

## COLABORATIVE CONSTRUCTION OF A CONCEPT MAP ABOUT FLEXIBLE EDUCATION

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**Abstract.** We are going to describe an experience in which the Concept map is used as a flexible tool in order to construct, organise, navigate, criticise and share knowledge. We have developed it in one subject of the last year of the Pedagogy degree in which from a list of concepts handed in to the students we have created Concept maps elaborated in an individual way and, subsequently we have related them in a collective map.

### 1 Introduction

The main axis of the experience we present is referred to the application of the Concept maps in the process of teaching-learning, emphasising the representation and the fact of sharing the knowledge from a constructivist perspective (Novak and Gowin, 1988; Novak 1990, 1991; Cañas et al., 2000). All these authors share the idea, widely accepted of the constructive activity of the student in the process of learning and, they consider that the concepts and proposals, which link the concepts, are central elements in the structure of the knowledge and in the construction of the meaning as well.

The construction of the Concept maps correspond to the basic principles in the meaningful learning (González and Novak, 1996), facilitates the capacity to learn to learn by means of the construction of own knowledge in the students, and it comes to be a highly useful tool whenever we have to represent the contents in a global and organised way, giving at the same time the possibility of its distribution through Internet. It consists on using them as cognitive tools in the nomenclature of Jonassen (2000) and, they are fundamentally used in order to widen, promote and reorganise the capacities of the students going beyond the limitations of the human mind.

The usage of the Concept maps is known as didactic resources: the uses that can be done are different and go from the usage of the lecturer as media to represent the information, to the creation of maps by the students as much individually as collaborative way. Therefore, we have tried to tackle the subject matter of the Concept maps from different perspectives: as a tool in hands of the students to organise the information about one concrete theme, as an evaluation tool for the teacher, as organiser in the design of materials for the learning and as a teaching-learning strategy.

Our main interest is based on the potentiality that presents as much the student's representation of the knowledge as share, contrast and organise a map created in a collaborative way. Moreover, the Concept maps are the suitable mechanism to create modules of independent contents (associated in our case to the map of each concept). Each map, by definition, expresses the knowledge about one specific context. A group of related maps can collect the content of one subject. These maps, obviously, will have links to maps with other subjects. However, this relation is not due to the sequence of the course but to the content. Each module of the subject becomes one independent unit and, at the same time integrated in the general subject (Flexible Education). The Concept map is used as a flexible tool to construct, organise, navigate, criticise and compare the knowledge.

### 2 The experience

This experience has been carried out in the subject 'Design and development of programmes of flexible and distance education' that belongs to a curricular plan of the Pedagogy Degree at the University of the Balearic Islands. It is about a subject that is given in an face-to-face modality although doing some work online through networked materials and tools. They use the knowledge based on the elaboration of Concept maps with respect to the students as a base for the creation of communication and learning atmosphere. We have used the Concept maps (Novak and Gowin, 1988) as strategies for the cognitive organisation. As well as the platform used in the course, it has been also used a software tool which allows the user the collaborative work<sup>1</sup> and others which provide the construction of Concept maps<sup>2</sup>, connecting concepts to each other through semantic links and complementing them through images, videos, pictures, graphics, texts, www pages, etc.

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<sup>1</sup> The tool work we use for the collaborative work is the BSCW (Basic Support for Collaborative Work).

<sup>2</sup> The tool chosen to design and represent the Concept maps were CmapTools (Developed by the team of the Institute for Human and Machine Cognition), free and versatile tool which can be very well adapted in the usage of this subject.

The students, besides constructing their Concept maps in order to show graphically their knowledge about the corresponding concept, collaborate digitally between them in the construction of their maps. They link them to the maps of the other students, publishing their model in the Internet, allowing the other students surf their web pages, and contributing to organise the knowledge about the subject.

The work, which we refer in our experience, consists on the whole group constructing the Concept map of the concepts related to the subject, which we will call COLLABORATIVE CONSTRUCTION of CONCEPT MAP about THE FLEXIBLE EDUCATION. They should construct the Concept map and associate it to the relevant material. Other students should examine and comment these maps, modifying them or adding new elements, creating alternative versions.

