Research on simulator-based training and instruction strategies

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Abstract

Modern technology offers many possibilities for measuring, logging, and processing trainee performance data and for using this information in optimizing and automating the progression of training scenarios and the delivery of instruction. However, most decisions with respect to training and instruction are made subjectively and on an intuitive basis. The conceptual framework described in this paper guides research on the development of objective methodologies for analyzing and optimizing strategies for simulator-based training and instruction. The general approach is illustrated by results from two recent studies: one dealing with the optimization of part-task training strategies and the other dealing with the automated delivery of instruction.

Introduction

The Training and Instruction Group at TNO-HFRI performs research and consultancy in training and instruction, particularly in those areas in which advanced training media are used. The research activities of our group can be divided into strategic research and applied research projects. Applied research projects comprise both military and industrial projects. Our strategic work consists of long-term projects aimed at the development of expertise, methodologies, and tools, and is organized in four different types of tasks or domains, viz. team tasks, cognitive tasks, procedural tasks, and high performance tasks. The focus of this paper is on high-performance tasks.

High-performance tasks are complex, time-critical, steering and control tasks in which the operator is in the primary control loop of the system (cf. Schneider, 1985). An example is piloting a combat helicopter. The time-critical aspect derives from the fact that the to-be-controlled system is dynamic and operates in a dynamic and often hostile or dangerous environment. The complexity of these tasks arises from the number of, the variety of, and the interactions between task components which, apart from perceptual-motor components, typically also comprise (sub-sidiary) procedural and cognitive components.

One of the training characteristics of these tasks is selection which is often required because many people fail to develop proficiency. Even after selection, the duration of training required to reach an operational level of performance may be considerable. Typically there are large differences between novice, advanced, and