

Patterns to Daylight Schools for People and Sustainability

In response to the earth's 24-hour cycle, all species have evolved daily biological or circadian rhythms (such as the sleep/wake behavior) that repeat approximately every 24 hours. In humans these rhythms are synchronized to the Earth's natural light/dark cycle. Lack of synchrony between light and dark and sleep/wake cycles may lead to sleep deprivation, stress, mood disorders, and perhaps immune system deficiencies. Following a series of studies on the effects of daylight on adolescents, the LRC developed a pattern book to help architects effectively daylight K-12 classrooms, hallways, and gymnasiums. To aid in identifying the positive attributes and potential shortcomings of each pattern, a color-coded diagram, a "daylight dashboard" was created.

The Daylight Dashboard

The daylight dashboard displays how well each pattern meets the following eight goals, which should be at the forefront of any good daylighting design for schools:

1. Illuminance: provide enough daylight to see tasks.
2. Coverage: Distribute ambient light throughout the space to avoid dark spots.
3. Diffuse Daylight: Minimize direct sun in all spaces with critical visual tasks.
4. Circadian Stimulus: Provide sufficient light in the morning to help entrain the circadian system.
5. Daylight Autonomy: Maximize the time when electric lights can be turned off.
6. Glazing Area: Minimize the area of windows or skylights.
7. View: Provide views to the outside.
8. Solar Heat Gain: Minimize solar heat gain in warm months; maximize solar heat gain in cold months.

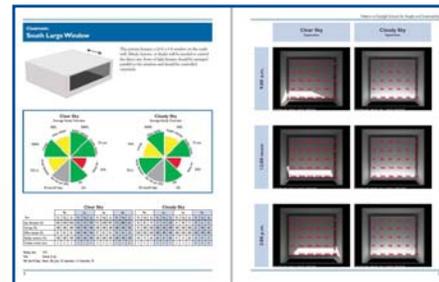
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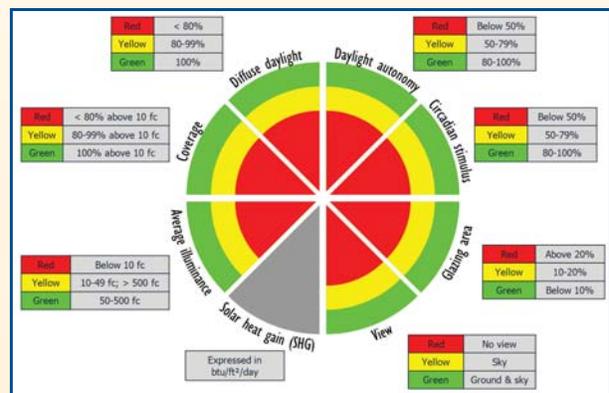


A 2-page sample from the publication detailing the effects of daylighting on a typical classroom scenario on clear and cloudy days.

Circadian Health

Beyond architectural design, building owners can help students maximize their circadian health.

- Use electric light sources with high correlated color temperature (CCT) in areas with little daylight.
- Limit the amount of daylight and prolonged exposure to computer screens in the early evening hours.
- Create exposure zones in the school by rotating students' desks or scheduling time in the morning outside, near windows, or under a skylight.
- Choose interior materials that have high reflectance colors (white, light blue) in the normal line of sight.
- Schedule classes to start later in the day so that school schedules better match sunrise and sunset.



The daylight dashboard shows eight characteristics of the daylighting design within a school space.

