

Sustainable lighting design in libraries

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Focusing on sustainable lighting designs in the libraries, the purpose of this presentation falls on dealing with the following four issues regarding to taking advantage of sunlight and energy saving:

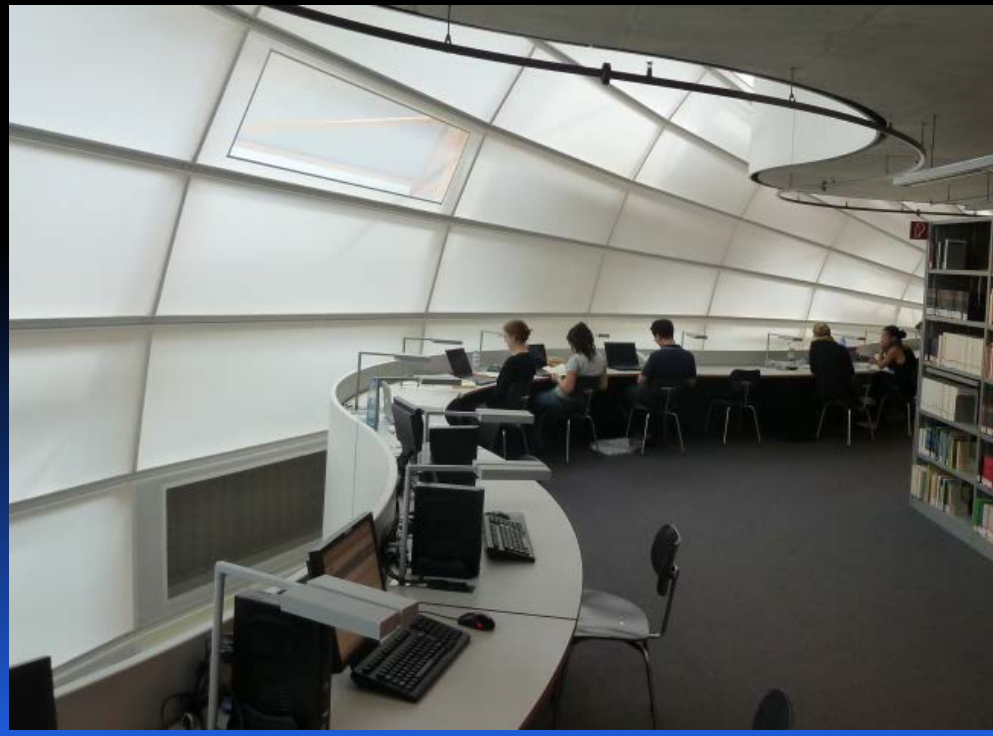
- Adding lamps in reading areas even with skylight or clerestory.
- Using brighter colors on the floors and ceilings to enhance reflection of sunlight into deeper interiors.
- Using energy saving devices on the stacks and reading desks.
- Differentiating energy saving designs in ambient lighting and task lighting.

Those design guidelines will be illustrated by various case photos comparatively.

Reading desks under the skylight



Free University Philology Library, Berlin



Jacob & Wilhelm Grimm Center, Humboldt University, Berlin



National Library new building, Beijing



Reading desks around the atrium

Vancouver Public Library



State Library of Berlin (Staatsbibliothek zu Berlin)



