European Journal of Agricultural and Rural Education (EJARE)
Available Online at: https://www.scholarzest.com
Vol. 2 No. 6, June 2021,
ISSN: 2660-5643

THE IMPORTANCE OF NATURAL LIGHTING IN BUILDINGS AND ITS GUIDES

Naser Hussain Khairi
TerSU

Article history:	**Abstract:**
Received 28th April 2021 **Accepted:** 10th May 2021 **Published:** 7th June 2021	This article best describes the importance and benefits of natural lighting in buildings and how to guide them efficiently and effectively into the interior area of buildings.

Keywords: Natural lighting, building, architectural design, daylight fixtures

Natural lighting, also known as daylighting, is a technique that efficiently brings natural light into the building using exterior glazing (windows, skylights, etc.). Before the 1940s, daylight was the primary light source in buildings; artificial lights supplemented the natural light. In the short span of 20 years, electric lighting had transformed the workplace by meeting most or all of the occupants' lighting requirements. Recently, energy and environmental concerns have made daylighting a rediscovered aspect of building lighting design. The physics of daylighting has not changed since its original use, but the building design to use it has. Daylighting is often integrated into a building as an architectural statement and for energy savings. However, benefits from daylighting extend beyond architecture and energy. The psychological and physiological aspects of natural light should also be considered. The comforting space and connection to the environment provided to building occupants provide benefits as significant as the energy savings to building owners and managers.

Effects of Light on the Body: Humans are affected both psychologically and physiologically by the different spectrums provided by the various types of light. These effects are the less quantifiable and easily overlooked benefits of daylighting. Daylighting has been associated with improved mood, enhanced morale, lower fatigue, and reduced eyestrain. One of the important psychological aspects from daylighting is meeting a need for contact with the outside living environment (Robbins 1986). According to Dr. Ott (Ott Biolight Systems, Inc. 1997a), the body uses light as a nutrient for metabolic processes similar to water or food. Natural light stimulates essential biological functions in the brain and is divided into colors that are vital to our health.

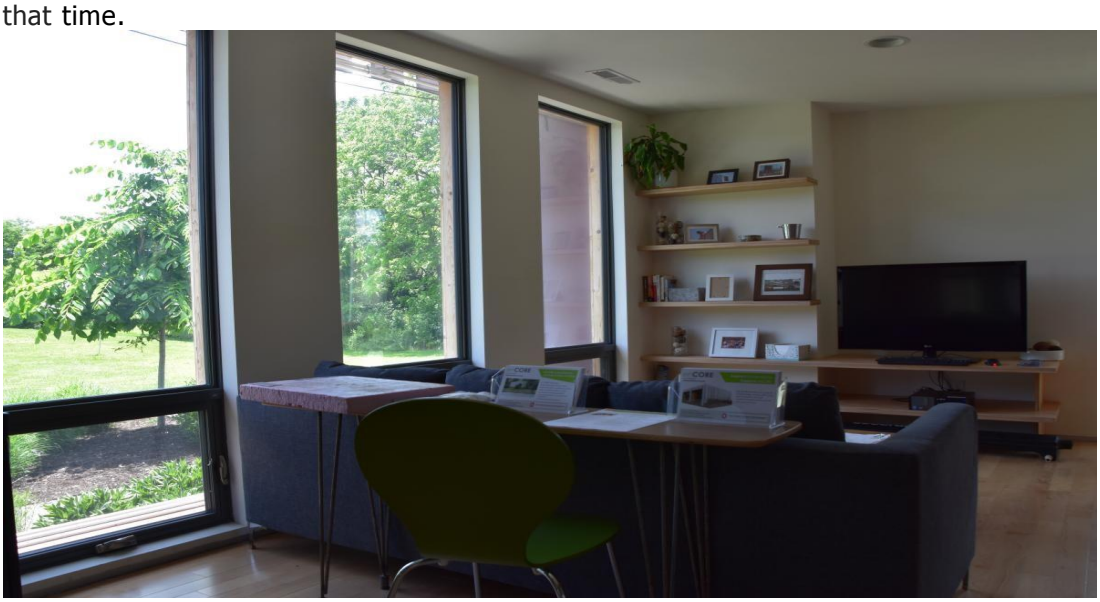
Energy Savings: In addition to the human benefits of natural light, the ongoing need to reduce energy use in buildings has encouraged increased use of daylighting. By incorporating natural daylight into buildings, the intent is to turn off some, if not all, of the electric lights in a daylight space. This creates a direct reduction in the electricity purchased for lighting but also creates a ripple effect of indirect benefits. Electric lights generate heat which in turn raises the temperature of the spaces where they are installed. If that space is being air conditioned, then more energy is being used for air conditioning when the electric lights are on but less when they are able to be turned off. This affects the direct amount of electricity purchased (i.e. kilowatt hours) and the direct cost of that electricity paid for by the owner or occupant. In addition, it can reduce the other part of most commercial electric utility bills, namely the peak demand charge. Utilities base this charge on the highest average spike or peak of total consumption that a customer uses over a prior billing period (i.e. a year or so). In many buildings, that peak is reached when the building is fully occupied, all the lights are on, and it is a hot day, meaning that the air conditioning is running at full capacity. Using some appropriate design strategies, daylighting can be used to turn off the lights, reduce heat buildup, allow the air conditioning to run at a lower level, and ultimately reduce peak demand. Natural daylight can be incorporated successfully in a variety of building types to provide benefits for people and to reduce energy use in buildings. The ability of daylight to produce all of these positive outcomes first requires attention to the design of the building.

