb some colours and reflect the rest. The colours we see are those that are reflected.

Lighting is an important aspect of interior design it enhances the aesthetic appeal and creates the mood and ambience of an interior space. Light is the main element that gives the room a special look and transforms it into a seamless combination of functionality and style. Besides playing a functional role it creates a visually dynamic space. There are basically two categories of light in a house natural daylight and artificial illumination. The sun and the whole vault of the sky provide free limitless light; it is part of daily life, but individuals have no control of a natural light source. Artificial illumination is mostly dependent upon electricity.

Colour preferences for interior space vary from person to person. It is the tendency for an individual or a group to prefer some colours over others such as having a favourite colour. Personal preferences of colour are the most important concept to consider in interior space of residential units. While selecting colour for residential interiors the preferences of homeowners is very much important.

In interior space surface reflectance plays a very important role in enhancing lighting performance. It is valuable in interior space in such a way that the higher the reflectivity of space the more evenly light is distributed in the space. For all practical purposes light can be regarded as travelling in straight lines. The direction of light rays can be controlled by the nature and surface qualities of the material it strikes (Faulkner and Ziegfeld, 1963). Nuckolls (1976) said that "light rays can be reflected, transmitted, and/ or absorbed according to the surface". Reflection of light rays occurs when the light rays bounce off the surface in another direction. There are, however, varying degrees of reflection. In interior space surface reflectance of lights plays an important role it helps to choose right colour and lighting according to needs. In interior space no surface reflects or absorbs all the light that hits it, but high-value colours reflect a high percentage and low-value colours reflect little. Reflectance is the ratio of light reflected by a surface to the light falling on it. If the surface reflects three-fourths

of the light that falls on it, the reflectance is 0.75 or 75 per cent (Agan and Luchsinger, 1965). The surface materials surrounding a light source have an influence on the amount and quality of light present in a particular area (Jane, 1978). The control of light within a room is directly related to the texture of the surface materials present in that area. The direction light rays pass through an area will influence the atmosphere or feeling of the space. For example, a highly glossed surface will reflect light rays making a room appear brighter and perhaps more festive.

Thus, realizing the role of colour and lighting in interior space, the present study was undertaken with the following objectives:

- To assess the natural light and artificial light sources used in selected activity areas
- To find out colour preferences of respondents as applied to interiors
- To determine awareness of respondents on role of surface reflectance in enhancing lighting performance in interior space.

## MATERIAL AND METHODS

For the study interview cum observation method was used for collection of data. Data were collected personally by the researcher. Personal interview method used to collect the data of respondent's general information, sources of day light and artificial light in selected activity areas, to analyze their colour preferences as applied to interiors and awareness level towards the role of surface reflectance of lighting.

In this study in order to evaluate the awareness of the respondents a awareness scale was developed. Twenty four questions based on role of surfaces smooth texture, rough texture, matte finishes and glossy finishes with respect to its reflection of light were prepared in statement form by reviewing different books, research reports, articles and journal and by consulting experts in the field. Awareness of the respondents on role of surface reflectance in enhancing lighting performance in interior space was categorized into high awareness, medium awareness and low awareness based in mean score.

### **Colour preference:**

Colour preferences in the study refer to the colours which are preferred and also applied in the selected interior spaces.

### **Surface reflectance:**

Interior space is concerned with anything that is found inside a space-walls, windows, doors, finishes, textures, light, furnishings and furniture. Colour of a space can dramatically affect the lighting of an interior surface can absorb or reflect light. In scientifically this very attribute of surface colour is termed as surface reflectance.

### **Statistical analysis:**

Frequency, percentage, mean and standard deviations were computed to elicit information according to the objectives of the study. Karl Pearson's co-efficient of correlation and t test were used to find out the relationship among variables.

## **OBSERVATIONS AND ANALYSIS**

The results relating to various objectives of the study obtained through analysis of data collected from the selected samples.

### **Personal and demographic characteristics of the respondents:**

Under this section of the results personal characteristics *i.e.* age, education and occupation of the respondents and demographic characteristics such as family type, family size and family income per month of the respondents are discussed below.

The findings on personal and demographic characteristics of selected respondents' reveals that maximum respondents belonged to middle age group were graduates and not employed. As regards to demographic characteristics cent per cent respondents belonged to nuclear families, having small family size (50%) ranging between 2 to 3 members and having income range between Rs. 70,000-Rs. 80,000 per month (70%).

