

Concept maps as tool for negotiation of meanings in the development of DE courses

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Abstract

This article rescues basic concepts regarding concept maps and turns to this tool for the planning, development and execution of distance education (DE) courses.

Concept maps facilitate the description of content of a course because they express in a clear and flexible way the interdependencies, scope and integration between concepts. There are many studies regarding the ways concept maps can be useful for teachers and students, mostly, for students who have in its use, the opportunity to represent dynamically the cognitive structure

of their learning. However, a not so clear application for concept maps is related to the called “negotiation of meanings”. We have developed the idea that concept maps can constitute a common knowledge basis for the negotiation of meanings between teams that plan, elaborate and execute DE courses.

Key-words: concept maps, tools for DE, design.

1 – Introduction

The debate over instructional *design* relates to the use of tools to manage and integrate digital resources and offer support for teaching and learning.

The most interesting tools are not necessarily new or developed specifically for the educational area. After all, the information systems area has a long history in the development of tools for data modeling.

The development process of an information system begins with the “extraction of requirements”, in which, through interviews, the developer of the system extracts from the clients words a safer initial schematic representation of what needs to be implemented (SOMMERVILLE, 2003).

We know that the complexity of an *online* DE course demands a planning that holds, in most cases, similar challenge: transform the pedagogical expectations of a group of people in application material and strategies to be implemented by other people. The transposition is not simple; the teams depend on clear and efficient communication. The representation and communication power of concept maps fits in this context, as we will see ahead.

2 – A review on concept maps

Concept maps are tools that assist in the organization and representation of knowledge (NOVAK, 1977). They are based on the theory of meaningful learning, developed by AUSUBEL (1968 apud MOREIRA, 2006). In meaningful learning, the subject learns a new concept as he organizes and connects new ideas to a previous basis of ideas that he already has, transforming his cognitive structure. This way, the most important isolated factor for learning is that which the learner already knows. In a different way, when the

new learning doesn't foresee relation between concepts, according to Ausubel, we are before what he himself called "mechanical learning".

The common graphic representation of concept maps occurs through a two-dimensional hierarchical structure, a diagram that refers to an inverted tree.

The position of a concept in the diagram is related to its scope and integration with other concepts, establishing relations of subordination or superordination.

By looking at a concept map, we notice that, in its superior portion, the concepts tend to be broader and more integrating, while in the inferior portion, we tend to find concepts that are little inclusive, such as elements that exemplify the more general concepts or even the exercises for verification of learning.

According to a common idea on concept maps, any given concept is an integrating part of a semantic unit called proposition, which corresponds to two concepts bound by one word, short text or even a mathematical formula.

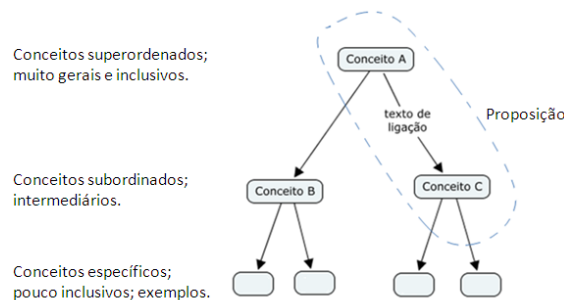


Figure 1: A model for concept mapping according to Ausubel's theory.

Adapted by MOREIRA(2006).

In the learning or representation process, one may run through or complete a map from bottom up or top down, which doesn't mean that, when choosing a direction, the interpretant needs to run through the map in its totality, on the contrary, he may, in the course of going up, go down, or vice versa. This movement modifies the map itself according to the knowledge of the student, in AUSUBEL's point of view (1968 apud MOREIRA, 2006).

We observe that the use of the concept map techniques allows the student to represent the cognitive structure regarding a given knowledge, while modifications in the map translate the transformation of this learning.

As, to Ausubel, the new learning depends fundamentally on what the subject already knows, the preexisting map must grow according to new attachments of

concepts, which occurs under the effects of concept integration or differentiation, among others (MOREIRA, 2006).

