Chapter XXVIII
Usability Evaluation of Digital Library

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ABSTRACT
This chapter introduces the concept of usability and provides examples of how usability has been used in digital library evaluations. Usability is a user-centered evaluation and has a theoretical base in human-computer interaction. The most concise definition of usability is “fit for use.” The dimensions of usability may also include usefulness, usableness, ease of use, effectiveness, efficiency, satisfaction, learnability, memorability, and error tolerant. The common methods of usability evaluation are described in this chapter, including formal usability testing, usability inspection, card sort, category membership expectation, focus groups, questionnaires, think aloud, analysis of site usage logs, cognitive walkthrough, heuristic evaluation, claims analysis, concept-based analysis of surface and structural misfits (CASSM), paper prototyping, and field study. Some evaluations employed one method; some used a combination of methods. There is a need for more empirical studies in order to understand users’ needs. Culturability is an interesting area to explore.

INTRODUCTION
A digital library is an information system that gives us opportunities we never had with traditional libraries or even with the Web. However, we need to have a better understanding of user’s needs in order to make digital libraries more intuitive to use. Usability testing is a way of learning from users. Usability testing is a user-centered evaluation. Usability is an elusive concept that may be viewed from many perspectives. This chapter provides a brief introduction on usability and how usability has been evaluated in various digital libraries.
DIMENSIONS OF USABILITY

Usability is dynamic interplay of four components: user, task, tool, and environment (Shackel, 1991). This relationship may be illustrated as shown in Figure 1, which is a modified version from Shackel (1991, p.23), Bennett (1972, 1979), and Eason (1981). The emphasis of this modified figure is on the interplay relationships among user, task, and tool. All are in the context of the environment.

Usability has user focus. It has a theoretical base in human-computer interaction. Many consider usability from an interface effectiveness point of view. Kim (2002) finds that “the difference between interface effectiveness and usability is not clear” (p. 26). Interface effectiveness is one of the most important aspects of usability as it is the medium through which users communicate and interact with the system.

Perhaps the most widely cited definitions are the ones of the International Standards Organization (ISO) and Nielsen. The ISO (1994) defines usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (p. 10). As Dillon (2001) points out, the ISO definition is extremely useful. This ISO definition places emphasis on measurable criteria of performance (i.e., effectiveness, efficiency, and satisfaction) that are context-bound by the type of user, the type of task, and situation of use. However, Dillon also considers that the set of metrics that falls out of the effectiveness, efficiency, and satisfaction model can place undue emphasis on speed and accuracy. For many contemporary interactions, Dillon suspects user experience will prove more complicated.

Nielsen (1993) defines usability as learnability, efficiency, memorability, low error rate, and satisfaction. He treats learnability as the most fundamental criteria. The system should be easy to learn so that the user can rapidly start getting some work done with it.

The most concise definition of usability is “fit for use” (American Heritage Dictionary of the English Language, 2000, p. 1894). The Usability Professionals’ Association (2005) defines usability as follows: “Usability is the degree to which something - software, hardware or anything else - is easy to use and a good fit for the people who use it.”

Shackel (1991, p. 24) reports that the definition of usability was probably first attempted by Miller (1971) in terms of measures for “ease of use,” and these were first fully discussed with an attempt at a detailed formal definition by Shackel (1981, 1984):

The capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios. (Shackel, 1984, p. 53-54)

It is worth noting that satisfaction is the most frequently cited attribute of usability while usefulness is the attribute often overlooked (Thomas, 1998). Dillon (2001) has expressed his concern that usability measures satisfaction as if it were the only affective component worthy of consideration. He states that affect covers the host of attitudinal, emotional, and mood-related elements of experience. These exist in all human endeavors, yet have been seriously overlooked in studies of usability.