Expressing the implicit instructional design language embedded in an LMS: motivations and process

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Outline

- Introduction
- General problematic
- Our approach
- **Process for identification and formalization of instructional design language**
  - HMI centered analysis
  - Technical centered analysis
  - Confrontation and formalization of final language
- Conclusion

Introduction

❖ Context

➢ Instructional design

- Learning scenarios
- Educational Modeling Language (EML) (as LDL, PALO, etc.)
- VIDL (Visual Instructional Design Language) (as E²ML, CPM, etc.)
- Standards (as IMS-LD)

➢ Platforms/LMS

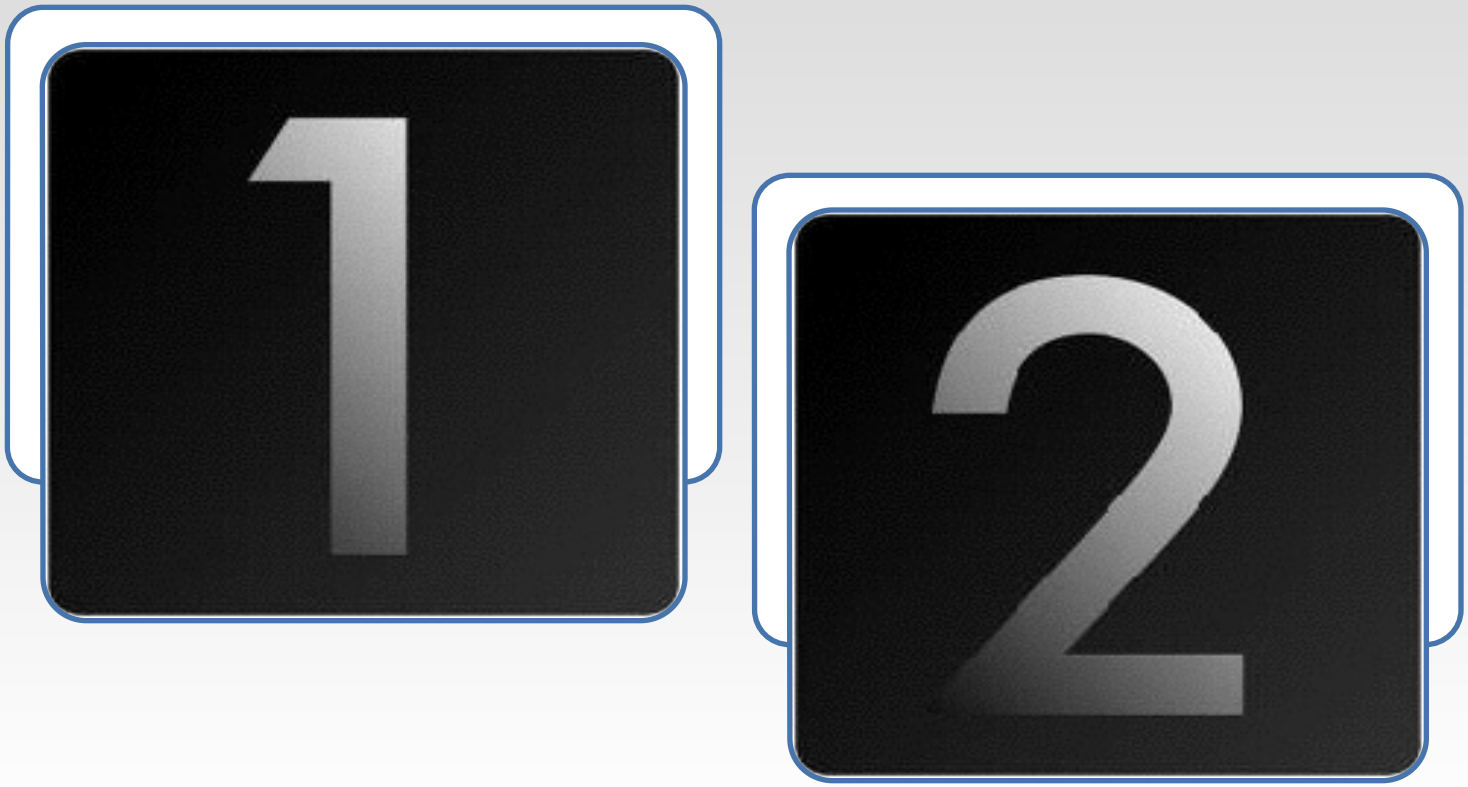
- Learning Scenarios
- Specific platforms Language (as Moodle)
- Dedicated editors
- Infrastructure (as Learning Design Infrastructure)

