USE OF CONCEPTUAL MAPS IN DISTANCE LEARNING COURSES

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Abstract. One of the greatest challenges to be faced by institutions working with Distance Learning Courses development and training is the content planning and structuring. This study presents a methodological proposal for a computational environment that enables education and training professionals to create didactic materials for distance learning courses. It was proposed the usage of Conceptual Maps as the cognitive strategy for acquisition and representation of knowledge, and the usage of a hyperstructure generated by the maps when orienting the creation of a browsing structure for web-based courses.

1   Introduction

The present project aims to develop a set of cooperative techniques to elaborate a methodological proposal for a computational environment to create didactic material for Distance Learning Courses. Conceptual maps will be used as a strategy to acquisition and representation of knowledge during the process of elaboration of didactic contents used in the course activities.

From Ausubel theory [AUS80], Novak [NOV98] has developed the Conceptual Maps that are graphic representations similar to diagrams that indicate relationships between concepts linked by words. They are also used to assist the hierarchical arranging and sequencing of teaching contents offering adequate stimulus to the student [FER00].

The usage of CmapTools[1] [CAÑ04b], developed by IHMC[2] (Institute for Human Machine Cognition) to create Conceptual Maps is proposed in this project for its many helpful aspects; for instance, its easiness of use, collaboration aspects [CAÑ04a], and more specifically the possibility to export the maps in XTM (XML Topic Maps) format. The export of maps in XML format is considered essential to the proposal due to the re-use of the hyperstructure created by the Conceptual Map as the browsing map of the course to be created by one or more designers of the Distance Learning Courses.

2   Conceptual Maps and XTM

In search of a theoretical model to assist the designer of Distance Learning Courses in organizing contents, and to provide a structure enabling more significant learning by the students (users) Conceptual Maps and the theory related to them were selected to contribute to the research. The Conceptual Maps allow the designer (instructor/teacher) to systematize knowledge taking into account prerequisites, necessities and aims of the students.

Distance Learning Courses based on web use hypertext structures to present content, therefore generating hyperdocuments that, from a didactic point of view, require attention from the planner. According to [KAW96], in hyperdocuments it is not quite convenient to permit a restriction-free browsing through all links of a hyperdocument hence causing problems such as disorientation and cognitive overload. There is no consensus in Computer Science in Education indicating the best methodology in configuration educational hypermedia systems. However, the information should be clearly and coherently arranged so the users understand the relationships between the nodes of the system.

David Ausubel's [AUS80] work and theory on Significant Learning were used concerning the pedagogical aspects to be considered in adult user training. According to [AUS80], the concepts and their hierarchical relationships should be identified, pointed out similarities and differences profiting by the natural sequence among topics. Ausubel emphasizes the Significant Learning is the process through which new information relates to a relevant aspect of the existing knowledge structure of an individual.

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[1] http://cmap.ihmc.us
[2] http://www.ihmc.us

"The Conceptual Maps or the so-called semantic nets are spatial graphic representations of concepts and their relationships. The Conceptual Maps simultaneously represent the process of organization of the knowledge through links, and the final product through concepts (nodes). Therefore, it is beyond the relationship between language and visual, it is, indeed, the interaction between objects and codes of the map" [AMO01].

There are several available tools to develop conceptual maps; CmapTools, 3x version with XML format to export maps called XTM has been used in this project. XTM is a specification which provides a model and grammar to represent the structure of information resources used to define the concepts and associations (relationships) between concepts. XTM is defined by an independent consortium called TopicMaps.Org[3] .

In the following part it will be described the methodological proposal to create Distance Learning Courses by ULBRA[4] (Lutheran University of Brazil) along with LEAD[5] (Distance Education Laboratory of the Federal University of Rio Grande do Sul - Brazil).

3   Methodology proposed for the elaboration of Distance Learning Courses

The aim of this methodology is to build a computational environment that allows the development of didactic material with a cognitive approach based on Conceptual Maps that, from a hyperstructure generated by the maps and exported in XTM format, will orient the creation of HTML pages that will contain the content of the course structured as in the conceptual maps. In other words, the proposal is to benefit from the Conceptual Map hyperstructure as browsing maps and to generate pages containing the contents of the course. The main requisites to elaborate the material according to the methodology [CAB02] are:

- To organize the contents according to the prerequisites, co-requisites and course goals;
- To allow the student a structured browsing, although not rigid, of the elaborated contents;
- To use textual, graphic and sounding means related to the contents;
- To use keywords to associate to the concept some ways in which it will be worked on during the course; for instance, to associate to the concept that it will have an exercise list, chats, group dynamics, discussions, assessments.

