Chapter 2
Student and Teacher Perspectives Testing a System for Adaptive e-Learning

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ABSTRACT

Personalization is becoming a mandatory requirement in Web-based Education and long distance learning in general, representing a flexible way of learning the exact amount of knowledge to reach a given learning goal. This approach saves time and money and it is particularly suited for life-long learning. The drawback is that the teacher has to produce some effort to prepare didactic material and while research in this field proposes several intelligent systems providing personalization with advanced didactic strategies, teacher's point of view is less considered. In this chapter we extend our previous work that aimed to build an adaptive system for education called LS-Plan, taking into account both teacher's and student's needs. In particular we carried out a comprehensive evaluation of the system embedded into an Adaptive Educational Hypermedia called Lecomps5, in order to experiment and prove the added value of the system.

INTRODUCTION

Thanks to the modern information technologies, Web-based education is widely used for distance learning, with both economic and didactic benefits. The absence of temporal and spatial constraints allows for (e-)learning in different contexts such as schools, companies and so on, saving money and time as well. By distance learning new didactic

scenarios and opportunities have been considered from a pedagogical point of view, giving a strong boost to the literature of the field of Web-based learning. From a didactic point of view different approaches are possible: the *student-centered* approach, where students autonomously build their own knowledge, playing an active role in the learning process, as opposed to the traditional role where they act as passive learners only; the *collaborative* or *socialapproach* where students learn, thanks to their belonging to a community of learners, i.e., through knowledge sharing among students and among students and teachers or tutors, using social and wiki services like chat, forum and blog. In this context, personalization, i.e., the capability of an educational system to produce learning paths depending on the student's personal traits and needs, is considered a very important requirement for distance learning and researchers have heavily focused on this aspect in recent years. The goal is to provide an alternative to the traditional *one-size-fits-all* approach: courses and contents have to be tailored to the particular student, with her previous knowledge, learning styles, interests, progresses and needs while taking the course. To this aim, many Web-based Educational Systems (WBESs) have been proposed in the literature, with a student model management capability, applying different techniques for building and updating such a model and for personalizing the educational activity.

In this chapter we extend a previous work where we presented some case studies concerning the application of an e-learning personalization engine called LS-Plan (Limongelli, Sciarrone & Vaste, 2008; Limongelli, Sciarrone & Vaste, 2009) to the Java language learning domain. Here we present a comprehensive evaluation of the LS-Plan system, an engine for providing a WBES with the capability to automatically produce personalized courses, adapting them on the basis of the student needs. Firstly a student model is built; secondly the student model is updated taking into account student's characteristics, navigational behaviors and

performance in the study, as measured by means of quizzes. Knowledge and learning styles are the student's characteristics taken into account by the system. Quiz results and navigational behaviors are considered for the student model management and for adapting the proposed course to student's needs. In this process the teacher is involved too: she is required to tag the learning materials while inserting them into the system.

The extended evaluation presented in this paper aims to assess the LS-Plan system from both student and teacher points of view. According to the literature, for evaluating the system from a student point of view, a *layered* evaluation is required (Masthoff, 2003), that is considering separately the student model and the adaptation decision making mechanism. To evaluate the system from a teacher point of view, we use some teacher evaluations about the produced learning paths. In this way, the experiments provide a complete evaluation of the overall system, focusing on: (i) the suitability of the provided personalization, given the student model together with the validity of the student model itself as assessed by users (i.e., the *layered* evaluation); (ii) the added value of adaptation for students' learning (i.e., the *as a whole* evaluation); (iii) students' and teachers' satisfaction in using the system. For performing the experiments, LS-Plan has been embedded into an educational hypermedia called Lecomps5 (Limongelli et al., 2009). The student modelling phase has been evaluated by the students themselves: we asked students if and how much they agreed with their own model. The adaptation decision making has been evaluated both by teachers, by expressing a score about the suitability of the proposed learning sequences, and students, by examining the number of times that students followed the LS-Plan hits. The *as a whole* evaluation focusses on the assessments of the differences between two groups of students, the first using the adaptive modality, i.e., the hypermedia enriched with the LS-Plan functionalities, the second using the non-adaptive modality, i.e., the simple hypermedia. Finally, we

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