

A large, solid yellow rectangular graphic positioned horizontally across the middle of the slide, partially overlapping the title text.

# DESIGNING DYNAMIC LEARNING ENVIRONMENTS

04.30.2025  
9AM

NAC



# Learning Objectives

1

**Assess classroom lighting components** and their applicability to different teaching tools and learning styles.

2

**Understand the physical/biological connection** between light and human health, learning styles, and circadian rhythms.

3

**Recognize the characteristics of light** that can enhance or deter from the learning environment.

4

**Evaluate current electric lighting technologies** that are available to us in our architectural designs, and how these impact the classroom.

# Introductions



**Julie Allen, LC, LEED AP**  
Lighting Designer  
NAC Architecture



**Darice Cadriel, AIA, NOMA, NCARB**  
Architect  
NAC Architecture



# ABOUT NAC

## **NAC**

Architecture that endures, challenges, and inspires.

NAC works towards impactful change to improve our communities and world.

## **We are lifelong learners.**

Our Research & Experience Development (RED) group uncovers meaningful, human-centered information to facilitate our architecture practice.

## **Collaboration.**

NAC + RED have partnered with universities on multiple research projects. We are committed to rigorous, meaningful research.

# ABOUT NAC

Over 40 years  
serving PK-12  
clients.



Formed  
1960



Formed  
1970



Formed  
1979

TSG, TBK,  
Northwest  
Architectural  
Company merge  
to form Northwest  
Architectural  
Company

1983



1998



ja Jubany Architecture joins NAC  
2006



AR7 joins NAC  
2011



Osborn joins NAC  
2014



2015



Trinity:PDA joins NAC  
2020



Today



# A4LE MACCONNELL AWARDS



**James Baldwin  
Elementary School  
2024 James D. MacConnell  
Winner**



**Glover Middle School,  
Finalist**



**Mount Si High School,  
Finalist**



**Hazel Wolf K-8  
E-Stem School, Finalist**



**Cherry Crest Elementary  
School, Finalist**



**Machias & Riverview  
Elementary Schools, Finalists**



**Cavelero Mid High  
School, Finalist**





Students spend  
**6 – 8 hours**  
a day in schools  
*(Fildaro, 2021)*



**Physical,  
biological, and  
neurological**  
development occurs  
*(Yand & Jeon,  
2020)*



**Success early in  
one's life effects  
their success later in  
life**  
*(Wang et al., 2015)*



**Typical Classroom Lighting Design**



What are teachers doing?