### **Assessment of natural light and artificial light sources in selected activity areas *i.e.* living rooms and kitchens:**

Lighting is one of the most overlooked and yet important element of good interior design. It is also essential in terms of creating the mood and ambience of a space, so getting it right from the start is vital. When creating an interior design scheme both artificial and natural lighting is important. Natural lighting is an important

tool in interior design the level of natural light in our rooms can really affect our mood.

In this part, an attempt has been made to assess the sources of natural and artificial lights in selected activity areas of respondents.

Data pertaining to the distribution of windows, doors and ventilators in living rooms and kitchens showed that majority of living rooms (66.6%) had two windows and 68 per cent kitchens had only one window. A vast majority of the living rooms (83%) had only one door while cent per cent kitchens had only one door. Majority of living rooms (66%) had two ventilators and only 6.6 per cent of living rooms had no ventilators. On the other hand maximum kitchens (68.3%) had only one ventilator.

Artificial lighting is any light that does not come from sunlight. It is manmade lighting, including fluorescent, incandescent and LED lights etc.

Data pertaining to artificial lighting in the living rooms and kitchens are showed that that majority of living rooms and kitchens had 1-3 numbers of artificial lights. Majority of respondents (95%) used fluorescent light. Finding showed that none of the respondents had any task lights in their living rooms. While in kitchens more than half of the respondents (56.6%) used task lights. Surprisingly a merge percentage of respondents used accent lights in their living rooms that are only 8.3 per cent had accent light. None of the respondents had any accent lights in their kitchens.

### **Use of artificial lights due to insufficiency of natural light:**

Artificial lights are not a natural component of the environment. It is used to replace natural lighting when it's not enough, such as buildings with insufficient number of windows or during night and sometime due to improper orientation of the buildings. In many interior spaces they have sufficient amount of natural light source like windows, ventilators but as the buildings are in close vicinity to one another that leads to hindrance in direct lighting or natural lighting. Due to improper orientation of buildings or houses, they do not get sufficient amount of natural light during day and then they have to use artificial lights to carry their activities.

An attempt has been made to find out the uses of artificial lights during the day due to insufficiency of natural light. In order to evaluate the uses of artificial lights information were collected and represented in Fig. 1 and 2.

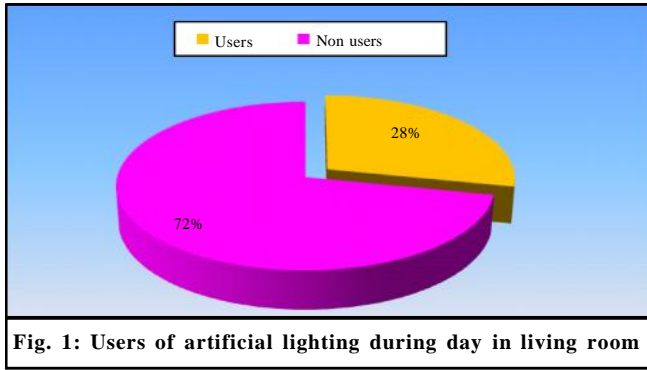


Fig. 1: Users of artificial lighting during day in living room

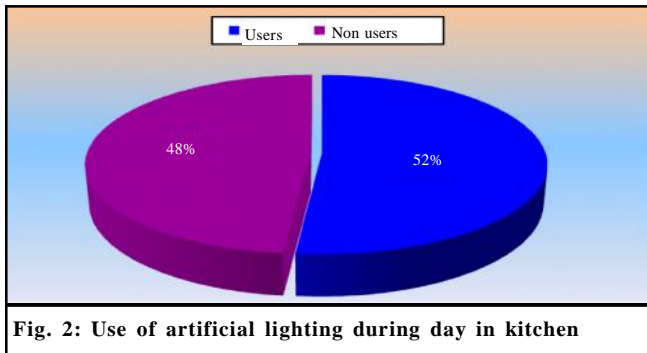


Fig. 2: Use of artificial lighting during day in kitchen

Only 28 per cent respondents used artificial lights during day and further it was observed that the respondents used only general lighting during the day due to insufficient natural light in their living rooms (Fig. 1).

Nearly 52 per cent of respondents used artificial lights during the day in their kitchens and out of which 18.3 per cent were used only general lighting and 33 per cent respondents were used both general and task lighting (Fig. 2).

