UX Quality with Online Learning Systems and Course Materials

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INTRODUCTION

Human-computer interaction (HCI) field aims to design and evaluate high-usability Interactive Systems (ISs) focusing on users' needs and ergonomic principles, among others. According ISO (ISO 9241-11, 1998; ISO 9241-210:2010(E), 2010), Usability is concerned with the "*effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments*." The following concept can also be found in this field and it is close related to the concept of usability. The User eXperience (UX) concept is defined by the ISO standard 9241:210 (2010) as: "*The perceptions and responses of users resulting from the use and/or anticipated use of a product, system or service*." There are some differences between the Usability and UX concepts, stressing the way to evaluate the user interaction with an IS. The usability of an IS refers to how satisfied the system users are, verifying whether the system is performing exactly what they want (the system efficacy) and with effectiveness. UX is concerned with understanding the users' perception regarding the IS itself that must evoke agreeable emotional responses of users.

In order to achieve both IS usability and UX quality, it is necessary to integrate HCI concepts and practices into an IS development method. HCI concepts can be characteristics of users (as *their emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use of an IS),* of their context of use (as easy accessibility and good luminosity of the environment) and of their interaction with such IS (as the modalities of interaction, the users task, etc.). In the online learning context, it is necessary to integrate HCI concepts into an online learning system development method. The pedagogic UX quality of an online learning system is related to how easy and effective it is for students to learn something using the system by *covering all the aspects of how they use it. It includes the way how well they understand how the system works, how they feel about it while they are using it, how well it fits into the context in which they are using it, and how well it contributes to the quality of their lives (*Alben, 1996).

In this text, an online learning system is composed of a virtual learning environment (VLE), with tools to support a collaborative learning and to access online course materials available for the students through this environment. So, it is important not only to think about the VLE UX quality, but also about the online course material UX quality.

We have identified some problems to achieve a successful deployment of online learning systems (Furtado, Mattos, Furtado & Vanderdonckt, 2003) and (Lisboa *et al*., 2011):

- **Lack of learning material 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 a specific device (as cellphone, digital TV, computer), it is important to envision the virtual course as the software. This way, it is expected that a course to be developed with the same severity as the software is planned by respecting the limitations of each device, for instance (Furtado, 2012);
- **Lack of holistic proposals for the production of content:** Any academic staff (such as a educator, a content producer), as part of his/her professional development, needs continuous training. Such training is often carried out adopting an integrated pedagogical-technological content (Perrenoud, 2001). Educational,

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communicational and technological categories need to be considered in methods and by technologies that can deal with a more integrated vision of the production of content (Lisboa *et al*., 2012); and

- **Lack of adaptive tools:** Learning systems are very useful, but most of them are not adaptive and neither is the user model predefined. In addition, user interfaces of such systems are generally specified without taking into account guidelines related to the users (as those related to the IS accessibility) and their UX.

All of these issues have a critical impact on the UX quality of online learning systems. Here the users can be students and/or any academic staff. Then we developed a general architecture for such systems, which aims to show the concepts.

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 UX quality issues. 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 users 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 of a course. Instructional design methodologies have evolved to treat possibilities of digital convergence (Lisboa *et al*., 2012), allowing students to access the most appropriate device according to their preferences.

Some authoring tools allow educators to develop their own instructional materials. Other tools, such as those for specific programming languages (HTML, FLASH, SVG), are only used by specialized teams.

CONCEPTS RELATED TO UX QUALITY WITH 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 (HCI, cognitive sciences, ergonomic, artificial intelligence, and education, and design).

According to this figure, the UX quality with an online learning system can be assured when this system's components have been built with quality and when the system's context of use has been taken into account. Quality of a system's components can be related to the: i) quality of the application, which refers to the educational content (such as learning stories and learning objects) and to knowledge (such as cases related to the collaborative practice in forums, for instance) involved in the system; ii) Quality of the interaction (of the system design), which refers to a good specification of the interactive information of the system (its windows, its buttons, etc.), including the different modalities of interaction (by gesture, audio, text) used to obtain several media (sound, text, image) through one or more devices. The quality of the context of use refers to aspects related to three elements: the user (as his/her ability to use new interaction devices and technologies), the environment and the platform that such user has experiences with the system.

The concepts related to UX quality in an online learning system are the following:

- Utilization of ontology to assure the flexibility in modeling learning applications. The ontology notion comes from the artificial intelligence