MEDIATION OF GROUP COGNITION

Gerry Stahl
College of Information Science and Technology
Drexel University, Philadelphia, PA
Gerry.Stahl@drexel.edu

1. Mediation of Group Cognition

The term "community-based learning" can refer to a variety of forms of learning. One can, for instance, insist on an individualistic notion of learning and argue that individual learning can be enhanced by factors that may influence it from a supportive community environment. At the other theoretical extreme, one can propose a social conception of learning and claim that most important knowledge building takes place at the community level, while individual learning is a secondary matter of internalization, acculturation or increased participation in community. Here, we will stake out a middle ground: that community-based learning should be analyzed at the intermediate level of small groups of individuals within the community.[1] We point out that small groups typically mediate the relationship of communities to their members and we propose a consideration of small group cognition as an alternative methodological focus to either cognition in the head of individuals or the cultural knowledge of a whole community. This approach has practical implications for CSCL and CSCW: collaboration is taken to be a potential emergent phenomenon of small group interaction, and the computer support of collaboration is analyzed as an enabling technology whose design and use forms and transforms the nature of the interactions.

Let us consider this article's title a word at a time. *Mediation* is the most complex and unfamiliar term. In popular and legal usage, it might refer to the intervention of a third party to resolve a dispute between two people. In philosophy, it is related to *media*, *middle* and *intermediate*. So in CSCL or CSCW, we can say that a software environment provides a *medium* for collaboration or that it plays an *intermediate* role in the *midst* of the collaborators. The contact between the collaborators is not direct or *im-mediate*, but is *mediated* by the software. Recognizing that when human interaction takes place through a technological medium the technical characteristics influence—or *mediate*—the nature of the interaction, we can inquire into the effects of various media on collaboration. For a given task, for instance, should people use a text-based, asynchronous medium? How does this choice both facilitate and constrain their interaction? If the software intervenes between collaborating people, how should it represent them to each other so as to promote social bonding and understanding of each other's work?

The preposition in the phrase is ambiguous. Is *of* to be taken in a passive or possessive sense? Does the mediation *of* group cognition refer to how the group cognition is mediated by the technology? Or, conversely, does it refer to how collaboration and shared meaning are mediated by the group

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[1] This paper is excerpted from (Stahl, in press), where issues of group cognition are considered at length [4].

cognition's act of mediating? This ambiguity is not accidental: in processes of mediation, that which is mediated, that which mediates and the mediation itself tend to merge into a process of co-determination in which each is defined and refined by the others.

By itself, the term *group* is quite straight-forward. In this context, we can take it to refer to a small set of people, usually numbering about three to six. But combined with the term *cognition*, it strikes many people as counter-intuitive. This is because cognition is often assumed to be associated with psychological processes in individual minds.

The usual story about cognition, at least in the Western culture of the past three hundred years, goes something like this: an individual experiences reality through his (*sic*, the paradigmatic rational thinker in this tradition is often assumed to be male) senses. He thinks about this experience in his mind; c*ognition*, stemming from the Latin *cogito* for "I think," refers to mental activities that take place in the individual thinker's head. He may articulate a mental thought by putting it into language, stating it as a linguistic proposition whose truth value is a function of the proposition's correspondence with a state of affairs in the world. Language is a medium for transferring meanings from one mind to another by representing reality. The recipient of a stated proposition understands its meaning based on his own sense experience as well as his rather unproblematic understanding of the meanings of language.

The story based on the mediation of group cognition is rather different: in this view, language is an infinitely generative system of symbolic artifacts (words, phrases, genres, etc.) that embody the cultural experiences of a community. It is a social product of the interaction of groups—not primarily of individuals—discussing and acting in the world in culturally mediated ways. Individuals who are socialized into the community learn to speak and understand language as part of their learning in order to participate in that community. In the process, they internalize the use of language: e.g., as silent self-talk, internal dialog, rehearsed talk, narratives of rational accountability, senses of morality, conflicted dream lives, habits, personal identities and their tacit background knowledge largely preserved in language understanding. In this story, cognition takes place primarily in group processes of inter-personal interaction, including mother-child, best friends, husband-wife, teacher-student, boss-employee, extended family, social network, gang, tribe, neighborhood, community of practice, etc. The products of cognition—thoughts—exist in discourse, symbolic representations, meaningful gestures, patterns of behavior; they persist in texts and other inscriptions, in physical artifacts, in computer databases, in cultural standards and in the memories of individual minds. Individual cognition emerges as a secondary effect, although it later seems to acquire a dominant role in our introspective narratives.

Most people have trouble accepting the group-based story at first and then starting to view collaborative phenomena in these terms. Let us take a closer look at the philosophical view which is sedimented in the term "mediation." It belongs to a tradition that undertook a fundamental critique of the individualistic perspective that goes back to Descartes and even Plato, and that underlies common folk theories about cognition.

2. Deconstructing Mediation

We can start to deconstruct the term *mediation* as used in CSCL and CSCW by looking at its use in Lave & Wenger's seminal *Situated Learning* [2]:

> "Briefly, a theory of social practice emphasizes the relational interdependency of agent and world, activity, meaning, cognition, learning and knowing…. Knowledge of the socially constituted world is socially mediated and open ended."

