Chapter 1
A Recommender System Supporting Teachers to Author Learning Sessions in Decision-Making

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ABSTRACT
This chapter pays attention to the automatic generation and recommendation of teaching materials for teachers who do not have enough time to learn how to use authoring tools for the creation of materials to support their courses. To overcome the difficulties, the research is intended to solve the problem of time needed to create adapted case studies for teaching decision-making in network design. Another goal is to reduce the time required to learn the use of an authoring tool to create teaching materials. Thus, the author presents an assistant that provides adapted help for teachers, generates examples automatically, verifies that any generated example fits in the class of examples used by the teacher, and recommends personalized examples according to each teacher’s preferences. He studies the use of data related to teachers to support the recommendation of teaching materials and the adaptation of Web-based support. The automatic generation and test of examples of network topologies are based on a probabilistic model, and the recommendation is based on Bayesian classification. This investigation also looks at problems related to the application of Artificial Intelligence (AI) to support teachers in authoring learning sessions for Adaptive Educational Hypermedia (AEH).

INTRODUCTION
The main question to answer here is how to provide Web-based context-sensitive help to teachers engaged in authoring Adaptive Educational Hypermedia (AEH). This chapter is intended to address and solve their problems of time needed to learn the use of an authoring tool and to create examples and additional teaching materials.

Our solution seeks to provide teachers with an easy to use access to an adaptive help and an authoring tool that will enable any qualified teacher to create his own course-work with minimal programming effort.
Although some AEH facilitate the development of supporting material for teaching, dealing with an AEH entails multiple challenges to combine and organize topics and resources. AEH systems are based on the hypertext structure, and they use information of each student to adapt learning to his needs (Brusilovsky, 2001). Most authoring tools used to create AEH remain difficult to learn and use. Authoring tools are programs used for the production of intelligent tutoring systems (Johansson, 2001).

To overcome the difficulties, in this chapter we will view the teacher as a trainee who needs to be instructed not only in the different pedagogical strategies involved in teaching a subject, but in the usage of an authoring tool for the creation of AEH (Vázquez-Abad, Rodríguez, & Aïmeur, 2003).

Consequently, this chapter also presents an assistant, ARIALE (Authoring Resources for Implementing Adaptive Learning Environments), that involves the recommendation of examples and the application of adapted help techniques. Our assistant generates examples automatically and verifies that any generated examples fits in the class of examples used by the teacher (the teacher’s teaching style). The generation and test of examples of network topologies are based on a probabilistic model, and the recommendation is based on techniques of artificial intelligence, such as Bayesian classification (Keller, 2002) and Case-Based Reasoning (CBR) (Cortés, et al., 1994).

The recommendation in this research is also based on the automatic generation of examples according to the teacher’s preferences, on the addition and reuse of existing examples in a case base, and on the learning of the teacher’s decisions related to which examples to use (Rodríguez, 2008).

ARIALE includes an authoring tool for the creation of teaching materials and a Teacher Model with information related to each teacher’s preferences. The Teacher Model belongs to a knowledge base that supports personalized help for teachers and the different decisions that ARIALE makes.

Decisions about how to provide recommendations and adapt help are based on teacher’s data stored in a Teacher Model, and ARIALE learns from these decisions to improve future support to teachers. Data related to used examples models each teacher’s teaching style. Each style evolves according examples changes (Rodríguez, 2011). This view of the Teacher Model is new and helpful, because our Teacher Model is part of a knowledge base that allows our system to be more flexible than a classical AEH with a static Pedagogical Model.

Regarding the aspects described previously, this investigation answers the following questions:

1. What can be the general structure and functionality of an assistant to support teachers authoring learning session in decision-making?
2. Which specific functionalities and characteristics of an authoring tool can allow implementer teachers to adapt teaching material according to their pedagogical goals?
3. How can the assistant generate and recommend examples to support teaching decision-making?
4. How does the assistant make decisions about which kind of help content to show, and which media to use for displaying the content?
5. How does the assistant learn to help teachers in a personalized or customized way?

In the following sections we discuss other projects related to our research, the problem focused on this research, the solutions, the knowledge base that ARIALE uses to make decisions, the adaptive help applied, a process to generated and recommend examples, a mixed method for developing our system, the results of an evaluation of the system and our conclusions.
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