As we go down the structure, as we have already mentioned, there is a progressive differentiation of concepts that are related to the subordinate learning, when going up the structure, there is an integrative reconciliation of concepts, related to superordinate learning. These processes are described in detail in the model of meaningful learning, proposed by AUSUBEL (1968 apud MOREIRA, 2006).

3 – Concept map as a rigid structure

To exemplify the use of concept mapping in DE courses, let's take the model called *set instructional design*, which clearly separates the phases of conception (*design*) and execution (implementation).

In other words, the planning of these two components of the instructional design occur before the action of learning, through the evaluation of necessities of learning, the target group and the project restrictions. In this case, the material tends to be highly structured, for the educational artifacts are set and don't suffer modification from feedback generated by the students. (FILATRO, 2008).

The concept mapping shows through the structuring of a kind of "general form for any course" which obeys, for instance, to the following structure:

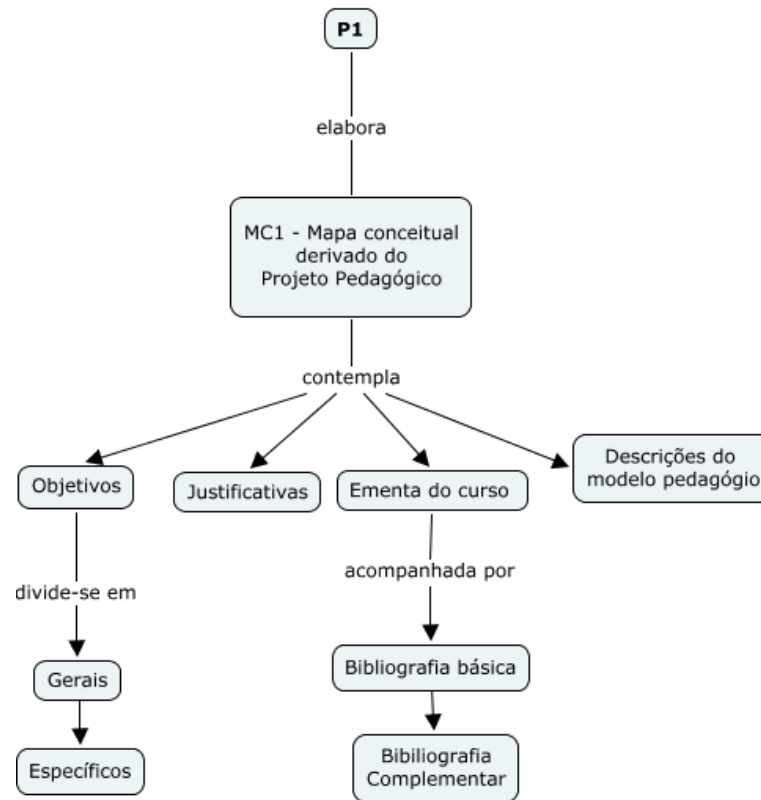


Figure 2: Generic concept map as base structure for the project of a course.

To exemplify, in the context of a set *design*, we started from the syllabus of a real subject in *lato sensu* postgraduate courses, Knowledge Management, and its possible concept mapping, as follows:

Syllabus for a Knowledge Management course:

Definitions for management of knowledge; forms of knowledge; knowledge creation model; “Ba” environment; knowledge conversion processes: socialization, externalization, combination and internalization; barriers and favoring factors for knowledge management; favoring conditions; knowledge management tools: practice communities, best practice **data**, organizational memory.

Taking the syllabus as basis, without, however, being limited to it, it is possible to draw the concept map:

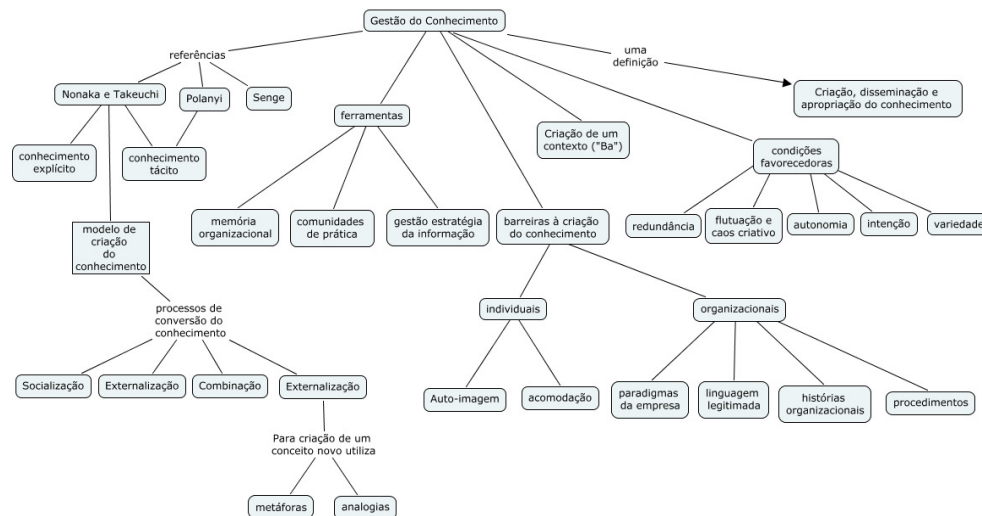


Figure 3: A concept map for a Knowledge Management course.

In this apparently rigid concept map, which immediately formalizes the structure of the syllabus of a course that must be followed in full, it's possible to incorporate examples of the studied concepts, complementary readings, relevant links, classroom discussion summaries, study cases and exercises, among other possibilities. This way, the concept map will be attached to new elements and its initially rigid structure will acquire, with use, a more adaptable conformity, flexible and subjective.

The professor may begin the course with the presentation of the concept map of the Knowledge Management, show the materials and main ideas which will later be explored in depth. In the course of classes, maybe in the beginning of every new class, he may revisit the map with the students, deepening its exposure, highlighting the concepts in focus, its relations, interdependencies and revisiting important points.

The set concept map may also be the main screen clicky of the environment of an *online* DE course. From the student's point of view, this facilitates the navigation through materials and content as occurs, for instance, on a *webpage* when we use a "site map".

Knowledge Management is a post graduation subject. Imagine it is in the curricular matrix of different specialization courses. Although the syllabus is identical, the focus of the subject for a Business Management course is reasonably different from that given to a People Management course, especially in the study cases and activities. Therefore:

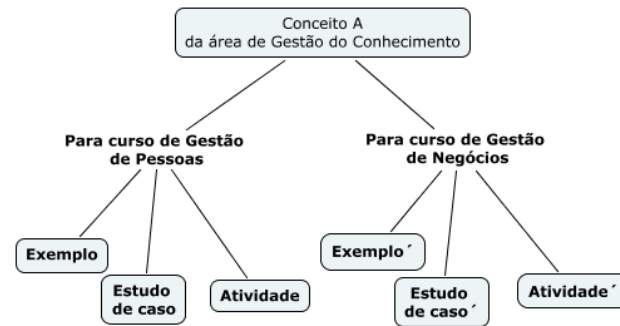


Figure 4: Concept map with inferior layer that represents additions made by the professor in the original map, according to application context and his working.

4 – Concept Map with interaction mechanism

According to LITTO (2010), the conventional strategies of preparation of a DE course demand a multidisciplinary team counting with a course manager, one or more academic specialists on the subject; one specialist in media; a sound and video producer; a graphic designer; a librarian; a software programmer and a head tutor to supervise the tutors who give support to students.

Grouping part of these elements in a concept map and imagining that P1 proposes the course, that P2 executes the curriculum, that P3 prepares the materials and that P4 represents the action of the tutors in the virtual environment, we have:

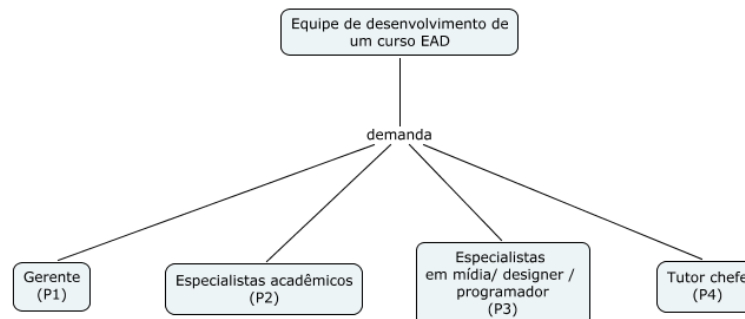


Figure 5: Concept Map with team of developers, based on LITTO (2010).