We understand that the Concept maps constitute a suitable mechanism for the creation of each independent module, when we represent the knowledge about each specific concept and when we provide a group of related maps, they can collect the content of the main subject: the flexible education.

In this way, the work on the one hand, constructing an individual map of each one of the main concepts of the subject –which will obviously be related to the kindred concepts – and, on the other hand, organising the map of all these concepts, which include such maps and relevant material of the subject. They will arrive to the last result by consensus through the cooperation between the members of the group. The work, which is based on the strategies of the collaborative work, composes a variety of activities from the students related with their research, selection, organisation, exchange, organisation of the concepts and their relations.

The experience was developed during five weeks (nov-dec, 2007), previously carrying out with the students in an introductory workshop about the creation of Concept maps and the use of the programme CmapTools. In the experience participated 32 students.

As figure 1 illustrates, the work consisted of two stages clearly distinguished:

- The first stage corresponded to the individual work, in which a concept was assigned to each student and should get information, locate the relevant material related with it (articles, web pages, etc), study it, so that he can elaborate his Concept map.
- The second stage corresponded to a tuning in common of all the studied concepts for each student. They should establish relations between the concepts, through a process of "negotiation" between all the members of the group, using different communication media provided the students (own of the platform Moodle and those of software for collaborative work). This stage concluded with the discussion of the map that has been configured, shaping new adjustments and modifications.

**2118**

**COLABORATIVE CONSTRUCTION OF CONCEPT MAP about FLEXIBLE EDUCATION**

**Individual and collaborative work<sup>1</sup>**

**Submit date: November 13, 2007**

The task consist to build, between the group class, a concept map with concepts related to the subject and it will called **COLABORATIVE CONSTRUCTION OF CONCEPT MAP about FLEXIBLE EDUCATION**. You must build the conceptual map and associate it relevant material. The other students should review and comment on these maps, modifying or adding elements, creating alternative versions.

According to the premises of collaborative learning, the task must be developed in a collective non-competitive context, in which all members of the group contribute to the learning of all, cooperating in the construction of knowledge. The task will be achieved through the direct activity of each member individually group and through the consensus between members of the group.

Procedure:

1. - a concept will be distributed to each student. You must study it and locate relevant material (images, web sites, documents...).
2. - you must seek concepts related to yours and establish negotiation with the other student who is working with that concept or concepts to establish relations among them. For this stage will be used BSCW sharing workspaces (folders) with those colleagues who work related concepts.
3. - you should put in the Collaborative Map (Located in the folder: 2118 in IHMC Public Cmaps, 3 Server) each of the concepts with their links and relevant materials (resources).
4. - the map will be checked in each stages and commented, suggesting changes, new elements, etc.... These proposals, comments, etc.... will be carried out in the discussion list associated with the Collaborative Map.

Figure 1. Instructions to carry out the activity.

A concept of this relation of main concepts was assigned to each student and should get information, locate the relevant material related with it (articles, web pages, etc), study it, and elaborate a Concept map about. Each of the individual maps created by the students were put in a common Server (figure 2).