# Fundamentals of Light Quality

- **Quality of Light**

  - CCT

  - CRI

  - TM30

- **Visual Comfort**

- **Dimming**

- **Controls**

- **Light & Health**

- **Daylighting & Views**

- **Colored Light**

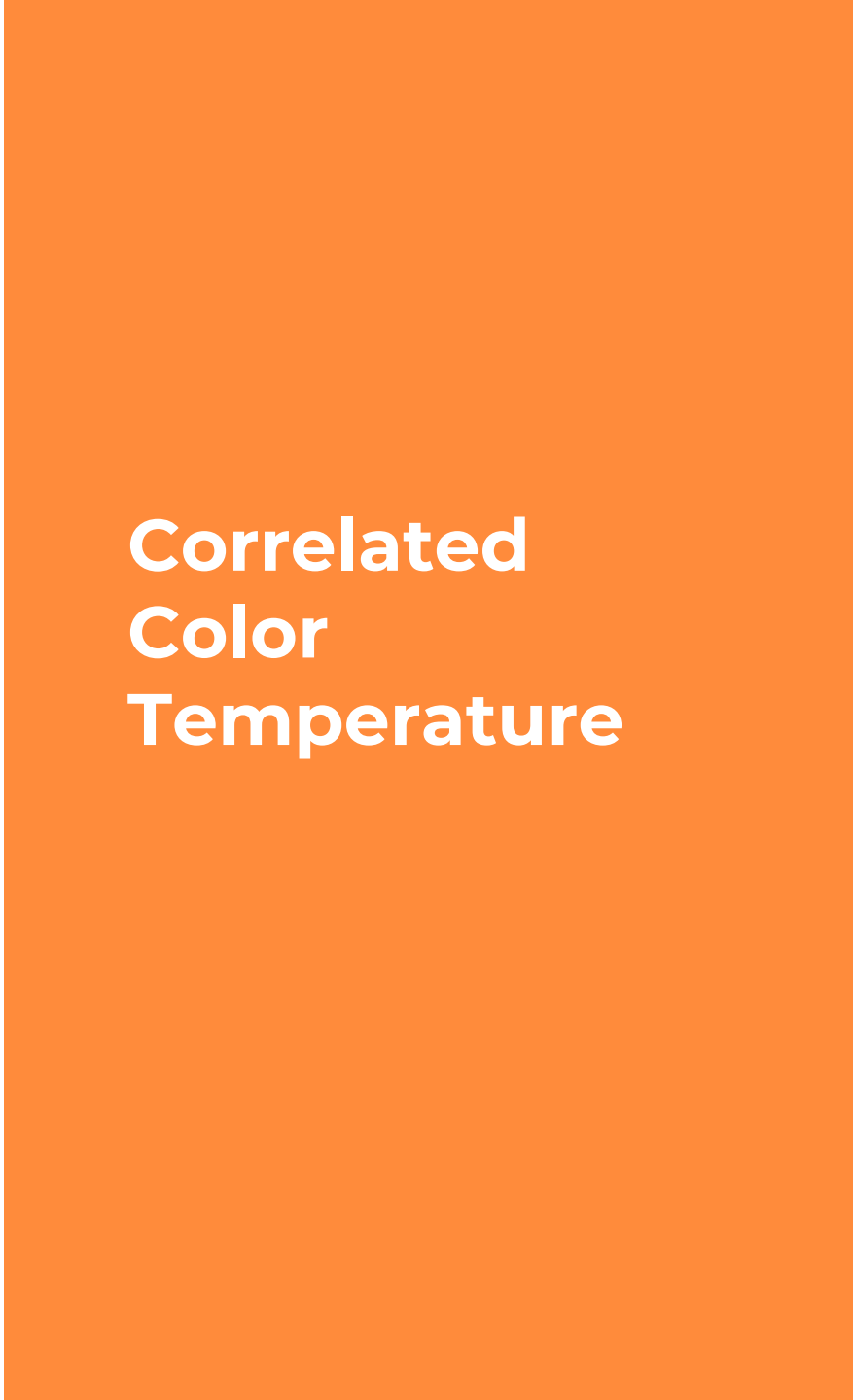
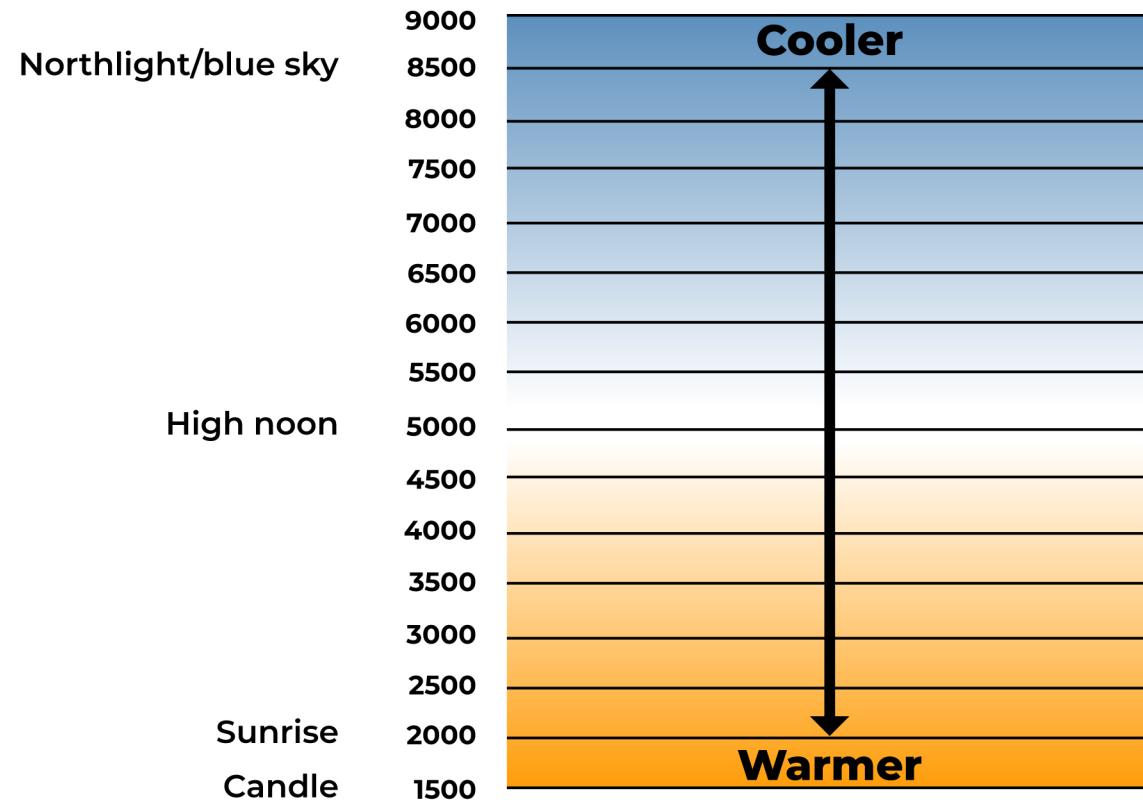


