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Original Research Paper

A Study on Effect of Lighting in the Work Environment of it and Non it Sectors

Home Science

KEYWORDS :

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INTRODUCTION

Light is the primary requisite of life. Light is the prime animator of interior space. Lighting a space is an important element in determining, the beauty and comfort of the home. The first function of a lighting design, therefore, is to illuminate the forms and space of an interior environment, and allow its users to undertake activities and perform tasks with appropriate speed, accuracy and comfort. Light is an art element as well as a utilitarian element. Good lighting design has an exclusive quality. Good lighting can also increase efficiency, relieve eye strain, cut down on accident and help to set mood of the room. Thus, light serves as a silent partner in enhancing our surroundings (Premavathy Seetharaman, 2001)

Well planned offices become highly effective workspaces capable of improving productivity, group interaction, communication and even employee satisfaction. Additionally, the new ideal for office environments is a workspace that is energy-efficient and sustainable. To create an attractive, productive, energy-conscious and eco-friendly office environment it's important to consider the systems that affect interior workspaces and employees (Boyce, 2003)

Currently, the single greatest opportunity to increase productivity, comfort, savings and sustainability is lighting improvement. Lighting is the single most impactful system on every environment and lighting enhancements in work environments are closely tied to improvement in the performance of workers. The best light for office environments is light that most closely resembles natural light (Boff, 1986).

Lighting levels need to be appropriate to the task. Working in dim or over bright work environments can result in eyestrain, headaches, irritability and, inevitably, reduced productivity. Light sources, including the sun, can create unwanted reflections, glare and shadows in the workplace that can cause discomfort and distraction, and can interfere with the performance of visual tasks. Low levels of lighting can cause depression, which for some people may be severe (Boyce, 2006).

Lighting at the workplace is based on ergonomic principles and has to meet safety requirements within the meaning of occupational health and safety. At the workplace, the illumination is mainly a part of ergonomic guidelines. Besides the fact that light does influence the personal well-being and health, it has also a positive impact on the motivation and performance (BSI, 2003).

Hence, this study relates to type of lights, lighting quality and eco-friendly office environment it's important to consider the systems that affect interior workspaces and employees. There are enormous opportunities for facility improvement across a wide range of systems that can reap tremendous productivity gains and operating savings too. The knowledge about the type of lights, lighting quality on the work environment can be gained through this study.

SCOPE OF THE STUDY

This study was undertaken to study on effects of lighting on the work environment of IT and Non IT sectors. This study was to find out the type of lights and its quality on the work environment of IT and Non IT sectors. The objectives of the study

1. To find out the type of lights in IT and Non IT sectors
2. To assess the quality of light on work environment of IT and Non IT sectors
3. To find out the effects of light distribution on the work environment IT and Non IT sectors

REVIEW OF LITERATURE

Lighting is an essential provision for any workplace. It is preferable to provide uniform illumination over the entire workplace by combining both natural and artificial lighting. Localized lighting may be required in certain cases to cut costs and improve illumination. Good lighting helps us to see and to recognize hazards. It can reduce visual strain and discomfort. Poor lighting may affect workers' performance and health as poor visibility increases the chances of errors being made. Lighting is one of several factors in an individual's working environment. The provision of 'good' lighting may assist in minimizing fatigue, which, if present, can inhibit a worker's efficiency. Fatigue must be addressed in many ways .Proper lighting can enhance task performance, improve the appearance of an area, or have positive psychological effects on occupants (Angela June Summers).

The management of health and safety at work regulations, 1992 (MHSW) require employers to have arrangements in place to cover health and safety. This includes lighting which needs to be suitable and adequate to meet the requirements of the Workplace (Health, Safety and Welfare Regulations, 1992).

The quality of lighting in a workplace can have a significant effect on productivity. With adequate lighting workers can produce more products with fewer mistakes, which can lead to a 10-50 % increase in productivity. Good lighting can decrease errors by 30-60 % as well as decrease eye-strain and the headaches, nausea, and neck pain which often accompany eyestrain. Adequate lighting allows workers to concentrate better on their work which increases productivity. The level of lighting that workers need varies depending on the nature of the task, the sharpness of the workers' eyesight, and the environment in which the work is done (Davis).

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The prerequisites that an illumination system must fulfill in order to provide the conditions necessary for visual comfort are the following:

- Uniform illumination
- Optimal luminance
- No glare
- Adequate contrast conditions
- correct colours
- Absence of stroboscopic effect or intermittent light.

