LIGHTING OPTIONS, COSTS, AND PERFORMANCE

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LED UPGRADE OPTIONS

Low Cost

- T8 LED Direct Wire ($8-10/lamp)
- T8 LED Lamp with Ballast/Driver ($7-9/lamp)
- Retro-Door-Kit ($75-100/kit)

High Cost

- New LED Fixtures ($95-125/fixture)
T8 LED DIRECT WIRE / BALLAST BYPASS

• Pros
  • Cheap, easy to install
  • Reduces energy consumption by roughly 60% (32w to 12w)
  • Removes Ballast

• Cons
  • Flicker – autism, epilepsy & migraine sufferers
  • Safety – line voltage to lamp holders
  • Power Surges – no protection
  • Energy savings is negligible versus ballast driven
  • Minimal Controls

• If you do:
  • Change lamp holders rated for direct wire
  • Label the fixture direct wire, line voltage
T8 LED WITH BALLAST OR DRIVER

• Pro
  • Cheap, easy to install,
  • Reduces energy consumption by 60%
  • No Flicker or electrical shock hazard

• Con
  • Fixtures will look the same
  • Minimal Controls
  • Light level is dependent expertise of installer
    • Need lower illuminance for computer use
    • Is glare an issue?
    • What about smart board, is light washing out content?
    • Want high level for paper based tests – improved student performance
LED RETRO DOOR KIT

• Pro
  • Field Adjustable Light Output
  • 0-10v dimming, occupancy sensing, and daylight harvesting capabilities
  • Improves the look of facility; the public will notice
  • Interchangeable Driver and Boards
  • Built for future upgrades and maintenance

• Con
  • About 30-40% more expensive than T8 LEDs
  • Typically installed fixture for fixture if upgrading 2x4 recessed fixtures
  • Not always compatible with surface mounted fixtures.
LED FIXTURE (FLAT PANEL / VOLUMETRIC)

• Pro
  • Field Adjustable Light Output
  • 0-10v dimming, occupancy sensing, and daylight harvesting capabilities
  • Improves the look of facility; the public will notice
  • Interchangeable Driver and Boards
  • Can reduce fixture count –lowers cost and future maintenance

• Con
  • About 20% more expensive than kits due to extra labor
  • Can be non-maintainable “Throw-away-fixture”
LED FIXTURE – FLAT PANEL
LED FIXTURE - VOLUMETRIC
SELECTING A COLOR TEMPERATURE

• 3000K, 4000K, 5000K?
• Studies consistently document higher student performance with higher Kelvin light
  • Reading speed, comprehension, cognitive thinking and even better attitude with higher kelvin lighting
  • Studies typically done with 5000-6500K
  • Blue Sky fluctuates between 6000K-8000K
  • 6500K most sold color temperature globally
• EPL recommends 5000K+.
SPECTRAL POWER DISTRIBUTION

Spectrum Increases Alertness

Natural Daylight – 5300K
Fluorescent Bulbs – 4000K
LED Philips Evo Kit – 5000K
LIGHTING CONTROLS

• Full Facility Controls
  • Not recommended – Localized controls are a better option for a school

• Occupancy Sensors
  • Only recommended if energy savings is the goal, with LEDs they rarely help an ROI

• Dimming Controls
  • Always recommended with constantly changing learning medium

• Daylight Harvesting
  • Only recommended if energy savings is the goal, with LEDs they rarely help an ROI

• Scene Selection

• Tunable Fixtures and Controls
TUNABLE LIGHTING

• Fixtures that have the ability to change color temperature (3000K – 5000K) through a switch on the wall. New systems are 2700K-6500K.

• Can be used scientifically or for preference selection

• More Blue in light (like the blue sky), the more alert humans become

• More yellow in the light (like a sunset or fire), the more drowsy humans become.

• Has to deal with cortisol and melatonin production which are turned on and off via photo receptors in the eyes.

• Runs roughly $3,500 - $4,500 per classroom (9-15 fixtures)
TUNABLE LIGHTING – DE SOTO

5000K at 100% Brightness

3000K at 50% Brightness
DE SOTO’S PERSPECTIVE

• Linzi Gronning – Middle / High School Principal De Soto School District
• Thoughts on the Tunable System
  • Do the teachers notice a difference in the students?
  • Do they actually use the capabilities?
  • Would you recommend it to other schools
  • How did you specifically fund the project?
THANK YOU!

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