# Table of Contents

- What’s Happening at 2009 HFES Annual Meeting
  October 19-23 ..........................2

- EDTG Technical Group Sessions 2

- EDTG Business Meeting with Macro-Ergonomics .........................8

- 2009-2010 EDTG Officers ..............8

---

**HFES 53rd Annual Meeting October 19-23, 2009**  
**San Antonio, TX**

**EDTG Business Meeting, October 21st, 2009**

**Environmental Design**  
(jointly with Macroergonomics)

**Day:** Wednesday  
**Time:** 3:15 – 4:30
ED1-Environmental Design: Office Environment Considerations & Student Issues
(Chair/Co-Chair: ConneMara Bazley, Michelle Robinson)
October 21st, 2009
Wednesday, 1:30 -3:00

Office Environmental Conditions and Computer Work Performance
Alan Hedge (Cornell U.)
Daniel Gaygen (Cornell U.)

Abstract
A field study of 16 people in a law office was conducted. Environmental conditions, air temperature, relative humidity, carbon dioxide (CO2), respirable particulates at 10 microns (PM10) and total volatile organics (TVOC), at each person’s workstation were recorded at one-minute intervals for 4 weeks. Synchronous measures of computer work performance data at minute intervals were logged with a web-based software system. Results showed a contemporaneous effect of CO2 on mouse clicks and of temperature on correct keystrokes, and one-hour lagged effects of CO2 and PM10 on correction keystrokes. Findings confirm that the quantity and quality of computer work is affected by indoor environmental conditions.

The Notebook Computing Experience Among University Students
Karen Jacobs (Boston U.)
Victoria Hall (Boston U.)
Erin Brownson (Boston U.)
Elizabeth Ansong (Boston U.)
Jackie Markowitz (Boston U.)
Matt McKinnon (Boston U.)
Sofia Steinberg (Boston U.)
Alexander Ing (Boston U.)
Ellen Wuest (Boston U.)
Peter Johnson (U. of Washington)
Jack Dennerlein (Harvard U.)

Abstract
There is a growing body of evidence suggesting that university students are self-reporting experiencing musculoskeletal discomfort with computer use similar to levels reported by adult workers. This study investigated how university students use
notebook computers. Forty-eight participants were randomly assigned to one of four conditions. Each condition included participants completing baseline and post-study a health and comfort survey and ergonomics quiz. Computer usage software was installed on participants’ notebook computer and all received participatory ergonomics training and external notebook accessories, e.g. keyboard and mouse. Participants in experimental conditions received either an external notebook riser, an ergonomic computer workstation chair or an external desktop display. Each participant was loaned a personal digital assistant (PDA), which contained a 45-question survey. The PDA randomly “beeped” 7 times in a 24-hour day for the participants to complete a survey. The use of the repeated measure survey was part of the Ecological Momentary Assessment (EMA) method. Over the duration of the study (3 months) participants met with researchers and completed a weekly visual analog comfort scale where they rated their workstation comfort. Notebook accessories, e.g., external mouse, external keyboard, notebook riser; an ergonomic chair; and participatory ergonomics training appear to contribute to a trend of decreased self-reported notebook computer-related musculoskeletal discomfort in specific areas of the body of participants. Based on the study’s results, a university-wide notebook computing education plan was initiated.

A Case Study on the Backpack Weight of School Students
Ruth Loewenhardt (Elegant Ergo)

Abstract
This case study looks at the perceptions and measurements of backpack weight with regards to elementary, middle and high school students as studied during the American Occupational Therapy Association's National Backpack Awareness Day in Pleasanton, California. School students participated in the weigh-in with high school volunteers assisting an ergonomics consultant with measurements. Two consecutive years were compared and results suggest that the middle school students carry the greatest backpack weight as compared to their percentage of body weight. Perceptions of the students regarding the backpack weight indicated a self-reported discomfort with the amount to be carried each day specifically due to the requirements of their teachers. It is through education of backpack awareness that educators and students should work together to reduce the load that each student needs to transport on a regular basis.

Computer Display Placement for Progressive Addition Lens Wearers: A Field Observation of Multiple Display Conditions
Paul Allie (Kokot and Allie Associates, LLC)
Douglas Kokot (Kokot and Allie Associates, LLC)
Cynthia Purvis (Hewlett-Packard Co.)
Michael Bartha (Hewlett-Packard Co.)

Abstract
A growing segment of the workforce wears Progressive Addition Lenses (PAL) to correct for age related loss of eye function. Many of these aging adults work with computer displays in their daily job tasks. There has been little research to determine display placement that best serves this group of workers. A field study was conducted to examine display placement for PAL wearers. Five conditions were examined; 1) using a notebook computer placed on the worksurface, 2) using a notebook computer positioned on a riser stand, with separate keyboard and mouse, and 3-5) using a separate 19 inch LCD display attached to 3 different adjustable mounts, each with
separate keyboard and mouse. When PAL wearers could control display distance and height they selected an average distance of 26.8 inches from the eyes, and a height that created an average eye-to-screen angle of 19.6° below eye level. Based upon perceived eye and body comfort and user satisfaction data, external display conditions with adjustable mounts were shown to be the favored solutions and were associated with the least amount of perceived eye and body discomfort. This type of display support design should be considered when offering PAL wearers’ adjustment solutions.