Myongji University Library, Seoul

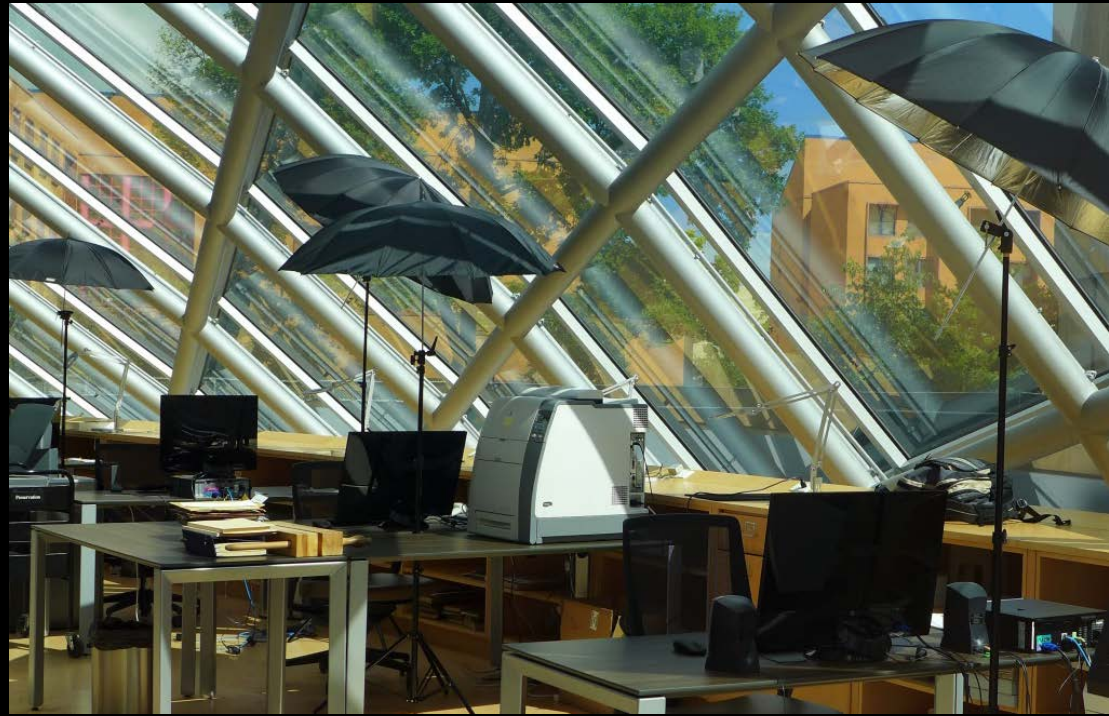


Reading desks under clerestory



In reading area, too much sun light may
be not so good for reading.

Umbrella may be a good companion for patrons in library.



Stacks under the skylight



Book Mountain
Spijkenisse Library, Netherland

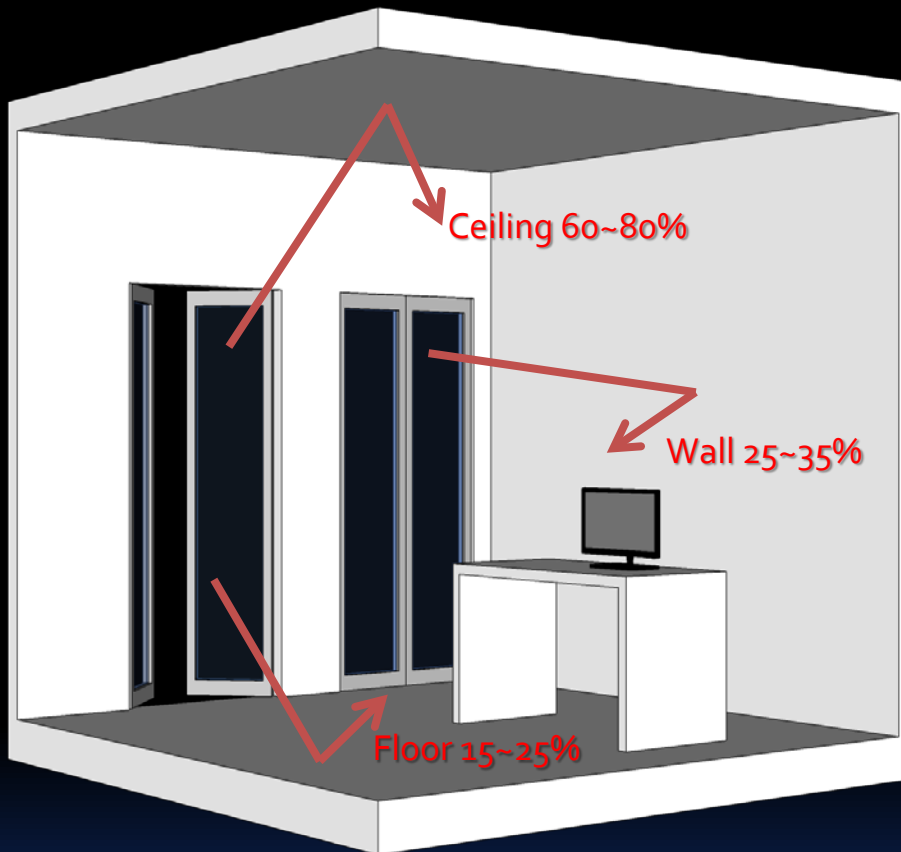


Social Science Library Taiwan University, Taipei



The colors of the floor and ceiling play key role in using natural light to light the room in library.





