Repertoires of Collaborative Practice: Theoretical Introduction and background

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Collaborative activities take many forms, and are an increasing reality in the 21st century. However, how people learn to collaborate, and what people transfer between collaborative situations is still undefined. While researchers have been exploring what makes a single collaborative learning instance successful—by examining the individual attributes of collaborators, the interactions and context of collaboration and the institutional or community practices that surround the episode—we are yet to fully understand how collaborative expertise develops. By studying how people collaborate and how people talk about collaboration, we propose that people develop Repertoires of Collaborative Practice, which they draw on when they encounter a new collaborative situation.

In our work on Repertoires of Collaborative Practice, we draw on Bratman's (1992) ideas to define collaboration. Bratman proposed three aspects of activity that are necessary to qualify it as a "Shared Cooperative Activity", which we note as necessary for an activity to also be considered collaboration. These aspects are 1) mutual responsiveness, 2) commitment to joint activity and 3) commitment to mutual support. Repertoires of Collaborative Practice describe the breadth of skills and behaviors, interactions and contextual affordances that come into play during shared cooperative activities, and can be used by collaborators to recruit and sustain mutual responsiveness, commitment to the joint activity and mutual support. We theorize that repertoires of collaborative practices develop through experience with different forms of collaboration and are influenced by the collaborative context. They include orientations to collaborative work, local ways of working, strategies for using tools and representational resources to support joint work, and the adaptation of longer standing institutional practices for the purposes at hand.

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In the same way, we see repertoires of collaborative practice as ways of engaging in collaborative activities that can be selected in particular contexts. These repertoires, and an understanding of the conditions in which they come into play, are developed through experiences collaborating and interacting with others, feedback in those situations about what is effective or problematic, and through opportunities to reflect on the process. The implementation of such repertoires of collaborative practice in action is strongly influenced by the context of the collaboration, the repertoires that collaborators bring, and the cultural affordances of the community in which the episode occurs.

The Repertoires of Collaborative Practice framework allows us to view the practices that people bring to a collaborative episode through four lenses: At the individual level, intentions and prior knowledge are important; at the interpersonal level, ways of managing the joint problem and relational space are focal; at the context level we examine how the available tools, representational resources, and constraints of a particular task influence the group; and at the community practice level, institutional norms and historical ways of interacting are attended to. Like Rogoff (2003), we see these as inter-related planes that interact in any collaborative situation but that are usefully segmented for analytic purposes. Collaborative practices, as we define them, comprise the habitual behaviors that are engaged in during a collaborative episode. Existing practices, drawn from other collaborative experiences, may be adapted in a new context to establish new ways of collaborating. Innovative new practices get developed over time, and in reaction to changes in context. Understanding when to implement an existing practice, alter the practice, recruit a practice from another experience or invent a new practice, comes from experience with collaboration, and a meta-cognitive approach to collaboration.

Motivation for developing a new framework

The motivation for proposing and investigating this framework is two-fold. First, there is a need to develop more comprehensive and inclusive theories to understand variability in collaboration. Inevitably, studies of collaborative learning find variation in learning outcomes (e.g. Barron, 2003; Chizhik, 2001; Hogan,
Nastasi & Pressley, 2000; Howe, Tolmie, Rodgers, 1992; Johnson, Johnson, & Stanne, 1989) and effect sizes for the impact of collaboration is estimated to be between .21 (Slavin, 1990) and .88 (Johnson and Johnson, 1992), indicating that there is significant variability between studies in the learning outcomes revealed. This variation has been explained in many ways, and by drawing on different theoretical constructs.

Researchers who have focused on collaborative process—on what goes on during a collaborative episode—have found that positive interactions and responses to proposals (e.g. Barron, 2003), elaborated answers to questions (e.g. Webb & Farivar, 1999), elaborated and clear reasoning about the problem being solved (e.g. Roschelle, 1992; Hogan, Nastasi & Pressley, 2000) and productive discourse (e.g. Chan, 2001), are all evident in groups where learning occurs. More successful groups show evidence of actively managing joint attention, a willingness of group members to engage in co-regulation, and attention to both the relational space and the content space inherent in collaborative contexts (Barron, 2003). Attempts to structure collaborative interactions have led to findings that having roles (e.g. Cohen, 1994), scripts (e.g. O’Donnell, 1996) and prior instruction in asking complex questions (e.g. King, Staffieri, Adelgais, 1998) can be useful for promoting learning. Other research that focuses on collaborator backgrounds—what collaborators bring into a collaborative situation—finds that prior relationships (e.g. Miell & McDonald, 2000), and prior content knowledge (e.g. Hmelo, Nagarajan, & Day, 2000) have influences on what is learned during collaboration. In addition to this, research that focuses on collaboration tasks—how the task demands vary—have found that positive goal interdependence, (e.g. Johnson, Johnson & Stanne 1989) is an important factor in influencing collaborative success. While the value of each of these perspectives for contributing to explanations of variability is evident, we argue that it is time to bring the perspectives into a single comprehensive framework, so that the overlapping and interactive effects of each of these explanation types can be considered and used to develop better supports for collaborative learning experiences.

As the studies to follow will report, when interviewees reflected on understandings of their collaborations, it was evident that their explanations were more complex than could be accounted for by any of the aforementioned single theoretical perspectives. Across the participants’ accounts of collaboration, reference was made to individual’s behaviors and past experiences during collaboration, the task demands and context norms, and the relationships between collaborators. While not all participants used each of these levels to describe their past collaborations, the complex set of reasons across interviews echoes different facets of the collaboration literature framed above, and leads us to seek an ecological framework that may take them into account simultaneously.

