QUANTIFYING THE PARTICIPATORY ERGONOMIC EFFECTS OF TRAINING AND A WORK ANALYSIS TOOL ON OPERATOR PERFORMANCE AND WELL-BEING

Jason J. Saleem

ABSTRACT

Participatory ergonomics (PE) is a macroergonomics approach in which the end-users actively participate in developing and implementing the technology. PE can be an effective method for involving front-line workers in analyzing and redesigning their own jobs. PE can be used at the macro-level, the micro-level, or somewhere in between. At the macro-level, the focus of the PE program is across an entire organization or work system. At the micro-level, the focus of a PE approach is on a particular task, workstation, or product. A major benefit for using PE is that workers are more likely to accept changes to their job if they participate in the redesign. Furthermore, workers' motivation, job satisfaction, and knowledge are enhanced through the participatory process.

There are many case studies that describe successful PE approaches. These studies, however, lack a control group or comparison group and so changes in the workplace (e.g., a reduction of musculoskeletal injury) cannot be attributed directly to the interventions resulting from the PE program with certainty. Quantifying the effects of PE is difficult because of problems in trying to isolate variables. Confounding variables are often difficult to contain. This study quantified some of the effects of PE by utilizing a controlled experimental design in the laboratory in which participants analyzed and redesigned a manual material handling job. The effects of this PE approach were quantified by measuring a reduction of risk factors associated with the job and by measuring a lift index of the lifting task that indicates a risk for injury.

Many authors state or infer that some degree of ergonomics training should be given to the participants in a PE approach. However, the effects of providing ergonomics training to participants in these types of participatory approaches are unclear. This research evaluates the effects of providing the participants with basic ergonomics

instruction relevant to the job being evaluated and redesigned. Also, this research suggests if the NIOSH lifting equation can be an effective tool in a participatory ergonomics approach in the redesign of a manual material handling job that involves lifting tasks. A 2-factor, between-subjects design was used.

Participants consisted of 32 volunteers (16 males and 16 females). Only individuals that have had no prior ergonomics knowledge were considered for the subject pool. Participants performed a simulated manual material handling job in the laboratory. After performing the job, some subjects were given ergonomics training and/or instructed on how to use the NIOSH lifting equation for manual lifting tasks. The participants were then asked to redesign the original job. The participants' redesigns were compared to the redesigns of the control subjects (who received no ergonomics instruction and did not use the NIOSH lifting equation).

The subjects who received the ergonomics instruction identified significantly more risk factors in the original job and eliminated significantly more risk factors in the redesign than the control subjects. The subjects who learned and used the NIOSH lifting equation also identified significantly more risk factors in the original job but did not eliminate significantly more risk factors in the redesign. The subjects who received the ergonomics instruction and who used the NIOSH lifting equation were not shown to have an advantage over the subjects who received the ergonomics instruction alone. The group that received the ergonomics training performed optimally with respect to the other experimental groups. Implications for participatory ergonomics approaches are discussed.