**Colour preferences of respondents according to the existing colour use in selected activity areas:**

Colour preferences are the tendency for an individual or a group to prefer some colours over others. Colour preferences vary from societies to societies, male to female, young to old age etc.

Colour preferences in the study refers to the colours which are preferred as well as applied in the interior spaces of selected activity areas. Under this section an attempt has been made to collect information on the colour preferences of the respondents as applied in interior space with special preferences to walls, floors and furniture/cabinets of selected activity areas.

Data on colour preferences depicts that respondents applied those colours in their interiors space of selected

activity areas which they preferred most. Therefore, there were no differences in their colour preferences and existing colour as applied in interiors.

**Colour preferences of respondents for living rooms:**

The colour preferences of respondents for living room walls, floors and furniture showed that majority of respondents preferred and applied off white colour in both walls (75%) and floors (70%) while for furniture mostly they preferred and apply brown colour (80%) (Fig. 3).

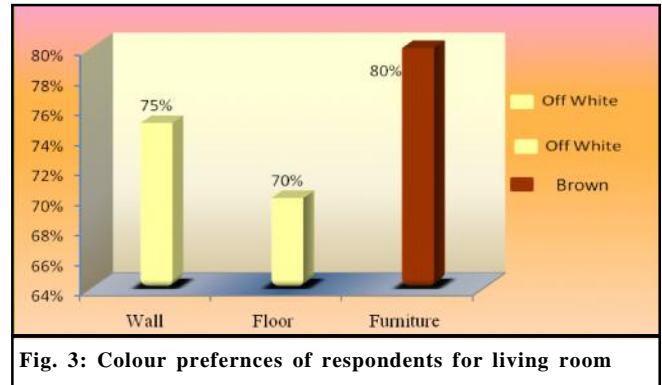


Fig. 3: Colour preferences of respondents for living room

Further, an attempt was made to determine the reasons for preferences of selected colours on walls, floor and furniture of the living rooms. Respondents reported that off white colour was used on walls and floors as it gives an airy, clean and simple look, whereas brown colour is preferred in furniture/ cabinets for being, simple, easy to maintain and matches well with most of the interior colours.

**Colour preferences of respondents for kitchens:**

The colour preferences of respondents for kitchen walls, floors and furniture/cabinet showed that majority of respondents preferred and used off white colour in walls (82%) while majority of respondents preferred brown color in floors (60%) and furniture/cabinets (47%) (Fig. 4).

Respondents reported the reasons for preferences of selected colours on walls, floors and cabinets of kitchens. Off white colour on wall was used for being hygienic and clean, followed by brown colour for being easy to maintain and matches well with most of the interior colours.

**Awareness of respondents on the role of surface reflectance in enhancing lighting performance in interior space:**

Interior space is concerned with anything that is

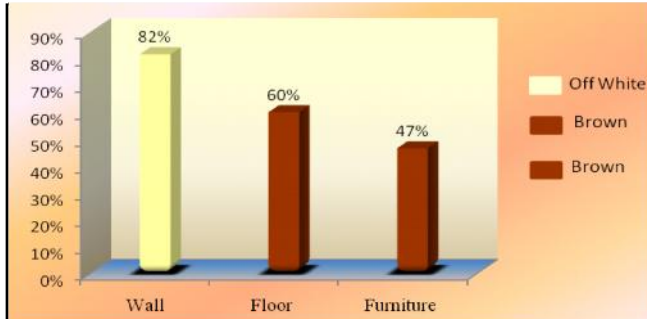


Fig. 4: Colour preferences of respondents for kitchen

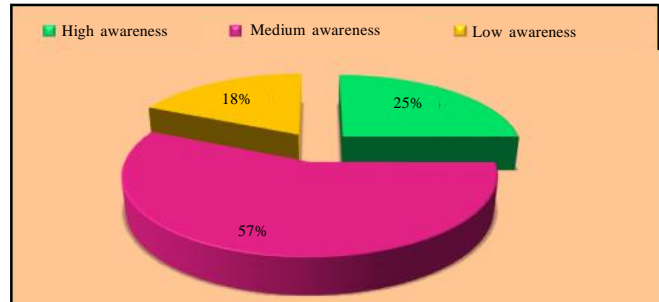


Fig. 5: Distribution of respondents according to their awareness level

found inside a space-walls, windows, doors, finishes, textures, light, furnishings and furniture. Colour of a space can dramatically affect the lighting of an interior surface can absorb or reflect light. In scientifically this very attribute of surface colour is termed as surface reflectance.

