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Envisioning How to Improve Natural Light Flow and Energy Saving in Learning Spaces: A Case Study of an Engineering Drawing Room in a Semi-Desert Area

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Abstract:
The study aims to highlight the importance of focusing on natural lighting in educational spaces, by focusing on increasing visual density and reducing energy consumption, thus contributing to the achievement of development goals. The study focused on the Engineering Drawing Room at the Higher Institute of Engineering in 15th of May City, addressing the problem of uneven natural light distribution in a self-drawing room. A digital panel simulation approach was used using VELUX Daylight Visualizer to study current lighting recommendations and test three scenarios: the current design, increasing window density by 30%, and integrating the Himawari Daylighting System with the removal of overhangs. Light distribution was evaluated at ten measurement points under different optional settings. Significant variations in lighting ranges were observed within the indicators, with close indicators and insufficient lighting in areas. Vascular dilation enhances brightness closer to different tissues. In contrast, the Himauri system demonstrated a relative improvement in providing contrasting illumination across languages, with a mean of 502.1 kd/m² and a minimum of 150 kd/m², while reducing heat loss. The study confirms the limitations of traditional daylighting trends and calls for the development of advanced performance-based solutions that combine architectural and architectural requirements. These findings provide an effective framework for enhancing the environmental performance of educational buildings, particularly in refurbished buildings, and a guide to constructing optimal, visually pleasing, and energy-efficient building environments.

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Natural multi-sports, sports, energy reduction, multi-sports, educational game solutions.

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