

Preface

The computer simulation-based education and training is a multibillion dollar industry. With the impressive advancements in technology, and the increased complexity of organizational decision-making (e.g., due to globalized nature of businesses), the projected demand for “decisional aids” is on the rise.

However, when it comes to people’s training for decision-making in “dynamic tasks,” effectiveness of computer simulation-based learning environments (ILEs) is limited at best. A large of body of empirical research indicates that during sessions with ILEs, people perform poorly on “dynamic tasks.” They do not develop adequate models of the task system. Instead, they continue to have a simplified, linear view of the task system. They lack the fundamental understanding about the dynamic task system that the structure of the task system is responsible for the behavior of the task system (e.g., there exists a time lag between “decisions” and their effects; the relationships between various variables of the task system are nonlinear). Without such understanding of the dynamic task system, the likelihood of any significant gain (say, in transferable skills) through the use of ILEs is questionable.

This book introduces you to system dynamics-based serious games that are implemented as human-facilitated ILEs. The key objective of this book is to enhance systematically your understanding of and provide you with insights into the general process by which human-facilitated ILEs are effectively designed and used in improving users’ decision-making in dynamic tasks.

Unique Approach of the Book

To realize the objective of this book, we performed the following three tasks:

First, we developed an integrated process model for better decision-making in complex, dynamic tasks. The model was developed on the basis of an extensive review of empirical research and practice of “dynamic decision-making.” With the explicit incorporation of human facilitation in the design of an ILE, this model facilitates the acquisition of multidimensional learning outcomes including the understanding of the task structure, system behavior, and relationship between the two—improving decision-making in dynamic tasks.

Second, to test the hypothesized process model, the laboratory experiments with human subjects were conducted. The laboratory experiments provided rich data on all the variables of the process model: prior knowledge, learning mode, task strategies, task knowledge, task performance, and transfer learning.

Third, the process model was empirically tested to demonstrate the effectiveness of human-facilitated ILEs in improving the subject's capability to make better decisions in complex, dynamic tasks.

Outline of the Book

This book is divided into four major parts. Part I serves as an introduction to the subject of “decision-making in dynamic tasks,” its importance, and its complexity. Part II provides background material, drawing upon the relevant literature, for the development of an integrated process model on the effectiveness of human-facilitated ILEs in improving decision-making in dynamic tasks. Part III focuses on the design and execution of laboratory experiments to gather empirical evidence for the validity of the process model. Finally, Part IV presents a comprehensive analysis of the gathered data to provide a powerful basis for understanding important phenomena of training with human-facilitated ILEs, thereby, helping to derive critical lessons to be learned. To facilitate a solution-oriented approach, each chapter provides with “the insights” that provide practical advice for the successful design, development, and use of human-facilitated ILEs.

Intended Audience

This book provides the reader with both a comprehensive understanding of the phenomena encountered in decision-making with human-facilitated ILEs and a unique way of studying the effects of these phenomena on people's ability to make better decisions in complex, dynamic tasks. This book can be used by managers and practitioners including policy makers, researchers, and students (both at undergraduate and graduate levels) of dynamic decision-making.

For managers and practitioners, this book provides insight into the complex, dynamic problems that they often encounter. For these readers, Part II, which provides an extensive review of previous research, may be skipped initially so that they can get directly to the process of evidence gathering (Part III), and the important lessons learned (Part IV). Policy makers especially interested in health care, energy systems, and education sectors can benefit from Chaps. 8 to 14. Consultants who conduct education and training related activities can equally benefit from the protocols developed in this volume.

For researchers and students, this book provides probably the most comprehensive study of decision-making and learning with human-facilitated ILEs. The background material of Part II provides a solid base to understand and organize the existing experimental research literature and approaches. The developed process model on the effectiveness of human-facilitated ILEs in improving decision-making in dynamic tasks, enables, for the first time, a systematic study of this complex field. As a textbook on decision-making with ILEs, this book can be used for a semester-based course, executive education, and self-study.

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