THE APPLICATION OF COMPUTER-MADE CONCEPT MAPS TO THE ORGANISATION OF INFORMATION: A COMENIUS PROJECT

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Abstract: We present here the application of the computational tool CmapTools, which allows us to create our own concept maps, including multimedia elements to clarify or exemplify concepts. From different pieces of information about traditional festivities we have created a concept model depicted in a main concept map to which some other secondary maps are subordinated. Surfing through the information is very easy –from each concept we can select a menu of icons which correspond to different types of elements (texts, images, graphics, videos, other concept maps, web pages, etc.). This concept model has the advantage of being totally open and subject to continuous modifications and expansions because new pieces of information can be added to the concepts in the map at any time.

1   Introduction

Concept maps, developed by Novak, are used as a means for the description and communication of concepts within the theory of assimilation based on a constructivist model of human cognitive processes, a learning theory that has had a great influence on the field of education (Ausubel, Novak and Hanesian, 1978).

A concept map if the two-dimensional graphic representation of a series of concepts connected through linking words, thus making simple propositions, in such a way that interrelation among concepts become evident. In this kind of scheme concepts are represented as labelled nodes and the relationships among concepts as connecting labelled arcs. Therefore, they are useful for the active exploration and manipulation of objects and ideas, both concrete and abstract, thus allowing the construction of new knowledge and new ways of thinking.

In the educational world concept maps have helped people of all ages to examine diverse fields of knowledge and they are used to teach students "to learn how to learn", making cognitive structures and self-constructed knowledge evident (Novak and Gowin, 1988; González and Novak, 1996).

2   Concept maps as a means of compilation and organisation of information

The information that we can obtain about any given topic through the mass media becomes larger and larger every day. Particularly the Internet has made it possible that anybody who has a computer with an Internet connection may have access to a large amount of information. However, when surfing the net, we rarely have an appropriate model of the organisation of the information web pages contain. It is very frequent that we click on a link without having a clear knowledge of the type of content we are going to find.

We nowadays have the program CmapTools (Cañas *et al.*, 2004), based on the construction of concept maps, which enables us to organise large amounts of information and documents (images, texts, videos, web pages, etc.) in such a way that access to this information is easy and flexible, browsing through the topic by means of concept maps. This program was developed by the Institute for Human Machine Cognition, and it can be downloaded freely from the Internet (http://cmap.ihmc.us). The software tools developed in CmapTools enable us to use concept maps as an elegant an easy to understand interface to browse through a multimedia system, as we can see in this piece of work. Besides, the new versions of CmapTools make it much easier to incorporate new knowledge during the construction of a concept map by allowing the search, whether on the web or in previously-created concept maps, of concept, propositions, resources, or even new topics related to the concept of the map that is being constructed. In this way, the searching tools can help during the process of construction of a model of knowledge (Carvalho, Hewett and Cañas, 2001; Leake et al., 2003).

Concept maps as a means of collaborative work among students

Work with concept maps using CmapTools enables collaborative work by letting students work on group projects and cooperate on problem solving situations. In the atmosphere proposed here, students can make notes, criticise, and even build their own organisation or representation about the contents of the module. Students will be able to create their own maps, thus modifying the initial maps of the project (without this affecting the

