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# A COMMUNITY OF PRACTICE ON CONCEPT MAPPING

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**Abstract.** This paper describes a community of practice on concept mapping that has been established in Turin, Italy by DSCHOLA. The main purpose of the community is to differentiate the various forms of knowledge representation from each other and to recover the general function of the knowledge representation connected with the learning environment. As a starting point, the community defined and shared a set of founding documents, which includes the Manifesto and the Documentation template. The community aims at structuring and organizing selective criteria in order to produce and make available documentations dealing with good practices on concept mapping.

## 1 Introduction

The objective of this paper is to introduce map.dschola.it, a community of practice on concept mapping in education. We have an interest in both practical and theoretical issues and are open for collaboration with anyone concerned with the subject.

The initiative was born within a project (see: http://www.dschola.it/en/project/project.php) that, over the last years, has coordinated both theoretical and practical initiatives concerned with ICT in education. It brings together all the efforts made over this period in order to emphasize the debate over the educational use of concept mapping in the school environment as a whole. All these initiatives have been accomplished through the organization of training courses and the production of subject-related material which is available on the Internet.

Map.dschola.it has been active since March 22, 2004, and has already collected a large set of materials and experiences, and a large number teachers from different types of schools have joined.

## 2 Community objectives

The main purpose of our Community is to discover, to improve, to define and spread best practices in the use of knowledge representation models in school.

We consider knowledge representation to encompass a comprehensive class of models, based mainly on concept nodes: *"Rappresentazioni della Conoscenza"*, KRs in Italian, but we'll refer them here as KRs. KRs include, among others, Concept Maps, Mind Maps, Block Diagrams, and Semantic Networks, Schemes. Within these, concept mapping carries particular relevance.

The map.dschola.it Community:

1. Acquires and recommends new projects and experiences related to Knowledge Representation Models, aimed to document the general function of these representations connected with the learning environment.

2. Defines these general shared criteria to differentiate and build up the KRs, in accordance to the different educational needs.

3. Modifies and adjusts new experiences and provides feedback to satisfy the contributors' counselling needs.

4. Selects samples of KRs to be shared through the Web site. The contributors are then invited to join the community as members and to participate in the general discussions.

5. Supplies tools and resources (guidelines to submit documents, information regarding software, reports and links to websites on related to KRs, and directions on how to use our communication services).

6. Searches for internal criteria for cooperative discussion, in order to define the community objectives and the organization strategies.

As stated in the second objective, one of the purposes of our community is to differentiate the forms of Knowledge Representation from each other. Among these, the community has particular interest in the differences between Concept maps and Mind maps are separated by a sharp edge. The community has found that the distinctions in structure and objectives between these two techniques are very hard to spread amongst the teacher community. These distinctions represent a necessary premise for the key objective 1.

