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GENERAL CRITERIA FOR REHABILITATION-MODERNIZING SPECIFIC TO TEACHING UNITS

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The school buildings must be adapted to the social-educational necessities of the students, appropriate for the age and biological necessities in terms of shape dimensions and number of classrooms. The development in maximal conditions of the school functions is achieved by the building rules that are secured by the pedagogical, hygienic and administrative postulates of modern schools. The quality of the indoor environment affects the teaching process, being in direct concordance with the student performances.

The paper evidences the necessity to unify criteria and parameters regarding the ambient comfort in civil buildings, especially in teaching units.

1. Introduction

The civil buildings, in their consistency, must offer the consumer not only protection against the aggressiveness of the environment, but also a healthy ambiance characterized by the absence of the causes leading to health problems and by a certain degree of comfort, created by a balance between requirements and the performances through which the requirements are accomplished.

Regarding the comfort offered by the building in the most general sense, the following aspects is necessary to taken in consideration:

- a) functionality – architectural aspect, the concordance between it and the destination, a correlation between the dimensions of rooms and the number of inhabitants, room organizations;
- b) the level of equipment – supply with heating, light, water supply, residual water sewage system, ventilation and air conditioning;
- c) the safety of the building – type of structure, the resistance and stability, time endurance, etc.;
- d) the ambient comfort – ensured by the quality parameters of basic life factors: air, light, heat, water.

From this point of view the school buildings must be adapted to the social-educational necessities of the students, appropriate for the age and biological necessities in terms of shape dimensions and number of classrooms.

The development in maximal conditions of the school functions is achieved by

the building rules that are secured by the pedagogical, hygienic and administrative postulates of modern schools.

The quality of the indoor environment, too, affects the teaching process, being in direct concordance with the student performances.

2. Critical Analysis of the Existing Situation

According to our research, the poor quality of indoor environment classroom, which generates negative effects on the students' health, resulting from the performed studies, is given by

1. Fresh air ratio which is insufficient
 - a) a low fresh air ratio results in the growing dissatisfaction degree of air quality, of respiratory illnesses symptoms and in the lack of focus during the work hours;
 - b) also a low fresh air ratio can result in the increase of the CO₂ concentration with direct results on respiratory problems.
2. The inadequate system of air disposal
 - a) the high level of CO₂ determined by low ventilation increases the incidents of the Sick Building Syndrome and reduces school performance; the low fresh air ratio results in the raising of the dissatisfaction rate regarding air quality, to an increase of cases of respiratory illnesses symptoms and to the difficulty in focusing on work;
 - b) asthma and allergic factors are increased due to the presence of inner polluting factors and dust and the bacteria in it.
3. Poor and irregular air distribution.
4. Indoor air temperature not in accordance with the type of activity
 - a) the use of inadequate heating systems resulting in increased indoor air temperature;
 - b) the way of heat transmission determines dust rising in the indoor environment.
5. Excess of humidity
 - a) humidity excess associated with dust lay is an ideal medium for the development of different type of fungi;
 - b) the relative air humidity can reach high levels even to vapour condensation.
6. Conceptual deficiency and improperly thermal structuring of tightness elements
 - a) thermal isolation;
 - b) according to size and made of low thermal resistance materials has direct effects on inner comfort;
 - c) lack of vapour barrier, the presence of thermal connections, the presence of local condensing phenomena which leads to degraded finishing work, of isolations and woodwork;
 - d) elements of very tight woodwork;
 - e) disturbance of the natural dynamics of the inner air currents, with noxious effects on space hygiene and the inhabitants' health;
 - f) it can close down the intake of fresh air.

7. Insufficient level of lighting of the room

a) use of inadequate lights and lamps will result in obtaining different lighting intensities and marked shadows over the work spaces;

b) the existence of insufficient glazed surfaces in order to allow natural light in.

8. High level of noise

a) contributes to increased nervous and physical disturbances and a state of tiredness and stress; this aspect can be emphasized by the sanitary installation noise, the vibration of floors in heavy traffic; the presence of insufficient of glazed surfaces in order to allow natural light in.

In conclusion turning *comfort and indoor environment* quality are two interdependent notions.

The values of inner climate parameters associated with the concentration of certain substances in the spaces meant for the teaching process can lead not only to discomfort but also to the poor health state of the students.

These phenomena can be generated by conceptual errors and building unfunctionalities and the plumbing located in it.

3. The Estimation of Rehabilitation–Modernization Criteria Specific to Teaching Units

Analysing the premises of *indoor environment quality*, which affects school performance in classrooms, *following the theme requirements*, we must elaborate a number of rehabilitation modernizing criteria according to the following principles:

1. Increase of fresh air ratio - measure leading to reduction of polluting components level existing in inner air (ASHRAE proposes a fresh air ratio of 7.5 L/s person, respective 27 m³ for a classroom containing maximum 50 students and a surface of 50 m²).

2. Controlling the state of humidity: controlling the humidity transfer through the exterior closing elements and the relative humidity of interior air which is given in a big proportion by the temperature distribution in classroom and on bordering surfaces.

3. Increasing the thermal protection level: operating at the level of building elements which constitute the building's envelope by thermo-isolations, seal offs, etc.

4. Reducing heat losses through windows: by the new types of windows with high level of thermal isolation, which characterize this requirement, should eliminate air infiltration felt throughout the cold season and also through reduction of radiation.

5. Ensuring interior air temperatures according to the destinations of teaching units: by modernizing the thermal equipment (boiler), heating units, pipes of supplying thermal agent.

6. Obtaining an optimal visual comfort: by using modern interior lighting systems which promote visual performance and an environment as comfortable as possible.

7. The organizing, the number and settlement of toilets according to specific requirements: to obtain a number of toilets corresponding to the present normative,

by replacing broken armature and modernizing them.

8. Obtaining acoustic sound comfort: to obtain a sufficient space for the teaching process to take place, the classroom being the most important room of a school (for example for a maximum of 40 students, the classroom surface will be 50 m^2 , namely $1.25 \text{ m}^2/\text{student}$).

Obtaining the ambient comfort and, as a result, thermal comfort, implies a series of measures (specific for the building and its installations) appropriate to the normal exploiting conditions of the building.

The assembly building–installation influences through a variety of functional, constructive, aesthetical, but also economical factors, the comfort in the housing buildings.

So, regarding the approached theme, not only the objectives directly linked with improving the ambient comfort but also energy economy and pollution reduction are two objectives that must be integrated in the general rehabilitation criteria system.

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CRITERII DE REABILITARE-MODERNIZARE SPECIFICE UNITĂȚILOR DE ÎNVĂȚĂMÂNT

(Rezumat)

Construcțiile școlare trebuie să corespundă necesităților social-educative adaptate la particularitățile de vârstă și cerințelor biologice ale elevilor.

Desfășurarea în condiții optime a funcțiilor școlii se asigură prin normele de construcție care au la bază anumite criterii care pot fi considerate "postulatele" pedagogice, igienice și administrative pe care le realizează școala.