original maps); they will be able to collaborate with each other and with the teachers on the creation of the maps electronically, complementing them with images, videos, texts, etc.; they will attach their maps to those of other students in their own schools, or the maps of experts, and they will automatically publish their model on the web, allowing in this way other students, teachers or ordinary internet users to browse through them. These activities represent a wide variety ways to manipulate knowledge that will help students in the construction of his or her own knowledge (Cañas et al., 1997).
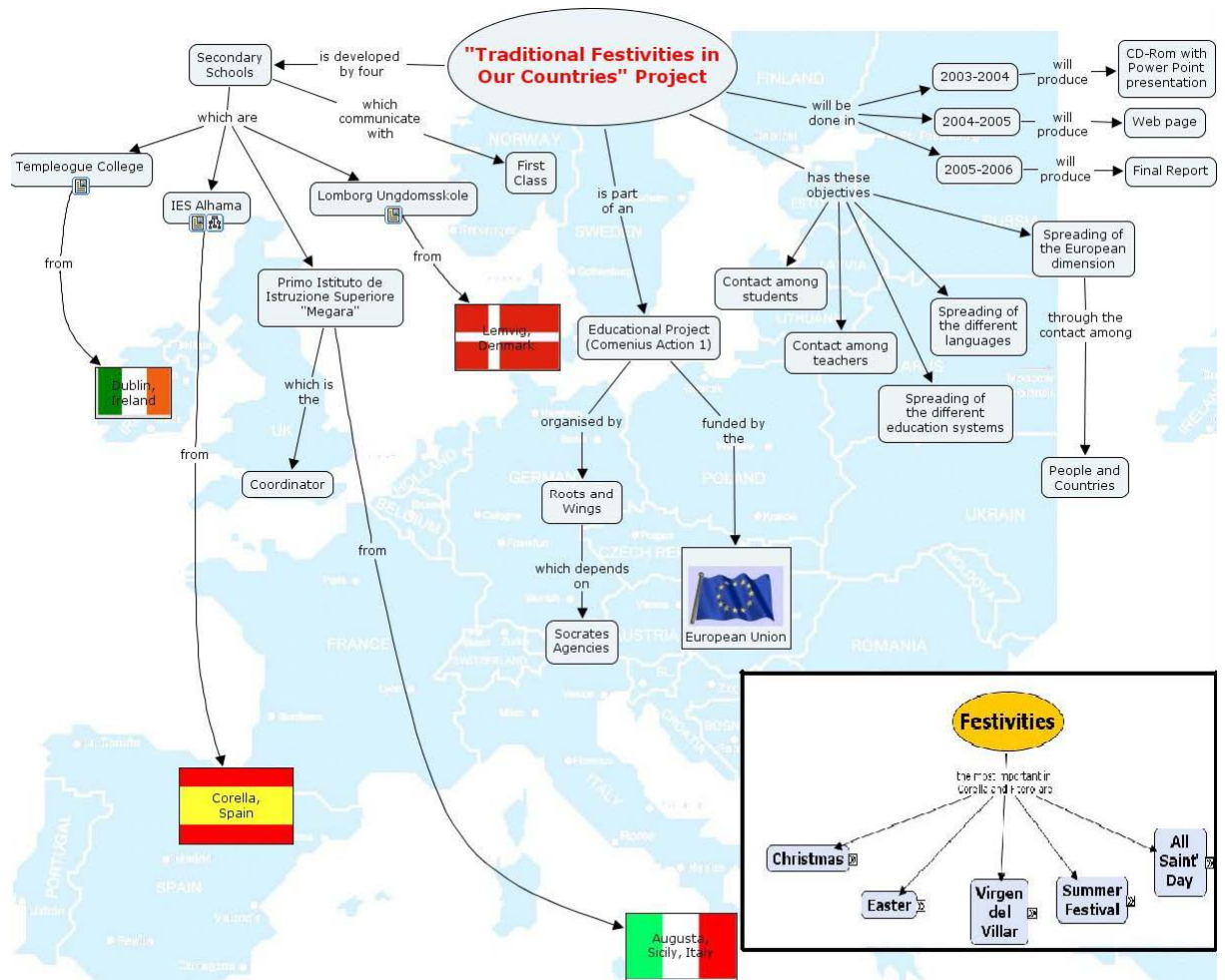

Figure 1. Main map of the project "Traditional Festivities"

2.1.1 Our proposal: development of the Comenius Project "Traditional Festivities" through concept maps

The Comenius Project –Action 1, about "Traditional Festivities in Our Countries" will be developed over three years (2003-2006). The work will be done with 16-year-old students in Spain. In this project take part four secondary schools on the whole: the Primo Istituto di Istruzione Superiore "Megara" from Augusta (Sicily), the Templeogue College from Dublin (Ireland), the Lomborg Ungdomsskole from Lemvig (Denmark) and the Instituto de Educación Secundaria "Alhama" from Corella (Spain).

One of the objectives of the Comenius project "Traditional Festivities in Our Countries" is to create a PowerPoint presentation about the most representative festivities in each country and a web page which includes all the information collected in the four participating countries. However, PowerPoint presentations or web pages, regardless of their connections, follow a linear presentation. Generally what you can obtain is a contents page with connections to the other pages where the different topics are developed. Each topic is implemented with a sequence of pages. On the contrary, concept maps are a browsing guide. When we study a map we are studying a model of elaborated knowledge.

The links between concepts in propositions have semantics. The icons under the concepts are links to other media that explain the concept in greater detail. These media can be other concept maps, images, video or audio files, web pages, etc. When you click on one of those icons, a window for the corresponding medium opens presenting the information. Figures 1 and 2 show the result of opening several windows in two concept maps for

this project. This environment allows students to browse through the maps and the media according to his or her interest, the questions he or she is trying to answer or the topic he or she is investigating. There is no best browsing sequence, as it happens in a linear text. It's the technology of CmapTools that allows us freedom from this linear structure (Cañas, 1999; Cañas et al., 2000).

In this piece of work we propose the construction of a collection of concept maps about "traditional festivities", in a similar way to those built in previous experiences, like the concept maps about Mars developed by Nasa Ames' Center for Mars Exploration together with the Institute for Human Machine Cognition, available on the Internet (http://www.cmex.arc.nasa.gov) (Briggs *et al.*, 2004), or the collection of maps about Science in general terms, which are being elaborated within the project "Understanding Science Through Concept Maps" (Cañas et al., 2003), also available on the Internet (http://conexiones.eafit.edu.co/intranet/cmaps/).