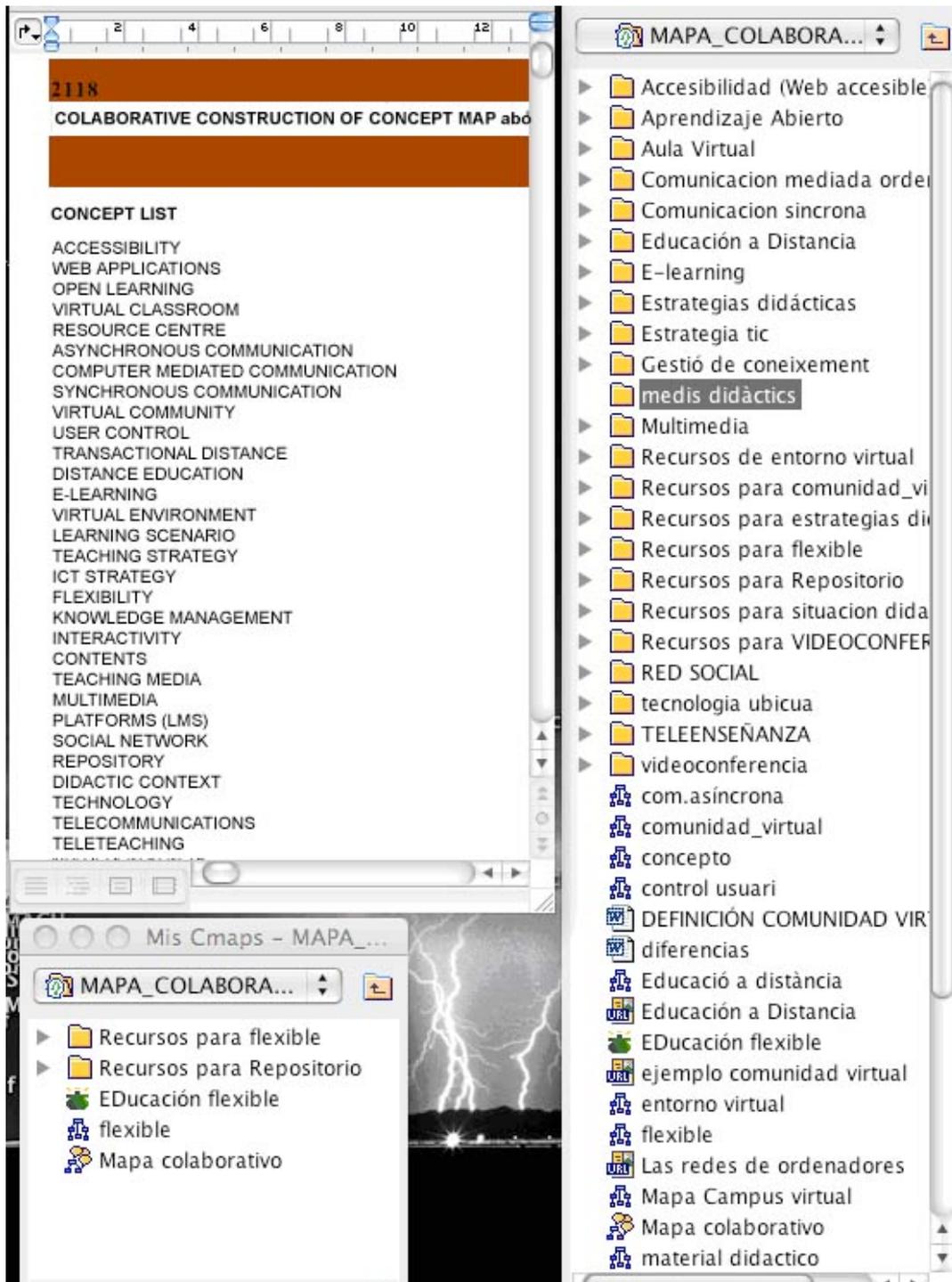


Figure 2.- The relation of main concepts assigned, and the initial and final folder of the project in the IHMC CmapServer.

Joint to the main concepts of the subject, a first map was provided to the students (Figure 3). They had to construct the collective map on it. The students had to construct the collective map on this by means of a process of negotiation of the connections between concepts.

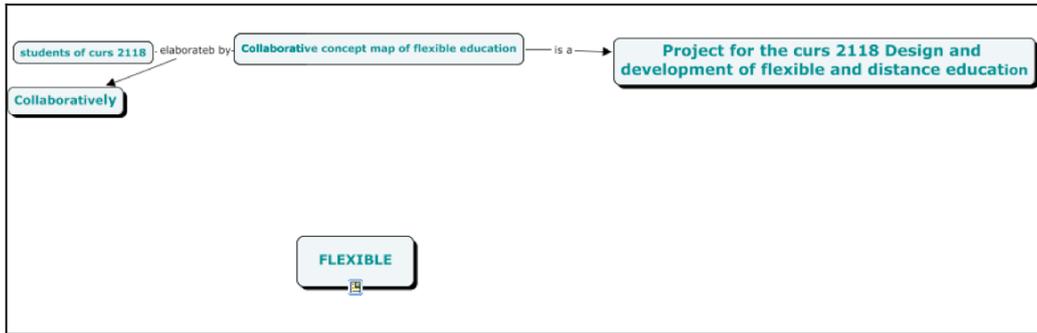


Figure 3. Initial map provided to the students.

