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Roles, design, and the nature of CSCL

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ABSTRACT

In this article, I argue that roles are a key construct for CSCL that demonstrate the interdisciplinary strengths of CSCL as a field. CSCL is a problem-driven field with a history of incorporating different paradigms, and has the advantage of using a design stance to understand phenomena like collaboration and learning that are difficult to study. Roles are understood differently by different disciplines, but the concept of roles serves as a boundary object between the different disciplines within CSCL and highlights potential areas for research.

1. Introduction

This special issue brings together a variety of articles on the nature of roles in computer-supported collaborative learning (CSCL), with a wide variety of perspectives ranging from the impact of scripted roles on student learning to emergent roles in naturalistic (not even explicitly 'learning') communities. The temptation is to arrange these articles on a continuum from those that assign roles (via scripts, or other means) and those that allow roles to be determined by participants and study what emerges. However, casting this special issue as 'should we script roles or not' would do a great disservice to both the studies in the issue, and to the field as a whole.

Roles are a key phenomenon not only in CSCL, and not only collaborative learning, but in learning and in collaboration more generally. Perhaps more importantly, roles help highlight what is unique and valuable about CSCL research and what it has to offer to other fields ranging from psychology and sociology, to education, to computer–human interface design. In the remainder of this commentary, the unique aspects of CSCL will be laid out, how roles and scripting fit into CSCL, and what this implies for other fields.

2. Characteristics of CSCL

2.1. CSCL as disciplinary crossroads

The field of CSCL has existed for approximately 20 years. Like many other new fields of study, the emergence of CSCL can be identified with both an intellectual and a cultural history. The intellectual history of CSCL, like so many other nascent fields, stemmed from developments that suggested novel combinations of ideas that permitted new solutions to old problems, in this case using technology to structure collaboration and learning. The problems of teaching and learning, and of collaboration, were old. What was new was the possibility that computers, and especially networked computers, could influence these processes. Like many problem-focused disciplines, CSCL did not neatly decompose into existing traditional disciplinary epistemologies. The problem itself could neither be called simply an engineering problem, nor a psychology problem, nor an education problem, nor an information design problem. Rather, CSCL attracted a variety of people from all of these disciplines who had interest in the application area. Evidence that this field was problem-driven rather than epistemology-driven can be seen in the debates over what the letters in CSCL stood for. While these days it is common to expand CSCL to computer-supported collaborative learning, one early book that helped define the field deliberately chose not to take a stand on the particular terminology (Koschmann, 1996a, p. xi).

The cultural history of CSCL is equally important in helping to define what CSCL is. Koschmann's (1996b) initial statement of the field included an explicit contrast between the computer-aided instruction and intelligent tutoring approaches that took a 'realist and absolutist' approach to studying learning with the more situated approaches that drew on communication theory, cultural theory, and more relativistic models of not only learning, but also of research itself. The juxtaposition of these perspectives is not unique and many fields from mass communications to curriculum design have encountered these two styles of research. Yet, CSCL served as a crossroads in many ways, because although these approaches were all included, there were also serious attempts to enmesh them. For instance, Roschelle's (1992) article on convergent conceptual change examined not only socio-cultural but also individual psychological understandings of what happens when someone's mind is changed by a conversation. Similarly, larger,

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multiyear research efforts such as CSILE (later Knowledge Forum) (Hewitt & Scardamalia, 1998; Scardamalia & Bereiter, 1991; Scardamalia, Bereiter, McLean, Swallow, & Woodruff, 1989), the Knowledge Integration Environment (Linn, Davis, & Bell, 2004), or CAMILE and associated efforts (Guzdial et al., 1997) incorporated multidisciplinary teams of researchers that not only studied, but also designed, built, and enacted CSCL environments. Their work also bridged the epistemologies of different disciplines.

2.2. Individual versus group versus cultural level phenomena

Another characteristic feature of CSCL is that the primary phenomena of interest, collaboration and learning, span many grain-sizes. Lemke (2001) has pointed out that when phenomena cross multiple timescales, typically the study of those phenomena hinges on trying to create theories within a timescale, and then linking those theories across timescales. In studying human activity, it is often hard (if not impossible) to connect different timescales through reductionism. In CSCL, the learning that takes place during collaboration is related to individual, and group, and cultural phenomena. Thus, CSCL is studied at many timescales, ranging from micro-genetic or gestural analysis of phenomena taking place moment by moment to the long-term evolution of an online community over many years. Importantly, these diverse methods are not de facto subspecialties, but rather are orchestrated in tandem to examine particular CSCL environments or theories. DiSessa (1991) has labeled endeavors such as this *local sciences*, in which overall reductionist coherence is set aside to allow for evolution of pockets of coherence around particular applications or problems.

