INTRODUCTION

Managers face problems that are increasingly complex and dynamic. Decision support systems (DSS) are designed to assist them make better decisions. However, the empirical evidence concerning the impact of DSS on improved decision making and learning in dynamic tasks is equivocal at best (Klabbers, 2003; Sharda, Steve, Barr, & McDonnell, 1988; Sterman, 2000; Todd & Benbasat, 1999). Over four decades of dynamic decision making; studies have resulted in a general conclusion on why people perform poorly in dynamic tasks. In dynamic tasks, where a number of decisions are required rather than a single decision, decisions are interdependent, and the decision-making environment changes as a result of the decisions or autonomously or both (Edwards, 1962), most often the poor performance is attributed to subjects’ misperceptions of feedback. That is, people perform poorly because they ignore time delays between their “actions and the consequences” (Sterman, 2000) and are insensitive to the feedback structure of the task system (Diehl & Sterman, 1995). Decision maker’s mental models about the task are often inadequate and flawed (Kerstholt & Raaijmakers, 1997; Romme, 2004). In this paper we argue that system dynamics based interactive learning environments (ILEs) could provide effective decision support for dynamic tasks by reducing the misperceptions of feedback.

BACKGROUND

Dynamic Decision Making

Dynamic decision-making situations differ from those traditionally studied in static decision theory in at least three ways: (1) a number of decisions are required rather than a single decision, (2) decisions are interdependent, and (3) the environment changes, either as a result of decisions made or independently of them or both (Edwards, 1962). Recent research in system dynamics has characterized such tasks by feedback processes, time delays, and nonlinearities in the relationships between decision task variables (Romme, 2004). Driving a car, managing a firm, and controlling money supply are all dynamic tasks (Diehl & Sterman, 1995) In these tasks, contrary to static tasks such as lottery-type gambling, locating a park on a city map, and counting money, multiple and interactive decisions are made over several periods, whereby these decisions change the environment, giving rise to new information and leading to new decisions (Forrester, 1961; Sterman, 2000).

ILE

We use ILEs as a term sufficiently general to include micro-worlds, management flight simulators, DSS, learning laboratories, and any other computer simulation-based environment—the domain of these terms is all forms of action whose general goal is the facilitation of dynamic decision making. Based on the on-going work in the system dynamics discipline (Moxnes, 2004; Otto & Struben, 2004; Qudrat-Ullah, in press; Sterman, 2002), this conception of ILE embodies learning as the main purpose of an ILE. Under this definition of ILE, learning goals are made explicit to the decision makers. A computer simulation model is built to represent adequately the domain or issue under study with which the decision makers can experience and induce real world-like responses (Qudrat-Ullah, 2005). Human intervention refers to active keying in of the decisions by the decision makers into the computer simulation model via the interface of an ILE.

Performance in Dynamic Tasks

How well do people perform in dynamic tasks? The empirical evidence (Diehl & Sterman, 2000; Klabbers, 2003; Moxnes, 2004; Sterman, 2000) suggests almost a categorical answer: “very poorly.” Very often the poor performance in dynamic tasks is attributed to subjects’ misperceptions of feedback (Moxnes, 2004; Sterman, 2000). The misperception of feedback (MOF) perspective concludes that subjects perform poorly because they ignore time delays and are insensitive to feedback structure of the task system. The paramount question remains, are people inherently incapable of controlling system with time lags, nonlinearities, and feedback loops? Contrary to Sterman’s MOF hypothesis, an objective scan of real-world decisions would suggest that experts can deal efficiently with highly complex dynamic systems in real life, such as, for example, maneuvering a ship through restricted waterways. The expertise of river