Introduction

- **Thesis:** *Domain-Specific-Modeling* approach for operationalization of learning scenarios on distance learning platforms

- **Finding:**
  - **Instructional Design**
    - Many EMLs [Koper and Manderveld, 2004] and VIDLs [Botturi and Stubbs 2007]
    - Few standards [De Vries et al. 2006] and authoring tools
    - EML are generally not compatible with platforms
  - **Platforms**
    - Many difficulties to appropriate platforms by teachers designers [Ortiz et al. 2009]
    - Practitioners are not familiar with this implicit instructional design domain
    - Each platform embeds a specific instructional design paradigm [Mekpiroona et al. 2008]

General Problematic



Our approach: Focusing on the platform language

1
- Identifying and formalizing of the implicit learning design language

2
- Adding a specific API to the LMS for realizing the import/ export facilities

3
- Exposing the identified language to specify new authoring tools

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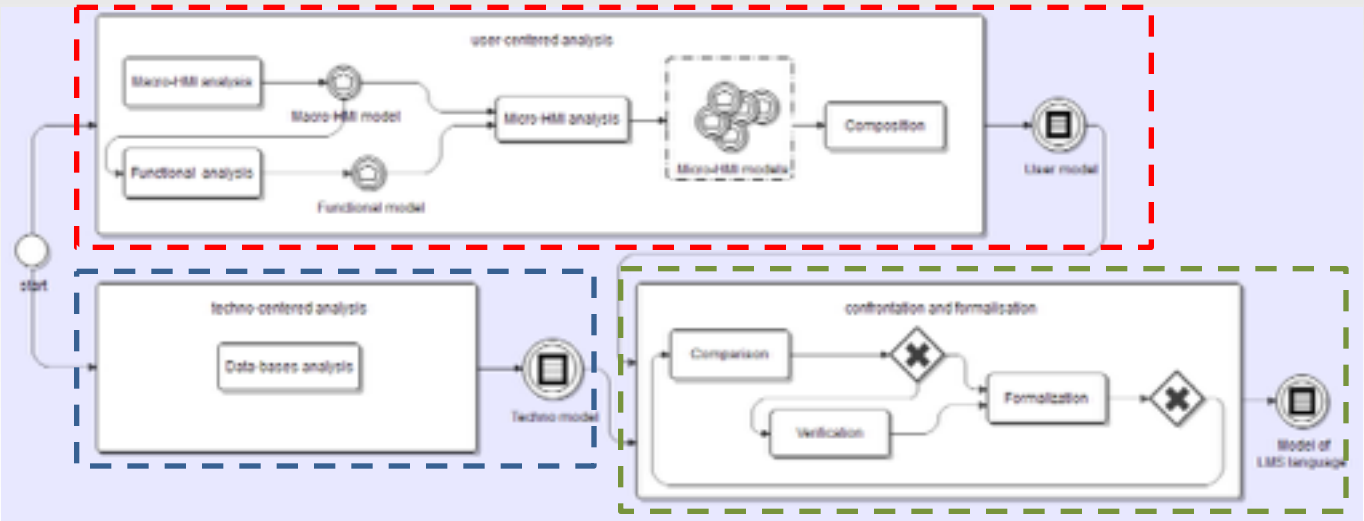
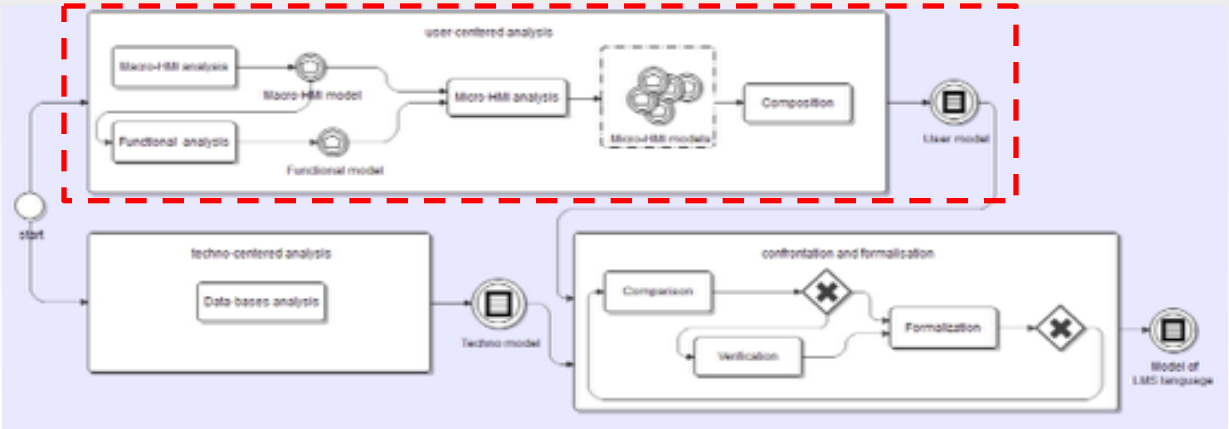
Process

