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Determining the Most Suitable Academic Days for Students in Ahvaz City Based on the Results of the Climate Advisor Index

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Abstract
Education, training, and upbringing are highly complex processes. As a result, multiple factors and elements are involved in its formation. The physical environment is one of the important elements in desirable education. By providing a suitable physical environment, students will engage in learning with better mental and emotional conditions and more tranquility.In this study, the bioclimatic conditions of Ahvaz city were evaluated using climate consultant software Based on the results of these indices, a total of 12 to 15percent of the training period hours were in comfortable bioclimatic conditions. In 45 to 50percent of the study hours, the climatic conditions were warm and undesirable for students, and in 30 to 35percent of the study hours, the air temperature was below the comfort threshold. Therefore, in more than 80to 85percent of the days when students are present at school, the temperature and climatic conditions are not conducive to their learning and comfort. In this 7 to 8month period, the number of hot and cold hours is approximately equal. However, since the undesirability of cold and discomfort conditions is less than that of hot undesirable conditions, and the cost of heating is lower than the cost of cooling, it is recommended to focus the study period on cool to cold months of autumn and winter. Based on the results of the bioclimatic consultant index, from 15 to 20days in the month of Mehr and from mid-Ardibehesht month, the thermal conditions exceed the tolerance threshold of students, and their health may be at risk. It is better to remove this period from the academic calendar. However, in other months of the study period, by considering appropriate strategies in the design and construction of schools, the climatic undesirability of this period can be addressed.

Key words: **Climate Consultant, Desired Educational Period, Ahvaz, Student, School**

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Extended Abstract

Introduction

Climatic comfort is one of the essential conditions for human life and activity. This comfort not only contributes to a healthy and safe living environment but also significantly affects the quality of an individual's activities and productivity. In an optimal climatic condition, a healthy life accompanied by psychological tranquility is achieved, and psychological comfort is the most crucial condition for achieving lasting and dynamic education and learning. Since no climate provides a comfortable living condition throughout all seasons and times of the day, humans have historically sought refuge in caves and primitive shelters, gradually evolving to create artificial environments that ensure these desirable living conditions. Therefore, the structures where education takes place are far more critical and sensitive in providing a conducive space for learning than even the work environment or the place of residence. Among the subsets of environmental comfort, thermal comfort is based on climatic conditions, which is considered a fundamental and complex issue. Measuring the level of comfort requires indicators for comparison with the total climatic conditions affecting the individual. In fact, no single climatic characteristic solely indicates the level of thermal comfort; just as the human body does not have a separate receptor for perceiving environmental temperature, all climatic variables collectively shape human perception of environmental conditions. Thus, determining thermal indicators is essential for measuring thermal comfort.

Data and Methodology

This research employs a mixed descriptive-analytical methodology.Field surveys and random sampling from schools in Ahvaz were conducted to determine the orientation of school buildings using a compass and photography. The most suitable model for designing educational buildings was extracted using climate consulting software. All calculations were performed using metric units, and a criterion was defined for each selected model. The ASHRAE standard was used to define thermal comfort in this study. Ongoing analyses provide the default values for each model of human thermal comfort in the climate consulting software. After entering the data into the climate consulting software, a summary of the parameters related to the Ahvaz station is displayed.

Results and Discussion

Sunlight is one of the most critical climatic elements in providing thermal comfort or disrupting it, as it is the primary source of heat and daily energy for any environment. Therefore, on hot days, this element can exacerbate conditions, while on cold days, by transferring sunlight into enclosed spaces through indirect (walls) and direct (windows) means, it can compensate for a significant portion of the heat deficit and bring conditions within the comfort range. The results obtained from the climate consulting data indicated that if we consider the need for shade and sunlight for schools in Ahvaz from October to June, there is a potential for 1189 hours of sunlight to enter the walls and internal spaces during this period. With appropriate design and correct orientation, this clean energy can be utilized to warm classrooms. Simultaneously, during this same period, there are approximately 2100 hours of excess sunlight that can intensify the heat inside classrooms, necessitating proper shading to prevent its entry onto walls and internal spaces. Overall, based on various indicators, only a limited number of hours throughout the year

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provide climatic and temperature conditions that are suitable for student education and learning. This time frame accounts for only 12 to 15 percent of the year. Conversely, during 30 to 35 percent of the year, particularly coinciding with the school academic period, temperatures fall below the comfort threshold for students. Additionally, between 55 to 60 percent of the year and 30 to 35 percent of the days aligned with school activities, the air temperature exceeds the comfort threshold for students.

Conclusion

The primary issue affecting the biological comfort of students is the high temperatures in classrooms. Achieving the comfort threshold in October, April, May, and June requires preventing sunlight from hitting walls and ceilings and controlling the entry of intense light and sunlight into classrooms. This issue necessitates the proper design of classrooms and appropriate orientation of windows and openings. Therefore, shading of buildings in school design is a significant concern. Approximately 30 to 35 percent of students' academic days, particularly in December, January, and February, experience temperatures that drop below the comfort level for students. Given that this temperature drop difference is not very significant, and a large part of this thermal gap can be compensated by transferring sunlight into indoor spaces. This approach not only conserves fossil energy but also creates a positive psychological environment for students by bringing natural light and sunlight into classrooms. For instance, the Farhikhtgan Girls' High School, which is oriented towards the south and features windows with a 15 to 20 cm overhang, has small window and opening dimensions. Considering the sun's angle of incidence, which ranges from 70 to 80 degrees in May and June at noon, and approximately 60 to 65 degrees during the morning to noon hours, the sunlight generally does not directly hit the south-facing windows during these times. Consequently, the southern walls are not exposed to sunlight for extended periods, ensuring that adequate light is available for classrooms throughout the school day. The sunlight not only provides illumination and warmth inside the classrooms but also enhances the visual and psychological conditions for students. Given the sun's angle during the cold season, the south and southeast orientations are suitable for transferring sunlight into interior spaces.

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