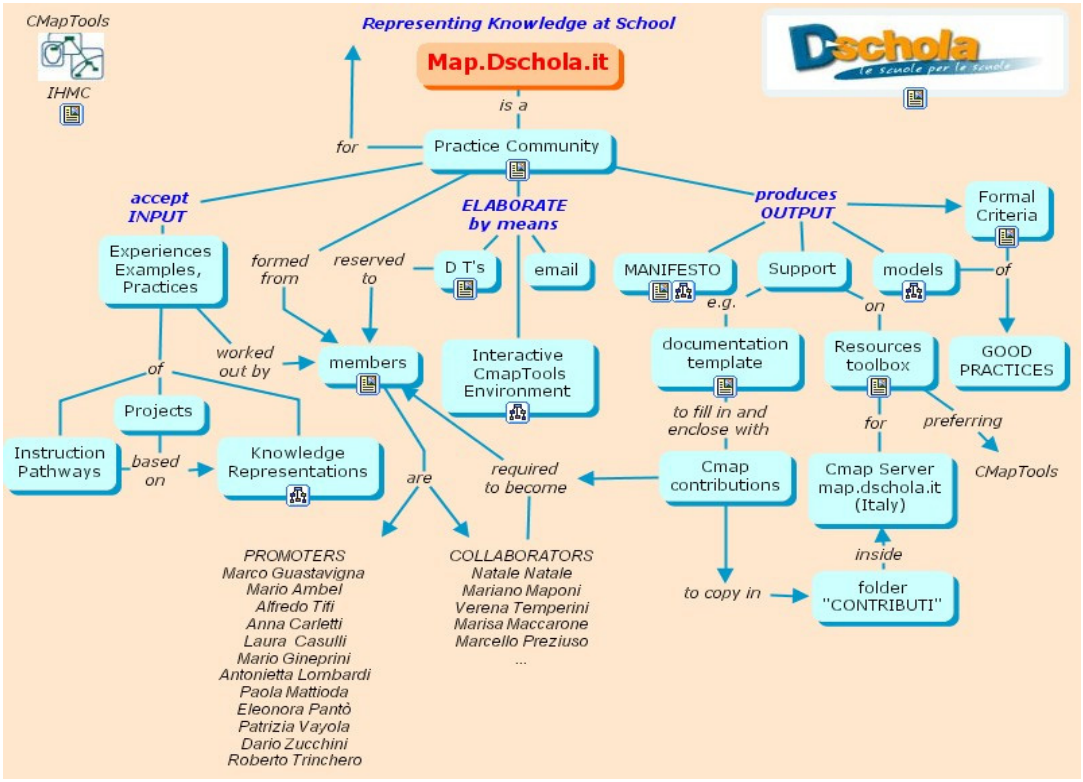


**Figure 1**. Home page of our Community as a flow chart – Cmap hybrid

## 3 Group members

The promoters of our community come from all levels of Italian public schools: from primary (or elementary) schools to universities, and most of them have previous experiences with concept mapping in classrooms and in training activities.

Many of the community members had previously met in collaborative frameworks and strengthened their professional bond sharing the same interest for concept mapping and related topics, and it was this collaboration that lead to the establishment of the community of practice. The members of the community come from different regions of the country, and through personal acquaintances and promotion, the list of team members was enriched by contributors to up to 20 members.

## 4 Community motivations and main remark frameworks

The community began by preparing and sharing some founding documents: the Manifesto, and the Documentation Template to submitted concept maps.

Our community is discussing problems emerging from the evidences of meaningful experiences proposed by contributors. Through these examples we achieve a better awareness of the function of basic principles, thus improving the very criteria for concept mapping.

*4.1 KRs*

In order to obtain a profitable use of the KRs in school, it is necessary to examine the existing relationships among concept mapping, the students' current knowledge, the methodology to integrate concept mapping in the instructional framework, and finally the exploitation of this methodology in evaluating and supporting the interdisciplinary character.

The Manifesto (see Fig. 2) highlights the research activity already operative within the group. The early results, described in the next section, are supported by our efforts towards:

- Defining the different map typologies, with particular reference to the very changeable concept mapping context. The major interest is focusing on the so-called *structural maps*. These maps express the subjective and in-progress component of the cognitive structure of the students, only when they interact with an "expert" or validated objective knowledge source, as a map achieved from a text;

- Conceptualizing or validating propaedeutical activities, oriented towards the acquisition of concept mapping as a working tool. The sharing, the criticism and the spread of the large number of evaluation criteria concerning Concept Mapping products and CM itself as a process;

- Critical discussion concerning the use of the inclusion principle, introduced by Novak as a natural consequence of the principle asserting that "... meaningful learning proceeds most easily when new concepts or concept meanings are subsumed under broader, more inclusive concepts, …" (Novak & Gowin, 1984, p. 15.). One of our Discussion Threads is focusing exactly on this topic;

- The discussion on the *Focus Question* cognitive function, included in CmapTools (Cañas et al., 2004) (one more reason to prefer this tool), tightly related with the frame concept specification (the one placed at the top of the cmap) and therefore with the previous problem;

- The issue concerning the choice and added-value of software for constructing and sharing conceptual maps (as opposed to using paper and pencil CM). Our community strongly emphasizes the choice of the IHMC CmapTools software for concept and mind maps. We are moreover "open eyed" towards other potentially more suitable software, for other forms of knowledge representations and/or for primary school students.

All the above mentioned researches and initiatives are aimed to developing models that help the teacher take advantage of concept mapping during classes.