It is important to consider light in the workplace not only by quantitative criteria, but also by qualitative criteria. The first step is to study the work station, the precision required of the tasks performed, the amount of work, and the mobility of the worker and so on (Eklund,1996).

METHODOLOGY

Based on the review the study was conducted on the effect of lighting on the work environment of IT and Non IT sectors.

Statement of the problem

The main problem of the present study was to find out the effect of energy saving lights on the work environment of IT and Non IT sectors.

Operational definition

Lighting

Lighting or illumination is the deliberate use of light to achieve a practical or aesthetic effect.

Light Emitting Diode

A light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it.

Compact Fluorescent lamp

A compact fluorescent light bulb (CFL) is a fluorescent light bulb that has been compressed into the size of a standard-issue incandescent light bulb.

Incandescent bulb

An incandescent light bulb, incandescent lamp or incandescent light globe is an electric light with a wire filament heated to a high temperature, by passing an electric current through it, until it glows with visible light.

Work Environment

The term work environment is used to describe the surrounding conditions in which an employee operates.

Research design

Research Design is the plan, structure and strategy of investigation conceived so as to obtain answer to research questions to control variance (Gupta, 1993).

To answer the main problem there by testing the hypothesis ex-post facto research design was followed. Ex-post facto research is systematic empirical enquiring in which the scientist does not have direct control of independent variable because their manifestation have already occurred or they are inherently not manipulated. (Kothari).

A univariate research design, cross-sectional in nature was used with type of light as independent variable and its effects on work environment as dependent variable. For the present study using simple random sampling method, 100 computer operators from IT and Non IT sectors were selected from the population.

The tool used for assessment in this present study was questionnaire. The data collected in the main study were edited, coded, classified and analyzed statistically using parametric tests namely one way ANOVA and using percentage analysis.

RESULTS AND DISCUSSION

Table -1

Demographic profile of the workers

Demographic profile	IT WORKERS		NON IT WORKERS	
	N=50	PER-CENT%	N=50	PER-CENT%
AGE				
16-22	10	20	22	44
23-30	27	54	23	46
31-40	13	26	5	10
41-50	-	-	-	-
GENDER				
MALE	15	30	5	10
FEMALE	35	70	45	90
EDUCATIONAL QUALIFICATION				
UG	36	72	47	94
PG	14	28	3	6
WORK EXPERIENCE				
BELOW 1 YEAR	5	10	2	4
1-3 YEAR	33	66	20	40
3-5 YEAR	12	24	28	56
TYPE OF LIGHT				
INCANDESCENT	-	-	19	38
LED	48	96	23	46
FLUOROSCENT	-	-	6	12
CFL	2	4	2	4
TYPE OF LIGHTING FIXTURE				
DIRECT LIGHTING	13	26	25	50
INDIRECT LIGHTING	11	22	10	20
SEMI DIRECT	16	32	5	10
SEMI INDIRECT	9	18	5	10
DIFFUSED LIGHTS	1	2	5	10

Demographic Profile of Selected IT and Non IT sectors

Table 1 depicts the demographic profile of selected IT and Non IT workers such as age, educational qualification, work experience, type of lights and lighting fixture is presented in Table–1.

Age:

Majority 54% and 46% of the selected IT and Non IT workers were in the age group of 23 to 30 years followed by20% and 44% of IT and Non IT workers belongs to 16 to 22 years of age and the remaining 26% and 10% were between 31 to 40 years.

Gender:

Majority 70% and 90% 0f workers were female and the remaining 30% 0f IT and 10% of Non IT workers were male.

Educational qualification:

It is evident from the table that 72% of IT and 94% of Non IT of the selected workers are graduates and the remaining percent were post graduates.

Type of light

Mostly 96% and 4% of IT sectors have LED lights and CFL lights while in Non IT sectors majority 46% uses LED followed by incandescent (38%),fluorescent(12%) and remaining % uses CFL lights in the Non IT sectors.

Type of lighting fixtures

In Non IT sectors most of the lights were fixed direct(50%), followed by indirect lighting(20%), and remaining 10% evenly distributed as semi direct, indirect and diffused lights. In IT sectors majority 32% of them uses semi direct lighting, 26% uses direct, 22% uses indirect lighting and 18% uses semi indirect lighting.

