Environmental Design Technical Group

The **Environmental Design Technical Group** is concerned with the relationship between human behavior and the designed environment. Common areas of research and interest include ergonomic and macroergonomic aspects of design within home, office, and industrial settings. At a time when there is great focus on creating sustainable environments it plays a vital role in bringing together researchers with the latest ideas to improve the places where we live, learn, laugh and love, and to span all ages, from children to the elderly. An overall objective of this group is to foster and encourage the integration of ergonomics principles into the design of all built environments.

TECHNICAL FOCUS

Careers in environmental design field are diverse because of the wide variety of modern workplaces. The work of ergonomists involved in environmental design ranges from optimizing the layout of workspaces and the design of work furniture and associated ergonomic accessories to improving the ambient conditions (heat, light, sound, vibration and air quality) in the workplace. This also includes research on extreme the environments, such as undersea or in space. As we enter an era of energy conservation with a focus on sustainable design EDTG members are pioneering novel concepts to create workplaces that facilitate work performance while reducing their environmental impact. People in this technical group conduct research or provide consultation to a range of companies and government organizations. Research and consulting services focus on optimizing the interaction between people and their environment.

Research has focused on how best to arrange the physical layout of a variety of places, such as the home, office, classroom etc., how to combine ergonomic accessories to create effective and efficient workstations that promote comfort and productivity, and how to provide ambient conditions that promote health and well-being. It includes laboratory studies of specific designs, such as the effects of different chairs on posture, pressure, comfort and performance. It includes field studies of settings ranging from offices and homes to classrooms and dance studios. It evaluates the impact of design interventions in real-world settings, such as testing how different lighting systems affect office employees.

Practitioners in this field commonly work as members of multi-disciplinary design and development teams. They are often involved in the design and evaluation of new buildings or building renovations. They work on the development of innovative new workplace products. They also provide invaluable expertise and input into the development of environmental design standards.

SUCCESS STORIES

EDTG members have been involved in a number of successful programs and products. Here are a few.

Sustainable settings and Immune buildings
Buildings impact the natural world and creating “green” buildings with minimal carbon footprints has become a priority, and ergonomics can play an important role in ensuring the effectiveness of such places. Buildings also can protect occupants from threatening conditions, including acts of terrorism. Unfortunately, architects and engineers often overlook basic ergonomic design principles in the buildings they create. For example, research has shown how

the flawed ergonomic design of egress routes adversely affected evacuation of the World Trade towers on September 11, 2001.

Indirect office lighting
The objective was to evaluate the design of alternative lighting systems for computer offices. The lighting had to create comfortable viewing conditions with minimal glare, reduce eyestrain complaints and also benefit work performance. Field-based research demonstrated that innovative indirect lighting systems performed extremely well and this has now become an unwritten standard for modern offices.

Innovative chair designs
We all sit to work at computers and many modern office chairs epitomize the application of good ergonomic design principles. EDTG has featured several studies of innovative chair concepts, including evaluating how well mesh back chairs provide lumbar support, how a continuous passive motion chair seat affects comfort and performance, especially for those with back injuries, and how chair concepts vary among cultures, such as the development of an ergonomic cushion for floor sitting in Japan

Sick Building syndrome
It has been estimated that as many as 20% of US office workers may breath polluted indoor air at work that can impact their performance and health, resulting in sick building syndrome (SBS) reports. Research presented at EDTG sessions has shown how SBS is also affected by other work factors, such as the degree of job stress and the experience of musculoskeletal discomfort, revealing a more complex model of how the office work environment impacts well-being, allowing designers to develop better solutions.

Ergonomic Accessories
Unsatisfactory workplaces usually can be dramatically improved using inexpensive ergonomics accessories. EDTG sessions have included studies of the benefits of using products such as downward titling keyboard trays, task lighting and adjustable LCD arms on the health and performance of employees.

Children's Environments
The environment has a substantial effect on children's development. EDTG researchers have studied how classroom design affects learning and how school computer use requires design solutions that do not expose children to injury risk factors.

Environment and Productivity
Work environments can significantly influence productivity. EDTG researchers have shown how the design of workplaces/workspaces and the ambient conditions affect the quantity and quality of work output.

BENEFITS OF MEMBERSHIP

The EDTG, like other technical groups within the Human Factors and Ergonomics Society, performs a variety of functions and services for its members. The EDTG sponsors technical sessions and a yearly business meeting at the Annual Meeting of the Human Factors and Ergonomics Society on topics of interest to members and participants. A newsletter is sent to all members several times a year. Additional information on the EDTG can be found in the HFES Web site http://hfes.org.

It is not necessary to be an HFES member in order to join the Environmental Design Technical Group.

ADDITIONAL READING & WEBSITES

For those that would like to learn more about human factors and environmental design please consult the following references:

Barrero, M. & Hedge, A. (2002). Computer environments for children: a review of design issues, *Work*, 18, 227-237.
Hedge, A., Sims, W.R. & Becker, F.D. (1995). The effects of lensed indirect uplighting and parabolic downlighting on the satisfaction and visual health of office workers, *Ergonomics*, 38(2), 260-280.
Hedge, A. (1999). Environmental Ergonomics, In Karwowski, W. (ed.) *Encyclopedia of Ergonomics*, Philadelphia, Taylor & Francis : 959-999.
Hedge, A., Morimoto, S. & McCrobie, D. (1999). Effects of keyboard tray geometry on upper body posture and comfort, *Ergonomics*, 42 (10), 1333-1349.
Hedge, A. (2000). Where are we in understanding where we are? *Ergonomics*, 43(7), 1019-1029.
Lueder, R. & Rice, V. (Eds.) (2008). *Ergonomics for children: Designing products and places for toddlers to teens*, Boca Raton, CRC Press.
O'Reilly,J.T., Hagan, P., Gots, R. & Hedge, A. (Eds.) (1998). *Keeping buildings healthy: How to monitor and prevent indoor environmental problems*. New York: J. Wiley & Sons, pp.137-162.
Pauls, J. (2002). Environmental design strategies for building egress, *Proc.46th Ann. Meet. HFES,* 865-869.
Pauls, J. (2002). Safer home stairways; application of public health policies and research findings to the development of design codes in the USA, *Proc.46th Ann. Meet. HFES,* 834-838.
Vink, P. (2007). Effects of the Office
Environment on Health and Productivity1: Effects of Coffee Corner Position. *Ergonomics and Health Aspects of Work with Computers*, 157-162.
Vink, P. (2004). *Comfort and Design: Principles*
And Good Practice, Boca Raton,CRC Press.

Websites:
Cornell University Ergonomics
(http://ergo.human.cornell.edu)
Humanics ergosystems
(http://www.humanics-es.com)
IEA Ergonomics for Children in Educational Environments (http://cehd.umn.edu/kls/ecee/)