# Light Quality



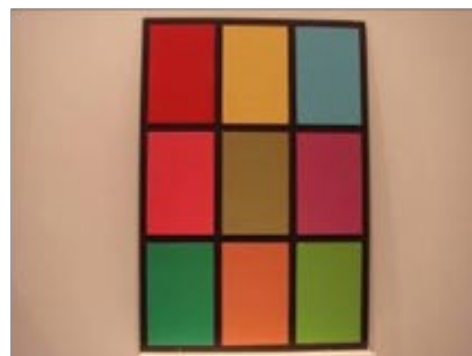
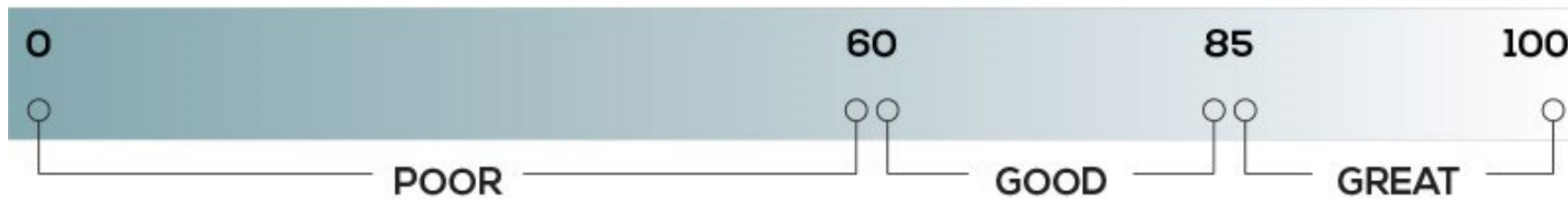


