Chapter 7

Cognitive Effects of Web Page Design

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INTRODUCTION

The advent of Web-based instruction, which relies upon hypertext models of interaction and design, reemphasizes the need for a clear understanding of how learners process and encode information presented in Web sites intended for instructional purposes. The unique nature of Web page design, mandated by constraints in the technology which limit student interactivity, and yet which support divergent exploration, necessitates a deeper consideration of how learners interact with various Web site design factors. The purpose of this chapter will be to address the cognitive implications of those factors. This chapter will not focus on specific graphic layout and design criteria or visual display specifications that have been extensively covered in the research literature on computer screen design. The intent, rather, is to review and discuss the major theoretical and design issues impacting contemporary instructional Web page design. It is essential however, to understand the basis for much of the Web page design that occurs currently, and that stems from much of the earlier work in computer screen design.

History and Research in Screen Design

The history of computer screen design has been scattered across disciplines and has addressed questions of need rather than of cognition. The vast majority of early research studies addressed the perceptual aspects of how
users viewed and interacted with data on the screen (Galitz, 1989). In most cases, these studies were technology driven, that is to say, they were conducted to test out or validate new screen display technologies such as higher resolution monitors and the utility of pointing devices such as the mouse (Card, English & Burr, 1978; Lu, 1984; Buxton, 1985; Foley, Wallace, Victor & Chan, 1984). The end result of this work generally reflected an attempt to answer the question of “How can we most effectively display data on the screen given the current or newest technology?” (Heines, 1984).

Of particular significance, however, was the research conducted at the Xerox Palo Alto Research Center (PARC) which led to the innovation of the Graphical User Interface (GUI) (Smith, Irby, Kimball, Verplanck & Harslem, 1982; Herot, 1984) which has come to dominate computer interfaces.

Research in some of the parent technologies has also been applied to the field of screen design, particularly in the area of visual perception. In many of the early studies, the act of interacting with the computer screen was seen as almost solely being one of maximizing visual perception (Heines, 1984). Clarity of image and recognition of display elements were the primary variables investigated (Rubinstein & Hersh, 1984; Brown, 1988). Little consideration was given to how the viewer used the information that was presented, or to how it was encoded into memory. Some of this research was useful, particularly that which was done in the area of visual complexity (Dwyer, 1978; 1987). While these studies were focused on other types of media rather than computer screens, the findings have become important to the design of screen displays and interfaces.

In a similar way, research into the perception of printed copy has contributed significantly to our understanding of how text is perceived and interpreted on the computer screen (Gropper, 1991; Gillingham, 1988; Jonassen, 1982). This research has worked almost at cross-purposes, however, to inform us on computer text display. In one sense, a good deal of the text-based research has enabled designers to specify optimum text size, font, style, and layout, but it has also made it quite apparent that the computer screen differs substantially from hard copy in important aspects (Garner, 1990; Hartley, 1997), a fact that many Web page designers fail to recognize.

When the research in computer screen design is viewed from a historical perspective, it becomes readily apparent that little attention has been given to the cognitive effects of screen design and even less to the educational implications of such design. A review of the work done previously is a useful place to start.
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