The concept map about Flexible Education was constructed and reconstructed by the students on a process of collaborative learning where it was required the direct activity of each of the members of the group.

The process was developed following one double strategy of instruction: Concept map and collaborative learning. The use of the network in the project, has promoted so much the knowledge in itself, like the capacity to learn to learn.

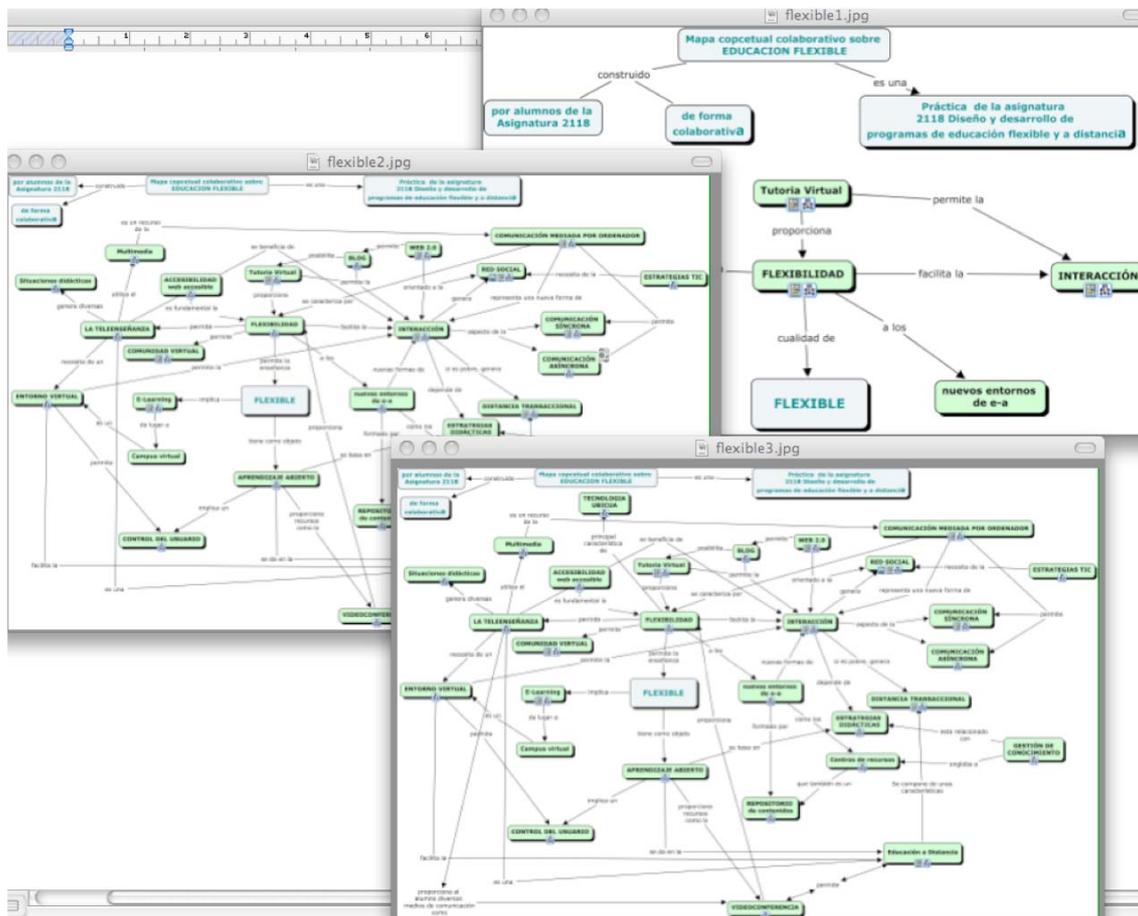


Figure 4. Evolution in the process of elaboration of the collective map (Week 1 to 4).