- Process objective: analyze, identify and formalize the instructional design language of LMS
- The process is composed by three main parts:
  - HMI centered analysis
  - Technical centered analysis
  - Confrontation and formalization



HMI centered analysis

- Two strategies of HMI analysis:
  - ➢ analysis of existent course/situations
  - ➢ analysis of HMI for specification of new courses
- 3 sequential analyses (macro-HMI, functional and micro-HMI)
- The composition for formalizing the model driven from the HMI centered analysis
  - ✓ *ensure the identification of the visual part of Instructional design language*



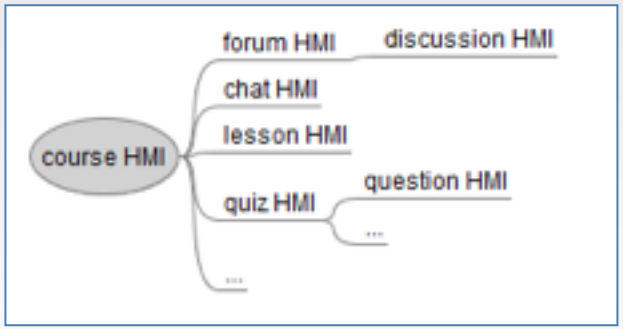
Macro-HMI analysis

- Identify HMI dedicated to Instructional Design (for specifying learning situations, learning scenarios, etc.)
- **Model formalism :** *mindmap of identified HMIs*
  - ➢ Each element of model represent the main concept of HMI
- **Approach:**

Browse HMIs platform

Identify the main concepts
(via the semantic analysis of HMI titles, forms and navigation path)

Identify relations between concepts



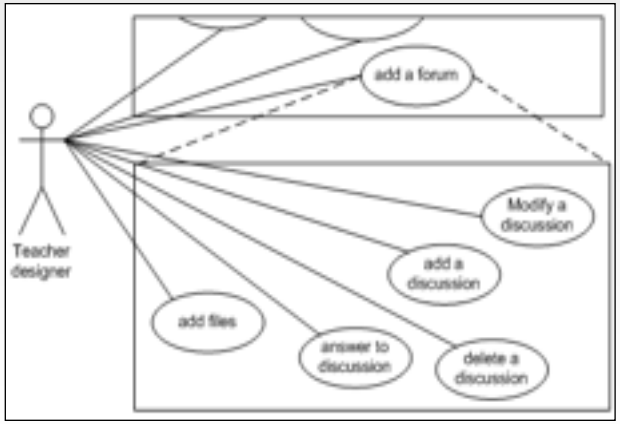
Functional analysis

- Identify functionalities relevant to instructional Design
  [administrative functionalities (display, management, etc.) are rejected]
- **Model formalism:**
  - SADT (*Structured Analysis and Design Technique*) model by adapting the semantic of use case diagram of UML language
  - Use case diagram for representing the internal models
- **Approach:**