The steps the designer must take to create the didactic material are based on the following stages:

1. Application of Conceptual Maps to model the domain;
2. Insertion of medias which will be associated to the concepts as resources to conceptual maps;
3. Insertion of activities related to concepts by keywords that will define how the concept will be performed during its presentation;
4. Exportation of the Conceptual Map in XML/XTM format;
5. Creation of the hyperdocument of the course and its respective pages HTML from the exported file XML/XTM using WebMap tool. The WebMap tool has been developed by the research group of Conceptual Maps from ULBRA, constituted by the authors of the present paper. This tool has already been functioning, and some experiments have been done.
6. Comprising of pages generated by WebMap tool in a managing environment of distance learning courses, so that the material may be available and accessed by the students.

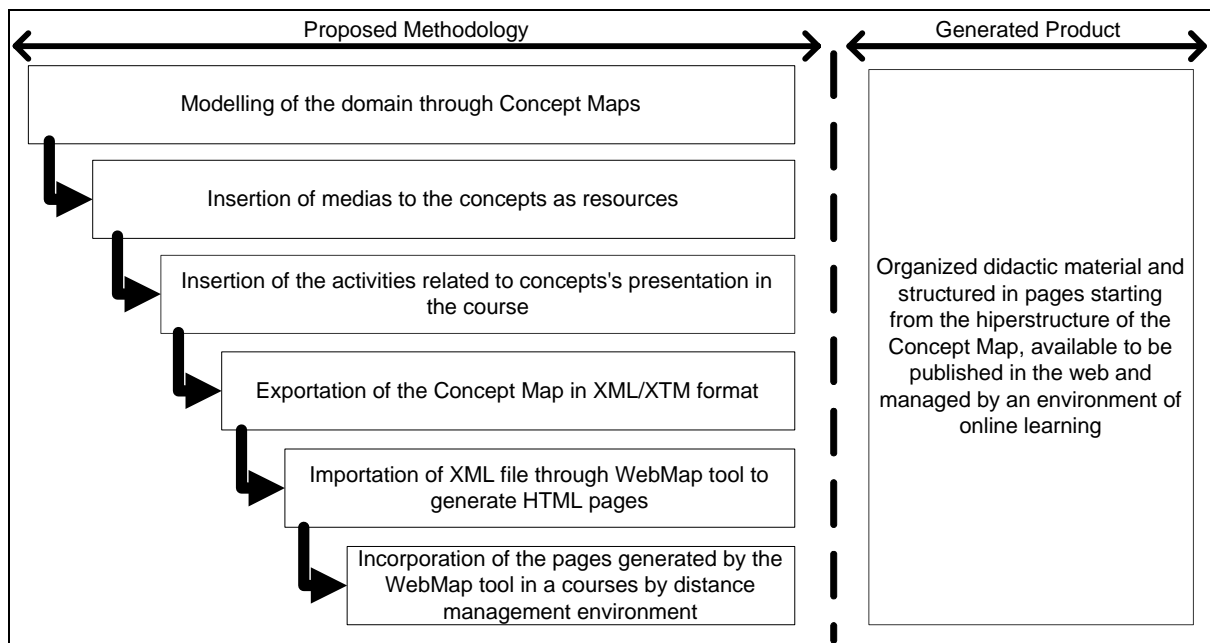In the figure 1 it is possible to observe the proposed steps in the methodology:

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[3] http://www.topicmaps.org
[4] http://www.ulbra.br
[5] http://www.cinted.ufrgs.br

