Heuristically Evaluating Web-Based ODL

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INTRODUCTION

The rapid establishment of third-generation distance learning environments, the so-called Web-based or tele-teaching environments, is nowadays a fact. The main means for the delivery of this new educational approach is the World Wide Web, and there are some good reasons for its use, such as its easy accessibility by many groups of learners. It also supports multiple representations of educational material and various ways of storing and structuring this information, as well as being powerful and easy to use as a publishing medium. Additionally, it has been widely accepted that the hyper-medial structure of the Web can support learning. Some researchers characterize the Web as an active learning environment that supports creativity. In addition to this, the Web encourages the exploration of knowledge and browsing, behaviors strongly related to learning. The associative organization of information in the Web is similar to that of human memory, and the process of information retrieval from the Web presents similarities to human cognitive activities (Tselios, Avouris, Dimitracopoulou, & Daskalaki, 2001).

However, a hyper-medial space like the Web cannot be considered, only by these features, as an effective tutoring environment. It is rather more appropriate to think of the Web as a powerful tool that can support learning, if used in an appropriate way. This is because learning is a process (Duchastel, 2001) that depends on other features, such as the learner's motivation, previous experience and learning strategies that the individual has been supported to develop. The effectiveness of any educational environment cannot be considered independently of these aspects.

So, the main question this chapter addresses concerns the evaluation of Web-based ODL (Open and Distance Learning) programs according to their *usability* and *learnability*, two notions of paramount importance for every learning environment. More precisely, after the pending definitions and the corresponding theoretical background, a heuristic approach is proposed and the most appropriate list of heuristics is presented.

LEARNABILITY AND USABILITY

To define the notion of "learnability," we must first answer the question, "What makes the (instructional) content of an environment easily learned?" The answer to this question defines in general the learnability of the environment. A more formal definition attempt would be the statement that it is *the set of methods, modes and tools of the environment that facilitate the acquisition of knowledge*. This work assumes that the notion of learnability embeds de facto the notion of the communication channel; it is impossible for someone to gain knowledge if the environment lacks the means to offer it. So, an evaluation of the learnability of the environment therefore evaluates the success rate of the established communication channel. Continuing on, the next question that emerges is the relation between usability and learnability, and to what extent one affects the other, which is a central question in this chapter. In more detail, we are interested as to whether a usable environment facilitates the acquisition of knowledge, or the opposite – whether a less-usable environment creates certain obstacles. Finally, this question transforms in the question if one can heuristically assess the learnability of an educational environment. Heuristic evaluation, as described initially by Nielsen & Molich (1990) and followed by Nielsen (1993), is a well-established expert-based interface method for evaluating the

usability of a particular interface. A set of interface experts is asked to judge the interface based on a set of a few criteria, the heuristics.

What do we mean by the term "usability"? According to the ISO-9241 (ISO, 1998) standard, we have the following definition: The *usability of a system is its ability to function effectively and efficiently while providing subjective satisfaction to its users*.

The usability of an interface is usually associated with five parameters (ISO, 1998; Nielsen, 1993), derived directly from the above definition:

1. **Easy to learn:** The user can get work done quickly with the system.
2. **Efficient to use:** Once the user has learned the system, a high level of productivity is possible.
3. **Easy to remember:** The casual user is able to return to using the system after some period of time without having to learn everything again.
4. **Few errors**: Users do not make many errors during the use of the system, or if they do so, they can easily recover from them.
5. **Pleasant to use:** Users are subjectively satisfied by using the system; they like it.

To conclude, when the synergy between usability and learnability occurs, the use of the software can be thought of as "integrated" in that a seamless union develops between the use of the software and the learning process (Squires & Preece, 1996).

THE EDUCATIONAL EVALUATION

The evaluation methodologies applied in the field usually utilize questionnaires in the classroom; however, most questionnaires embody closed-type questions, so they lack the opportunity to clarify other aspects that could be of interest or have an impact on the environment and on the involvement of the software on learning. Moreover, closed-type questions do not take into consideration the individual differences students have in learning. In general, quantitative approaches in evaluating an educational environment have been strongly debated as monosemantic approaches that must be supplemented by qualitative ones, which focus on *how* and *what* the student learns.

Other studies in the research field of evaluating distance learning environments are those of Holmberg (1977), Saba & Shearer (1994) and Garrison (1993); however, none of them deals solely with the field of evaluation of Web-based environments, as is the case of Makrakis, Retalis, Koutoumanos and Skordalakis (1998) and Koutoumanos, Papaspyrou, Retalis, Maurer and Skordalakis (1996). These all are user-based evaluation approaches, since they utilize (more or less) questionnaires that have to be answered by users.

THE HEURISTIC EVALUATION

As regards the expert-based approaches, Jacob Nielsen and Rolf Molich began their research in 1988; in 1990, they presented the "heuristic evaluation" (Nielsen & Molich, 1990). The basic point was the reduction of the set criteria to just a few, at the same time being broadly applicable and generally agreed, simultaneously augmenting the evaluators' expertise and, consequently, their reliability. These "heuristic rules" or "heuristics" derived from studies, criteria lists, on-field observations and prior experience on the domain.

The core point in evaluating the initial approach is the usability of the interface. Based on the ISO principles on usability (ISO, 1998), Nielsen (1993) stated the following heuristics, which we have slightly modified and reorganized:

1. Simple and natural dialog and aesthetic and minimalistic design.
2. Visibility of the system status: provide feedback.
3. Speak the users' language: match between system and real world.
4. Minimize the users' cognitive load: recognition rather than recall.
5. Consistency and standards.
6. Flexibility and efficiency of use: provide shortcuts.
7. Support users' control and freedom.
8. Prevent errors.

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