In this part an attempt has been made to assess the awareness level of respondents on role of surface reflectance in enhancing lighting performance in interior space.

Analysis on awareness level of respondents revealed that maximum respondents *i.e.* 56.6 per cent had ‘medium awareness’ followed by 25 per cent respondents having ‘high awareness’ and 18.3 per cent respondents had ‘low awareness’ on the role of surface reflectance in enhancing lighting performance in interior space (Fig. 5). Similar findings was reported by Sandhu *et al.* (2005) who found that maximum number of respondents from selected houses in Ludhiana were aware of colour of walls and draperies, as a measure to regulate reflected light and agreed maximum to the fact that reflectance from walls and colour of ceiling has an effect on regulation of the light intensity.

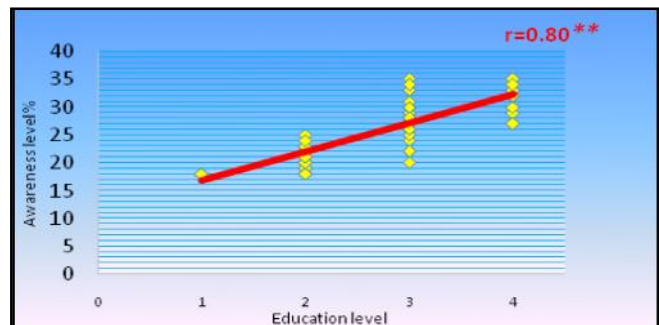


Fig. 6: Relationship between the awareness level and education level of the respondents

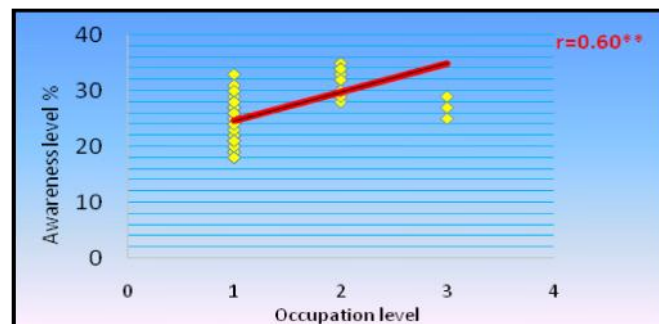


Fig. 7: Relationship between the awareness level and occupation of the respondents

**Awareness of respondents on the role of surface reflectance in enhancing lighting performance in interior space and personal variables:**

Further correlation co-efficient was computed and it was found that there was highly significant relationship between the awareness level of the respondents on the role of surface reflectance and education ( $r=0.80^{**}$ ) and occupation ( $r=0.60^{**}$ ), indicating that higher the education level of the respondents more was the awareness level (Fig. 6) and similarly employed respondents had more awareness than non-employed respondents (Fig.7). Negative relationship was observed between the age ( $r=-$

$0.11$ ) and family income ( $r=-0.05$ ) of the respondents and the awareness level (Table 1).

Selected variables	R
Age	-0.01186
Education	0.80**
Occupation	0.60**
Family income	-0.05757

\*\* indicate significance of value at P=0.01

This results can be attributed to the fact that the higher education makes the respondents more exposed to books, magazine and create a genuine interest to know about the relationship between the surface reflectance and light and how it effects in our interior space. So it might enhance awareness on the role of surface reflectance in enhancing lighting performance in interior space.

The occupation of the respondents *i.e.* employment of the respondents outside home might have given more exposure in gaining knowledge regarding role of surface reflectance in enhancing lighting performance in interior space.

As a significant relationship was found between the selected variables and awareness level of respondent's role of surface reflectance in enhancing lighting performance in interior space except age and family income of the respondents, the null hypothesis was partially accepted.

### Conclusion:

From the above discussion it can be inferred that respondents had average awareness level on the role of surface reflectance in enhancing lighting performance. Majority of female respondents with high awareness level were highly educated and employed. It is encouraging to know that respondents usually select those colours which they preferred most in the interior spaces. This is may be due the fact that choosing colors for interiors is a major investment for them. This study can be useful for colour consultants, interior architects, designers and lighting designers who use light in order to create different atmospheres in a space.

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