

Poster

Daylight to fulfill Lighting Needs for Demented Elderly

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Introduction

A lighting design, attuned to visual and non-image forming (NIF) effects, contributes to the well being of elderly people with dementia. Based on literature¹ recommendations are found for illuminance levels (E) and color temperature (CCT). Visual and NIF effects can be achieved by electric lighting as well as by daylight. The aim of this study was to locate the position in the communal living room of a newly build Dutch nursing home, which fulfill both needs most of the time, using only daylight. The time slots for the NIF effects were taken from 10-11 am and from 3- 4 pm and for visual needs between 9 am and 5pm.

Methodology

To predict the illuminance levels, a model of the future situation was made, using the software program Radiance. Radiance models were made of the living rooms in their final state. To predict the illuminance levels over a whole year, the rtcontrib-tool [1] in Radiance was used. Color temperature measurements were performed in one of the living rooms under different sky conditions and different parts of the days. The software program DIALux was used to calculate the illuminance of the electrical lighting.

Results & discussion

Based on the simulation of the daylight illuminance levels, the extent to which the NIF needs (> 1000lx, vertical at eye) can be fulfilled strongly dependent on the position in the room, viewing angle, time of the day, and moment of the year. The illuminance levels near the window satisfy those needs most of the time when looking in the direction of the window (70 -100 % of the time between 10-11 am (figure 1) and 60-90

% between 3-4 pm). When looking away from the window, 4-70% of the time values over 1000 lx can be reached. The visual needs can be fulfilled between 30 and 95% of the time.

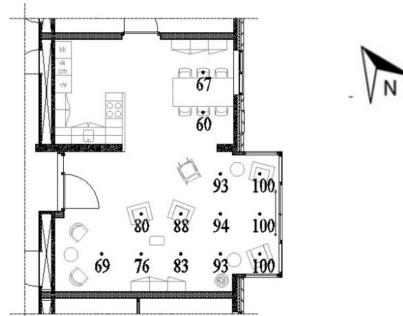


Figure 1% of the time (10-11 am) NIF effects are reached, looking at window

The kitchen and the back of the living rooms need additional lighting in more than 40% of the time for both lighting requirements. Based on the CCT-measurements, daylight can be used to fulfill the NIF needs for all measurement positions (measured values between 4700K – 6200K). Note that since the finishing of the room influences the CCT, the outcome might be different in the final situation.

Conclusion

Depending on the layout and finishing of the room, daylight can very well be used to fulfill both visual and NIF effects in communal living rooms for the largest part of the day. Additional lighting is needed to ensure the recommended lighting condition for 100% of the time.

References

- 1 Aries, M.B.C., Vlies, R.D. van der, Westerlaken, A.C., (2010), Inventarisatie en vastlegging van de state-of-art kennis over licht en ouderen, Delft, TNO
- 2 Jacobs, A., (2010), *Understanding rtcontrib*