Analyze the HMIs widgets

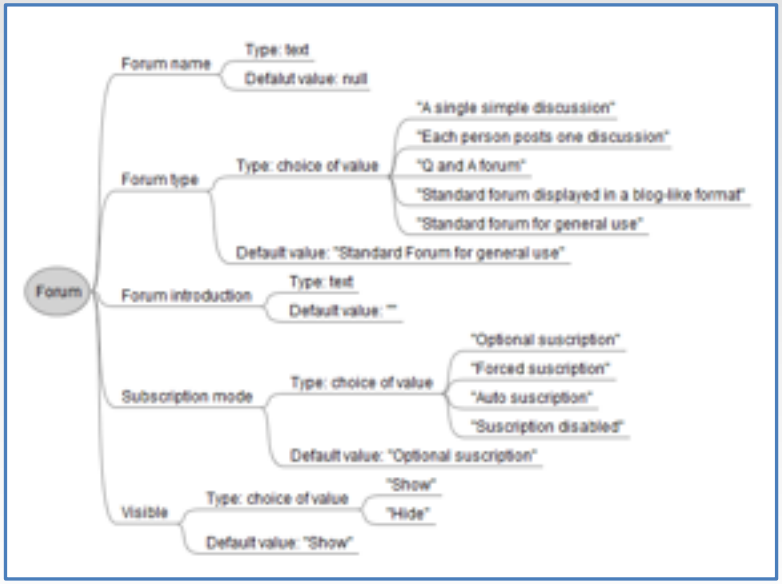
Identify the pedagogical criterion (or not) of each widget

Attribute a functionality for each pedagogical widget



Micro-HMI analysis

- Identify element relevant to instructional design, their attributes and their properties (type, value domain, default initializations, etc.)
- **Formalism:** *mindmap*
- **Approach:**
  - Analyze titles and details of blocks, forms, etc. and HMI component
  - Take into account elements and attributes required by HMI or have a pedagogical criteria
  - Identify all properties of elements and attributes

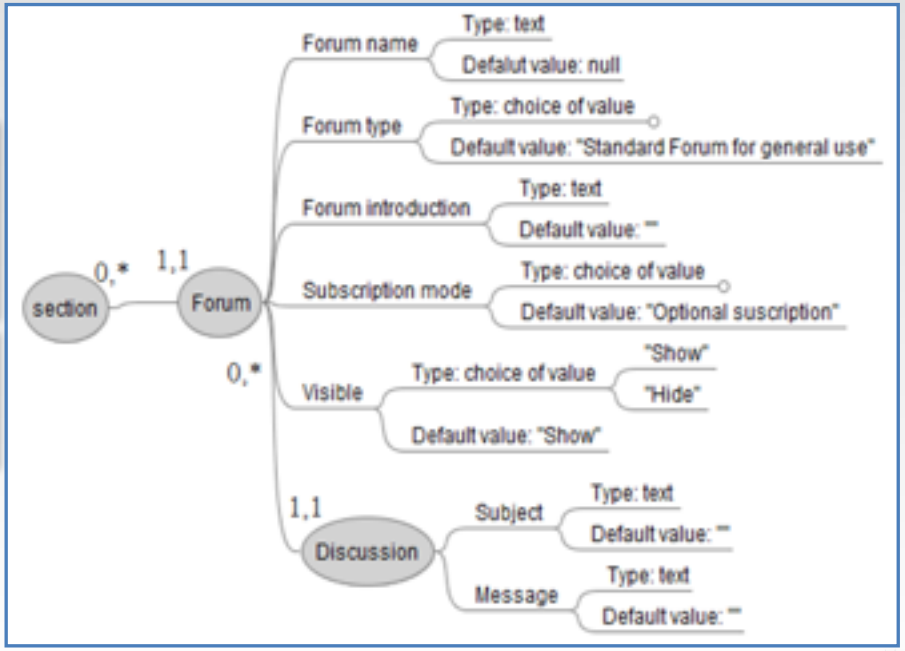


Composition

- Formalize the partial instructional design language derived from the HMI centered analysis by combining the micro-HMI models
- **Formalism:** *mindmap* of micro-HMI models
- **Approach:**

Identify the relations between the micro-HMI models from the macro-HMI and functional models

Add multiplicities between associated models



Technical centered analysis

❖ Several technical aspects to analyze: Data-bases, source code, course backup/restore (if exist)

❖ The data-base analysis consists in specifying the ***Conceptual Data Model*** in relation with Instructional Design

