

# Lighting in Schools



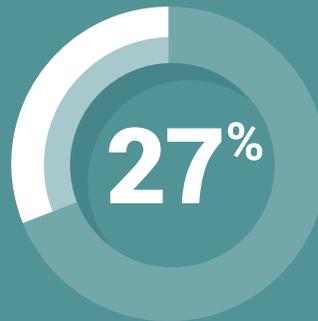
WorldGBC believes in green buildings for everyone, everywhere. Schools are no exception. We call for schools that are energy efficient, have low greenhouse gas emissions, and schools which are designed and operated for children's health, wellbeing and performance.

To help, WorldGBC has produced a series of briefing notes, focusing on four features of indoor environmental quality. These are intended for school board decision-makers, as well as school designers and facility managers, to share how design and operation features affect students' health and, in turn, their academic performance. By combining health, wellbeing and low carbon operation, we can ensure students spend their days in truly green school buildings.

## PROBLEM:

Poor lighting in schools can have a negative affect on children's health and academic performance.

## PREVALENCE:



of US schools are reported to have inadequate lighting. <sup>1</sup>

## SOLUTION:

Thoughtful school design and operation through use of daylighting and energy efficient artificial lighting can improve student health and performance. This can also most often be done without increasing greenhouse gas emissions.

## What is lighting?



Lighting in the built environment has two components:

- + Natural lighting from windows and skylights
- + Artificial lighting provided by electric lights

The balance between sufficient daylighting and artificial lighting requires the consideration of factors including:

- + Building design and orientation
- + Geographical location (climate and seasonality)
- + Heat loss or gain from windows
- + The need for particular task-lighting
- + Hours of operation of the school.

# Lighting affects children's health and comfort



## Children have higher sensitivity to light <sup>2</sup>

because they have smaller pupils and less melatonin-suppression than adults, affecting their sleep/wake cycles and circadian rhythm <sup>3</sup>



## Daylight exposure in children

has been associated with reduced low-activity time and increased weekend physical activity <sup>4</sup>



## Blue spectrum LED light <sup>5</sup>

in the morning could make children more stimulated <sup>6</sup> and alert at school compared to those exposed to dim light

# Lighting affects children's performance at school



## Significantly higher scores

and fewer typing errors were recorded on a computerised test for students under simulated daylight compared to artificial lighting <sup>7</sup>



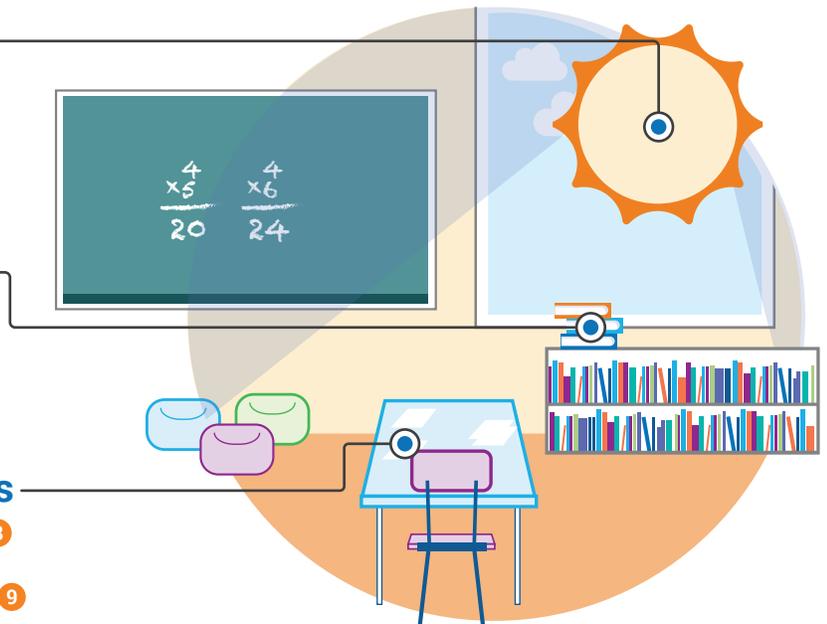
## US students showed a 36%

increase in oral reading fluency when exposed to high-intensity light, while those in standard lighting conditions increased by only 16% <sup>8</sup>



## "At-risk" students showed larger gains

in oral reading fluency when exposed to high-intensity <sup>8</sup> light, compared to those in standard lighting conditions, and their improvement closely followed national trends <sup>9</sup>



# A truly green school has good lighting and low carbon emissions, achieved through:

- **Ample daylight**, which reduces the need for artificial lighting, thereby reducing overall energy use and carbon emissions. Heat gain/loss through windows must be managed.
- **The use of light emitting diodes (LEDs)**, especially those tuned to circadian rhythms, for artificial lighting needs. These lights use significantly less energy than older technologies, thereby reducing building energy consumption.

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