# Color Temperature Chart

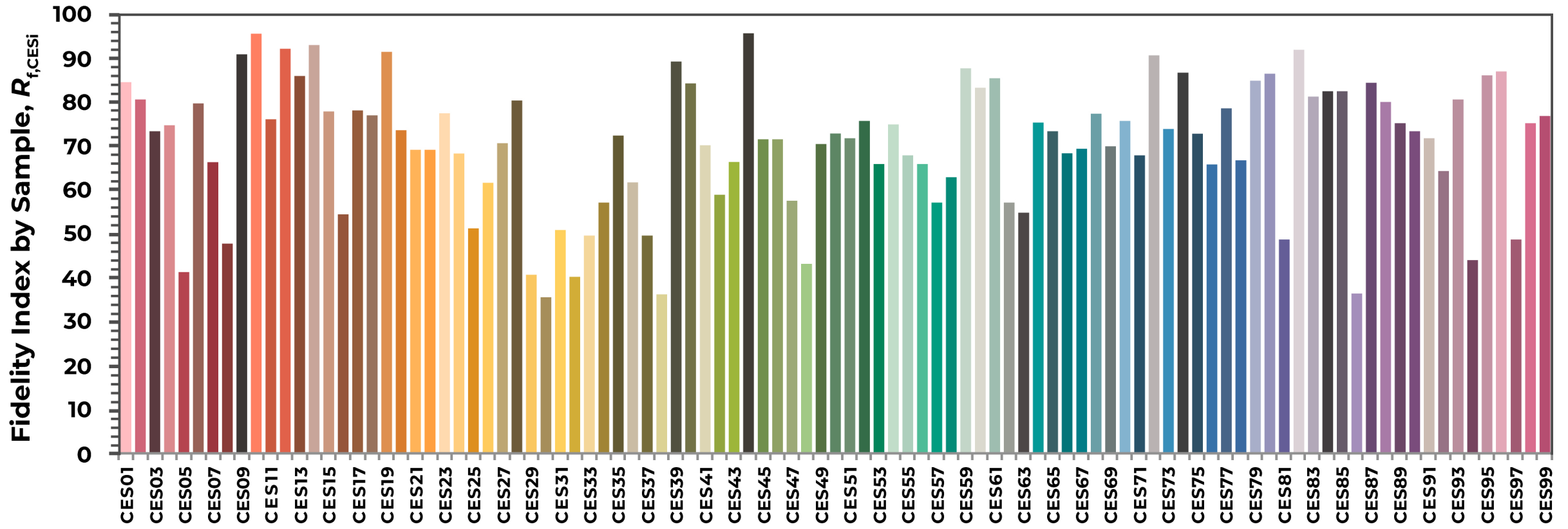


Correlated  
Color  
Temperature

# Color Rendering Index



# TM-30





# Light Quality



<EXIT>



