Chapter 4
Exploring Past Trends and Current Challenges of Human Computer Interaction (HCI) Design:
What does this Mean for the Design of Virtual Learning Environments?

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ABSTRACT

This chapter investigates the potential of aesthetics in the design of Human-Computer Interaction (HCI). In particular, it aims to provide a means by which aesthetics can be applied in photorealistic Virtual Reality (VR) to create engaging experiences. Indeed, this chapter suggests that much can be gained from looking at the aesthetics of photorealistic VR content as opposed to solely looking at the more traditional HCI approaches that have mainly concentrated on the performance and efficiency issues of the technology. The chapter is motivated by the very notion that the aesthetic potential of photorealistic VR content is, and continues to be, underestimated whilst the emphasis on the development of newer and more efficient technologies to create engaging VR experiences increases. Challenging this, the author reports on the results of a comparative analysis performed on two photorealistic virtual environments. These results highlight how both aesthetic form and functionality – efficiency and performance issues – need to be considered in tandem in order to create engaging VR experiences. In demonstrating this, the chapter aims to not only successfully emphasize the experiential side of photorealistic VR, but also to advance the idea of the engaged interaction and in doing so, a new design drive for HCI.

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INTRODUCTION

Research shows that aesthetics has the potential to play an intrinsic role in HCI design (Lavie & Tractinsky, 2004; Tractinsky, 1997; Tractinsky, 2004; Tractinsky, 2005; Petersen et al, 2004; Djajadiningrat et al, 2000; Hoffman & Krauss, 2004). By the term *aesthetics*, I mean the process that causes an interaction between the design and the information already stored in the users mind – personal feeling, past experiences, formal knowledge – to expand and/or recombine their existing information and in turn produce a variety of emotions (Csikszentmihalyi & Robinson, 1990). However, in truth, it has taken many years for people like designers, developers, and researchers etc. to fully understand and realize the extent of this potential within HCI. For years the emphasis of the field of HCI has been on usability and particularly efficiency considerations, such as those involving objective performance criteria, time to learn, error rate, and time to complete a task (Lavie & Tractinsky, 2004). Even today, reminiscent of Card et al. (1983) many researchers believe that all HCI requires is a science base of knowledge (built from cognitive psychology and allied sciences) about human performance on which designers then can draw for their designs. However, as Hoffman & Krauss (2004) have pointed out, modern HCI design has placed too much emphasis on performance issues and not enough on other aspects, like aesthetics. In view of this, I propose to closely examine the past trends and current challenges of human computer interaction design. In particular, I will focus on the design of virtual environments that I firmly believe has been left behind in the current HCI movements towards the creation of more holistic experiences. Addressing this, I advocate a shift in focus from performance issues to now showing how aspects like aesthetics can also play a strong role in building people's attitudes and 'engaged' interactions in photorealistic virtual environments. In summary, the following sections aim to illustrate how a new HCI "design" approach can play an integral part in the design of 'engaging' user interfaces for virtual environments.

PAST TRENDS: HCI AND USABILITY

Human-Computer Interaction is an interdisciplinary subject drawing on knowledge derived from the subject areas of science (physical and social sciences), engineering, and art (Johnson, 1992). This diverse mix of subjects brings with it a broad gathering of interest; however what they all have in common is the understanding that HCI involves the study of interactions between people and computers. The term HCI goes back to the early 1980s when it officially emerged with two main foci: the first on the development of methods and techniques to improve usability; the second on inventing new and more usable software and tools (Carroll, 2001). Even in these early instances, usability can be seen as taking a central role in HCI; so much so, that still today the discipline is portrayed 'as the study and the practice of usability. It is about understanding and creating software and other technology that people will want to use, will be able to use and will find effective when used' (Carroll, 2001, p. xxvii).

As history shows, this desire for usability very quickly became entwined with cognitive psychology theory; it became enthralled with finding out how fast or how easily a user can cognitively interpret the interface in order to efficiently complete a task. In fact, this made such an impact on HCI that researchers are still applying processes that feed into and support this way of designing. For example, over the last ten years, semiotics has started to play a more prominent role in HCI: this idea of the 'coupling of a sign process and a signal process' (Nake & Grabowski in Fishwick, 2006, p. 65) feeds into cognitive theory where 'the notion of the sender and reader in semiotics is not