Quality Of Light distribution On Work Environment Of IT And Non IT Sectors

Table 2

One Way ANOVA Depicting quality of light Distribution on the Work Environment of IT and Non IT sectors

Quality of Light Distribution	Type Of Light	Sum Of Squares	df	Mean Square	F
Non Uniform Distribution	Between Groups	1.215	1	1.215	6.606*
	Within Groups	18.025	98	.184	
Deep Shadows	Between Groups	.960	1	.960	4.523*
	Within Groups	20.800	98	.212	
Too Strong And Uncomfortable	Between Groups	1.127	1	1.127	5.801*
	Within Groups	19.033	98	.194	

Table-2 exhibits the results of one way analysis of variance carried to depict the distribution of different type of light on the work environment among IT and Non IT sectors. The results showed that f value found to be significant at 5% level indicating that the non uniform distribution of light differs based on the work environment among various sectors.

Regarding the deep shadows in distribution of light, the F value(4.252) was found to be significant at 5%level indicating there is difference between IT and Non IT sectors. It was also evident that too strong and uncomfortable of distribution of light is different among IT and Non IT sectors based on the work environment.

Glare of Different Type of Light on The Work Environment Of IT and Non IT Sectors

Table 3 indicates the results of one way analysis of problems of glare of energy saving lights on the work environment of IT and Non IT sectors. The result showed that F value was not found to be significant, indicating that the hindrance caused due to glare was similar on the work environment among IT and Non IT sectors.

Regarding the brightness caused by glare has a significant difference between the work environment of IT and Non IT sectors. The F value was found to be significant at 5% level. Hence hypothesis 4 is accepted.

TABLE-3

One Way ANOVA Depicting glare of Different Type of Light On The Work Environment Of Working Sectors

Light glare	Type of light	SUM OF SQUARES	df	MEAN SQUARE	F
Hindrances	Between Groups	.135	1	.135	.676NS
	Within Groups	19.575	98	.200	
Too bright	Between Groups	.882	1	.882	4.008*
	Within Groups	21.558	98	.220	

Table 4

One Way ANOVA Depicting physical factors of Different Type of Light On The Work Environment Of Working Sectors

PHYSICAL FACTOR	Type of light	SUM OF SQUARES	df	MEAN SQUARE	F
Flickering of light	Between Groups	.000	1	.000	.000NS
	Within Groups	22.750	98	.232	
Unwanted noise of lights	Between Groups	.107	1	.107	.456NS
	Within Groups	22.933	98	.234	

Table -4 depicts the results of one way analysis of variance carried over IT and Non IT respondents regarding flickering of light and unwanted noise of lights.

The result indicated that the F value was not found to be significant and it depicts that there is no difference in the flickering of light and unwanted noise of different types of energy saving lights. It is evident that there is similarity in the physical factors influenced by the different types of energy saving lights among IT and Non IT factors.

Table 5

One Way ANOVA Depicting level of satisfaction of Different Type of Light on the Work Environment of Working Sectors

Level of satisfaction	Type Of Light	Sum Of Squares	df	Mean Square	F
Difficulty in typing task	Between Groups	.375	1	.375	6.606*
	Within Groups	26.375	98	.269	
Performance of typing task	Between Groups	.327	1	.327	4.523*
	Within Groups	25.433	98	.260	
Difficulty in color matching	Between Groups	1.927	1	1.927	5.801*
	Within Groups	42.583	98	.435	
Performance in color matching	Between Groups	.375	1	.375	1.069NS
	Within Groups	34.375	98	.351	

The result of ANOVA carried to exhibit the level of satisfaction of different types of light on the work environment among working sectors of IT and Non IT sectors.

The results shows that F ratio was found to be significant at 5% level indicating that the selected subjects of IT And Non IT workers found difficulty in typing task and color matching task. And it has a significant in the performance of typing task and no difference in the color matching task among IT and Non IT sectors.

Summary and conclusion

Majority of the workers belong to 23 to 30 years of age and most of them are female, graduates. Most of them use LED lights followed by incandescent lights and fixture of light was direct lighting. It found be significant difference in the distribution of light on the work environment among IT and Non IT sectors. It is evident that there is a significant difference between the problems of glare on the work environment among IT and Non IT sectors, on the part of Physical factors on the work environment the results showed that there is no significant difference in the physical factors on the work environment. The level of satisfaction on the work environment has a significant difference among IT and Non IT workers

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Conclusion

The study focused on the effect of types of light on the work environment among IT and Non IT sectors. It is concluded that the quality of light, distribution of light has an effect on the work environment and also glare affects the work environment.

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