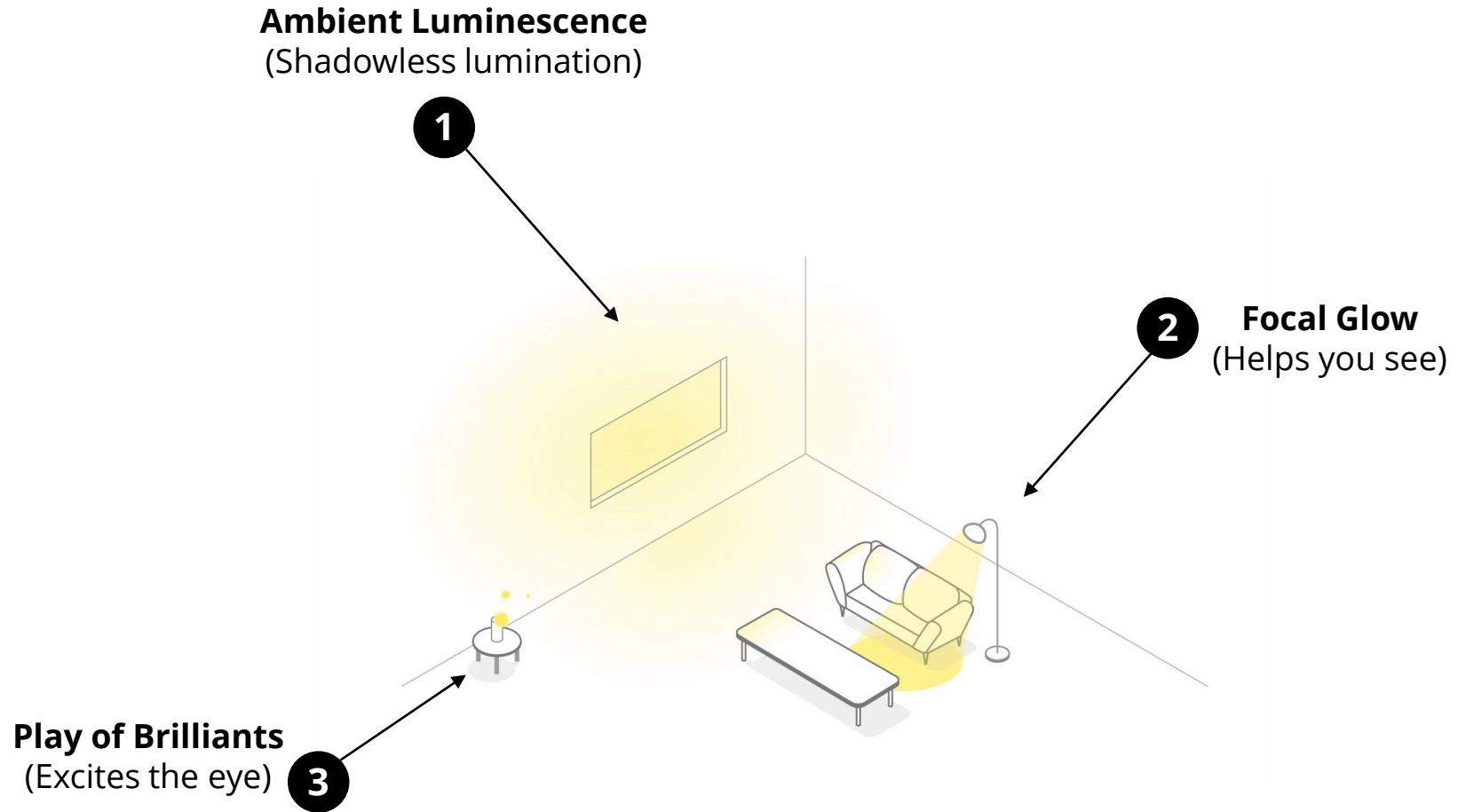
# Visual Comfort



# Visual Comfort



Richard Kelly



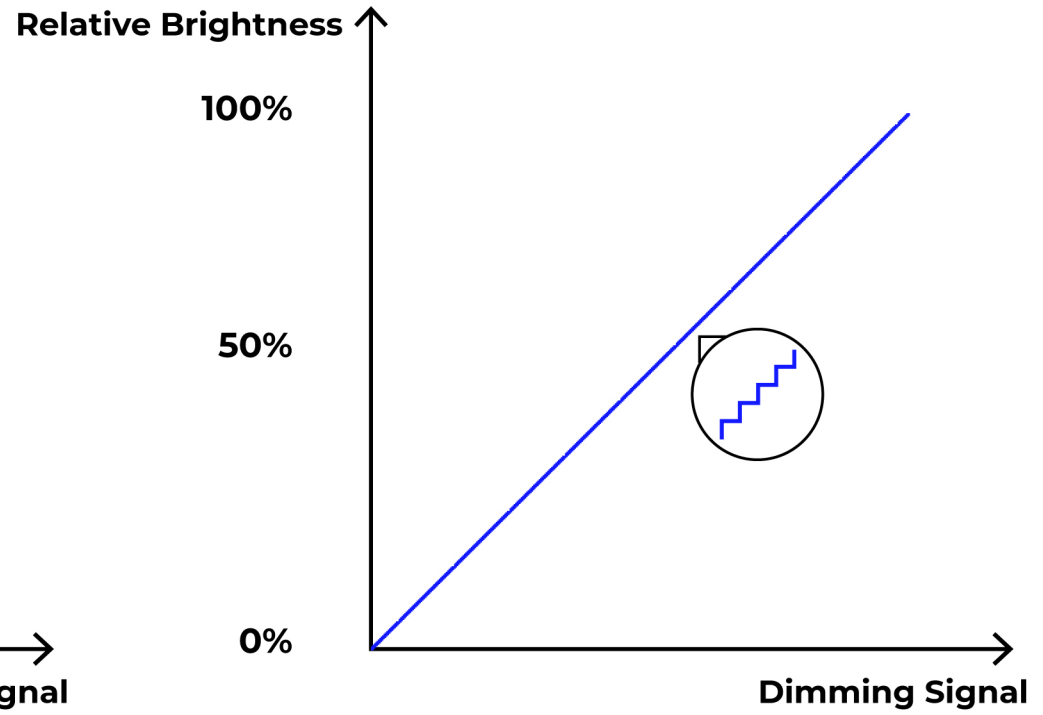
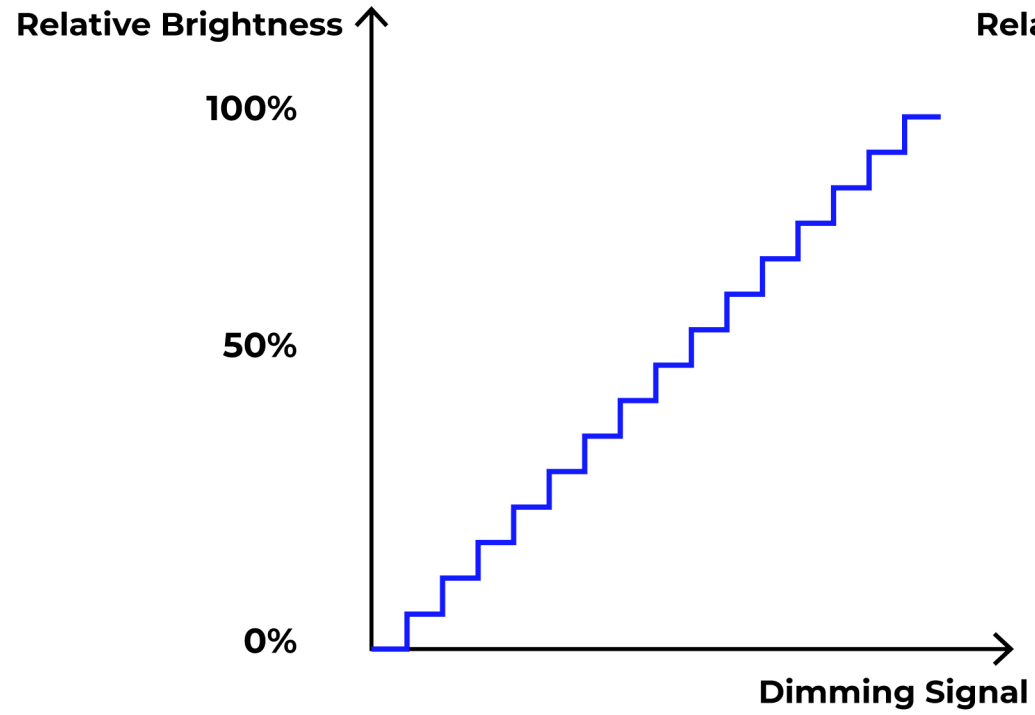
# Visual Comfort





