The role of evaluation in an effective development of didactic materials: The MD2 approach

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Abstract

Evaluation is one of the most important activities in the didactic materials development since it allows developers to check if the properties of obtained material satisfy all the requirements established at begin of its development and if that material can be an effective support to achieve the educational goals of any instructional situation. Its results are crucial data for the material redesign in such cases when those requirements or educational goals are not satisfied. Here we describe our vision of evaluation in the MD2 development approach that proposes to assess the didactic materials based on their pedagogical utility and usability.

1. Introduction

Nowadays there are available a wide range of new opportunities for instructional reusability and personalized learning. Evaluation of didactics materials allows developers to check whether the properties of obtained material satisfy all the requirements established at begin of its development. It also provides tangible information about material’s utility, validating if such material can be an effective support to achieve the required educational goals, reusability and personalization. Most approaches to evaluation in e-Learning context are related to Educational Hypermedia [2];[3] and they proposed procedures and metrics to assess educational hypermedia applications. In despite of the recognized value of evaluation, it has been mostly neglected in approaches dealing with didactic materials development like CopperAuthor [1], RELOAD [6]. In this paper we present how the MD2 approach applies the previous experience in the evaluation of educational hypermedia systems to the current e-Learning trends based on the usage of learning objects and units of learning.

2. The evaluation approach in MD2 method

Didactic materials are herein considered as we had defined in [4]. A general procedure for evaluation has been proposed for the evaluation of usability of hypermedia systems in [2] and it can be adapted to assess didactic materials as we had explained in [5]. There is a set of material desired features needed to check when we are concerned with their development such as if they are reusable, compliant to the e-Learning standards and specifications, and they have an acceptable quality [4]. Thus, one of the objectives for didactic material formative evaluation should be its quality. It can be analyzed from the product view and HCI perspective as its usability and from the pedagogical view as its educational usefulness or pedagogical value.

Our approach to the development of didactic materials is named MD2 after Spanish acronym for Didactic Material Development Method. The rationale behind the approach is that materials development can be effectively supported if we count on means to describe material main features: contents and pedagogical strategy e.g. the MD2 model and, a method to guide the different stages of its development: selection, composition and evaluation e.g. the MD2 method [4]. The MD2 approach supplies an evaluation framework composed by elements from the Usability-Quality (UQ) view of MD2 model and evaluation mechanisms described by the 13th step of MD2 method. The UQ view elements provide information about the parameters or criteria and their related metrics needed to assess the pedagogical value and usability of the obtained material, which are based on findings of evaluation research related to Educational Hypermedia [2] [3]. They are input data to evaluation mechanisms described by 13th step of MD2 method [4] which process evaluation data based on the difference of what values of pedagogical
value/usability are observed by users versus their predefined expected values. Such comparison and its results will provide developers with reliable information about the obtained material pedagogical value/usability.

A set of UQ view elements (Q) are used to check if created material has an appropriate pedagogical value that effectively support educational tasks and helps to achieve the defined learning objectives. Those elements are Material Richness, Completeness, Coherence and Accuracy, which are shown in Figure 1. Their values belong to fuzzy sets corresponding to linguistic terms [Low, Medium, High] or [Good, Average, Poor]. Thus, developers are firstly asked to give their assessment of those pedagogical value-related criteria or elements through a web-form and their answers are controlled to belong to defined sets. Then, an aggregation of the users-observed values of those elements, i.e. Observed Utility or Material relevance, is compared against a predefined minimum accepted value, i.e. Quality threshold, in order to check if the material’s Pedagogical value is adequate and to provide feedback to users about which elements of material should be modified to achieve appropriate levels of pedagogical utility.

The other set of UQ view elements (U) are Error frequency and severity, Self-evidence, Familiarization time, Efficiency of use and Memorability. Their values are also represented as fuzzy sets. Developers are asked to give their assessment, in a similar way as we had explained, their values are controlled and then, aggregated to obtain the Observed Usability value, which is compared to the predefined Usability threshold to control whether the material has acceptable usability. In cases where the material does not reach acceptable levels of pedagogical value or usability, all information gathered during the evaluation is used to propose clues for the material redesign, helping developers to modify the features related to the failure until the material will reach appropriated quality and usability levels.

3. Future works

Currently we are involved in the deploying and assessment of the module of MD2tool, which implements the proposed evaluation framework. The analysis of their results will help us to check the effectiveness of this evaluation framework in real development situations.

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4. References