At first, although we have concept maps of pedagogical projects and defined syllabus, we only have a vague idea of the ways through which the production of instructional materials, environments and strategies will be developed and it would be quite utopian to clearly and definitely trace the paths for this preparation, defining all the inputs and outputs between teams, from P1

to P4. We will study a few possibilities of interaction between P1, P2, P3 and P4 through concept maps.

We present these interactions in the following picture (Figure 6), in which the concept map 1 (MC_1) represents the expectations of P1 in relation to the course, the concept map 2 (MC_2) represents the negotiation between P1 and P2, the concept map 3 (MC_3) represents the negotiation between P1, P2 and P3 and therefore, successively:

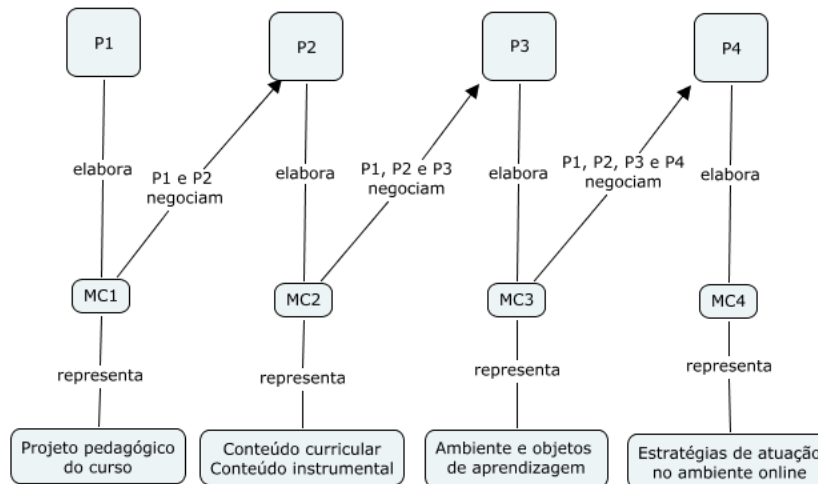


Figure 6: Concept map that represents sequential negotiations of meanings between the actors responsible for a course. Each MC_i represents a concept map.

Notice, in figure 6, that P1 will develop the first concept map (MC_1) defining a detailing level that refers to the called pedagogical Project of the course, as we've seen in Figure 2. Instead of presenting this pedagogical project through a text, he will resort to the structure of the concept map which details objectives of the course, skills, expected competences, target group, characteristics of the pedagogical model, etc.

Team P2 will elaborate, respecting the maps represented by figures 2 and 4, in a negotiation with P1 the second map (MC_2) containing the details of the contents, support materials and evaluation activities that are desired to be produced by P3. The referred negotiation of meanings will happen through permutation of propositions between concept maps of P1 and P2 and in the additional explanations that the maps will demand. However, we haven't yet concluded the elaboration of our hypothetical DE course. We know of the difficulties which will be faced by P3 when developing the material foreseen in MC_2 .

At this point of the process, we propose the occurrence of a new negotiation of meanings through concept maps. The P3 team will carefully study the concept maps elaborated and negotiated by P1 and P2 and elaborate its own concept map MC₃ also with negotiation, as long as it is anchored to the concept maps that precede it and justify it.

Following the same steps, team P4 will be based on a concept map, also negotiated through derivations of previous concept maps, in order to explicit how the acting of the tutors in the virtual learning environment will happen.

