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The many levels of CSCL

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Collaborative groups in context

Pierre Dillenbourg and Fabrice Hong bring our flash theme of scripting to a conclusion with a pedagogical design model for scripting classroom activities. Their theoretical framework for conceptualizing and structuring pedagogical scripts defines three primary social levels on which learning, interaction and knowledge building can take place: that of the individual student, the small workgroup and the class as a whole (including the teacher). An effective script not only works on a given level, but more importantly relates the activities at each level to each other to form an effective integrated pedagogical process. The authors propose their suggestive SWISH principle as a stimulus for collaborative learning. Collaboration, they argue, takes place most effectively in a relatively unconstrained small group process of peers working together to overcome some cognitive barrier to the shared accomplishment of a joint task. In order to set up the groups oriented to their tasks and to introduce the barriers without interfering with the self-directed nature of small-group collaboration, a script specifies how to form small groups and organize tasks while operating on the teacher-centered classroom level, and then "split when interaction should happen" (SWISH) onto the small-group level. Following the collaboration phase, the script then specifies individual- and class-level activities to share, solidify and internalize the knowledge building that took place in the groups. While supporting the idea that small-group interaction is key to collaborative learning, the article stresses the essential role of integrating that interaction in coherent processes involving individual and class activities as well. This recognition represents a major step forward for CSCL theory. The article provides a detailed analytic framework for thinking about and supporting this complex and often overlooked need for an effective pedagogy that integrates across social levels.

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Another major pedagogical problem in many CSCL applications is that students and teachers often focus on procedural learning and minimize the conceptual learning that was intended by the curriculum designers. *Ingeborg Krange and Sten Ludvigsen* illustrate this problem in striking detail. In their case study, a computer system to support collaborative learning of genetic theory includes a table for identifying the DNA genetic codes of amino acids used to build proteins. It also includes a 3-D game interface for building a protein in a molecule-level virtual world and then using it in a human-level virtual world. The human-level game is supposed to motivate students to learn the science necessary to save a life, but instead distracts from the science altogether. During the problem-solving collaboration, most students are so focused on the game goal that they restrict the science learning to manipulating the information in the table without even allowing a curious student to ask what the symbols in the table are supposed to represent conceptually—i.e., how genes, amino acids and proteins are related. The game narrative distracts from, rather than motivates the science inquiry. The table artifact becomes an end-in-itself to manipulate, rather than a mediator for understanding connections among biological concepts. The authors argue that this common pedagogical problem in science education arose because of the way in which mediating tools at three social levels intersected in the concrete situation of this classroom: the school as curriculum deliverer, the knowledge domain (high school genetics) and the computer tool (a website with the table and the 3-D virtual world environment). Although the teacher and students enacted the joint task and their collaborative priorities together as a small group, they were situated in a context that included the institutional constraints of the school, the conceptualizations of the domain of biology and the pedagogical design embedded in the software. Without taking these multiple levels of constraints into account, one cannot expect CSCL activities to succeed in inspiring students with deep insights into contemporary understandings of genetics and other sciences.

The paper by *Bernhard Nett* looks at an even higher-level context for a CSCL application: a multi-institutional, inter-disciplinary consortium of the type becoming increasingly common, particularly within the European Union. A group of faculty from institutes of law, computer science and economics across Germany undertook the task of implementing innovative forms of CSCL for college education in “computers and law.” Nett’s analysis traces the emergence of a community of practice within the effort, in which the tutors associated with the project formed an effective small group that overcame serious institutional barriers to collaboration at the faculty level. Through both face-to-face and computer-mediated communication, the group of tutors proposed, implemented, refined and facilitated a MOO environment for use by the students. The tutor community generally played an important integrative role within the project, allowing the curriculum provided by the faculty to be effectively taken up—along with the MOO—by the student body. As seen in this analysis, a community of practice evolves through specific group processes, which cannot be scripted as part of an organizational plan, but which may play a crucial role in the success of a larger, more formal learning organization.

Quantitative and qualitative analysis on many levels

The typical levels within CSCL interventions, according to Dillenbourg and Hong, are: individual, small group and class. The analyses of these and other levels by Krange and Ludvigsen and by Nett are qualitative. It is also possible to conduct quantitative analyses of processes at these levels and of the interplay between levels. *Ulrike Cress* argues for the importance of conducting such studies and provides an in-depth introduction to a statistical method for analyzing the results. Multilevel analysis (MLM)—or hierarchical linear modeling (HLM)—is becoming increasingly popular in CSCL and related research, but is relatively complicated to conduct. It allows one to do regression analysis when individual subjects are nested in groups, as is usually the case in collaborative learning. If one tests individual students before and after some group activity, then the learning that may have taken place could be a function of the skills, backgrounds and efforts of the individuals, but it could also be a function of the interactions that took place within the groups. For instance, if one wants to test whether girls learned more than boys, that comparison would be confounded by whether each of the girls or boys was in a good group or a bad group. MLM separates the effects at different levels and reports how much of the variance is due to individual effects and how much to group effects. In order to do this, understandably but unfortunately, MLM requires larger sample sizes than are common in CSCL studies. Cress addresses this and other issues for adapting MLM to CSCL.

