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Post-Occupancy Evaluation Of Elementary Schools In Tehran With A Human-Centered Approach; A Reflection On The Social Quality Of Space

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Abstract

This study aims to conduct a human-centered assessment of the spatial and social quality of elementary schools in Tehran, focusing on the lived experiences of end-users, including teachers, administrators, and staff. The Post-Occupancy Evaluation (POE) method was employed as the primary framework for data collection from ten public schools with diverse architectural typologies. The main data collection tool was a structured questionnaire comprising 31 environmental, functional, and social indicators, addressing aspects such as ventilation, lighting, thermal comfort, safety, aesthetics, users' psychological satisfaction, and social interactions. Statistical analyses were performed using ANOVA, Pearson correlation, and Exploratory Factor Analysis (EFA). The results revealed that classrooms and halls generated the highest satisfaction levels among evaluated spatial zones. Indicators such as ventilation, furniture, and psychological motivation showed the strongest correlations with overall user satisfaction. Moreover, three latent factors were identified as the main dimensions of the human-centered user experience in relation to social interaction: "Spatial Quality and Psychological Assurance," "Sensory and Environmental Comfort," and "Spatial Navigability." The findings highlight the significance of incorporating social quality alongside functional and environmental considerations, offering a foundation for the human-centered design and redesign of school environments.

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Extended Abstract

Introduction

Post-Occupancy Evaluation (POE) has emerged in recent decades as an effective approach for assessing building performance, in line with social and cultural transformations. It has become a powerful tool for simultaneously evaluating environmental quality, energy consumption, and user satisfaction. Focusing on three dimensions—functional, operational, and behavioral—this method encompasses not only the objective indicators of architectural quality but also the subjective perceptions and psychological needs of users. Through feedback generated from the interaction between designers and occupants, POE facilitates the continuous improvement of built environments and enhances user well-being. In Iran, given the rapid and often uncontrolled pace of construction and the weakness of oversight mechanisms, the need for precise evaluations to reduce energy waste and improve environmental quality is more strongly felt than ever. Schools, as spaces where the future generation spends most of their daily time, require particular attention to social, psychological, and environmental aspects in their design, so as to optimize energy consumption while also ensuring the comfort and satisfaction of students and teachers. Accordingly, the present study aims to examine the impact of post-occupancy evaluation on energy consumption, environmental quality, and school plan design principles, addressing the question of how implementing the POE model can lead to improved design of educational spaces and better responsiveness to user needs.

Methodology

This study, adopting a human-centered approach and focusing on the social quality of space, conducted a post-occupancy evaluation of elementary schools in Tehran from the users' perspective and analyzed their perceived experience of educational environments using a mixed quantitative and qualitative method. To this end, 10 schools with diverse spatial and architectural characteristics were purposefully selected, and data were collected through a 31-item questionnaire on a five-point Likert scale, covering various dimensions of environmental, spatial, psychological, and functional quality. The statistical population included teachers, principals, and school staff, and a total of 384 valid responses were analyzed. The validity and reliability of the instrument were confirmed, with a Cronbach's alpha coefficient of 0.893. Subsequently, the data were analyzed using statistical methods including ANOVA to compare mean satisfaction levels across different spaces, Pearson correlation to examine the relationships between environmental factors and overall satisfaction, exploratory factor analysis (EFA) to identify latent dimensions, and hierarchical cluster analysis to determine four distinct user satisfaction patterns. This analytical approach, along with the presentation of the research process (as illustrated in Figure 2), provided deeper insight into the diversity of needs and spatial priorities of elementary school users.

Results And Discussion

The study revealed that user satisfaction with educational environments is a multidimensional phenomenon shaped by the interplay of physical, environmental, psychological, and functional factors. The reliability of the questionnaire was confirmed with a Cronbach's alpha of 0.893, and statistical analyses showed significant differences in satisfaction across various school spaces. Elements such as ventilation, air quality, acoustic comfort, colors and materials, furniture quality, and the condition of floors and ceilings had the greatest impact, underscoring the need to balance functionality and aesthetics in school design. Furthermore, factors like safety, emergency preparedness, spatial coherence, and psychological comfort significantly influenced users' positive perceptions. Pearson correlation analysis highlighted mental motivation ($r=0.706$), furniture quality and material/color choices (both $r=0.701$), and the condition of walls, floors, and ceilings ($r=0.608$) as strongly correlated with overall satisfaction, emphasizing the importance of perceptual and psychological dimensions alongside physical ones. Exploratory factor analysis identified three principal dimensions shaping user experience: spatial quality and psychological assurance, environmental/sensory comfort, and spatial legibility and accessibility. These findings demonstrate that successful school design should follow a human-centered approach that addresses users' functional, mental, and sensory needs. Post-occupancy feedback can serve as a valuable input for revising designs and enhancing the quality of educational environments. To this end, the study recommends strengthening human-centered principles in school (re)design, incorporating natural ventilation, daylight, appropriate colors, materials, and furniture from a psychological perspective, and improving spatial coherence and wayfinding to foster safety and calmness. Finally, conducting similar studies in other regions of the country is advised to develop comprehensive national strategies for improving educational spaces.