In the figure below, we gathered the concept maps and the connections between them, giving an overall notion of totality and movement:

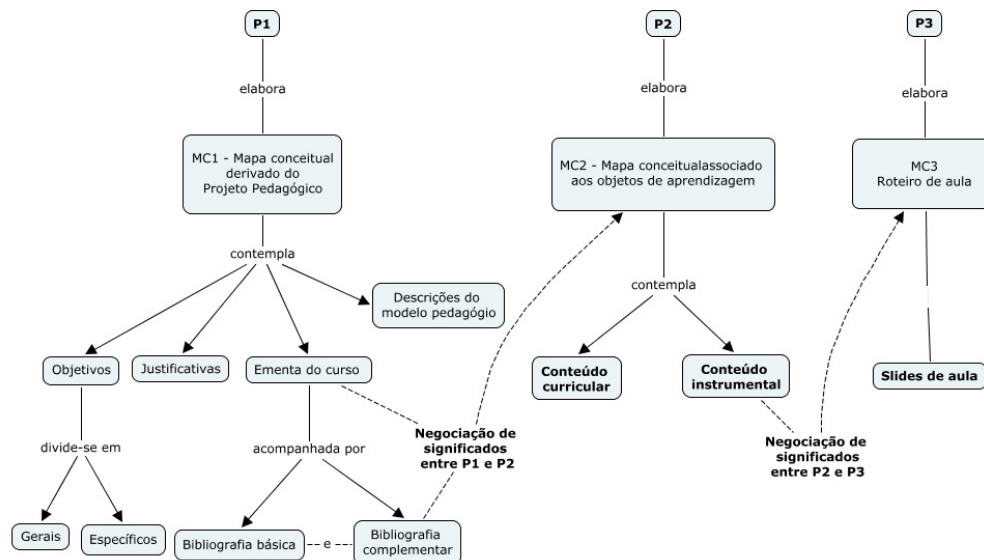


Figure 7: Possible concept maps with inputs and outputs and negotiation of meanings between P1, P2 and P3.

The use of concept maps for a DE course recovers the idea of an incremental development, for the initial specifications although clear, are not immutable. Each step in the project takes base on the production of concept maps that are modified along the cycle of development of the elaboration of the course, allowing the rigidity of the set instructional design to acquire a certain flexibility from the point of view of the work of the teams responsible for the project.

This way, the final result tends not to distance a lot from the expectations of the teams involved, because there is an active participation of

everyone in the construction of a base of shared knowledge on the project, represented by final concept maps, resultant from negotiations.

The group of concept maps along the Project can be seen as one big concept map of the course of, reaffirming the characteristics described in item 2 of this article, foreseen by NOVAK (1997) and inspired by AUSUBEL (1968 *apud* MOREIRA, 2006).

4 – Discussion and final comments

We know that concept maps may work as a curriculum analysis instrument, teaching resource, learning evaluation means, self learning orientation, analysis of the logical structure of a course, among other possibilities (MOREIRA E BUCHWEITZ, 1993).

In the universe of DE, in practical terms, we have observed that many courses spring from a compilation of book indexes and are sujeitos a internal organization problems, inconsistent content or even plagiarism.

There is a lack of construction methodologies, but there is a strong interest in the development and adoption of advanced tools, mostly because DE is moving towards working in the scale of production line (MOORE, 2008) having in the Internet its most promising *locus*.

In this article, we defend that concept maps serve to negotiate meaning between project development teams for DE courses. For this, we started out from a more closed instructional design model with clear distinction between the conception and planning of materials of a course, its development and its preparation for application and saw that the technique of concept maps interferes in this rigidity offering an opportunity of experimentation of course modeling instruments.

The adequation of concept maps for the representation of pedagogical projects presented deserves refining and maybe demands other complementary graphic representations that will be able to be developed in future articles.

Another possibility to be investigated is that if concept maps, or any other representation associated to them, can represent by itself an evaluation instrument of the work of a student, of the professor or even of the efficacy that the specificity that DE courses demand.

We believe the virtual environments of learning are also big laboratories of learning not only for the student bound to a specific course, but, above all, to the community that plans, develops and executes projects of courses in new environments.

¹ Subject administered by one of the authors in several post graduation courses

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Notas:

1 – In this article we used the CMAP TOOLS software for the construction of the concept maps. Available on the Internet em: <http://cmap.coginst.uwf.edu/> Visited on: 15/07/2010.
