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Letter to the Editor

The Impact of AI-Driven Lighting on Workers' Cognitive Performance

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Dear Editor-in-Chief

With the rapid advancement of Artificial Intelligence (AI) technologies and their integration into the workplace, this technology is no longer solely confined to task automation; rather, it is increasingly incorporated into the design of physical work environments, including lighting systems (1). Based on available data, the impact of AI-driven lighting on workers' cognitive performance presents significant potential, offering a positive, dynamic, and adaptive influence. This allows lighting systems to transition from a 'static' to a 'responsive' state, directly affecting key cognitive factors. These systems have the ability to automatically adjust light intensity, temperature, and spectrum based on real-time environmental data and employee physiology. Consequently, AI-based lighting can manage cognitive load in a way that reduces average reaction time and enhances accuracy. Key cognitive benefits include improved alertness, optimized concentration, mitigation of light-induced distractions, and reduction of visual fatigue (2).

For example, an intelligent lighting system can automatically shift the Correlated Color Temperature (CCT) towards cooler light upon detecting signs of fatigue, thereby enhancing alertness levels. This real-time adjustment introduces a paradigm shift in the way humans interact with the work environment and has become critically important in knowledge-based and high-concentration settings, such as data centers, control rooms, and research facilities, where any lapse in cognitive performance could lead to costly errors (2).

AI-driven lighting holds the potential to fundamentally transform the work environment. By dynamically and instantaneously adjusting light intensity and color temperature based on employees' biological needs and real-time tasks, this technology can effectively enhance alertness, concentration, and accuracy while mitigating vis-

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ual strain-induced fatigue. However, the success of these systems hinges on designing algorithms that manage environmental changes smoothly and predictably to avoid imposing an additional cognitive load. Looking ahead, as sensor technology and algorithmic precision evolve, intelligent lighting is expected to become an essential and irreplaceable component in optimizing workforce productivity and cognitive health within complex environments (3).

Despite the widespread application of these technologies, the lack of systematic scientific research based on direct and quantifiable measurement of these systems' impact on workers' cognitive performance constitutes a major knowledge gap. Most current models for environmental lighting rely on static or general circadian rhythm models, whereas new intelligent systems adjust lighting parameters based on instantaneous input data. This research endeavor would not only facilitate a deeper understanding of the human-smart workspace interaction but also serve as a foundation for establishing novel photometric ergonomics standards in organizations, ultimately revolutionizing the design protocols for future workplaces.

Conflict of interest

The authors declare that there is no conflict of interests

References

1. Pandey K (2025). The Intelligent Workplace: AI and Automation Shaping the Future of Digital Workplaces. *International Journal of Scientific Research in Computer Science, Engineering*, 2025;13(1)1-10.
2. Sun R, Xu S, Han Y, Zhuang D, Yan B, Sun C (2024). Exploring impacts of thermal and lighting conditions on office workers' subjective evaluations, cognitive performance and EEG features in multi-person offices. *Journal of Building Engineering*, 95:110170.
3. Melikoğlu Y (2024). The Impact of Architectural Workspaces Supported by Artificial Intelligence on Psychological Productivity. *Anatolian Journal of Mental Health*,1(2):50-74.