JBEEJournal- Journal of Building and Environmental Engineering

E-ISSN:2756-7826

ARTICLE
THE OCCUPANTS' VISUAL ACUITY AND PERFORMANCE: METHODS FOR MEASURING OCCUPANTS' VISUAL AND WRITING PERFORMANCES IN DAYLIGHT SPACES

Elina Mohd Husini[a], Raja Nur Syaheeza Raja Mohd Yazit[b*], Awangku Abdul Rahman Awangku Yussuf[c]

[a] *Architecture Department, Faculty of Engineering and Built Environment, Universiti Sains Islam Malaysia, Nilai, 71800, Negeri Sembilan*
[b] *Architecture Program, Faculty of Built Environment, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak.*
[c] *Faculty of Science and Technology, Universiti Sains Islam Malaysia, Nilai, 71800, Negeri Sembilan*

* *Corresponding author: rajanursyaheeza@gmail.com*

ARTICLE HISTORY
Received: 25 October 2020
Accepted: 4 March 2021
Published Online: 31 March 2021

KEYWORDS
Daylight illuminance level
Reading and writing performance
Horizontal distribution

ABSTRACT

Acceptable illuminance level in spaces is essential for optimum task performance that requires visual efficiency such as reading and writing. Passive design strategies are developed to meet the occupants' visual comfort such as optimizing the daylight source. Previous researcher highlighted the illuminance level in a space correlates with the occupants' performance, where the illuminance level which is higher and lower than the recommended by the guidelines decreases the overall performances of the respondents. The guidelines and standards highlighted the acceptable illuminance level in office and school are between 300 lux to 500 lux. Various methods have been developed to identify the reading and writing performances of occupants in relation to daylight and illuminance level. This paper aims to study suitable methods that can be developed in identifying the occupants' reading and writing performances in daylight spaces. The most common method to measure the respondents' writing performance is the speed (minute) and word per minute (wpm) of the respondents to complete the writing task such as Handwriting Speed Test (HST) and Detailed Assessment Speed Handwriting (DASH). Secondly is to explore the changes of illuminance level whether has relation to visual performance. Therefore, the visual test is conducted to identify the task performance within the range of acceptable illuminance level. The students achieved the high visual performance not at the recommended level of illuminance. The changes of illuminance level of 30 percent had influenced the student's visual performance. In order to control the lighting strategy, the lighting systems and sensors in learning spaces are suggested to stable the light intensity and contribute to energy consumption.

1.0 INTRODUCTION

Daylighting quantity and quality in buildings' assessments are significant in identifying the effects on visual comfort (Howlett et al., 2007). For an indoor space, daylight is measured using the illuminance level (lux) as the total luminous flux incident on a working surface (Husini et al., 2018). According to Green Building Index (GBI) in Malaysia, the illuminance level is recommended to be measured at 800 mm to 900 mm of the working plane height. This amount of the incident light will illuminate the working surface that correlates with the human perception of brightness level in a space (Ohno, 2005). Natural daylight in a space creates three effects on humans, which are known as 'Triple Effect' shown below (Zumtobel, 2018):

i. Visual functions
    a. Illumination of a task area in conformity with relevant standards
    b. Glare-free and convenient
ii. Creating biological effects
    a. Supporting the circadian rhythm
    b. Stimulating or relaxing
iii. Emotional perceptions
    a. Lighting-enhancing architectures
    b. Creating scenes and effects

Spaces that are designated for specific tasks or activities require appropriate environmental luminosity which has an optimum lighting quality (Veitch and Newsham, 1998). Lighting quality can influence:

i. visual performance,
ii. post-visual performance such as eating, reading, walking and all activities,
iii. communication and social interaction,
iv. mood state such as happiness, performance,