The second motivating factor for this work is the increasing use of, and need for, collaboration across many situations and contexts in the 21st century world. It is recognized that the world of work in the 21st century is calling for complex cognitive and interpersonal skills (Business Roundtable, 2005; Committee on Prospering in the Global Economy in the 21st Century, 2007; New Commission on the Skills of the American Workforce, 2006; SCANS, 1991), and there have been calls from industry and graduates for more authentic learning experiences to prepare them for this new, evolving workplace (e.g. NSF, 1996). There is increasing recognition that the solutions to the societal and intellectual challenges we face, currently and in the future, will be solved collaboratively. There remains a call in the literature for more robust, holistic learning theories that articulate the significance of social resources and historical and developmental processes in learning (e.g., Cole, 1996; Rogoff, 2003; Wertsch, 1991). Understanding how people become good collaborators, and the affordances that support effective collaboration, remains essential to understanding how people learn collectively, share knowledge, network, and innovate (John-Steiner, 2000).

Metacollaborative reflection as a resource for the development of repertoires of collaborative practice

Central to the development of repertoires of collaborative practice is the role of metacognition that we find reflected in participants’ accounts of collaboration. We suggest that attending to metacollaborative reflections may illuminate the conceptual development in the collaborator (perspective taking, theory of mind, imagined collaboration processes and outcomes) and how people view and make decisions in collaborative settings. This includes the ability to reflect and evaluate one’s thoughts and interactions about an aspect of one’s work or working process. Metacognition is the awareness of one’s interactions and position in context and the regulative use of this self-awareness in context. While metacognition has received broad attention in child development and in education (e.g., Brown, 1987; Flavell, 1979; Hacker et al., 1998; White & Frederiksen, 1998), the role of metacognition in relation to collaboration has not received as much attention, especially in relation to culturally-situated collaboration rather than laboratory tasks (e.g., Engeström, 1989). We contend that what individuals know about themselves, others, the dynamics of the context, and the norms and values of the community practices, influences their collaborative practices. Through a case study approach in the data papers that follow, we will investigate self-reported accounts of collaboration as well as observations of collaborators working to better understand how metacognitive knowledge was used by participants in their previous collaborative experiences. Increased metacognitive awareness concerning collaborative practices may be
considered a desirable outcome of participating in collaboration activities and an important competency for developing repertoires of collaborative practice.

We propose that Repertoires of Collaborative Practice are developmental in nature, emerging out of experience collaborating and the development of a meta-cognitive awareness of an individual's ability to make changes to their own behavior, recruit the attention and interactions of others in the group, define a joint problem space, or draw on prior experiences and institutional practices to alter a collaborative episode. Evidence suggests that children need social interaction to develop language (e.g. Kuhl, 2007), Theory of Mind (Peterson & Seigal, 2000) and joint attention (e.g. Mundy, 2003; Clifford & Dissanayake, 2008). Additionally, studies that compare children and non-human primates, led Moll and Tomasello (2006) to explore a Vygotskian intelligence hypothesis, theorizing that engaging in social interaction is necessary for the development of high levels of social cognition. Building on the evidence and theory that social interaction is necessary for infants to learn to interact, we propose that experience collaborating is necessary for people to learn to collaborate; that people need to acquire repertoires of collaborative practices, in the same way that infants acquire the ability to recruit joint attention and develop Theory of Mind and language.

Recent experimental work has looked explicitly at learning to collaborate. Rummel and Spada (2005) examined differences between groups who participated in both a training and experimental phase of collaboration. Their results indicate that individuals can transfer what they learn about collaboration into a new setting. A follow up study (Rummel, Spada & Hauser, 2009), replicated these findings, and examined learning conditions in which explanations were paired with the scripts or models. They found that the model was always better than the script, but that model plus explanation was better than just model, and that script plus explanation was better than just script. Cortez et al (2009) describe a tool that supports collaboration. Their tool, the LCC System (Learning-to-Collaborate-by-Collaborating) monitors on-line collaboration, prompting better collaborative behaviors during the interaction. Their results showed better collaboration for most teams using the system. Another tool to support the development of collaboration is described by Nussbaum et al (2009). They found that teachers who used the tool reported higher levels of engagement in small group discussion in their class, suggesting that it is also a tool that could support collaborative engagement, but as yet, does not show transfer of these skills without the tool's support.

These recent studies of learning to collaborate, indicate both a recognition for this gap in the literature, and evidence that people can, in fact, develop new ways to collaborate. The Rummel et al studies suggest that observing collaboration is more useful than scripting collaboration, and suggest the value of additional studies that examine the differences between watching other collaborate, and engaging in collaborations. In addition, the Rummel, Spada and Hauser (2009) study, indicated that providing explanations with examples of collaborations was most useful for collaborators. This suggests a role for meta-collaborative knowledge for better collaborative outcomes, which we see as an important aspect of Repertoires of Collaborative Practice. This is reinforced by the two studies that provided support for collaboration, during collaborative episodes, indicating that making people aware of their behavior had an influence on their collaborations.

The papers that follow describe collaborative practices seen across a variety of situations. Each paper examines collaboration in a different setting, looking at the practices that people transfer in from prior collaborative experiences, and how people talk about transferring practices to other collaborative experiences. The papers all use a similar structure, first describing the context within which they are examining collaborations, followed by data-driven cases of particular collaborators. The authors of each paper will reflect on the practices identifies in the context, and the transfer of practices that are described by the collaborators. Finally, the authors will summarize the practices they observed and speculate on how practices were developing across collaborative experiences. During the symposium we will summarize themes across the papers and suggest implications for CSCL design, and for this developing research agenda.

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