

# 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.

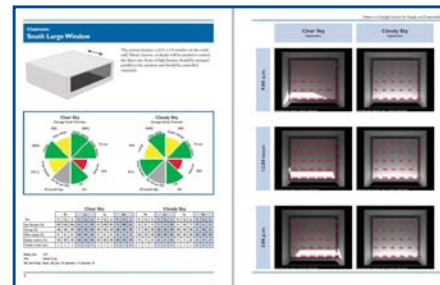
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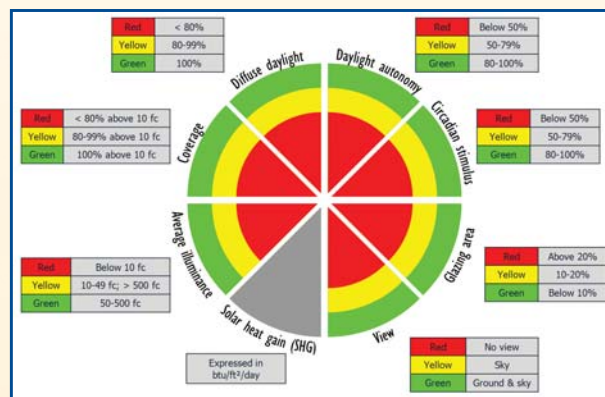


A 2-page sample from the publication detailing the effects of daylighting on a typical classroom scenario on clear and cloudy days.

## 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.

