

**TESIS DOCTORAL**

UNIVERSIDAD DE SALAMANCA

DEPARTAMENTO DE INFORMÁTICA Y AUTOMÁTICA



**DISEÑOS INSTRUCTIVOS ADAPTATIVOS:  
FORMACIÓN PERSONALIZADA Y REUTILIZABLE EN  
ENTORNOS EDUCATIVOS**

**RESUMEN**

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## RESUMEN

Los Sistemas Hipermedia Adaptativos con fines Educativos (SHAE) son capaces de ofrecer recorridos y contenidos curriculares adecuados a las necesidades y características de cada alumno. No obstante, a pesar de su índole educativa, es habitual que no consideren la adaptación de la estrategia pedagógica, y, en consecuencia, no incluyan herramientas de autor que permitan crear reglas de adaptación, lo que restringe su difusión más allá de contextos experimentales. Al mismo tiempo, debido a que utilizan modelos únicos para diseñar los componentes y elementos educativos, no cuentan con características y mecanismos para reutilizar o intercambiar contenidos, actividades, estrategias o reglas de adaptación, lo que se traduce en un incremento en su tiempo y costo de desarrollo.

Para superar estos problemas esta tesis propone emplear la especificación IMS *Learning Design* (IMS LD) como método de marcado en la anotación y modelado de componentes denominados Diseños Instructivos Adaptativos (DIA), que consideran las actividades de aprendizaje que se llevarán a cabo, los objetivos que se desean alcanzar, los prerrequisitos necesarios para llevar a cabo la instrucción, y las reglas de adaptación necesarias para adecuar el flujo de aprendizaje a las características de los alumnos. Asimismo, para garantizar su interoperabilidad, los DIA se definen como objetos independientes, lo que permite reutilizarlos e intercambiarlos en diferentes estrategias, sistemas y aplicaciones compatibles con IMS LD.

Para establecer los atributos con los que cuenta un DIA se tomaron en cuenta la caracterización, técnicas y elementos para realizar la adaptación que utilizan los SHAE desarrollados hasta el momento, así como las propiedades de IMS LD para modelar condiciones adaptativas y estrategias instructivas.

La propuesta de esta tesis ha servido, además, como base para desarrollar una herramienta de autor que permite la creación de DIA. Dicha herramienta se ha empleado para realizar un experimento que permitió evaluar la propuesta a través de un caso práctico en una situación real de aprendizaje.

**PALABRAS CLAVE:** Diseño Instructivo, Lenguajes de Marcado Educativo, IMS LD, Sistemas Hipermedia Adaptativos con Fines Educativos, Hipermedia Adaptativa.



## ABSTRACT

Adaptive Educational Hypermedia Systems (AEHS) have the potential of delivering instruction tailored to each student. However, despite many years of research, these systems have been used only in a few real learning situations. There are different reasons for this. First, most of them do not consider the adaptation of the pedagogical strategy or the authoring of learning flows. Consequently, their dissemination outside experimental contexts is limited. Moreover, since they make use of proprietary semantics to identify and define adaptivity conditions and educational elements, they do not have the possibility to share contents, learning activities, learning strategies or adaptive techniques among lessons or applications.

In order to solve these problems, this thesis proposes a component called *Diseños Instructionales Adaptativos* (DIA, Adaptive Learning Designs), which uses as common notational method the IMS Learning Design specification (IMS LD). The objective of DIA is twofold. On one hand, it permits the definition of the characteristics of the learning flow, like its learning objectives, prerequisites, learning activities, method of instruction and adaptive behaviour and; on the other, it supports the reusability and exchangeability of the defined components among learning designs and tools compliant with IMS LD.

The definition of the DIA component is founded on the characterization, techniques, and elements that AEHS take into consideration for performing adaptivity, and the attributes of IMS LD to model adaptivity and learning strategies.

Moreover, an authoring tool has been developed in order to create DIA. It has been utilized for performing a study to evaluate the adaptivity behaviour of a DIA in a real learning situation.

**KEYWORDS:** Learning Design, Educational Modelling Languages, IMS LD, Adaptive Educational Hypermedia, Adaptive Hipermedia.

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