Chapter 2.26
Usability of Online Learning Systems and Course Materials

Elizabeth Furtado
Universidade de Fortaleza, Brazil

INTRODUCTION

Human-computer interaction (HCI) aims to design and develop high-usability interactive systems (ISs) focusing on users' needs and ergonomic principles, among others. The usability of an IS refers to how easy it is to use and to learn. Similarly, software engineering (SE) aims to design and develop high-quality ISs focusing on schedule, budget, communication, and productivity. The quality of an IS refers to how satisfied the system clients and/or users are, verifying whether the system is performing exactly what was requested.

In order to achieve both IS usability and quality, it is necessary to integrate HCI concepts into an IS development method. HCI concepts can be characteristics of users (such as their preferences, language, culture, and system experience) and of their context of use (such as easy accessibility and good luminosity of the environment). In the online learning context, it is necessary to integrate HCI concepts into an online learning system development method. The pedagogic usability of an online learning system is related to how easy and effective it is for a student to learn something using the system. For these reasons, it is important not only to think about the IS quality, but about its usability as well. In this text, an online learning system on the Web is composed of a virtual learning environment (VLE), with tools to support a collaborative learning and online course materials available for the users through this environment. So, it is important not only to think about the VLE usability, but also about the online course material usability.

We have identified some problems to achieve a successful deployment of online learning systems (Furtado, Mattos, Furtado & Vanderdonckt, 2003):

- **Lack of learning quality:** Many academic staffs are not worried about the design of online course materials. The material of a face-to-face course is hardly ever adapted to online course material. Whenever a course is to be published on the Internet, it

is important to envision the virtual course as the software. This way, it is expected that a course is to be developed with the same severity as the software is planned.

- **Lack of adaptive tools and guidelines:** Learning systems are very useful, but most of them are not adaptive and neither is the user model predefined (Gomes & Viccari, 1999). In addition, user interfaces of such systems are generally specified without taking into account guidelines (Eleuterio & Eberspacher, 1999).
- **Lack of training in collaborative technologies and methods:** Any academic staff (such as a teacher), as part of his/her professional development, needs continuous training. Such training is often carried out without using technologies that can deal with adaptive and collaborative processes. It is necessary to fulfill these needs by adopting an integrated pedagogical-technological content (Perrenoud, 2001).

All of these issues have a critical impact on the usability and quality of online learning systems. Thus, we developed a general architecture for such systems, which aims to show the concepts that must be considered to increase the quality of the learning process and to increase their user interface (UI) usability.

The remainder of this article is structured as follows: in the next section, we explain the main concepts that helped us to develop such general architecture. Then, we provide the best practices used in a development cycle of an IS, focusing on the usability issue. Finally, we summarize the main points of this text.

VLE AND ONLINE COURSE MATERIAL BACKGROUND

As we have mentioned before, an online learning system is composed of a VLE and online course instructional materials.

A VLE has to provide students with spatial freedom and time flexibility. It has to be flexible enough so that every student may profit from his/her own skills and abilities, use his/her previously developed idiosyncratic characteristics (cognitive, social, or emotional), and apply his/her previously gained experience and expertise (Karoulis & Pombortsis, 2003). Some tools available in a VLE are the following: links to tutorials and course materials, collaborative tools (as discussion forums, chats), evaluation tools, and administrative tools.

The main focus in instructional material is on: content, exercises and solutions, and project and lecture notes. The online course material needs ad hoc preparation: target and expected results must be stated, keywords must be provided, and a review must be present at the beginning and at the end of each chapter. Some authoring tools allow teachers to develop their own instructional materials. Other tools, such as those for specific programming languages (HTML, FLASH, SVG), are only used by specialized teams.

BASIC CONCEPTS RELATED TO USABILITY IN ONLINE LEARNING SYSTEMS

The general architecture proposed here (see Figure 1) aims at the development of VLE and online course instructional materials, taking into account some concepts studied in different areas (human-computer interaction, cognitive sciences, ergonomic, artificial intelligence, and pedagogy).

According to this figure, an online learning system's usability can be assured when its components have been built with quality and when users' needs have been taken into account. Quality of a component means: (i) quality in the application corresponds to content, which refers to the information and knowledge involved in the system. Information (such as learning stories