

## Computer Support for Collaborative Reflection on Captured Teamwork Data

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**Abstract:** We describe the significance of collaborative reflection for team learning at the work place and present accounts for computer-supported reflection on joint teamwork. These solutions provide support for collaborative knowledge construction and meaning making based on captured teamwork data. They include support for articulation work and adapt recent accounts of scaffolding and guidance to the generic scope of team reflection at the workplace.

### The Significance of Reflection for Team Learning at the Workplace

Reflection on one's own work practice has been identified as one of the central mechanisms of learning at work (Argyris & Schön 1996; Boud, Keogh, & Walker, 1985; Dewey 1933; Kolb & Fry 1975). It leads to a better understanding of own work practice and work-related experiences and can guide future behavior (Järvinen & Poikela, 2001; Moon, 1999). As most business organizations have implemented *teams* to face successfully the challenges in business life, we argue that research should consider *team learning by collaborative reflection on joint work* more thoroughly. The social dimension of reflection has recently been described by Dyke (2006), who highlights the role of sharing experiences for the purpose of learning (see also Hammond & Collins, 1994 and Orton, 1994). Joint discussion on experience is considered to stimulate and deepen individual reflection and to enable creative solutions. Recent definitions of team learning thus include the notion of reflection explicitly (e.g., Edmondson, 1999). In this context and in accordance with constructivist theories of cognition, learning is considered to occur as collaborative construction of knowledge (Roschelle & Teasley, 1995). In particular, the process of co-constructing knowledge leads to a deeper insight into a situation or problem, enabling the creation of new and well-grounded knowledge on the group level. This corresponds with the fact that reflection is often accomplished collaboratively by a team or working unit and based on sharing work-related experience. We consider collaborative reflection as an emergent phenomenon in which a shared understanding about work practice is established in an team, allowing for learning from past experiences. The availability of shared material which mirrors recent work practices serves as a catalyst and basis for this mutual reflection and sense making. The research described in this paper as well as the design and the implementation of corresponding tools is embedded into the project *MIRROR - Reflective Learning at work*, which aims at engaging employees in reflecting on their own work practice and specific work-related experiences in order to learn from it.

### Designing Computer Support for Collaborative Reflection

While many concepts such as scaffolding and guidance have been shown to be beneficial in educational settings (cp. Jermann, Soller, & Muehlenbrock, 2001; Stahl, Koschman, & Suthers, 2006; see also Carell & Herrmann, 2009; Carell, Herrmann, Kienle, & Menold, 2005; Cress & Kimmmerle, 2008; Herrmann & Kienle, 2008), little is known on their application in the workplace setting. There, teamwork refers to aspects of team effectiveness with regard to the task the team is required to achieve. This usually has nothing to do with learning in the first place. However, team learning is strongly interrelated with task performance if we consider that learning from past teamwork experiences is crucial for enhancing future team performance (Edmondson, 1999). Team performance thus depends on a team's ability to learn from experience by means of reflection on own work practice (Kayes & Burnett, 2006). Reflection should thereby be based on material that mirrors real work practice. To support team reflection, we use an approach based on using *recorded data from team work*.

Recorded data from teamwork provides a basis for collaborative reflection on own team work and thereby enhances a team's awareness on its own work practice. However, using such data for collaborative reflection not only needs sophisticated means of gathering and aggregation of the data, but people need to be supported while interacting with this data, e.g., relating different data snippets to each other and articulating individual understandings. We argue that both gathering data and interaction with data needs a socio-technical solution in order to support collaborative reflection and knowledge construction properly. This approach has to combine organizational methods and processes with information technology and intervention strategies. We focus on the explication of experiences and reflection results by means of articulation, support for group discussion of experiences and meaning making from this shared experience as well as the convergence and construction of new knowledge.

- 1) *Articulation support:* We suggest that collaborative reflection on captured teamwork data can be facilitated by specific means to comment on such data and to support individual articulation (Suchman, 1996).

Through individual and collaborative annotations, a rich and comprehensive database to guide collaborative reflection will be made available. This will enable teams to make sense of captured teamwork data and to use it for further reflection through negotiation of individual understandings of teamwork.

- 2) *Scaffolding and guidance support*: Solutions for guiding and scaffolding will include support for synchronous and asynchronous reflection processes such as the functionality of external referencing to parts of recorded material, visualizations of the process of communication and reflection, or summaries and control of the interplay between questions, answers and arguments.
- 3) *Synergy support*: In order to help people access results and to make them sustainable, processes of convergence and the construction and explication of new knowledge have to be supported. We intend to implement voting and tagging to support structuring of reflection material and converging parts of the articulated reflection into new ideas which go beyond individual reflection.

Our research intends to provide an integrated solution for applying collaborative knowledge construction and meaning making based on captured teamwork data by supporting articulation, discursive interaction and synergizing on shared experiences. It aims at applying concepts of scaffolding and guidance for the generic scope of workplace reflection and integrating these solutions into a socio-technical framework intertwining technical support and intervention strategies. In order to accomplish these goals, further work will be focused on investigating processes of collaborative reflection and deriving potential support for it in real world settings.

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