Thoughtful integration of many building elements and a collaborative design team are essential to achieve successful daylighting. For example, one cannot simply incorporate large windows into a space and expect it to be well daylit. During the design process, decisions related to building orientation, furniture placement, controls, surface finishes and colors should not be made independently. This integrated approach was explored in a previous Enlighten article, which highlighted the important role of the interior designer in daylighting design. The case study outlined in this article exemplifies the necessity of this approach, as well as the negative impact unsuccessful daylighting can have on occupant use, comfort and satisfaction.

About the building
An office building intentionally designed to use daylight as the primary light source to save energy was selected for study. Similar architectural daylighting strategies were used throughout the building and interior vertical blinds were used across all offices on four floors located on the south, north and west perimeter zones. External sun-shading on the southern façade was the only variation across orientations. After occupancy, a unique design challenge was inadvertently discovered.

Real-world situation
One particular occupant was suffering from seasonal affective disorder and required more light. The occupant did not have easy access to the office blind controls because a set of full height cabinets were covering the manual controls in the office. In turn, the occupant used all overhead electric lights in addition to four incandescent task lights. Obviously, this behavior voided potential energy savings in the office and decreased occupant satisfaction. This unfortunate layout was repeated in half of the perimeter offices.
Case study

Through a case study approach, the phenomenon of the occupants’ inability to control daylight within their offices was explored. In addition, the case study evaluated how lack of control affected perceived satisfaction and behaviors. This study used post occupancy evaluation questionnaires, interviews and building observations. It was guided by the hypothesis: The inability to control daylight with window blinds impacts behaviors and satisfaction in daylit offices. Three corresponding research questions were posed to further explore the hypothesis:

1. Have occupants manipulated spatial elements to gain access to blind controls?
   a. If so, how and why?
2. Does orientation impact occupant behaviors and satisfaction?
3. Is there a correlation between satisfaction and how often occupants manipulate their blinds?

All individuals with offices within the building received an online questionnaire; however, respondents without exterior windows were removed from the analysis. Questions were designed to elicit responses regarding each occupant’s access to blind controls, satisfaction surrounding their office and daylit environment, reported behaviors, light related health issues and demographics. Follow up interviews were conducted if further explanations regarding survey responses were needed.

Findings

The case study found that the blind controls were not accessible to all occupants. Over 50 percent of total respondents (n=35) reported obstructed blind controls. Of these, nearly 60 percent had modified their offices environment through physical or behavioral changes to gain access. The issue of control was further explored through interviews, which discovered that occupants who modified their environment either added longer cords or extensions to blind controls or asked maintenance staff to switch blind controls to the opposite side of the window (reversed control location). Two occupants reported a change in behavior versus physical environmental changes. One reported that they climbed on top of their desk while the other, a shorter occupant, crawled under their desk to change blind position. The remaining 37 percent, without access to blind controls, did nothing to their offices to reach the inaccessible controls.

In terms of general office satisfaction, most assessments varied among three overarching categories as expected including access to control; no control, but modified environment; and no control, but did not modify environment. Those who had changed their offices to gain access to controls were the most satisfied, and those with no control that had not modified their environments were the least satisfied.
Observations were also part of this case study. Exterior photographs were used to document actual blind position as adjusted by occupants on the north, south and west facing facades of the building. Photographs were taken every two hours from 8:30 am–4:30 pm, five times per day, for a period of two weeks to collect varying sky conditions and total blind occlusion (i.e. the total percentage of blinds obstructing any given window).

While the blind observations were of interest and did vary by orientation as expected, no significant correlations were found between the observed blind change frequency and any of the measured satisfaction responses gathered from the initial online survey. However, analyses of the survey responses uncovered a moderate positive correlation between reported blind adjustment frequency and the

Figure 2: Results from occupant satisfaction survey

Figure 3: This video graphically documents blind patterns. The sky image within each iteration is representative of the actual sky condition at the time the photograph was taken. Black windows signify closed blinds, white represents open blinds and the three shades of grey represent varying levels of blind occlusion; 25 percent, 50 percent and 75 percent respectively.
satisfaction questions designed to assess glare; this suggests that the individuals most impacted by glare issues tended to operate their blinds less frequently. This was expected, but was not statistically proven through the photographs of actual blind positions. Additionally, a negative correlation was revealed between satisfaction with both view and privacy and reported blind change frequency. This finding, in conjunction with interview responses, implies that occupants who operated their blinds more frequently were more satisfied with both their views and privacy. Privacy was extremely important to most occupants, as their professions required them to change clothes in their offices frequently. Some respondents reported that blind control was more important for privacy issues over daylight and glare issues.

**Conclusion**

This case study ultimately leads to the conclusion that interior designers, and the entire design team in general, must become more aware of how building occupants control daylight within their space for personal preference, privacy and alleviation of glare. Furniture placement and daylight control strategies must be considered for successful daylighting design. If an occupant does not have access to control daylight, the source may not be used as intended, omitting any potential energy savings from reduced electric lighting use. Furthermore; daylight commissioning, the testing of daylight systems and controls prior to occupant move in, may help to mitigate control issues and design missteps.

This article briefly outlines a small sample of the case study findings. A more in-depth look at this study can be found within the following article “Understanding controls, behaviors and satisfaction in the daylit perimeter office: A daylight design case study” and master’s thesis “Unforeseen issues within the perimeter daylit office: A study of daylight controls, behavior, and satisfaction.”

**Sources and resources**