Reflection ratio in office

(FGL (1989) Information on Lighting Application Booklet 13: Good Lighting for Local Authority Buildings and Amenities. Frankfurt: Fördergeinschaft Gutes, p.6)



Estimated reflection ratio in library



In high ceiling space.



In large space



Different colors of floor and ceiling make different results.





Many libraries used bright color in the floor and ceiling. are bright.



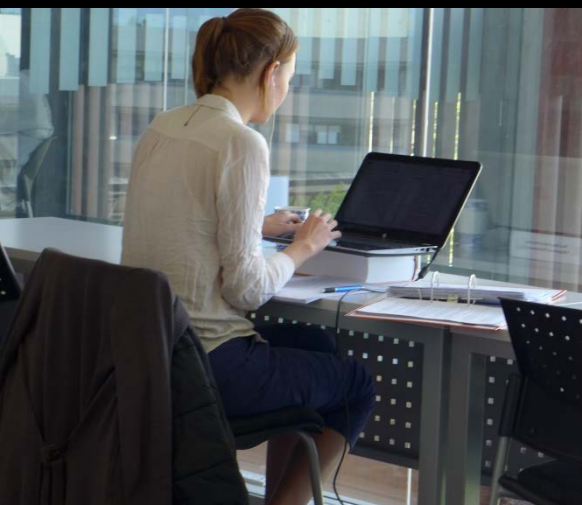
Stuttgart Public library



Energy waste in luminous ceiling



In some regulations, luminance is different between stacks and reading area.

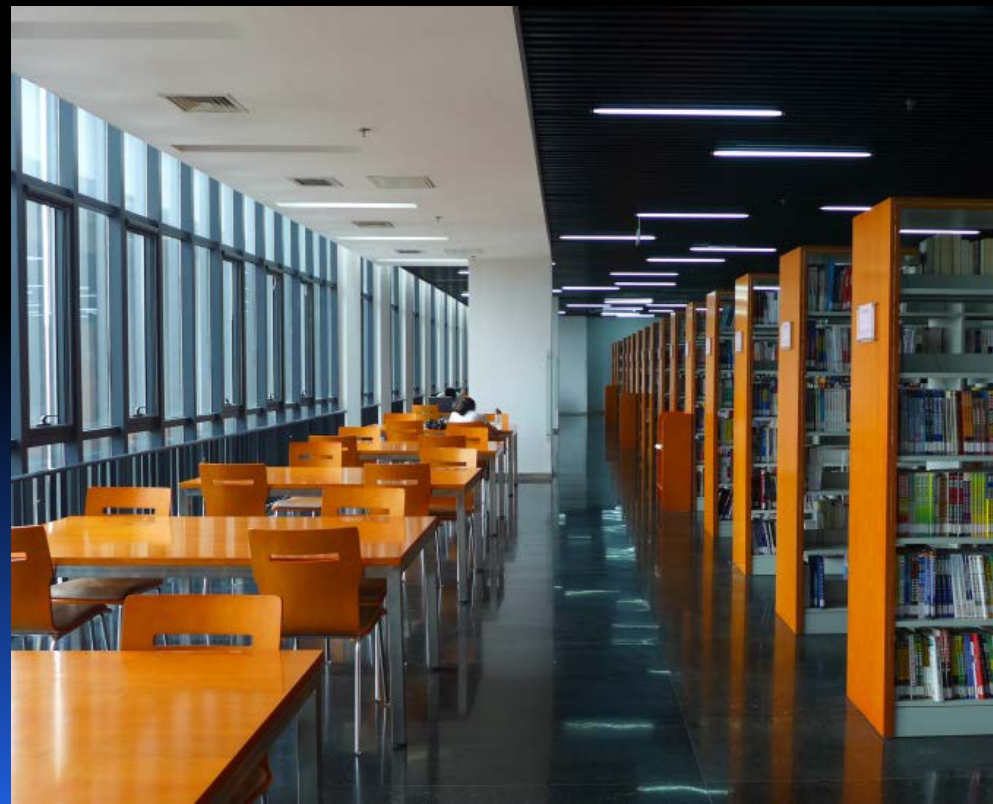


The same luminance in the stacks and reading area.



Adding the luminance in the reading desk
by lamps or lighting fixtures in the ceiling

Changing the lighting fixture in the ceiling to enhance the luminance in reading area.



Adding lamp to enhance the luminance in reading desk near the stacks.