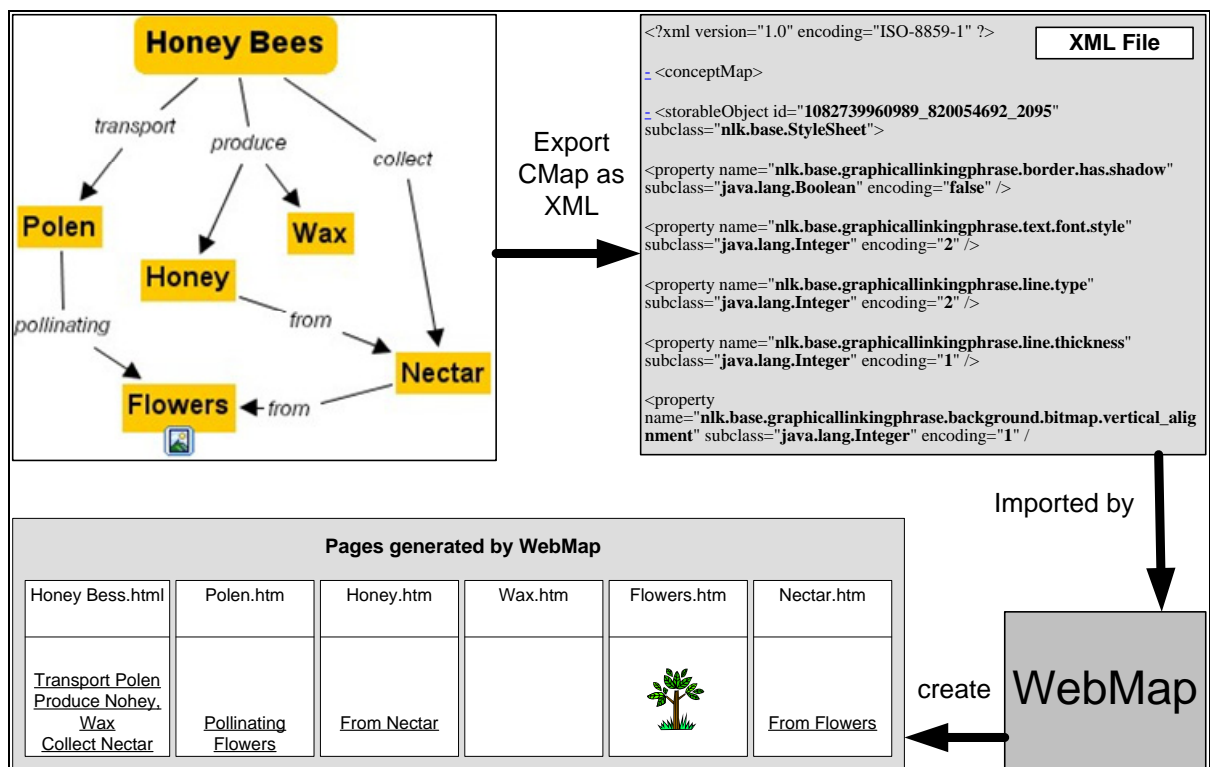**Figure 1**. Steps to be followed to the application of the methodology

Figure 2. Overview of methodology

After all those steps are followed, the designer will be able to present a hyperdocument structured and organized according to a methodology with pedagogical support provided by Conceptual Maps. The benefits of applying the methodology directly reflect in the quality of the course once there is a sequential planning of the content.

In figure 2 it is shown the application of the methodology generating a file XML from the maps. Followed by the use of WebMap to make HTML pages with links to the other pages - as it was previewed in the map - and also adding to the pages the resources sampled in the maps, such as in the concept Flowers where it was incorporated in the map an illustration that was automatically inserted in an equivalent document. Not only an illustration, but also other types of resources can be inserted, including the ones to define ways to present the content as it has been described in stage 3 of methodology.

It is important to point out the goal of the proposal is to organize the didactic content to be used in an environment controlling and executing all the activities of a distance learning course.

4   Final considerations

The main goal of this project is to present an approach of organizing content using Conceptual Maps, and re-using the hyperstructure of these maps associated as a hyperdocument of the course on Web. Also to enable the association of maps already existents in the elaboration of new courses, therefore facilitating to re-use materials previously elaborated. This methodological proposal does not present any news on tools suggested to be used in the course, only in the way they interact benefiting from the structure of conceptual maps as hyperdocuments, using XML/XTM format to generate the hyperdocument of a course.

The design of this project facilitates the creation of content, particularly for distance learning courses which content is presented in hyperdocuments, organizes them enabling their re-use; consequently contributing significantly in producing courses and disciplines offered by educational institutions.

The present methodological proposal is part of an initiating project that involves the set up of an environment for managing distance learning courses using technologies such as learning objects, workflow, adaptable multimedia among others.

5   References

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