Colored Lighting in Offices the New Caffeine? Looking into Performance Effects of Colored Lighting
H. C. M. (Jettie) Hoonhout (Philips Research)
M. Knoop (Philips Lighting)
Ruben VanPol (U. of Maastricht)

Abstract
Innovations in lighting technology have made it simple to realize a wide range of lighting colors, and effortlessly change settings when desired. According to popular belief, color and lighting influence mood, well-being and performance. However, research is inconclusive regarding such claims; often variables such as brightness are not well controlled, or only subjective and no performance measures are reported. This study aims to address some of these issues. In an office setting, one wall was illuminated with blue or red light with comparable saturation and brightness. These colors were chosen because of inconclusive views on their effect, and their potential relevance for office-tasks. White light was offered in the immediate task-area, to meet illuminance and color rendering requirements. 76 participants were randomly assigned to one condition, and asked to perform several tasks. Mixed effects were found of condition on task performance.

ED2- Environmental Design: Aging & Disability Considerations
(Chair/Co-Chair: Paul Allie, Alan Hedge)
October 22nd, 2009
Thursday, 1:30-3:00

Evaluating Common Approaches Used to Accommodate People With Disabilities Residing in Existing Multi-Family Housing
Alison Vredenburgh (Vredenburgh and Associates, Inc.)
Ilene Zackowitz (Vredenburgh and Associates, Inc.)

Abstract
A high degree of ambiguity regarding the Fair Housing Act (FHA) law is causing disagreement concerning how developers and owners of existing multi-family housing should remedy properties that do not meet the accessibility requirements. The FHA is not a building code; nor does it have any legally required dimensions as to how to design an accessible building. Thus its application tends to be inconsistent. The FHA was enacted to prevent housing discrimination of people in protected classes including race, color, religion, national origin, sexual orientation and people with disabilities. There is disagreement among experts regarding how best to accommodate people with disabilities. This paper addresses two different approaches to remedy multi-family housing accessibility: uniformly applying “safe harbors” and tailoring units to users’ specific needs. Satisfying safe harbor standards ensures avoidance of FHA claims. However, since the capabilities and limitations of people with disabilities differ significantly from one person to the next, we discuss the two approaches in their relative ability to best
A Conceptual Framework for Guiding Data Collection in Facilities Programming
Lubomir Popov (Bowling Green State U.)

Abstract
Facilities programming involves data collection about users, their activities and behavior patterns, needs, values, and preferences. This part of programming has a social science nature and requires a well thought out research design. The purpose of this paper is to present a conceptual framework that can guide the research design, data collection, and data analysis in the programming process. The paper proposes a general and inclusive conceptual structure that will be further developed and operationalized when applied to a particular building type and a specific programming situation. The framework represents only the most fundamental dimensions of the social organization and its constituent elements. The framework will structure the cognitive domain so that the information can be handled more easily and will provide assurance that basic aspects of the social organism will not be overlooked. The process and method for project-specific adaptation and elaboration will be discussed in a subsequent paper.

Understanding Aging in Place for Older Adults: A Needs Analysis
Cara Fausset (Georgia Tech)
Andrew Mayer (U. of Calgary)
Wendy Rogers (Georgia Tech)
Arthur Fisk (Georgia Tech)

Abstract
A goal of many older adults is to remain in their own homes as they age (Beyond 50.05 Survey, 2005). However, a detailed assessment is lacking of the needs of older adults as they age in place. Using focus groups, twenty-six independently living older adults (mean age 78.8 years) from the Atlanta metropolitan area were asked to describe the tasks they perform to maintain their homes, as well as any difficulties they have performing these tasks. Participants described performing a wide range of tasks and focused primarily on physical difficulties. However, participants also reported solutions to manage these difficulties that fell into three broad categories: cessation, perseverance, and compensation. These categories represent classes of opportunities for interventions that may help older adults remain independent in their homes longer. By understanding the nature of home maintenance problems older adults encounter while aging in place, interventions and re-design efforts can be more effective. These data suggest that interventions should start with answering physical issues.

Designing Inclusive Educational Spaces With Reference to Autism
Abir Mullick (Georgia Tech)
Rachna Khare (Georgia Tech)
Sarah Endicott (Georgia Tech)
Marisa Topping (Georgia Tech)

Abstract
Autism is a lifelong neurological disorder that affects communication, imagination and social abilities of an individual. There is no such highly prevalent condition that is so inadequately represented in the environmental research and design standards. This paper attempts to address and validate the environmental factors affecting the performance of children with autism in educational spaces. The paper is derived from a larger study that aims to produce design guidelines for educational facilities for children with autism, which are universal in nature and of benefit to all
children. The study intends to develop a framework that will work as a tool for architects, designers and facility managers to design high performance educational spaces for all. Although the overall study considers many design aspects such as observation, discussion and survey, the purpose of this paper is to present the enabling aspects of educational environment for children with autism and measure their effects on educational performance.

