

The Relationship Between Physical Ergonomic and Students Academic Performance: A Conceptual Paper

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Abstract

The learning environment is vital to ensure that students perform well in their studies as it significantly influences their motivation, focus, safety, health, overall learning experience, and academic success. Thus, this paper aims to examine the relationship between physical ergonomics, including noise, lighting and humidity, and students' academic performance. The study's target population is active postgraduate students of Malaysia higher education institutions. To conduct this study, the researcher will collect primary source data by randomly distributing questionnaires. All data will be analyzed using Smart PLS. The study findings will be clarified using frequency analysis, descriptive statistics, correlation, and multiple regression analysis.

Keywords: Physical Ergonomic, Noise, Lighting, Humidity, Academic Performance

Introduction

"In the pursuit of academic excellence and optimal learning outcomes, various factors come into play, influencing the overall performance of students. One crucial element that often goes overlooked is ergonomics. Derived from the Greek terms "ergon," meaning "work," and "nomos," signifying "natural principles or arrangements" (Schelussel & Maykel, 2019), ergonomics focuses on human anatomical, anthropometric, neurological, and biomechanical aspects related to physical activity, according to the (International Ergonomic Association, 2016).

The COVID-19 epidemic that broke out in 2020 caused a significant shift in the education field, leading to the widespread adoption of various online learning approaches. Quick adjustments were made to the internet infrastructure at universities and other institutions of higher education to facilitate the mandatory implementation of rigorous quarantines. These widespread changes had a profound impact on students' lives, necessitating the

establishment of new coping mechanisms to successfully transition to an online learning environment, which may have consequences for various aspects of ergonomics (Gumasing & Castro, 2023). Hence, it is of utmost importance that students have access to physically ergonomic equipment to boost their academic performance and maintain focus while learning.

Numerous studies have been conducted over time to investigate the myriad of elements that influence students' academic performance in the field of education, including different approaches to education and people's socioeconomic backgrounds. However, despite the potential significant impact of ergonomics on student performance, there remains a need for more focused research on this topic. Therefore, *this study aims to identify the physical ergonomic factors affecting students' academic performance*.

Literature Review

Academic Performance

A student's academic performance is defined as their "degree of knowledge displayed in an area or subject relative to the standard for the particular age and level of schooling." (Jimenez, 2000). Multiple factors exert influence on the academic performance of students. According to Apter, 2(014) various environmental factors such as classroom noises, lighting, colours, temperature, and seating arrangement have positively or negatively influenced students' learning abilities.

Students are the lifeblood of any educational institution, making them priceless resources for any school, college, or university. Therefore, giving them access to a safe and stimulating learning environment with cutting-edge resources is paramount to ensure they have a positive learning experience and reach their full academic potential.

Noise

Noise is defined as any audible disturbance that has the potential to cause physiological impairment, such as hearing loss, or emotional distress, such as feelings of anger (Basner et al., 2014). According to Barrett et al (2016) noise levels that are too high have become a significant obstacle in learning. Noise is another factor that can negatively affect students, as it reduces their concentration and energy levels. Furthermore, noise might decrease students' enthusiasm to learn when attempting to study.

According to a previous study by Realyvásquez-Vargas et al (2020), noise is a significant factor that significantly affects the academic performance of University students. In addition, research by Klatte et al (2013) also showed that noise influences a student's performance. Thus, the following hypothesis is developed to be tested in future study

H1: There is a significant relationship between noise and students' academic performance.

Lighting

Lighting is the third most important factor among the nine interior design influences in work performance (El-Zeiny, 2012). Furthermore, the Commission for Architecture and the Built Environment discovered that "good lighting quality and sufficient illumination have been related to a 15% decrease in absenteeism and gains in efficiency of between 3% and 20%" (Cabe, 2005). Similarly, proper lighting is vital for students in enabling focused study and enhancing academic performance. That have two types of light which are natural light and artificial light. The number or level of light required in a classroom is usually based on when a student performs or studies during the day or night.