One technique to finesse the problem of larger sample sizes is to "fake" the group interaction so that all the individuals experience the same small-group processes. The experiment reported by *Joachim Kimmerle and Ulrike Cress* does just that. Over a hundred subjects were put into conditions with varying forms of social awareness about the actions of other members of their small group. The experiment subjected the participants to a classic information-exchange dilemma in which individuals had a disincentive to contribute their own knowledge to the group but benefited if the group was well-informed. Although subjects believed they were interacting with other subjects in small groups, the inputs from other members were simulated to standardize the group-level effects. The experiment was able to confirm its hypothesis about a group-level effect on the individuals without actually having real groups! In addition, finer analysis of the effects provided empirical evidence to refine the theoretical social psychology model behind the hypotheses.

Reviews in the first 2 years

From the founding of the journal to the time this issue was prepared for publication—basically during 2006 and 2007—354 reviews were completed, not counting meta-reviews by Executive and Associate Editors supervising the review processes. This resulted in 45 papers being accepted for publication and 63 papers being rejected out of a total of 128 submissions (there are currently 20 submissions in the review and revision pipeline). Following is a list of most of the reviewers involved; in many cases these reviewers sought the assistance of colleagues, who may not be included in this list:

Shaaron Ainsworth, Rick Alterman, Jerry Andriessen, Hans Christian Arnseth, Gerardo Ayala, Michael Baker, Daniel Bodemer, Jacqueline Bourdeau, Bertram Bruce, Amy Bruckman, Jürgen Buder, Murat Perit Cakir, John M. Carroll, Carol K. K. Chan, Tak-Wai Chan, Elizabeth Sandra Charles, Cesar Alberto Collazos, Charles Crook, Lucilla Crosta, Ton de Jong, Sharon Derry, Pierre Dillenbourg, Angelique Dimitrakopoulou, Lone Dirckinck-Holmfeld, Paul Dourish, Nathan Dwyer, Noel Enyedy, Brian Foley, Andrea Forte, Hugo Fuks, Ricki Goldman, Jonathan Grudin, Frode Guribye, Jörg M. Haake, Päivi Häkkinen, Thomas Herrmann, Cindy E. Hmelo-Silver, Christopher Hoadley, Ulrich Hoppe, Christine Joyce Howe, James M. Hudson, Sanna Järvelä, Patrick Jermann, Richard Joiner, Christopher Jones, Regina Jucks, Yael Kali, Victor Kaptelinin, Manu Kapur, Andrea Kienle, Joachim Kimmerle, Paul A. Kirschner, Matthew J. Koehler, Timothy Koschmann, Thérèse Laferrière, Minna Helena Lakkala, Victor Lally, Mary Lamon, Nancy Law, Lasse

Lipponen, Jacques Lonchamp, Chee-Kit Looi, Rose Luckin, Sten R. Ludvigsen, Kristine Lund, Andreas Lund, Johan Lundin, Richard Medina, Naomi Miyake, Anders Mørch, Daisy Mwanza-Simwami, Bonnie Nardi, Matthias Nückles, Hiroaki Ogata, Claire O'Malley, Jun Oshima, Roy Pea, Ruediger Pfister, Janet Read, Peter Reimann, Jochen Rick, Tim Sean Roberts, Markus Rohde, Jeremy Roschelle, Liam Rourke, Nikol Rummel, Nadira Saab, Johann W. Sarmiento, Tammy Schellens, Gregg Schraw, Baruch Schwarz, Anna Sfard, David Williamson Shaffer, Wesley Shumar, Amy Soller, Nancy Songer, Hans Spada, Marc Stadtler, Constance Steinkuehler, Jan-Willem Strijbos, Masanori Sugimoto, Daniel Suthers, Berthel Sutter, Gustav Taxén, Ramon Prudencio Toledo, Jan van Aalst, Ravi Kiran Vatrapu, Marjaana Veermans, Barbara Wasson, Jim Waters, Rupert Boudewijn Wegerif, Armin Weinberger, Gordon Wells, Martin Wessner, Tobin Frye White, Fatos Xhafa, Joyce Yukawa, Nan Zhou.

We apologize if any reviewer names were unintentionally missed. Note that having two executive editors and five associate editors to supervise the double-blind peer-review process allowed us to review the last two papers in this issue from the research lab that Friedrich Hesse directs without involving anyone from the lab in the reviewing or the acceptance decisions.

The high quality of the papers published in *ijCSCL* is largely attributable to the incisive critiques and suggestions from these reviewers and the openness of the authors to adopt most of the suggestions in a collaborative spirit. Almost no articles are published without extensive rewriting in response to the double-blind peer reviews exchanged through our electronic system. In this sense, the production of the journal is itself an effective exercise in computer-supported collaborative learning and community knowledge building.

Welcome to *ijCSCL* volume 3!

We anticipate an exciting year now that *ijCSCL* is well established. If you have a breakthrough paper for the CSCL research community, please submit it. If you have any questions about a potential submission or would like to join our world-class community of reviewers, contact us at info@ijCSCL.org. Please make sure that your subscription is up to date by renewing your ISLS membership at www.isls.org. We look forward to seeing you June 24–28 at ICLS in Utrecht.