This theory of social practice can be traced back to Hegel and Marx by way of Vygotsky. Vygotsky described what is distinctive to human cognition, psychological processes that are not simply biological abilities, as *mediated cognition*. He analyzed how both signs (words, gestures) and tools (instruments) act as artifacts that mediate human thought and behavior—and he left the way open for other forms of mediation: "A host of other mediated activities might be named; cognitive activity is not limited to the use of tools or signs" [5]. Vygotsky recommended replacing the exclusive focus on individual development with a "zone of proximal development" that assessed group cognition, the ability of small groups to achieve intellectual results [5].

Vygotsky attributes the concept of indirect or mediated activity to Hegel and Marx. Where Hegel loved to analyze how two phenomena constitute each other dialectically—such as the master and slave whose identity arises through their relationship to each other—Marx always showed how the relationships arose in concrete socio-economic history, such as the rise of conflict between the capitalist class and the working class with the establishment of commodity exchange and wage labor. The minds, identities and social relations of individuals are mediated and formed by the primary factors of the contexts in which they are situated.

The term *mediation* takes on a variety of interrelated meanings and roles in discussions of social theory. The point here is to start to think of group collaboration software as artifacts that mediate the cognition of their individual users and support the group cognition of their user community.

3. Mediation by Groups

Small groups are the engines of knowledge building. The knowing that small groups build up in manifold forms is what becomes internalized by their members as individual learning and externalized in their communities as certifiable knowledge. At least, that is a central premise of this article.

Although we can see many examples of the decisive role of small groups, their pivotal function is rarely acknowledged. For instance, the two prevailing paradigms of learning in CSCL—which may be referred to as the acquisition metaphor and the participation metaphor [3]—focus on the individual and the community respectively, not on the intermediate small group. In the acquisition metaphor, learning consists in the acquisition of knowledge by an individual; for instance, a student acquires facts from a teacher's lesson. In the participation metaphor, learning consists in knowledgeable participation in a community of practice; for instance, an apprentice becomes a more skilled practitioner of a trade. But if one looks closely at the examples typically given to illustrate each paradigm, one sees that there is usually a small group at work in the specific learning situation. In a healthy classroom there are likely to be cliques of students learning together in subtle ways, even if the lesson is not organized as collaborative learning with formal group work. Their group practices may be structured in ways that support individual participants to learn as the group builds knowledge. The peer group may also resist the official educational goals; the small group defines what is to be valued as learning. In apprenticeship training, a master is likely to work with a few apprentices, and they work together in various ways as a small group; it is not as though all the apprentice tailors or carpenters or architects in a city are being trained together. The community of practice functions through an effective division into small working groups.

Some theories, like activity theory [1], insist on viewing learning at both the individual and the community level. Although their examples again typically feature small groups, the general theory highlights the individual and the large community, but has no theoretical representation of the critical small groups in which individuals carry on their concrete interactions and into which the community is hierarchically structured.

My own experience in research collaborations and in my apprenticeships in philosophy and computer science impressed me with the importance of working groups, reading circles and informal professional discussion occasions for the genesis of new ideas and insights. The same can be seen on a world-historical scale. Quantum jumps in human knowledge emerge from centers of group interaction: the Bauhaus designers at Weimar, the post-impressionist artists in Paris salons, the Vienna Circle, the Frankfurt School—in the past these communities were necessarily geographic locations where people could come together in small groups at the same time and place.

The obvious question, once we recognize the catalytic role of small groups in knowledge building, is: can we design computer-supported environments to create effective groups across time and space? In order to achieve this, we need a degree of understanding of small group cognition that does not currently exist. In order to design effective mediated collaboration, we need to develop a theory of mediated collaboration based on a design research agenda of analysis of small group cognition.

Most theories of knowledge building in working and learning have focused primarily on the two extreme scales: the individual unit of analysis as the acquirer of knowledge and the community unit of analysis as the context within which participation takes place. We now need to focus on the intermediate scale: the small group unit of analysis as the discourse in which knowledge actually emerges.

Following are some research hypotheses for a theory of small group cognition:

- The small group is the unit that mediates between individual learning and community learning.
- Community participation takes place primarily within small group activities.
- Individual learning is acquired through participation in these small group activities.
- Both individual identities and community practices are formed through small group activities.

Here are some theoretical issues to be investigated in such a research program focused on the small group unit of analysis:

- Can we make learning visible in group discourse (so we do not have to rely upon measures of indirect learning outcomes)?
- Can we identify meaning-making and knowledge-building at the group unit?
- Can we say that it is possible for a group, as such, to think, learn, build knowledge or construct meanings that cannot be attributed to any of the group members individually?
- Can processes of group cognition provide a basis for individual cognition and learning?

The size of groups can vary enormously. Our examples tend to be of small groups of a few people meeting for short periods. Given the hypothesized importance of this scale, it is surprising how little

research on computer-supported collaboration has focused methodologically on this unit. Traditional approaches to learning measure effects on individuals. More recent writings talk about communities of practice. Many studies of collaboration that do talk of groups look only at dyads, where interactions are easier to describe and qualitatively different from those in larger small groups.

The emphasis on the group as a unit of analysis belongs at the foundation of a science of collaboration. It is not just a matter of claiming that it is time to focus software development on groupware and to develop appropriate techniques (e.g., for assessment of groupware). It is also a methodological rejection of individualism as a focus of empirical analysis and cognitive theory. Software should support cooperative work and collaborative learning; it should be assessed at the group level and it should be designed to foster group cognition. For that, we need a fitting theoretical framework centered on an understanding of the role of small groups and the mediation of group cognition.

4. References

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