Effective natural lighting will admit natural light, but will avoid admittance of direct sun on task surfaces or into occupants' eyes. Daylight inside a home can come from three sources:

- Direct Sunlight: direct light from the Sun
- External Reflection: light reflecting off of ground surfaces, adjacent buildings, light shelves, and wide window sills. Excessive reflectance is undesirable as it causes glare.
- External Reflection: light reflecting off of internal walls, ceiling, and the floor of your home. This also includes high reflective surfaces such as smooth or glossy surfaces, light colored finishes, and mirrors around a room

Natural lighting Design: Most daylighting components are integrated in the original construction plan, however, technologies such as tubular daylighting devices, skylights, electric lighting controls, and optimized interior design may be considered in retrofit projects. The science of daylighting design is more complex than simply bringing light into a home. When adding a daylighting fixture, you must consider balancing heat gains and losses, glare control, and variations in daylight availability. Additionally, window size and spacing, glass selection, the reflectance of interior finishes, and the location of interior partitions all must be considered. Furthermore, there are many different types of daylight fixtures and each has its own unique set of design considerations.

Windows: Are by far the most common daylighting source. Windows specifically used for daylighting are generally implemented in the design phase since the window head height and glare control is easier to deal with during that time.

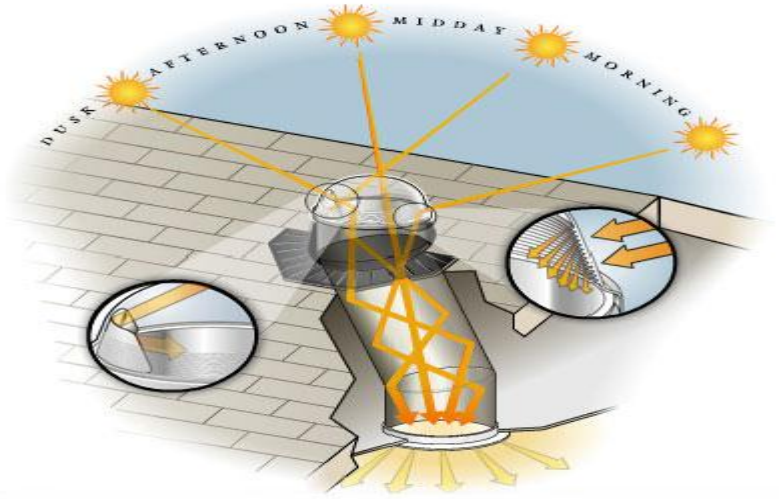


Skylights: Is a common top lighting source, and they are implemented in the design phase. Skylights can be either passive or active, though the majority of skylights are passive. Active skylights are windows that have a mirror system within the skylight that tracks the Sun, and are designed to admit more sunlight by channeling the light into the home.

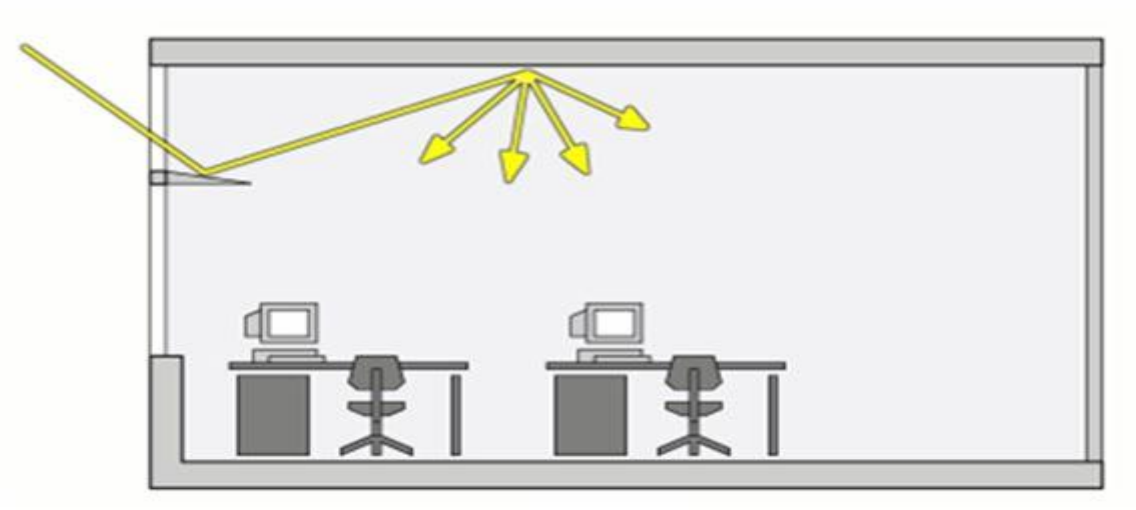
Image source: yourhome.gov.au

Tubular Lights: also known as solar tubes, are light channels that allow light to enter from the roof and be reflected using mirrors into a home. They have become more popular for top lighting in recent years. This is largely because they can be installed in retrofit projects easier than skylights and are cheaper for the homeowner.

