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PHYSIOLOGICAL BASIS OF SANITARY AND HYGIENIC CONDITIONS OF SCHOOL ROOMS

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Abstract

This article scientifically substantiates the physiological foundations of sanitary and hygienic conditions in classrooms. The study analyzes the impact of the educational environment on students' bodies, particularly on the functioning of the visual, auditory, respiratory, and nervous systems. The importance of compliance with physiological standards for lighting, temperature, humidity, air exchange, noise levels, furniture, and sitting posture in classrooms is justified in relation to maintaining students' work capacity, attention, and health. In addition, the paper addresses issues related to the prevention of fatigue, visual strain, spinal disorders, and functional impairments that arise as a result of noncompliance with sanitary and hygienic requirements. Scientific conclusions and practical recommendations for creating a healthy and comfortable educational environment in classrooms are presented.

Keywords: classroom, sanitation and hygiene, physiological foundations, lighting, microclimate, air exchange, ergonomics, educational furniture, student health, educational environment.

Introduction

It is well known that sanitary and hygienic conditions play a crucial role in ensuring a complete educational and upbringing process in general education

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institutions. These conditions include the sanitary and hygienic status of classrooms, specialized subject rooms, and auxiliary educational facilities.

Sanitary and hygienic conditions in classrooms are of great importance for maintaining students' health, physical and mental development, and the effectiveness of the educational process. The growing organism is extremely sensitive to environmental factors, and an improperly organized educational environment may lead to various functional disorders and the development of chronic diseases. Therefore, strict adherence to physiological principles and sanitary and hygienic standards is required when organizing classrooms.

Classroom lighting is directly related to the functioning of the visual analyzer. Adequate and properly organized natural and artificial lighting reduces eye strain, facilitates concentration, and increases students' work capacity. Failure to comply with lighting standards may result in decreased visual acuity, rapid fatigue, and headaches.

Microclimate parameters—air temperature, relative humidity, and air exchange—also have a significant impact on students' physiological condition. Air temperatures in classrooms that are higher or lower than recommended norms may disrupt thermoregulation processes, reduce attention, and cause rapid fatigue. Adequate ventilation, in turn, ensures sufficient oxygen supply to the body and supports the normal functioning of the nervous system.

Compliance of educational furniture with ergonomic requirements is closely related to the physiology of the musculoskeletal system. Desks and chairs that do not correspond to students' height may lead to spinal curvature, incorrect sitting posture, and muscle strain. Properly selected furniture, on the other hand, promotes correct posture formation and prevents dysfunctions of internal organs.

Noise level is another factor that negatively affects the nervous system. Excessive noise distracts students, increases psycho-emotional tension, and reduces the level of learning achievement. Therefore, ensuring acoustic comfort in classrooms is essential.

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The comprehensive examination program aimed to assess the functional capabilities of the visual analyzer in schoolchildren in a holistic manner. Specifically, it envisaged the study of visually demanding activities performed during the educational process, taking into account students' vocational orientation and gender. In addition, the study planned to identify possible interrelationships between visually intensive activities in school, sanitary and hygienic conditions in classrooms, the somatic (physical) health status of schoolchildren, families' social conditions, and the ecological situation of the area where students live and study.

In studying visually intensive activities among students, we proceeded from the fact that the visual organ plays a crucial role in human life, as more than 90% of information about the surrounding environment is perceived through vision. Any pathology of the visual organ may therefore have negative consequences for human work activity.

The speed and quality of information processing are directly related to the state of the visual analyzer. This is particularly important in childhood and adolescence, since it is during this period that the final formation of ocular refraction occurs, which may develop as normal (emmetropic), myopic (nearsighted), or hypermetropic (farsighted) refraction.

Taking into account the importance of assessing the functional capabilities of the visual analyzer in 9th-grade students of schools in the city of Qarshi, we conducted examinations in accordance with the research methodology (Chapter 2), testing 9th-grade students according to their vocational orientation and gender. To assess the functional capabilities of the visual analyzer, the following three methods were used:

- determination of the nearest point of clear vision;
- assessment of the speed of visual–motor reaction;
- evaluation of visual activity efficiency.

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According to ophthalmologic and ergonomic criteria, a reduction in the distance to the nearest point of clear vision under the influence of visually intensive work indicates the development of accommodative spasm in children, that is, the emergence of "false myopia" (pseudomyopia).

In addition, other sanitary and hygienic conditions in classrooms—such as the organization of the educational process, work and rest schedules, and students' nutrition—were also organized at a high level. All the sanitary and hygienic conditions listed above in this school met the highest standards and fully complied with modern requirements established for the public education system of the city of Moscow.

Furthermore, in our opinion, another important factor is that nearly all students (more than 90%) reside in the area where they study, and most of them come from financially secure and socially stable families.

A comparison of accommodative spasm levels—that is, the reduction in the distance to the nearest point of clear vision—between students in mathematics-oriented and humanities-oriented classes showed nearly identical indicators across all studied schools (Table 37). However, as noted, students in humanities-oriented classes demonstrated a slightly greater reduction in the nearest point of clear vision compared to their peers in mathematics-oriented classes, accounting for 5.34% and 5.23%, respectively.

At the same time, we found that the degree of accommodative spasm development was relatively higher in boys than in girls. The average relative indicator of reduction in the nearest point of clear vision was 7.87% in boys and 3.33% in girls.

The results of reflexometric studies—namely, measurements of students' visual–motor reaction time to a light stimulus—made it possible to identify complete and precise uniformity in comparative data on the dynamics of visual reaction speed, in contrast to some other test methods aimed at assessing the visual analyzer.

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These results showed that in all examined schools and classes (both mathematics- and humanities-oriented), by the end of the school day, that is, after the sixth lesson, students' visual–motor reaction time increased.

Similar results in assessing the degree of visual fatigue have been reported by many researchers (V. V. Krizhanovskaya, 1997; P. I. Gumener, 1982; Yu. M. Pratusevich, 1985; G. Sherrer, 1978, and others). In their studies, such findings were evaluated as objective evidence of fatigue of the visual–motor apparatus, arising from prolonged work with small objects or extended use of computer video terminals without protective screens, insufficient lighting levels, and the influence of a number of other adverse factors that impose a heavy load on the visual analyzer.

Analysis of the obtained results showed that the highest relative indicators of deterioration in visual–motor reaction from the beginning to the end of classes were recorded among students of School No. 7 in the South-Western Administrative District (by 20.58%), School No. 354 in the Central Administrative District (by 18.45%), and School No. 820 in the North-Western Administrative District (by 16.58%).

Conclusion

Organizing sanitary and hygienic conditions in classrooms in accordance with physiological requirements is a key factor in preserving students' health, enhancing work capacity, and ensuring the effectiveness of the educational process. Proper selection of lighting, microclimate parameters, and furniture prevents negative effects on the visual and musculoskeletal systems and ensures normal functioning of the nervous system. Therefore, strict compliance with sanitary and hygienic requirements in educational institutions is of great importance in fostering a healthy and well-developed generation.

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