**Lighting design**

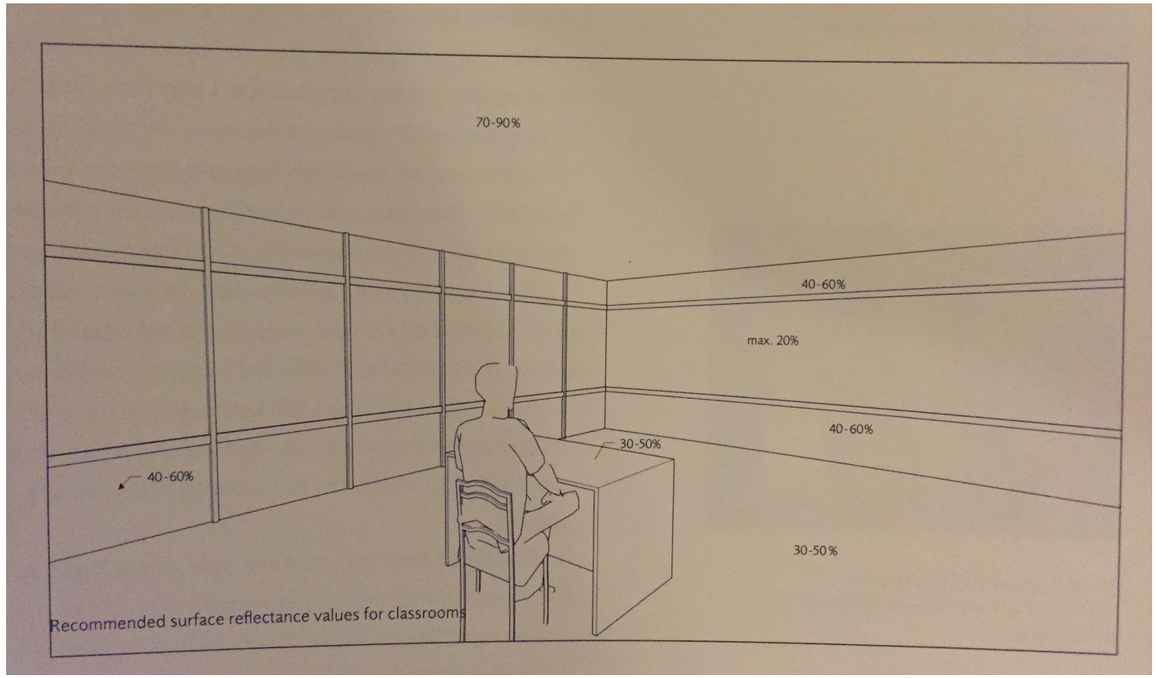
The presence of daylight in educational buildings plays a significant role in the process of learning. Performance of students is measured by a number of yardsticks, among them are their performance in tests. Students in classrooms with the most daylight progressed 20% faster on math tests and 26% faster on reading tests. Classrooms with the most window area were associated with a 15-23% faster rate of improvement. Classrooms with skylights were associated with a 19-20% faster rate of improvement. Classrooms with operable windows were associated with a 7-8% faster improvement in three out of four cases that have been investigated when compared to classrooms with non-operable windows. An appropriate daylighting strategy in schools is to provide adequate amount of light where needed while ensuring no visual discomfort and good visual performance.

Studies have shown that successful daylighting principles are:

- The building should be enlongated along an east-west axis.
- Apertures placed high in the wall such as clearstoreys or tall side windows optimise daylight distribution and bring light deeper into the space.
- Bringing daylight from two different directions reduces the chances of discomfort glare and evens out the daylight distribution.
- Use indirect daylighting to control sunlight inside the classroom. Direct sunlight inside a classroom can cause glare and discomfort.

**Daylighting systems are of two general categories:**

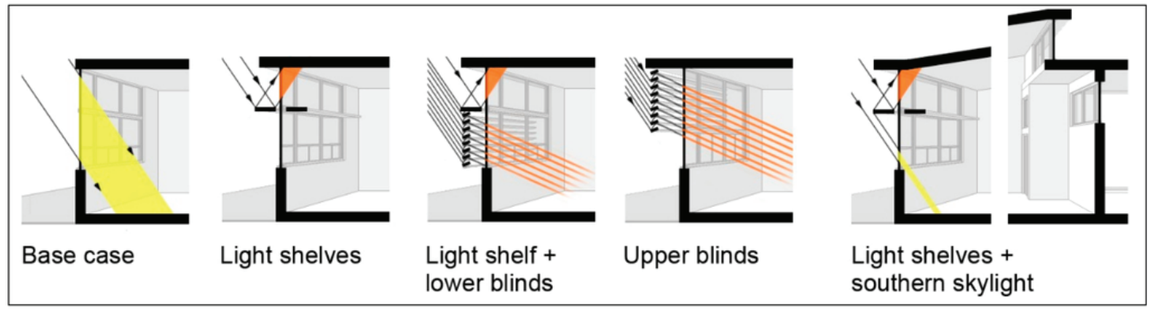
1.Top-lighting systems where daylight is distributed inside the room from the ceiling or the roof.
2.Side-lighting systems where daylight is distributed inside the room from the sides of the room.




*Recommended surface reflectance values for classrooms*, source *A Design Manual: Schools and Kindergartens*

## Recommendations for visual comfort

| Area | | | Footcandle | Lux |
|---|---|---|---|---|
| **Tasks** | Reading printed | | 30 | 300 |
| | Reading pencil material | | 70 | 700 |
| | Duplicated material | Good | 30 | 300 |
| | | Poor | 100 | 1000 |
| | Drafting, benchwork | | 100 | 1000 |
| | Up reading, chalkboards | | | |
| | sewing | | 150 | 1500 |
| **Classrooms** | Art room | | 70 | 700 |
| | Drafting room | | 100 | 1000 |
| | Laboratories | | 100 | 1000 |
| | Lecture room | Audience area | 70 | 700 |
| | | Demonstration area | 150 | 1500 |
| | Shops | | 100 | 1000 |
| | Study halls | | 70 | 700 |
| **Corridors and stairways** | | | 20 | 200 |
| **Dormitories** | General | | 10 | 100 |
| | Reading books, magazines, newspapers | | 30 | 300 |
| | Study desk | | 70 | 700 |




*Sections of typologies that integrate architectural elements, such as light shelves, protections and skylights. Direct daylight is shown in yellow, while diffuse daylight is shown in orange* , source *Methodology for Assessing Daylighting Design Strategies in Classroom with a Climate-Based Method*