➢ *Ensuring the specification of models in conformance to platforms language*

❖ **Approach:**

looking over all database tables

focusing on tables in relation to instructional design

specifying the database schema

generating the Conceptual Data Model

Confrontation and formalization

- Formalize the final model of Instructional design
- The confrontation concerns:
  - ➢ the definition of similar elements,
  - ➢ the non-existence of some elements or attributes,
  - ➢ the divergences about the types of attributes,
  - ➢ etc.
- Objectives of step:
  - ✓ refine the HMI model
  - ✓ detect and correct differences
  - ✓ ensure the final model will be specified in machine interpretable format
- **Formalism:** metamodel
  - ➢ provide a basis for the specification of VIDLs and the development of dedicated editors, on top LMS languages in accordance with the DSM approach

Confrontation and formalization

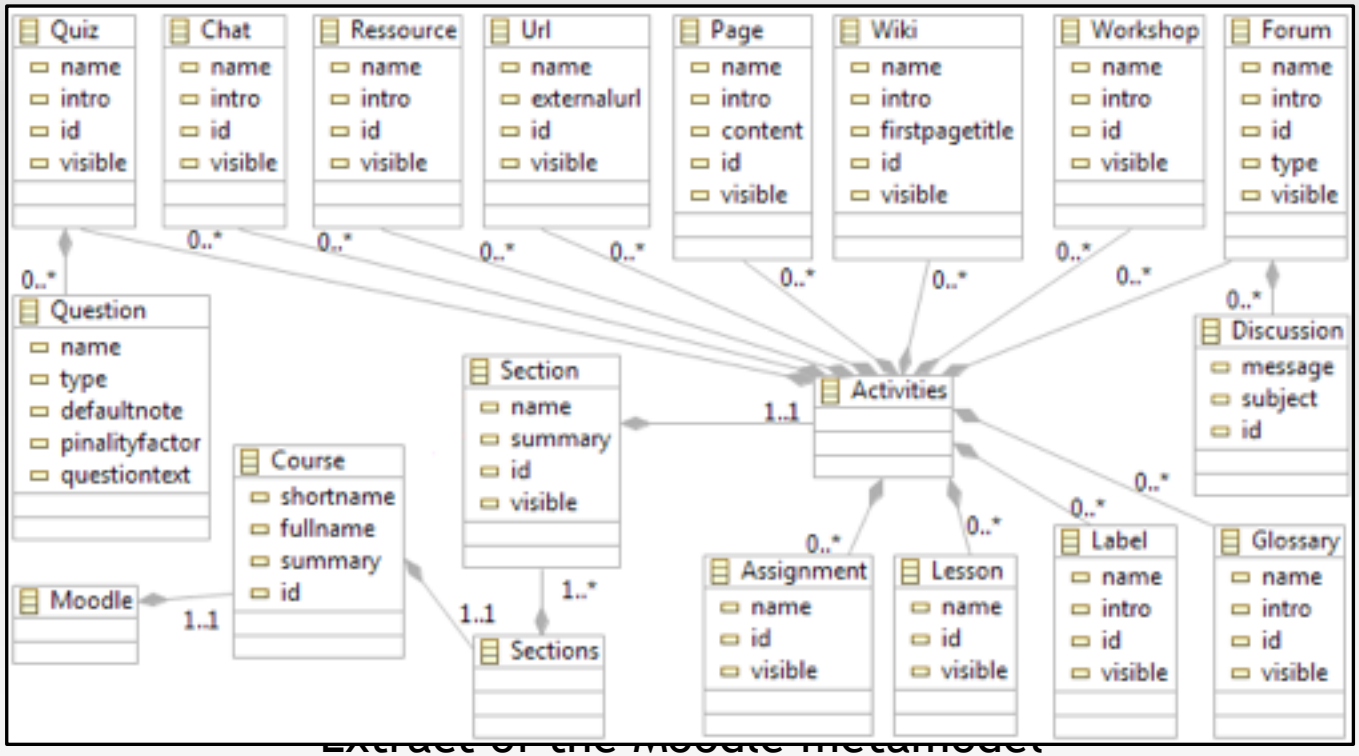
❖ **Approach:**

Verify the existence of elements of HMI model on technical model	Model the verified element by a meta-class
Verify attributes in terms of existen and type	Model attributes by meta-attributes

