Chapter 3
User Interface Designs, Task Categories and Training

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ABSTRACT

This chapter provides a preliminary framework for learner centered user interface design across a variety of training categories. To arrive at this framework, the authors explore (1) user interface design principles and the extent to which they apply to learning environments, (2) the learner centric psychological principles that should be included in the design of learner interfaces, and (3) methods by which training tasks are categorized. The overarching premise of the framework is that designs that are compatible with the psychology of learning promote learning, and ultimately performance, better than those that do not. This seemingly simple concept is sometimes in conflict with user interface design principles for other purposes, such as general purpose websites or marketing campaigns. The framework results in a notional configuration of 27 learner centered training interfaces, which are analyzed for their relevance to user interface design. The chapter concludes with a call for further research to determine best practices in learner interface design.

INTRODUCTION

Digital information and its delivery are ubiquitous in modern society. From the moment a digital radio or cell phone awakens you, to your daily work routines, to checking on your Facebook friends, our lives are becoming one never-ending interface to the digital world. Advancements, enhancements, and extensions of this trend are relentless. The delivery of education and training content in digital form is clearly part of this trend, as testified by the explosion of the e-learning marketplace. E-learning holds much promise for the training of the workforce, for the education of youth, and
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for the development of society (Wisher & Khan, 2010). In Badrul Khan’s popular depiction of an e-learning global framework through his octagon model, interface design plays a prominent role (Khan, 2001). The challenge of designing interfaces specific to the needs of the digital learner is worth examining.

The chapter takes a holistic view of this challenge. Our central question concerns the optimal ‘user interface’ between a learner and learning content. Do user interface design principles for general operational use apply to learning environments? What factors from a learner-centric perspective should be considered as an underpinning to an ideal interface design for learners? Our examination, then, is from a learning perspective, although from more of a training rather than from an educational point of view. The objective in training is to systematically acquire knowledge, skills, rules, concepts, and attitudes that result in improved performance in another environment. We focus on the application of technologies, specifically information and communications technologies, to bring about this systematic acquisition. What matters for the trainee to interface with digital learning content is our concern.

This chapter is organized into a background section and three main sections. The background section covers learner-centered psychological principles; the user-centrist theme is used throughout the chapter. For our purposes, the user is the learner. A learner centered approach begins with an understanding of how the mind functions, so the natural tendencies of the learner should be factored into designs of the interface to learning content. The background covers some psychological principles of learning centered around the learner rather than the instructor. This analysis is further narrowed to what matters most in training.

The first main section considers relevant aspects from the user-interface-design literature related to simulations, in particular the issue of physical fidelity. The section briefly covers the fidelity question as it relates to reproducing the same cognitive experience by the user/operator/learner. Should the intention be to make the experience and interactions intuitive and efficient, in terms of achieving learning outcomes, or merely replicate the actual environment at a lower cost? The second section, the most extensive, reviews relevant training analysis literature, drawing from the many models that have been proposed for categorical descriptions of the elements of training. The intention is to recognize these contributions and what they can offer to categorical descriptions of learner interfaces. The third section attempts to unite the concepts from the first two sections and form a holistic view of the relationship between interfaces and learning content. This is an ambitious goal, and the limited space allotted for this chapter will allow us to only introduce many of the key areas and examine only a subset of interface configurations. The objective of this chapter is to establish a framework for the many factors that underlie the successful development of the learner interface to digital learning content for the purpose of training.

BACKGROUND

In the past century, significant progress was made in understanding the training of skills and abilities, even performance at an expert level (Clark & Wittrock, 2000). The psychological principles of learning and instruction have led to cognitive models that focus on the critical roles of the learner’s cognition, including motivation, memory, comprehension, attention, and the active construction of meaning and understanding (Newell, 1990). These models converge on the human memory system and the processes that attend, transform, store, and retrieve information during learning and later during performance on the job. Note that such models focus on the capacity of the individual to learn and perform, and thus can be viewed from a learner-centered point of view.