Previous research by Realyvásquez-Vargas et al (2020) found that lighting is one factor that positively affects students' academic performance. If there is insufficient and enough lighting, this will have a detrimental impact on the student's academic performance. Beside that, study by Singh et al (2020) showed that classroom lighting significantly impacted students' performance in Delhi schools. As a response, the following hypothesis is developed to be tested in future study

H2: There is a significant relationship between lighting and students' academic performance

Humidity

The well-being and comfort of students are closely tied to the quality of air circulating within the building. Adequate air circulation in learning spaces is essential, as it impacts students' health and overall experience. Thus, ensuring a high air quality standard in a learning environment is vital, as poor circulation can lead to discomfort, affecting students' concentration and well-being. According to Hameed & Amjad (2009), If a business gives and keeps good room air quality for its workers, it will help them do tasks more effectively and reduce the effects of work stress. The same goes for students; having good room air quality will help them concentrate more and avoid stress during their studies that can directly affect their academic performance.

Previous research by Chao et al (2021) showed that humidity significantly impacts learning performance among undergraduate students. When the space of learning low humidity, this lead to decrease performance compared to if the environment has good humidity. This may be because when there is low humidity, students cannot give full intention and concentrate on their study and, in the end, harm their performance.

In addition, study by Gumasing & Castro (2023); Wargocki et al (2019) also found that temperature affects students' performance. Lower temperatures in the classroom have been found to enhance student's performance compared to higher temperatures. When the temperature is high, and the humidity is low, students may be lethargic, tired, and not focused during the study. Thus, the following hypothesis is developed to be tested in future study:

H3: There is a significant relationship between humidity and students' academic performance

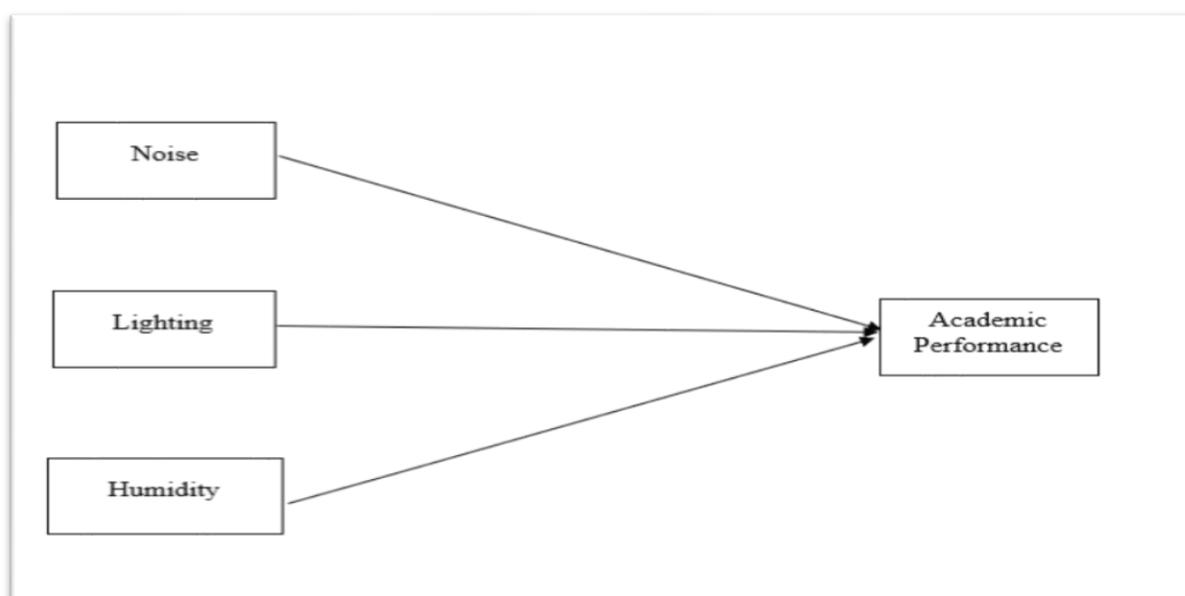


Figure 1: Proposed conceptual framework

Conclusion

Based on findings made during the literature review, many studies have been conducted to observe the relationship between lighting and students' academic performance from a physical, ergonomic perspective. However, there need to be more studies regarding two other variables in physical ergonomics related to noise and humidity. Poor Physical ergonomics is one of the main factors that can negatively affect students' academic performance. This is because physical ergonomics, such as lighting and noise, can lead to tiredness, stress and uncomfortable for students.

Moreover, this study holds significant importance as it furnishes crucial information to the university to strategize and create a conducive lecture room environment to enhance the student's academic performance, fostering a culture of continuous improvement and learning. Thus, the researcher considered it necessary to examine and understand which physical ergonomic factors affect students' performance due to numerous concerns related to students' safety, comfortable and academic performance.

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