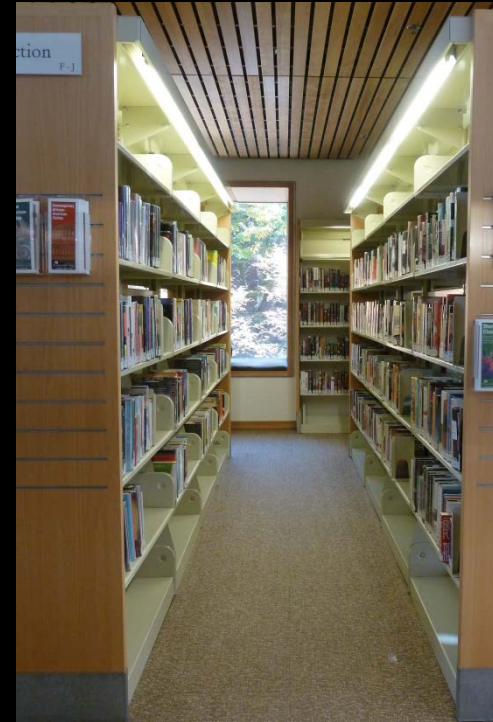


Lighting in stacks turn on in open hours

Traditional types of lighting fixture in stacks.



Different types of lighting fixture in stacks may have chance to do something in energy saving.



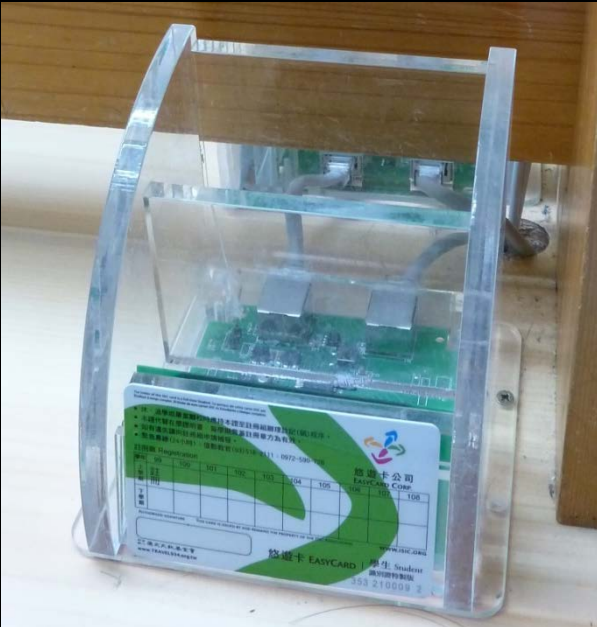
Motion-sensor control in stacks





Control box of the lamp

Chung Hua University Library, Hsinchu Taiwan



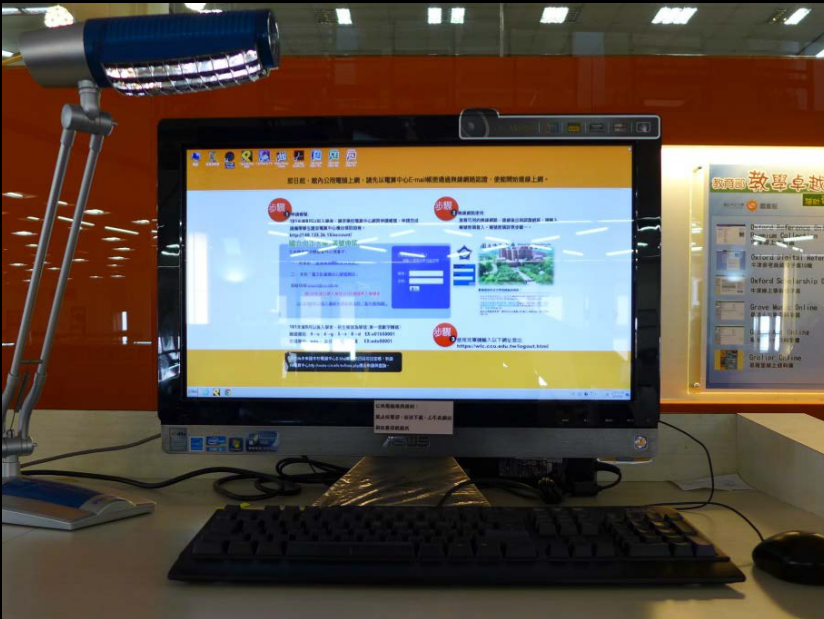
Ambient lighting vs. Task lighting

It's hard to understand what natural light they want in reading desk.

