

The CORDTRA Analysis Tool in Action: Experiences and Suggestions

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Abstract: This short paper presents the authors' experiences and reflections from using an existing tool (CORDTRA) for analyzing collaborative learning interactions evident in wiki and threaded discussion technologies. The paper aims to discuss the strengths and limitations of the tool, in terms of existing research, and provide thoughtful recommendations for its improvement.

A Brief Review of the Study

CORDTRA (Chronologically-Oriented Representations of Discourse and Tool-related Activity) provides “an innovative representation for analyzing the evolution of discourse and tool-related activity across time” (Hmelo-Silver, Chernobilsky, & Nagarajan, 2009, p. 3). This short paper presents a formative evaluation of the CORDTRA tool. We adapted the CORDTRA tool to investigate the collaborative learning (CL) interactions evident in wiki and threaded discussion technologies as students worked in groups to analyze a case. This work was part of a larger-scale study which examined the affordances of these two Web 2.0 technologies to promote or constrain successful computer-supported (CS)CL in online settings. We very briefly discuss the context of this work below, however the complete study is reported elsewhere (Ioannou & Brown, 2010).

We collected data from 34 graduate students enrolled in two sections of an online, learning theories course at a large public University in the Northeast USA. Additionally we collected data from 10 students enrolled in a blended e-learning learning, educational psychology course at a private University in Cyprus. During the 4-week investigation, students (in groups of 3-4) collaborated on case study analysis, online. Groups discussed two different case scenarios and produced a consensus plan suggesting a solution to the problem embedded in each case. Groups in the USA used WebCT's threaded discussion board and a wiki built in MediaWiki (the open-source platform originally written for Wikipedia) to support their collaboration. Similarly groups in Cyprus used Moodle's threaded discussion board and MediaWiki. Data included: (a) logs of groups' online discourse archived in MediaWiki discussion pages and threaded discussion board (i.e., day/time stamp, collaborator's name, collaborator's contribution), and (b) groups' consensus plans developed in wiki article-pages and Word documents attached back and forth on the threaded discussion board.

The online discourse of each group was analyzed using a coding-and-counting approach to Computer-Mediated Discourse Analysis (CMDA; Herring, 2004). Subsequently, the CORDTRA tool (a CORDTRA for each group) allowed the investigators to beyond coding-and-counting to carefully examine the relationships between the collaborators, the discourse they engaged in, the mediating tools they used, and the construction of their consensus plan (Hmelo-Silver et al., 2009). Each time-point on a CORDTRA diagram represents a collaborator, one or more discourse/construction categories, and the corresponding technology feature that the collaborator is using. The coding scheme and sample CORDTRAs will appear in the poster presentation.

Reflections on the Use of the CORDTRA Analysis Tool

CORDTRA seems to be an appropriate analysis tool for the study of CL using Web 2.0 technologies, such as wikis and threaded discussion. The diagrams are effective in revealing patterns in context in CSCL settings. Also, as a history flow visualization technique, CORDTRA may have advantages over more popular analytical techniques, such as social network analysis. Social network analysis graphically represents the patterning of people's interaction (i.e., who interacted with whom). Although this is useful information, it discards the content and nature of knowledge construction that take place in the interactions (Stahl, 2006). Instead, the CORDTRA diagram, in relation to the corresponding discourse, seems to support deeper understanding of CSCL. At the very least, this tool brings the investigator closer to what is happening between the students, the discourse they engage in while collaborating, and the mediating tools they use.

However, this tool does not come without its limitations. Firstly, generating the diagrams using Excel scatterplots is a quite labor intensive process. If CORDTRA is to be used extensively by the CSCL community, an automated process for generating these diagrams should be developed. In the literature, there are a few attempts to develop analytical and visualizing tools that automate the study of CSCL. Yet, there is a need for a toolset that supports, (a) data from different platforms (e.g., MediaWiki and WebCT discussion forum), and (b) different forms of data analysis (see Law, Yuen, Huang, Li, & Pan, 2007). With regards to integrating data from different platforms, Klamma and Haasler (2008) implemented a system for generating and visualizing wiki

networks for wikis built on MediaWiki. Their goal was to study the evolution and dynamics of wikis, within a social network analysis framework. Additionally, Viégas, Wattenberg, & Dave (2004) developed a history flow user interface, again for MediaWiki, in order to study the evolution of Wikipedia. Using this interface the investigators were able to see the contributions on a wiki page, the authors who contributed, and a visualization of the history flow. Recently, Giguët and Lucas (2009) developed the “Calico Website”-- a tool that incorporates analytical and visualization features for the study of threaded discussion forums from different e-learning platforms, such as WebCT and Moodle. Nevertheless, none of those tools allows the development of chronological diagrams from data generated in both wiki and threaded discussion tools. Moreover, with regards to analyzing data in different forms, Law et al. (2007) argued that lots of time is wasted in transforming data into different formats for different analyses, because the tools for different kinds of analysis in CSCL are not yet integrated. The investigators experienced this difficulty during the study. Specifically, a significant portion of CMDA (Herring, 2004) was initially conducted in NVivo -- a specialized coding tool. Later, the investigators realized that all codes had to be re-entered in an Excel sheet in order to generate the CORDTRA diagrams.

A second limitation of the CORDTRA methodology involves the interpretation of the diagram, which requires significant additional time commitment on top of generating it. A CORDTRA makes sense only in relation to the corresponding discourse; patterns of collaboration are not clear from the diagram, unless one carefully considers the discourse and the diagram *together*. As Hmelo-Silver et al. (2009) explained, the investigator needs to zoom in on the areas of the diagram where interesting patterns exist to explore the phenomenon deeper, going back and forth between the CORDTRA and the coded discourse. A potentially useful functionality for the CORDTRA analysis tool would be the ability to select a particular instance on the scatterplot to see the corresponding lines of discourse. This would make the concurrent exploration of discourse and scatterplot more efficient. A similar functionality was implemented in the “Calico Website” for the study of threaded discussion forums (see Giguët & Lucas, 2009). Additionally, it would be practical to have a “zoom in” functionality for CORDTRAs to spread out the scatter plot around a particular time point. When there is significant activity, collaborators’ discourse and actions overlap extensively on the diagram; this, not only makes it difficult to observe any patterns, but also underestimates the amount of activity taking place at that time. Such “zoom in” functionalities are currently implemented in video and audio editing software.

Our poster presentation will provide thoughtful recommendations for the improvement of the CORDTRA analysis tool. The presentation should be of interest to the scientific community using instruments of this nature for the study of CSCL.

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