

Collaborative Discovering of Key Ideas in Knowledge Building

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ABSTRACT

In this paper, we describe our work-in-progress for developing Collaborative Discovering Tool (CoDi tool) that is meant for enhancing knowledge building discourse in the Future Learning Environment 2 (Fle2) system. Knowledge building discourse in the Fle2 type of systems usually leads to gradual accumulation of notes. We have found that users experience difficulties to get an overall picture of the knowledge produced and synthesize its advancement. By providing means for the participants to highlight key ideas, that they find particularly useful, the CoDi tool was designed to facilitate collective management of knowledge and inquiry and provide various visual representations of the database. We report results of a pilot experiment carried out with the CoDi prototype that appears to be a promising tool. However there are certain open questions concerning what are the social and pedagogical effects of highlighting ideas in different educational setting, how highlighting should be organized so that it would provide strongest support of knowledge advancement, and whether the results should always be shared not only by tutors but also by students. Regardless of the challenges, the development of the CoDi tool appears to open up an interesting line of inquiry that we would like to share with the CSCL community.

Keywords: Knowledge building environments, shared understanding, social awareness, design of CSCL systems, information design

KNOWLEDGE BUILDING WITH THE FLE2 SYSTEM

The main aim of computer supported collaborative learning (CSCL) environments is to provide students with advanced computer tools for knowledge production taking place in an interaction between the users (Scardamalia & Bereiter, 1993; 1994). In most of the CSCL applications (e.g. CSILE, CoNotes, Belvedere, Knowledge Forum) the knowledge production happens in a shared working space where students may carry out discussion by writing their notes. The Future Learning Environment 2 (Fle2), is a CSCL environment designed to support collaborative knowledge building and progressive inquiry (<http://fle2.uiah.fi>, see Leinonen, Raami, Mielonen, Hakkarainen, Muukkonen, 1999). The idea of progressive inquiry is to support a research-like study process, where the students themselves generate research problems, make hypothesis and search explanatory scientific information as a group (Hakkarainen, 1998; Hakkarainen & Sintonen, in press; Muukkonen, Hakkarainen, & Lakkala, 1999; Muukkonen, Lakkala, & Hakkarainen, 2001).

The current version of the Fle2's Knowledge Building (KB) module functions as a shared space for asynchronies dialogue and conferencing. The discussion is constructed around *Course Contexts* set by the tutor and all notes posted to the database are labeled with a *Category of Inquiry* (Problem, Working Theory, Deepening Knowledge, Comment, Meta-comment, Summary and Help) reflecting a step in process. Currently the knowledge building discussion of the group can be viewed as a thread or as a list of notes sorted by writer or by category of inquiry (Leinonen 2000). Testing of the Fle2 KB has shown the following pedagogical usability problems: (1) When the amount of the KB notes increases rapidly they are difficult to find and locate (knowledge-management challenge), (2) Other participants' activities are difficult to match (awareness challenge) and (3) the process of progressive inquiry appears for the students more as a linear process than a deepening circle (deepening-inquiry challenge).

An essential aspect of the Fle2's KB is that all knowledge artifacts (notes) are saved to the database. This way the Fle2 KB becomes an organizational memory of the group of learners. Effective organizational memory should be able to answer such questions as "Why did we do this?" and "How did such and such come to be the case?" (Conklin 1993). In the Fle2's KB a crucial problem is that when the amount of notes grows high investigating back to the history of the knowledge building process and making overall impression of the database becomes very difficult.

The study was focused on developing a new tool to solve the problems stated above related to the handling of information flows in a knowledge-building environment, making students more aware of the nature of the progressive inquiry process and aiming to increase participants awareness of their co-students thinking and the groups collective ideas.

CODI PROTOTYPE

The Collaborative Discovering of Ideas tool (CoDi tool) prototype was made for highlighting relevant material in the knowledge building notes. The students and tutor are able to review their individual highlights as well as group's highlights.

Figure 1 describes a user scenario of the CoDi tool. At first the students are working with the KB database according to the model of progressive inquiry by adding their own study problems, theories, and deepening knowledge in to the KB database. In some stage the tutor is introducing the CoDi tool for the students and asking them to highlight the most important ideas (paragraphs) from the notes in the KB database. After this the data related to the highlighting and the notes (writer, data, category of inquiry, link) are offered as alternative views of the content of the database. These visualizations can then be used as a starting point for further discourse.

The experiment with the CoDi tool was carried out with students taking part in the study project on Design for CSCW/L carried out as part of the Future Learning Environment study project organized by the UIAH Media Lab at the University of Art and Design in autumn 2000. The study project lasted four months. More detailed description of the course and the class can be found from the <http://www.euro-cscl.org> database.

CONCLUSIONS

The main idea of the CoDi tool is that it offers the user the opportunity to select an interface that he or she is most comfortable (thread, list, map, etc. views). The CoDi tool gives an interesting possibility to combine and display many different levels of data at one glance. Users may take different views to the content of the KB database and use these views for browsing the database as well. The new views provided by the CoDi tool are: (1) *The KB Dartboard view* represents spatial relationships between notes values (calculated from the highlightings), (2) *The KB Social Blocks view* provides social network analyses of the groups activities, and (3) *The Key Idea Cluster views* of each note showing what paragraphs each participant has highlight (see Figure 1). The purpose of these views is to help participants to collectively assess progress of their knowledge building inquiry and navigate across the database with the help of the key ideas.

The prototype described in this paper offers interesting possibilities for students and teachers to define group's key questions and compare them with individual interests. It may also function as a learning process negotiation tool helping to orient and coordinate individual activity in the group context, raising discussions about other people's opinions, encouraging collaboration and possibly supporting reflection of learning and knowledge-building processes. The tool also helps to solve the problem concerning the representation of the KB-discussion, which should be more spiral in nature as indicated by the progressive inquiry model (see Hakkarainen, 1998; Muukkonen et. al., 1999). The solution proposed in this paper appears to be promising in terms of solving the problem of growing number of the knowledge-building notes.

There are still many open questions concerning pedagogical effects of the CoDi tool. We believe, however, that this kind of a tool or framework for tools would offer good possibilities to further developed Knowledge Building environments in other systems beside the Fle2 as well.

REFERENCES

Full paper with references is available in the following URL: <http://www.uiah.fi/~tleinone/codi/>

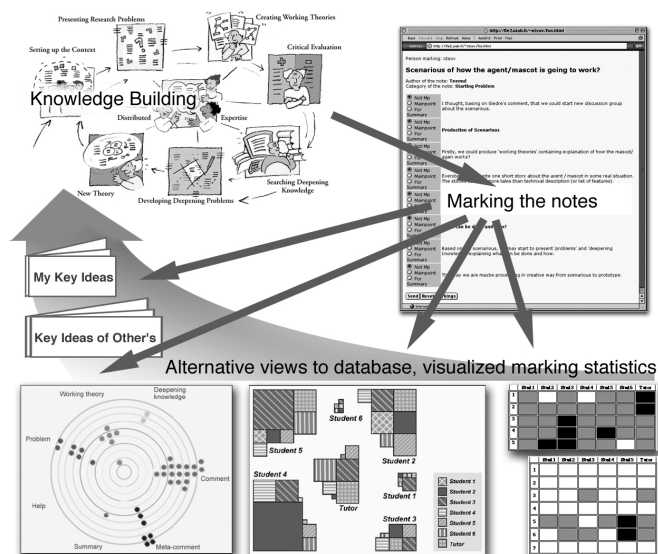


Figure 17: Knowledge Building, highlighting the notes and data provided for the users