Identify relations between meta-classes (based on existent relations on HMI and technical models)

Identify and represent multiplicities on the metamodel

Example of result process



Extract of the Moodle metamodel

Conclusion

- Our approach:
  - centered platforms
  - based on instructional design language of platform

- Approach based on tree points:
  - (1) Identification and formalization of instructional design language of platform by a specific process
  - (2) Add new import/export facilities to platform
    - Specification of an XML schema equivalent to metamodel resulting from process
    - Adding new communication facilities (import/export) with external conception tools
  - (3) Specification of new languages (VIDL) and conception tools (as graphical editors) based on the identified language and by using a DSM approach

Thank you for attention

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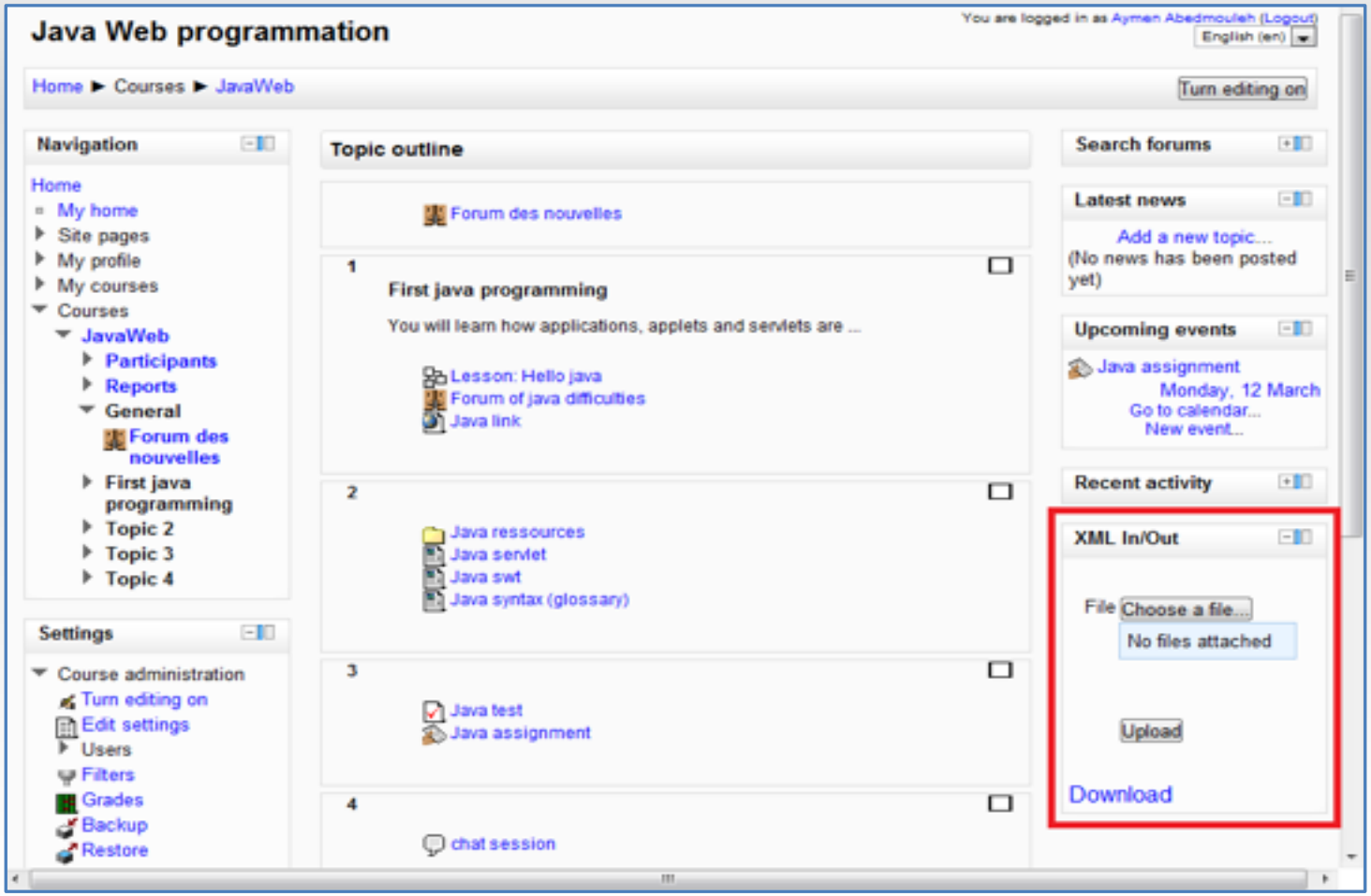
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My home
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Participants
Reports
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Filters
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Topic outline
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Java assignment
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Add a new topic...
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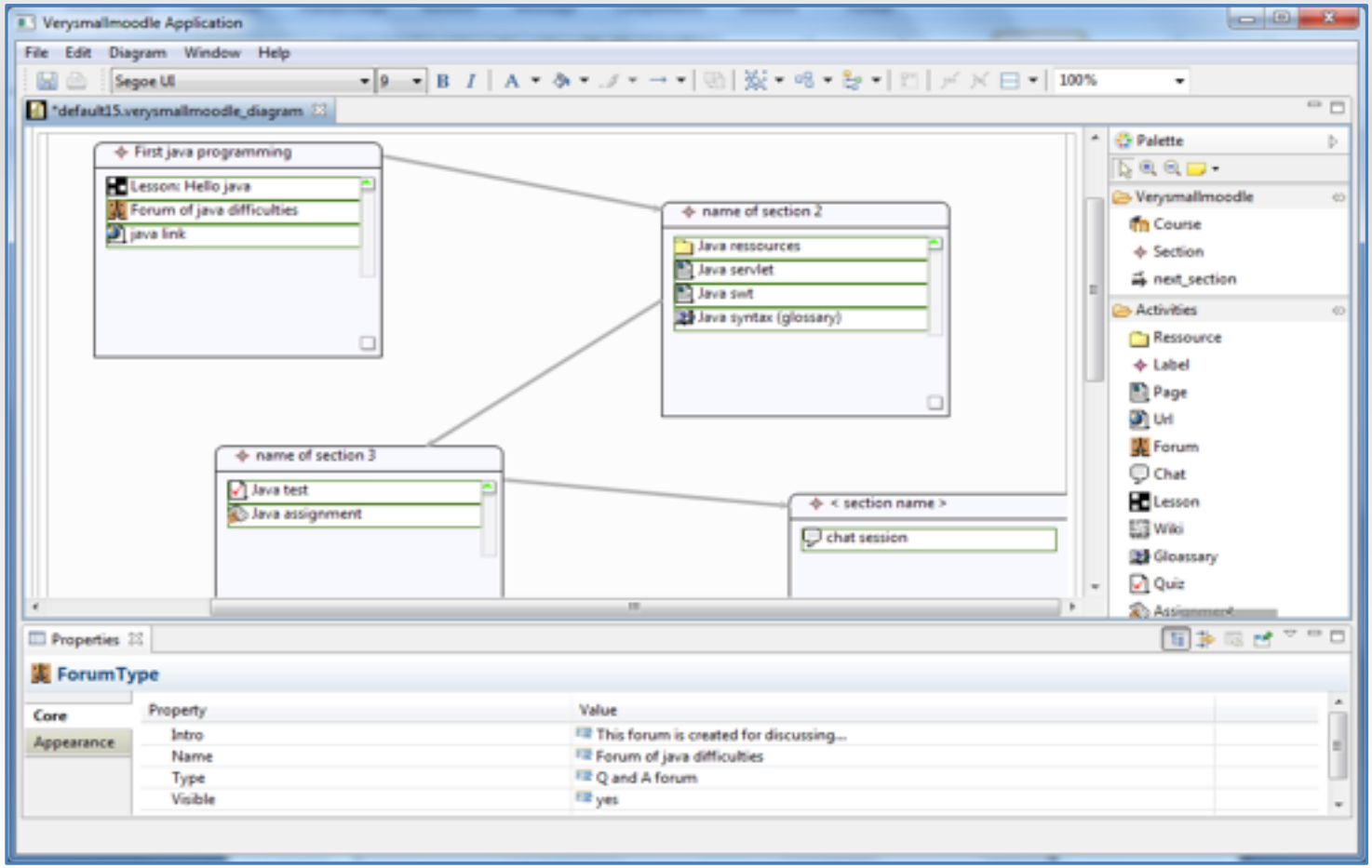
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