

The influence of objective and perceived room climate control on user satisfaction in the context of reduced energy consumption in office buildings and schools – an interdisciplinary view.

J. Brensing¹, P. Schweizer-Ries², A. Thewes¹, & S. Maas¹

¹ University of Luxembourg, Luxembourg City, Luxembourg

² Saarland University, Saarbrücken, Germany

Introduction

Buildings account for 40% of total energy consumption in the European Union (European Parliament, 2010). In order to reduce this amount, a growing number of passive and low energy buildings have been built. Intelligent buildings give users the opportunity to adapt the room climate to their comfort needs. In addition, the systems avoid any energy waste with the help of ICT based centralized monitoring and management systems (Walden, 2008).

The determination of comfort and its possibilities for regulation has often been treated as a technical decision, while in fact, technologies are applied by human beings who decide how to use them and how satisfied they are with their use (Schweizer-Ries, 2008). User comfort is not just a result of physical influences but a process, which underlies several social, emotional and cultural influences (Brager & de Dear, 1998, Gossauer & Wagner, 2008, Steemers & Machanda, 2010). Steemers and Machanda showed that there is no correlation between energy consumption and the users' satisfaction with the room climate, although high energy consuming technology was created to regulate the climate to improve thermal comfort (Steemers & Machanda, 2010). The clue seems to be the control over environmental conditions. It has been demonstrated that people like to control their environment and that a high degree of perceived control results in a higher satisfaction with the users' thermal comfort in comparison to a low degree of perceived control (Bluyssen et al, 2011, Walden, 2008).

So far, no clear separation has been established among the subjects between existing, technical, energy related control

possibilities and perceived control possibilities.

Aim of the study

The aim of this interdisciplinary project, involving engineers and psychologists, is to clarify the links and differences between existing energy related control possibilities, perceived control possibilities and satisfaction with room climate. The perceived control possibilities determine the relationship between real control possibilities and satisfaction with the room climate. Additionally the role of other important psychological control concepts like self efficacy and environmental consciousness is evaluated as moderating variables. As sample teacher and employees of schools and modern offices of Luxembourg are chosen to have a full spectrum of all technical control possibilities at the workplaces. Standardized questionnaires as well as technical data are used in comparison. Until now the survey is in the planning stage but will start soon. First results will be published and a statistical model of links between objective energy related control possibilities and the satisfaction with the room climate moderated by psychological influences will be presented. The study gives advices for improving satisfaction with work places in office rooms and schools, which saves money, material and energy because expensive retrofitting modifications of the installed technology to fit the users' needs will no longer be necessary.

References

- Bluyssen, P.M., Aries, M., van Dommelen, P. (2011). Comfort of workers in office buildings: The European HOPE project. *Building and Environment*, 46, 280-288.

- Brager, G. & de Dear, R. (1998). Thermal adaption in the built environment: a literature review, *Energy and Buildings*, 27, 83-96.
- European Parliament (2010). Directive 2010/31/EU of the European parliament and of the council of 19 May 2010 on the energy performance of buildings. *Official Journal of the European Union*, L 153, 13- 35.
- Gossauer, E. & Wagner, A. (2008). Nutzerzufriedenheit am Arbeitsplatz – Ergebnisse einer Feldstudie. *Bauphysik*, 30, S. 445- 452.
- Stemers, K. & Manchanda, S. (2010). Energy efficient design and occupant well-being: Case studies in the UK and India. *Building and Environment*, 45, 270–278.
- Schweizer-Ries, P. (2008). Energy sustainable communities: Environmental psychological investigations, *Energy Policy*, 36, 4126–4135.
- Walden, R. (2008). *Architekturpsychologie: Schule, Hochschule und Bürogebäude der Zukunft*. Hrsg. Pabst Science Publishers. Lengerich.