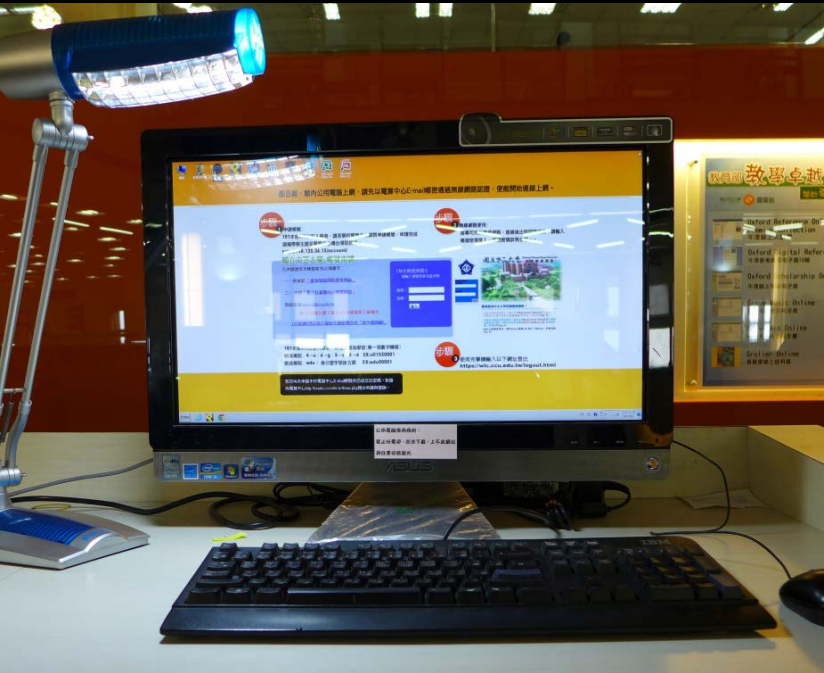


The ratio of light between ambient lighting and task lighting

Ambient lighting



Ambient lighting and task lighting



Task lighting + ambient lighting



Ambient lighting



Chengchi University Library, Taipei

Ambient lighting: 457Lux

Ambient lighting + task lighting: 633Lux

Task lighting ratio: $633\text{Lux} - 457\text{Lux} = 176\text{Lux}$
 $176/633 = 28\%$



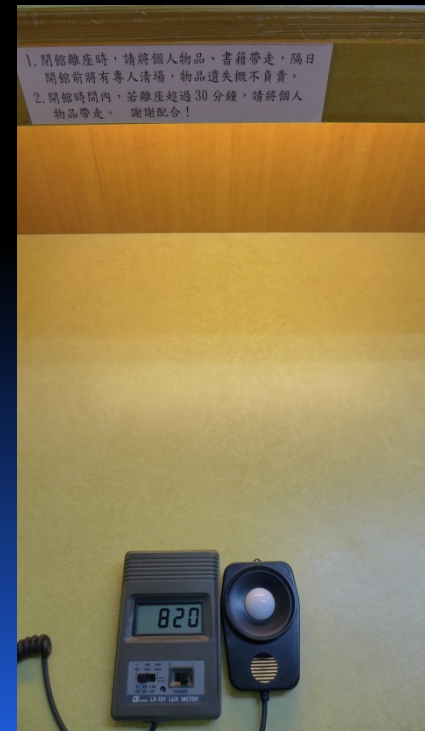
Taipei University of Technology Library, Taipei

Ambient lighting: 508Lux

Ambient lighting + task lighting: 820Lux

Task lighting ratio: $820\text{Lux} - 508\text{Lux} = 312\text{Lux}$

$$312/820 = 38\%$$





National Library, Taipei

Ambient lighting: 296Lux

Ambient lighting + task lighting: 703Lux

Task lighting ratio: $703\text{Lux} - 296\text{Lux} =$

407Lux

$407/703 = 58\%$



C.V. Starr East Asian Library, UC Berkeley

Ambient lighting: 233Lux

Ambient lighting + task lighting= 813Lux

Task lighting ratio: $813\text{Lux} - 233\text{Lux} = 580\text{Lux}$

$580/813 = 71\%$



Conclusion

In order to achieve the effect of sustainable lighting design in libraries , some suggestions are made:

- It is necessary to set lamps on the reading desks even in the atrium with skylight.
- Using brighter colors on the floor and the ceiling will enhance the reflection of sunlight into deeper interior space of the library.
- There should be motion-sensor controllers in stacks and cardbox nearby the lamp on the reading desks.
- The differences between the ambient lighting and task lighting design should be emphasized.

Thank you