

Preface

The objectives of this book are to discuss the effect of different strategies for rehabilitation of school buildings on classrooms' indoor environmental quality (IEQ) and to present a multi-objective methodology for enclosure optimization of school buildings, combining artificial neural networks and life cycle cost.

The energy efficiency of buildings, including public buildings, is a major concern for all European governments. The best strategy to reverse this scenario includes efforts on the rehabilitation of those buildings, improving their energy efficiency, without sacrificing the IEQ.

The IEQ within a classroom is linked to the health, comfort and performance of students. It is well established that there are classroom environments where IEQ is poor. Therefore, the rehabilitation of school buildings is assumed as an appropriate strategy. Consequently, some countries have sponsored nationwide programmes for the rehabilitation of school buildings, whose result has been, in some cases, other than the expected. Classrooms performance in service conditions must be evaluated, and from the results, optimized solutions should be established and carefully designed and executed to have the desired effect. Thus, these interventions must be carefully prepared, and the technical decisions must be scientifically supported to guarantee the economic sustainability of the buildings, often neglected during the design process. The rehabilitation of a school building should be regarded as a procedure of combining a number of variables and objectives, sometimes conflicting, including energy, IEQ and costs (initial, operational and maintenance), on a search for an "optimum solution".

The special features of this book are (a) a state of the art of school building rehabilitation; (b) the IEQ assessment of several school buildings, including non-rehabilitated and rehabilitated, according to different strategies; and (c) the proposed multi-objective optimization procedure.

The main benefit of the book is that it discusses the topics related to rehabilitation of school buildings, presents results of the IEQ assessment on nine school buildings and launches a discussion on how the "in-use" performance of schools is key to understand how designed performance is actually experienced. It maps the most used multi-objective algorithms and artificial neural networks architectures

and proposes a methodology for combining these numerical tools with building dynamic simulation and life cycle cost analysis for the school enclosure optimization of buildings. This methodology is appealing to both the scientists and the engineers. At the sametime, this book matches the expectations of a variety of scientific and engineering disciplines, such as civil and mechanical engineering, architecture, and mathematics. The book is divided into several chapters that intend to be a synthesis of the current state of knowledge for benefit of professional colleagues.

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