ED3- Environmental Design Potpourri
(Chair/Co-Chair: Claudia Mont'Alvão, Karen Jacobs)
October 22nd, 2009
Thursday, 3:30-5:00

On the Control of Environmental Conditions Using Personal Ventilation Systems
Alan Hedge (Cornell U.)
H. Khalifa (Syracuse U.)
J. Zhang (Syracuse U.)

Abstract
This paper examines the concept of personal control as this relates to the design of personal ventilation systems based upon the body’s physiological and psychological homeostatic requirements. Literature on the effects of personal control of environmental conditions is reviewed. The concept of a “just noticeable difference in discomfort” that underpins the desire to initiate some personal control action is discussed. The concept of personal control is symmetrical for thermal conditions (hot or cold) but, apart from some pleasant fragrances, is asymmetric for indoor air quality (where less pollution is better). Factors that may influence the exercise of personal control will be summarized. Finally, important information for the design of PVS systems that are both energy efficient and effective in optimizing the micro-environmental conditions for workplace employees will be presented.

Simulated Visual Impairment to Detect Hospital Wayfinding Difficulties
Justin Rousek (U. of Nebraska - Lincoln)
Sonja Koneczny (U. of Nebraska - Lincoln)
M. Hallbeck (U. of Nebraska - Lincoln)

Abstract
Many public facility layouts have been developed with little consideration for the visually impaired, producing difficult and unpleasant wayfinding experiences. This study analyzed the current issues in a wayfinding task for the visually impaired and makes recommendations towards wayfinding improvements within a healthcare setting. Normally-sighted participants (m=25, f=25) wore one of five different vision simulator goggles to replicate a specific vision condition (diabetic retinopathy, glaucoma, cataracts, macular degeneration, and hemianopsia) and were then given directions how to get to specific series of departments within a hospital campus. Participants then navigated a second time without the simulated vision condition, with normal vision, so comparisons could be made. The results of this study show that for visually impaired people, decorative elements often create major disturbances in wayfinding. Combined with other age related conditions, this may put patients and visitors at high risk of accidental injuries. In addition, changes in lighting often are misleading and may cause doorways and hallways to appear larger/smaller than they are. The size, illumination and placement of signage also appear to be unsatisfactory. Most of these problems can easily be detected, categorized and eliminated by hospitals using these data.
A Survey of Smart Home Interface Preferences for U.S. and Korean Operators
Kyeong-Ah Jeong (Purdue U.)
Robert Proctor (Purdue U.)
Gavriel Salvendy (Purdue U.)

Abstract
A survey was conducted to determine Americans’ and Koreans’ preferences in both general and specific aspects of smart home interface design. 210 Americans and 282 Koreans participated. The respondents preferred to interact with a smart home using a physical device (a computer, cell phone, or remote control) rather than through communication modalities such as speech or gesture. Though different, the layout organization preferences of the American and Korean respondents conflicted with those expected on the basis of an often cited distinction between Americans’ and Koreans’ preferences for functional vs. thematic structures, respectively. Based on the survey, the conclusion was reached that smart home interfaces should be adapted to the particular culture. General and culture-specific guidelines for smart home interface design are proposed.

Model Integrating Assistive Technology Use and Human Performance for People With Disabilities
Scott Haynes (Georgia Tech)
Carrie Bruce (Georgia Tech)
Jon Sanford (Georgia Tech)

Abstract
The ageing workforce and returning veterans have generated a heightened awareness of the need to accommodate people with disabilities in the workplace. A critical factor in developing useful accommodations is being able to accurately quantify the abilities of the person and the demands of the environment. Human factors specialists are often involved with measuring human capabilities and environmental factors with the aim of improving human performance. However, the use of assistive technology (AT) is typically not considered in the development of such assessment models. This paper presents a theoretical framework for the integration of AT into a process model for assessing human performance.

EDTG Business Meeting, October 21st, 2009
Environmental Design
(jointly with Macroergonomics)
Day: Wednesday
Time: 3:15 – 4:30.

Please join us for news and events about each TG.
Plan on renewing your TG memberships.
2009-10 Environmental Design Technical Group Officers

**EDTG Chair**
Michelle Robertson
michelle.robertson@libertymutual.com

**EDTG Program Chair**
Karen Jacobs
kjacobs@bu.edu

**EDTG Newsletter Editor**
Courtney Sherman
csherman@degw.com

(This Edition: Newsletter Editor)
ConneMara Bazley
cbazley@jimconna.com

**EDTG Webmaster**
Justin Owens
justin.owens@gmail.com