Dimming

# Dimming



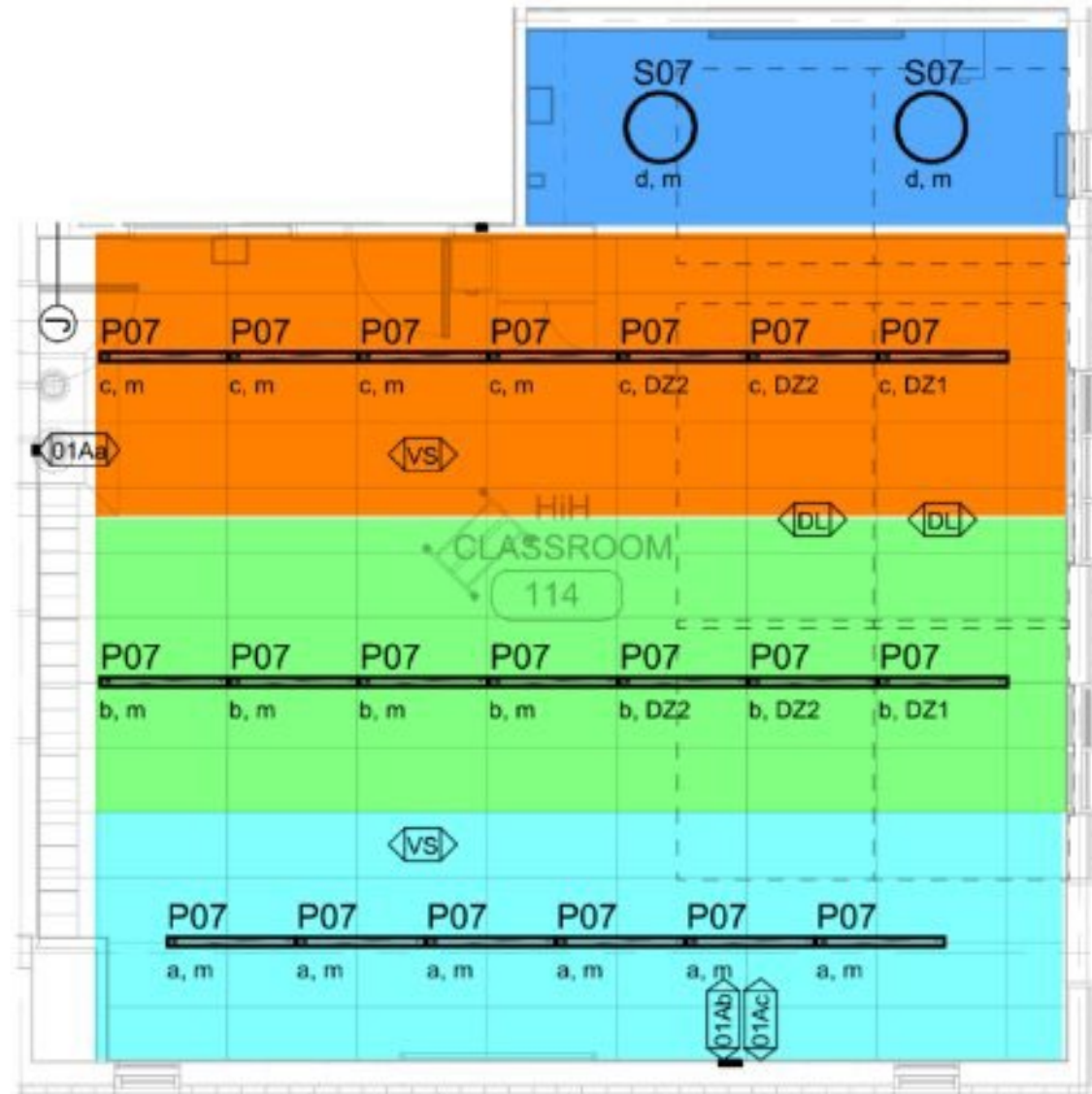
# Dimming





Control

# Control





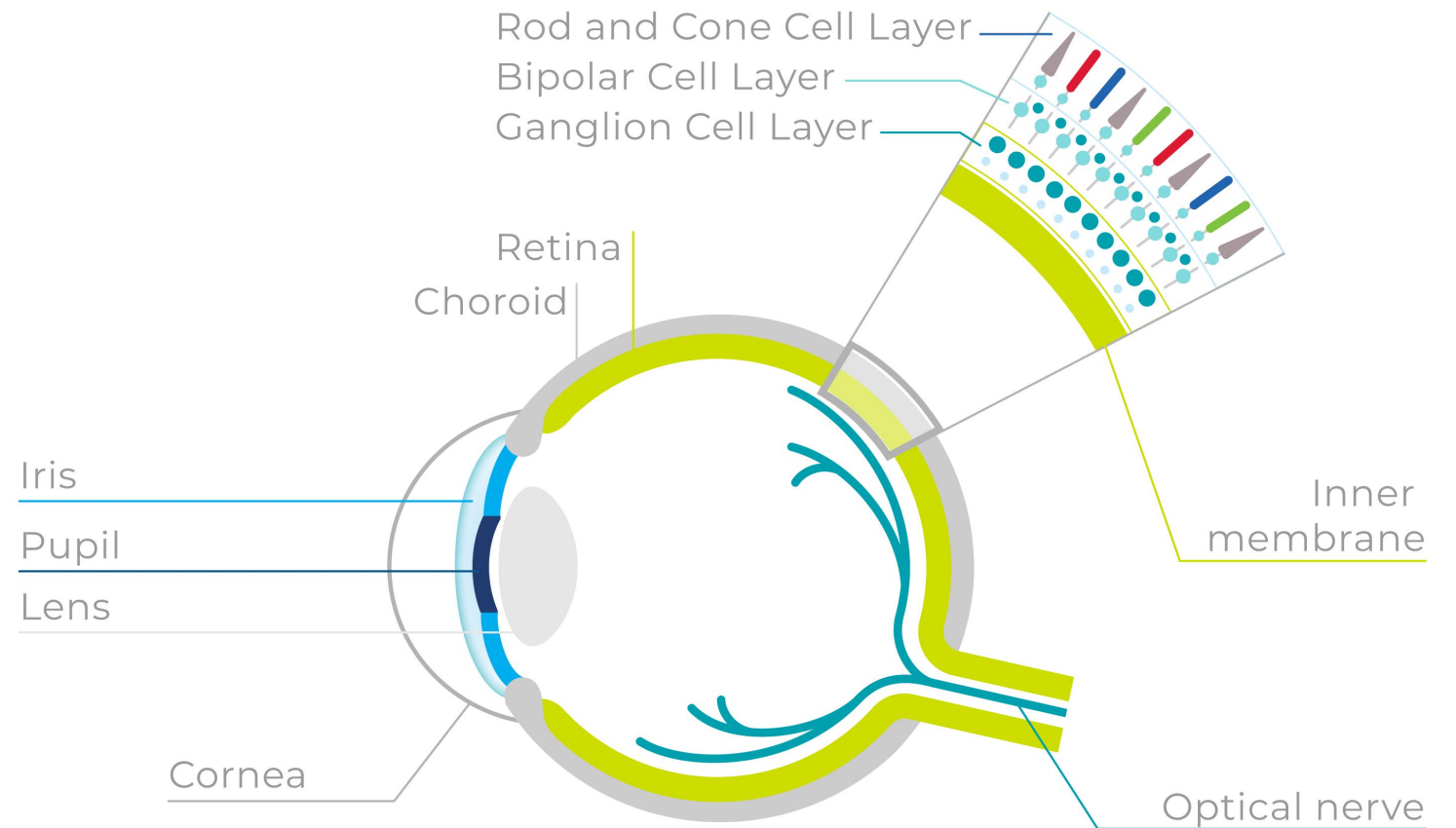
# Control



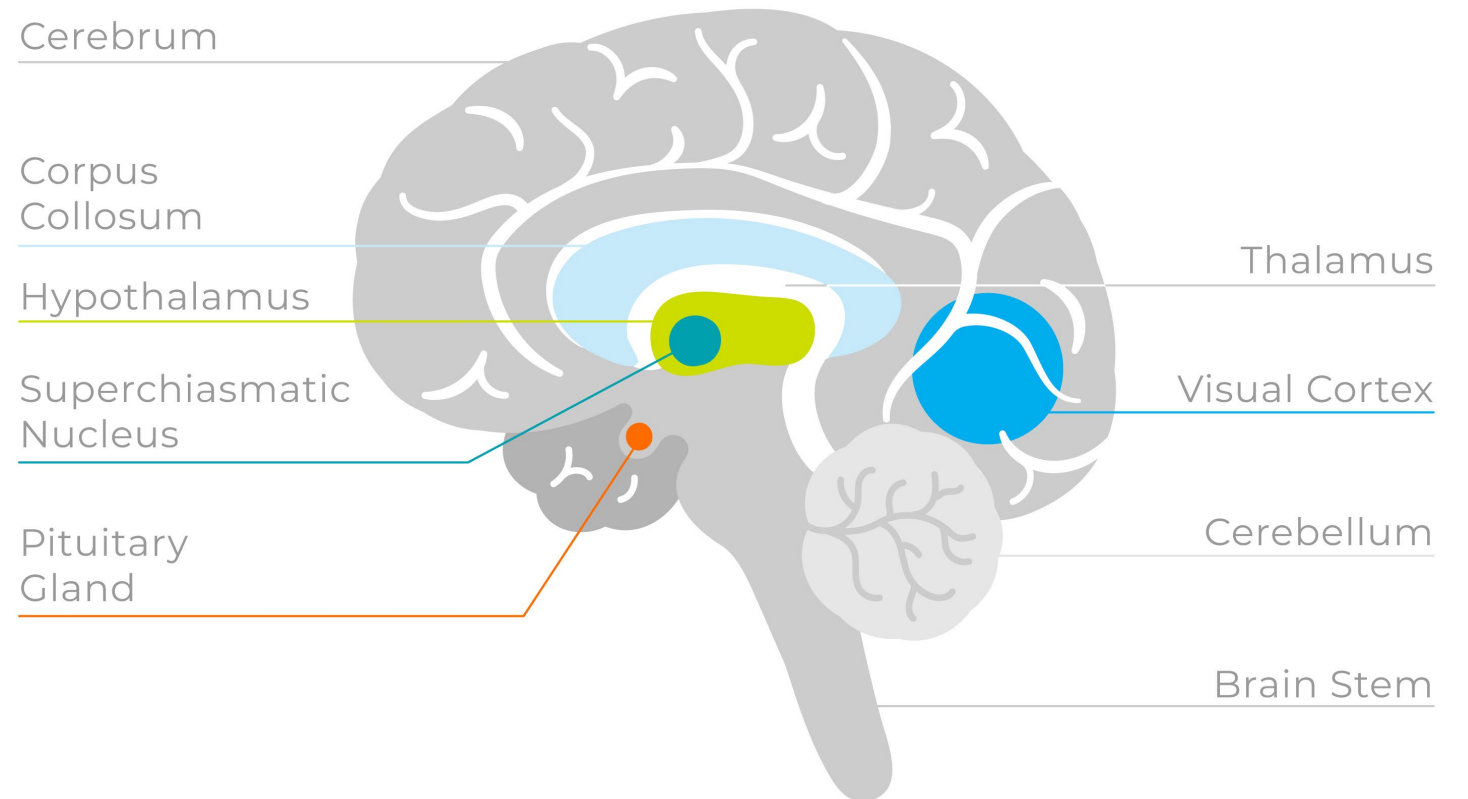


# Light and Health

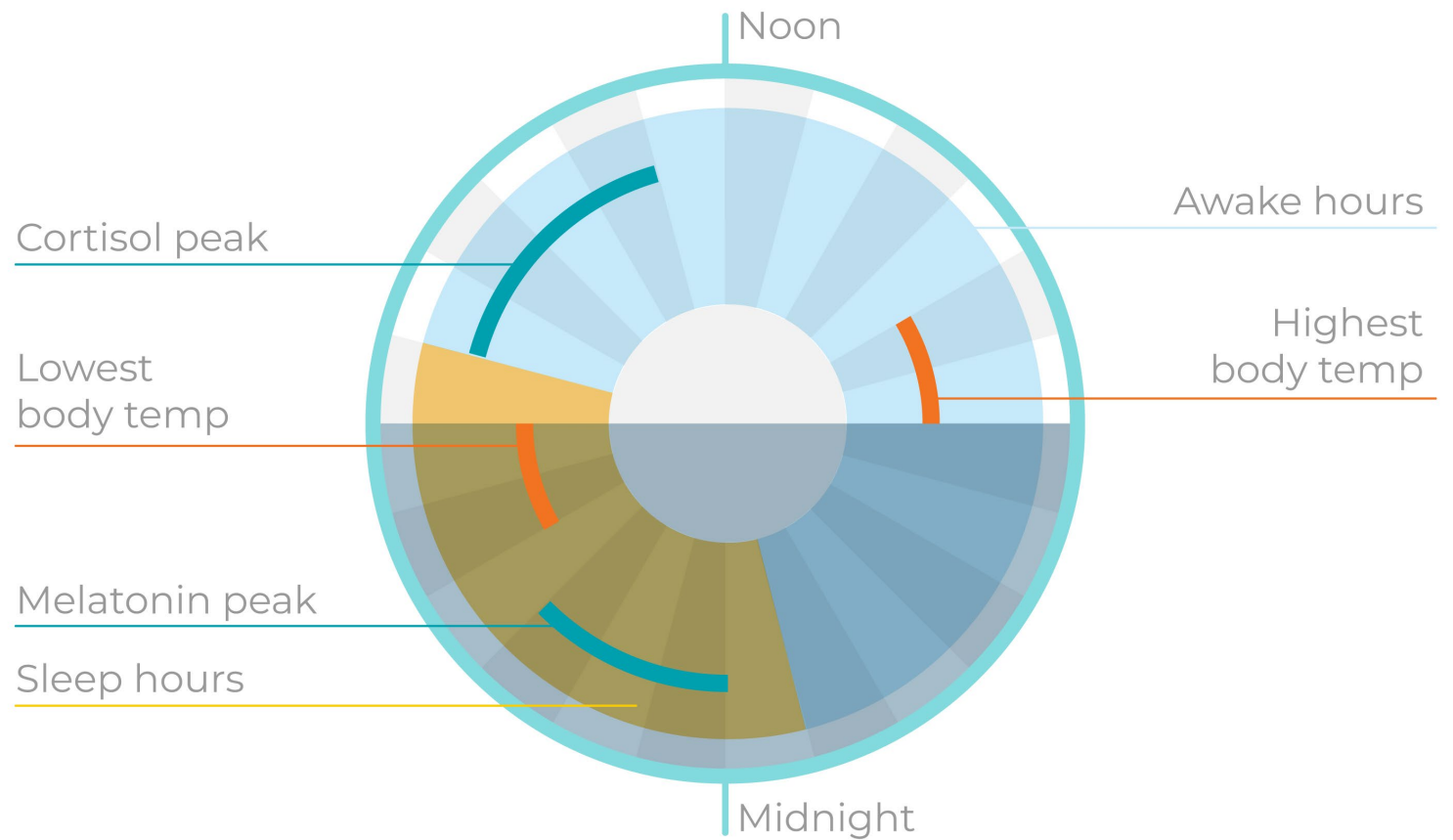
# The eye



# The brain



# Circadian Rhythm







# Light and Health



# Daylight





# Daylighting

**7% - 18% increase in student standardized test scores (Heschong, 2002)**



**Views to the exterior and a connection to nature increases student academic success.**



# Multi-sensory



# Multi-Sensory Rooms



# Chromotherapy





# Color Changing Light





# Fundamentals of Light Quality

- **Quality of Light**

  - CCT

  - CRI

  - TM30

- **Visual Comfort**

- **Dimming**

- **Controls**

- **Light & Health**

- **Daylighting & Views**

- **Colored Light**

# Putting it all together...

What are the main lighting features to include in creating an ideal K-12 classroom to promote students learning?

What are the roadblocks?



**James Baldwin Elementary School**  
Seattle Public Schools

**Thank you!**

**NAC**