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# CHOOSING THE RIGHT LIGHT

*The benefits of full-spectrum lighting continue to be researched and debated*

By Jennifer A. Veitch, Ph.D.

With the subject of good lighting conditions commanding wide-spread attention, the debate over the value of full-spectrum fluorescent lighting needs to be looked at more closely. Lighting design should accommodate six human needs: visibility, activity, health & safety, mood and comfort, social contact and communication, aesthetic appreciation. Claims about the superiority of one lighting product over another should be evaluated against criteria in all of these areas. However, this assessment also requires attention to architectural design, maintenance, economics, and energy issues. No one product fits all circumstances.

## Evaluating full-spectrum lighting

A full-spectrum fluorescent lamp mimics daylight in the north sky, having emissions in all parts of the visual spectrum and some emissions in the ultra-violet range. It appears slightly blue, and renders colours well. Some people claim that the similarity of the light between a full-spectrum fluorescent lamp and daylight makes it inherently better for meeting human needs, by improving visual acuity, mood and, on the school scene, achievement and attendance.

The National Research Council's Institute for Research in Construction has reviewed the literature on full-spectrum lighting to clarify the validity of this idea. Most of the claimed benefits are not conclusively supported by the scientific evidence.

**Visibility.** Seeing task details depends on the size, contrast and brightness of the task and on characteristics of the viewer (age in particular). Some researchers theorise that lamps with relatively more blue light will improve visual acuity because this stimulation appears to reduce pupil size and in turn, increasing depth of field. If this were true, full-spectrum lamps would produce better visibility than most other lamp types. However, the effects that have been demonstrated in the laboratory under strict experimental controls have not been observed in field studies under normal viewing conditions.

**Performance and behaviour.** Several prominent studies involving classroom lighting received widespread publicity, and have led some classroom teachers to change the lighting (even at their own expense!). However, close examination of these studies revealed several problems in the research design and statistical analysis.

**Mood and comfort.** Probably the most common claim for full-spectrum fluorescent lighting is that it prevents or treats depression. It is true that light therapy is an effective treatment for the clinical condition Seasonal Affective Disorder (SAD), and it might even be helpful for other forms of depression, but the type of white light that is used in light therapy does not affect treatment outcomes. Any very bright white light, administered at the right time of day, is effective. Furthermore, the effectiveness of this medical treatment doesn't mean that everyone should be exposed to high light levels all the time.

**Safety and health.** Other health effects ascribed to full-spectrum fluorescent light are based upon its ultraviolet component. The literature is confusing on this point. One group suggests that the presence of ultraviolet light in interiors is essential to health because modern, Western society receives too little exposure to naturally-occurring UV light. Others fear that UV exposure from fluorescent light (full-spectrum light in particular) could be a carcinogen. The total UV dose that one would expect from the lighting sources in a typical office, however, is very small in comparison to that received outdoors.

**Aesthetics.** Full-spectrum light does make it easier to distinguish between colours than some other lamp types. However, it is not the only lamp that provides good colour rendering, and other lamp types will be more appropriate for some places. Few of us would want the very cold colour of a full-spectrum lamp in our living rooms; we would rather have the warm colour of an incandescent lamp.

**Social connections and communication.** Non-visual processes related to lighting also influence us. Being in environmental

conditions, including lighting, that we prefer puts us in a good mood (what psychologists call *positive affect*), which leads us to behave more co-operatively and creatively. Preferences for different types of light vary, but some studies have found that full-spectrum lighting is not well-liked in comparison to warmer colour temperatures, especially if the light level is low.

## Conclusions: Is full-spectrum lighting the quality choice?

Most of what we need to know about lighting types and their effects on people remains to be learned. For example, there might be some benefit to using lamps with some UV output in circumstances where there is very little daylight (such as the far North), but no one has studied this question.

We do know, however, that for general use in offices, schools, and institutions, there is no particular benefit to using a full-spectrum lamp over any other lamp type. If one wants to make fine colour discriminations, then one needs a lamp with good colour-rendering properties, which could be a full-spectrum lamp (but need not be).

The most important consideration in creating good-quality lighting is not the lamp type. Codes and standards are silent about lamp type, focusing instead on light levels, distribution, and glare control as the most important considerations. Characteristics of the end-users, the setting and activities in it, the architecture, and economic issues all come into this complex equation.

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