Maps can be created in each participating school by students coordinated by the teachers responsible of the project, which will select the resources (images, videos, texts, web pages, etc.) that will complement the maps. Initially maps will be created in English and translated into the languages of the participating students. Besides, since the tools that are need for the construction on map can be obtained for free for educational use, students can create their own maps linked to the maps of teachers and other students, thus showing their understanding and assimilation of the different topics.
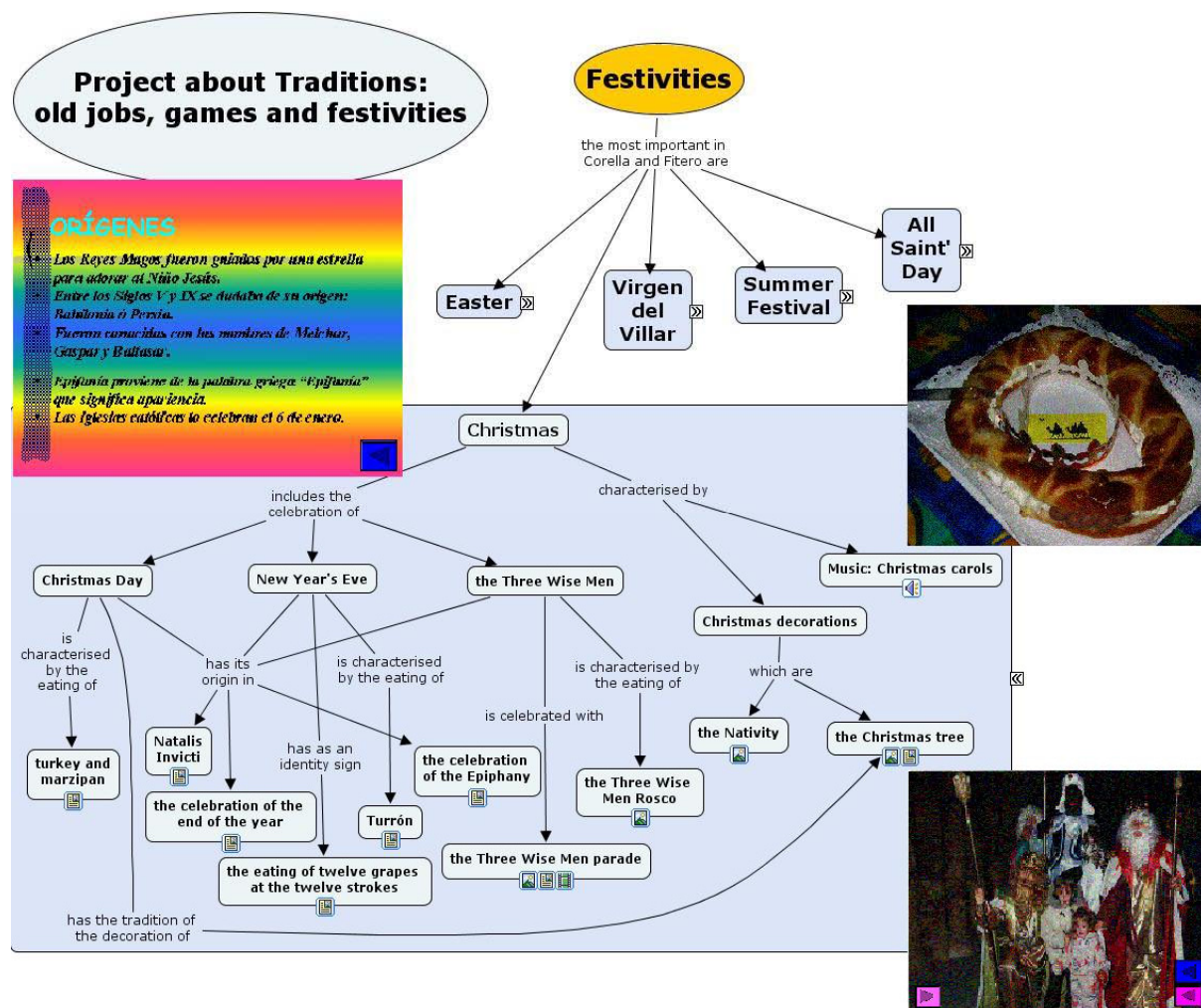

Figure 2. Images and texts associated to the concept map about the festivities in Corella and Fitero (Spain)

This work proposal, which will be initially developed by the Spanish group, includes the following steps:

1. Creation of a main concept map which contains the general project guidelines, its objectives, the participating schools, etc. This map will be continuously updated to include the different actions within the project.
2. Creation of a concept map of the main festivities in our towns, Corella and Fitero (Spain), linked to the main map.
3. Development of the previous concept map and addition of new resources by students.
4. Creation of new concept maps of the festivities of the other participating countries, thus establishing the corresponding connections among all the maps.
5. Publication of all the maps on the Internet.

Acknowledgements

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