The elaboration of the concept map allows to organize the new information and to connect it with the already existing one. It was a step-by-step process. The final structure of the Concept map and the interconnection of the maps of each one of the concepts were been from a process of discussion, negotiation, exchange and reflection on the own work and the contributions of the others. The maps was linked between them, forming the representation of the group's knowledge (Figure 5).



The lack of communication between the members of the group caused that the definitive Concept map did not present a coherent and clear structure. The collective map was not sufficient to discuss, depurate and organise, and consequently it would not be definitive and could include concepts or connections erroneous. In the present situation of the map, their correction and discussion can serve as point of beginning for a future course.

### 3 Conclusions

In this experience, the Concept map and its elaboration through the suitable software is considered, as it is done it has developed taking as departure Jonassen (2000) a cognitive or mental tool. When it is used to develop abilities of the critic thought, which for this author consist on a group of abilities that cover the critic thought as such (analysis, evaluation and connection) the creative thought (elaborate, synthesise and imagine) and the complex thought (design, solve problems and take decisions).

From the developed experience, we can extract some reflections, although never definitive.

Own experience relation:

- In general, the students have had difficulties for the collaborative learning, had mainly to the lack of experience in this type of activity, and it was necessary at the beginning of the second stage, remember them what the work supposes in the group and its fulfilment of one of the project in common (share knowledge, strategies of communication, exchange of information,...)
- The list of discussion associated to the Concept map was not used at all. In its place of negotiation, the exchange, etc., it was developed in the forum of the course on MOODLE of the virtual environment and also face-to-face exchanges.
- The proposed term for the activity was not sufficient to discuss, depurate and organise the collective map, so we can say that the final presented work has not been ripened enough, and consequently it would not be definitive.
- The main problem, associated to the collaborative learning, was the insufficiency or deficiency of communication between the members of the group, which caused that the definitive Concept map did not have a coherent and clear structure for its later use like didactic element.

Related to the learning

- The students have used the tool to represent and express the models of each concept and to interrelate each of the Concept maps in a collective map, allowing the constructive critic and promoting the collaboration between them.
- Having to organise the resources through the Concept maps, the students must show a good domain on the subject (in this case the assigned concept), they contribute to improve the process of selection, assimilation, organisation and expression of the elements of the Internet to integrate them in their own material, having to dedicate time to the understanding of the concept.
- The mood of the maps to organise the information provide that the groups of the students should collaborate in the creation of the complex models, in which contents can be added with the time. The maps are easily linked between them, forming the representation of the group's knowledge. This facility complements the atmosphere of the collaboration on the construction of the Concept maps.
- The student constructs and reconstructs the knowledge supporting it on the process of collaborative learning where it is required the direct activity of each of the members of the group. The 'active learning' is developed in a non-competitive group, in which all the members of the group contribute to the learning of the rest, collaborating on the construction of the knowledge.

- This activity, in addition has allowed the students to learn to develop new abilities of communication supported by the new technologies and the handling of network tools for the collaborative work.
- The use of Concept maps as learning strategy foments the metacognitive reflection of the student on their own process of learning, helping him to regulate and to control this learning. Therefore, the collaborative construction of the Concept map foments, this way, a joint reflection and the coresponsibility of the final result.
- These methodologic strategies have cultivated in the students as much "the know that", like "the knowledge how", through the use of Internet as tool of research and the applications to collaborative work by means of Concept maps.

In relation to the product:

- The elaborated collective map, although we should consider that it is not definitive, constitutes a valuable resource for the following course. It will allow us to advance it, complete it, discuss it and improve it.
- When specifying how the different concepts of the subject are related, have contributed – and will contribute – to filter and depurate the thought when contributing to the comprehension of the new concepts and, in consequence, to integrate new knowledge.
- Just as the structure of the collective map is presented and the different maps of each of the concepts, as far as it concerns the presence of them as the consistency of the links, they contribute to identify Concept mistakes, errors on comprehension, etc.

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