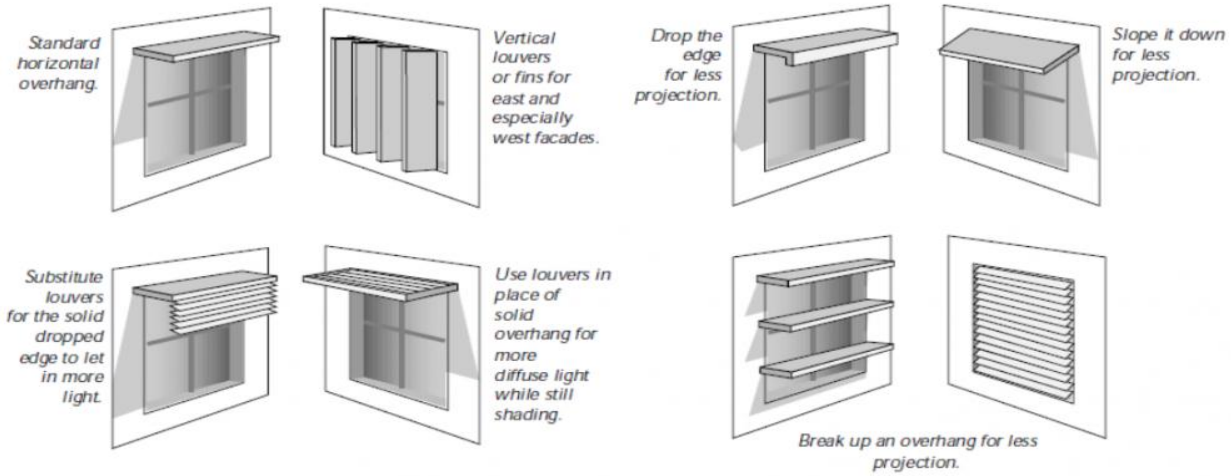
Image source: inhabitat.com



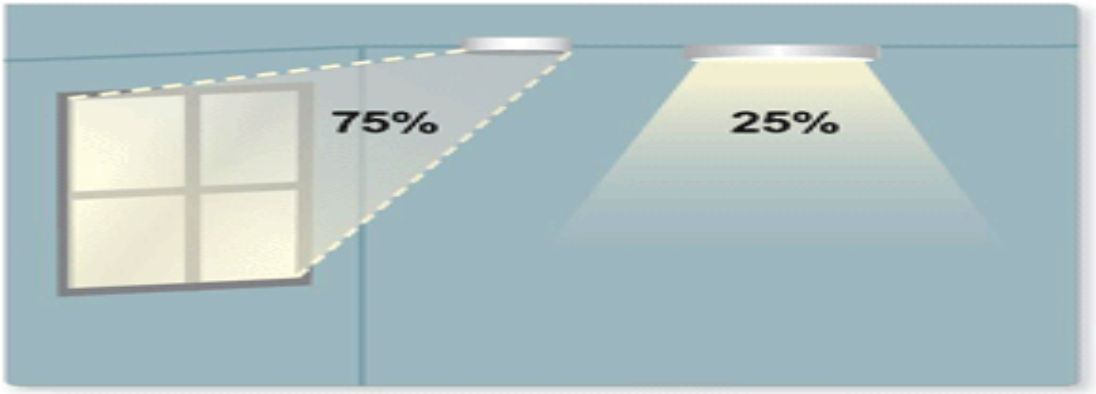
Redirection Devices: Take incoming sunlight and direct it towards the ceiling space. They aim to reduce glare and to increase daylight penetration. These devices typically take on of two forms: louvered systems or a large horizontal element. Horizontal elements are commonly referred to as light-shelves22
Image source: iitbuildingscience.wordpress.com



Solar Shading Devices: Are often implemented to control the solar gains and potential glare from windows. These shading devices include overhangs and blinds
Image source: sustainabilityworkshop.autodesk.com



Daylight-Responsive Electric Lighting Controls: Incorporate photocells to sense the available light and act accordingly by dimming or turning off the electric lighting system in response
Image source: www.digikey.com



REFERENCES

1. https://greenhome.osu.edu/natural-lighting
2. Begemann, S.H.A.; van den Beld, G.J.; Tener, A.D. (July 17, 1996). "Daylight, artificial light and people in an office environment, overview of visual and biological responses." International Journal of Industrial Ergonomics. Vol. 20; Amsterdam, Netherlands;
3. Daystar Sun lighting Systems. (1998). "Benefits of Natural Daylighting." http://www.daystarsunlighting.com/benefits.htm. Accessed June 11, 1998.
4. https://www.sciencedirect.com/science/article/abs/pii/S0960148100000276
5. https://continuingeducation.bnpmedia.com/