Design plays a key role in uniting these grain-sizes. Rittel and Webber (1973) labeled the problem of planning design to be a *wicked problem*, meaning that traditional inductive and deductive science often fails to provide sufficient prediction to allow planning to be deterministically conducted. On the one hand, CSCL maintains a degree of breadth due to its applied nature – all related disciplines and approaches are welcome to the degree they are useful. But on the other hand, as pointed out by DiSessa, design means that we may need to favor local sciences as opposed to a more unified, but less catholic, global science of CSCL. The alternative is what Herb Simon has called *the sciences of the artificial*, or *design science* (Simon, 1969). Designers use processes to solve problems where there is no closed solution. They explore problems as part of solving them, they iterate, and they apply metaknowledge and craft to create solutions that work, even though the science is insufficient to predict the outcomes of the designer's choices.

2.3. Why CS makes CSCL fertile ground for research

The existence of the 'CS' in 'CSCL' provided new opportunities for both design and research. The possibility of anonymity, of recording every instant message or every message opened by a user, of delivering impossibly complex scaffolds through tutoring systems – all allow designers ways to influence and researchers ways to study the complex ballet of interactions we call collaboration and learning. Computing provides a vital lever with which to move collaboration and learning, and therefore provides unprecedented opportunities for both design and for study through design in what is now called design-based research (Design-Based Research Collective, 2003; Wang & Hannafin, 2005).

Technology does not, however, provide complete control over the collaborations and learning, nor does it end the problem of design. As Stahl (2001, p. 169) writes:

> "The naïve, technology-driven view was that tools (...) would make a significant difference on their own. The subsequent experience has been that the classroom culture bends such tools to its own interests and that this culture must be transformed before new media can mediate learning the way we had hoped they would. So CSCL research has necessarily and properly shifted from the affordances and effects of the technology to concerns with the instructional context."

As pointed out by Salomon (1996), technology itself does not constitute a learning environment; rather, he proposes that researchers should focus on differences in patterns of relationships between learners, tools, and their context. We have levers to pull in the design and implementation of technology, and we may have additional, more familiar levers to pull in the form of teaching, classroom orchestration, and the like. However, each of these involves a design/enactment distinction – there is the designer or orchestrator's intent, and then there is the less predictable enactment in a real context. As put by Hall (2001, p. 185), "How are collaboration and learning a contingent response to designed environments"?

Although this lack of control may foil would-be experimentalists, others have used new methods to study socially contextualised designs in context (Hoadley, 2004). Design-based research methods use iterative change-in-context, as well as the growing intuition of designers-in-context, to explore highly context-dependent interventions. Here, computers can have a 'triggering effect' (Salomon, 1996) on the people, contexts, and processes of learning and collaboration that we wish to study. The Design-Based Research Collective (2003) stated: "Because the intervention as enacted is a product of the context in which it is implemented, the intervention is the outcome (or at least an outcome) in an important sense." (p. 5). There is room for design, important not only as a flagpole to rally different disciplines around, but as a vehicle for both practical applications and a particular sort of cross-grain-size research.

To sum up, CSCL, which considers how learning and collaboration can be fostered through computers or other means, has a unique intellectual and cultural history that brings disciplines together. Because of the object of study, unidisciplinary approaches have been insufficient, and researchers from different paradigms have had to construct 'local sciences' that may span grain-sizes, disciplines, or timescales. In part due to the affordances of technology, researchers have had both the boon and the challenge of dealing with design. On the one hand, design allows practical application, and is an effective way to deal with systems where the consequences of actions are not fully predictable. On the other hand, design may require us to deal with the dichotomy between what is intended and what actually happens, making controlled experimentation more problematic. Nowhere are these features more evident than in how CSCL studies roles in collaboration.

3. Roles and scripting in CSCL

Roles are a microcosm of the complexity of CSCL, and may in fact constitute a central defining construct for the field. Each of the studies deals with roles in a different way, and yet the construct proves to have relevance in widely varying disciplinary perspectives, and across varying grain-sizes and timescales. Although it may initially jar the reader to see the concept used so differently by each of the articles in this special issue, it is productive to juxtapose these different uses, as this highlights some of the key tensions within the field, and some of the key useful distinctions that may not be obvious at first glance.

3.1. Scripting versus emergent roles: a false dichotomy?

Perhaps the most obvious distinction in how different CSCL researchers approach roles is to see them as 'scripted versus emergent'. Here, the apparent distinction is that a designer of collabora-