

# The impact of a large-screen projection of the technical process on shared mental models and team performance in a furnace control room

---

Vera Hagemann, Annette Kluge, & Björn Badura  
University of Duisburg-Essen  
Germany

## Abstract

Large screen projections (LSP) are applied in control rooms in order to facilitate a shared overview of running processes for shift staff. So far, little is known about the teamwork-related impact of LSP. It was assumed that LSP affect a) the congruency of mental models of interdependently working teammates and b) team performance. Congruency is a prerequisite for effective teamwork due to its impact on team-coordination processes. Shared mental models (SMM) regarding task and team interaction affect mutual expectations regarding the teammates' behaviours. They facilitate tacit coordination, mutual performance monitoring, and proactive offering of support. In a pre-post-test design, 21 operator teams of 3 engineering students each (N = 63), divided into two groups (LSP on/off), were investigated regarding their SMM acquisition within a furnace simulator. Following 45 minutes of training, task- and team-SMM were measured. Afterwards, the groups worked at the simulator "SteelSim" either with or without LSP to produce raw iron for 45 minutes. This was followed by the post-test SMM. Team performance was measured as the amount and quality of produced raw iron. It was found that although LSP did not significantly affect task and team-interaction SMM, LSP increased team performance significantly.

## Introduction

Given the increasing complexity of organisations and task fulfillment, teamwork is deemed essential for success in meeting constantly changing requirements and in reacting flexibly to turbulent business environments (Cannon-Bowers & Bowers, 2011; Morgan et al., 1993; Salas et al., 2005). However, teamwork is not always successful. Often, it is also afflicted with communication or coordination problems (Hofinger, 2005), and how these problems are handled will have an impact on the team's performance (Baker et al., 2006; Stout et al., 1997). Among other things—e.g. team training strategies (see Cannon-Bowers & Bowers, 2011; Smith-Jentsch et al., 2008) such as cross training (team members switch their roles) or guided team self-correction (teams are instructed to observe teammates' behaviour and provide and accept performance-enhancing feedback)—technical resources play a crucial role in dealing with such kinds of teamwork affordances. One of these technical resources is a "large screen projection" (LSP). An LSP generates an overview of

In D. de Waard, N. Merat, A.H. Jamson, Y. Barnard, and O.M.J. Carsten (Eds.) (2012). *Human Factors of Systems and Technology* (pp. 75 - 89). Maastricht, the Netherlands: Shaker Publishing.