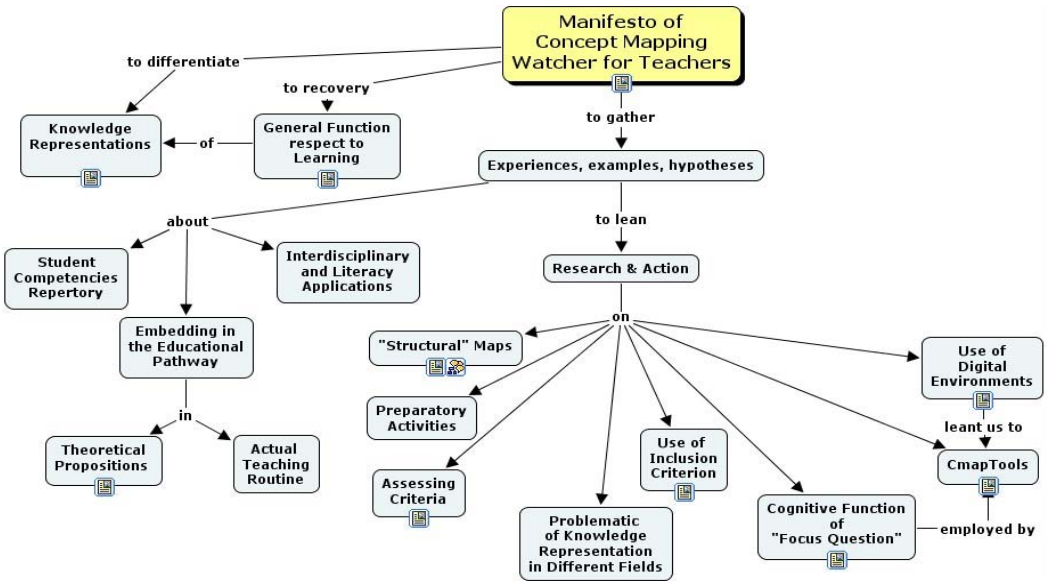


**Figure 2**. Our Manifesto in cmap format

## 5 First results

Our website http://map.dschola.it has been contacted over 6000 times, since it began operating. The same server hosts also a CmapServer (Cañas, Hill, Granados, Pérez, & Pérez, 2003) (map.dschola.it (Italy)) collecting about sixty maps and schemas, mostly from associated contributors. All community members initially had some difficulties in classifying, defining, studying and understanding these works, and to regulate and manage the process of collaboration and comparison of ideas to reach agreement and syntheses.

To carry out the sixth objective described above, we have started using email services and recently we have moved to discussion threads, both public and private. We are testing CmapTools collaboration tools for closer interactive work among members, in synchronous and asynchronous modalities.

These adaptation changes are proper for **a *slow*** reflection process of the community as a whole, where the focus is not on the number of contributions gathered, but on how much we gain in awareness of the logical and operative models actually pursued in the published works, their teaching contexts, elaboration modes and actual learning relapses.

We are realizing that concept mapping requires a great cognitive effort, wide theoretical interpretations and constant critical comparisons. The learning process does not consist of an empiric accumulation. It consists indeed of a dynamic and demanding relationship between theory and praxis.

If, on one hand there is a lack of direction and dissemination, on the other hand there is a logical-operating engineered reference model, along with both a large number of experiences apparently implementing (or simplifying) that model, and some experiences critically implementing it.

As far as the evaluation is concerned, we are aware that maps are - above all - an excellent mediation instrument in the educational framework, where the teacher can direct the pupils towards a continuous process of "revision" of the same map, thus being informed on its pupils' pre-competences.

If we assume that concept mapping is a proper language, it is clear that it has a proper "grammar". In order to separate the pedagogical dialogue described above from interferences, it is necessary to concentrate early on the concept mapping syntax, making sure that strategic difficulties – which occur during the proposition coding – don't hide the student's real misconceptions and lack of acquaintances.

For this reason it is necessary both to accurately differentiate propaedeutic activities from those benefiting from the methodology, and develop separate tested schedules, according to our needs. However, strict syntactic rules for concept mapping could cause the same interferences in mediation action. For instance, as far as the inclusion criterion is concerned, Novak underlines how "For different learning segments, the superordinate-subordinate relationships of concepts will change, and we therefore sometimes use the analogy of a rubber sheet for a concept map in which almost any concept can be 'lifted up' to the superordinate position, but still retain a meaningful propositional relationship with other concepts on the map" (Novak & Gowin, ibid. p 16-17). Furthermore, rules state that names and relative pronouns in the linking phrases mustn't be used and many names and attributes cannot be combined in a single conceptual node.

Despite the fact that the above mentioned rules can be regarded as important, they would never prevail over the aim of constructing and gathering new meanings in the truth description.

As far as the Focus Question (FQ) is concerned, we have already specifically defined several ideas and formal criteria.

Firstly, we have gained awareness that the main concept of the FQ itself does not need to coincide with the upper concept on the map, while that map will comply with the inclusion criterion.

In other words, in order to make a survey on a specific issue (the FQ), sometimes it can be suitable to insert the group of necessary concepts in a wider conceptual structure, distinguished from other more knowledge-inclusive related concepts, rather than "pulling up" the focus question-related concepts, by using the inclusion relations in an improper way.

This option will also help the students gain awareness that the knowledge is not made of bricks, but of communicating "organs" linked by "vessels".

Finally, in order to support the reading of concept maps reading (only few people would locate the FQ of a map) we have decided to describe the same Focus Question in an isolated text square. The text square will also account for the author of the map and the educational process beyond it all.

## 6 Expectations

We have a set of expectations from the community. Among them, that improved technological competences of Italian teachers and improved schools' technological resources will promote the use of concept mapping within the educational context. The effectiveness of this methodology will rely on shared glossary and software, and on educational methods accepted by all educational departments. The sharing of flexible syntax rules for conceptual mapping, and the assessment models (being able to distinguish when our students acquire knowledge in a meaningful way) should also support this methodology.

Our community welcomes new people and supports new institutions, providing "know how" and warranties for good practices in applications on concept mapping.

To give our effort a European dimension of our, we expect to have an English version of our website ready by September 2004.

## 7 Acknowledgements

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