Chapter 6 – Discussion

BEING TOLD TO DO SOMETHING OR JUST BEING AWARE OF SOMETHING? AN ALTERNATIVE APPROACH TO SCRIPTING IN CSCL

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Abstract: It might be easily accepted that learning and understanding can be positively influenced by some forms of social interaction. In the past, different aspects of social interaction have already been proposed for this purpose. The concrete form of social interaction can be communicated or even enforced by providing a script or might be subject to an individual process of self-guidance which is based on being well informed about the partner, the situation, and the development of the ongoing social interaction. Some chapters of this book as well as this one address these alternatives.

In this chapter, I will try to go beyond a mere summary of the contributions in this part of the book. What follows can rather be characterized as a reflection on very basic alternative strategies for influencing computer-supported collaborative learning. However, before explaining the essence of these alternative strategies and discussing how the studies reported above actually make use of them, I would like to bring to mind some premises on which they are built. In the following I try to sketch a rough framework that outlines the underlying rationales.

What has to be kept in mind first is that from the perspective taken here, *learning* is the final goal of the activity and all other accomplishments, above all good collaboration, are only means to this end. This has to be stressed explicitly in order to differentiate this perspective from others that view collaboration as an end in itself. This is another strand of research addressing the fact that many activities in education and work life build upon the ability to cooperate and collaborate effectively. In particular, members of collaborative dyads or teams have to make sure that they understand each other quite well, know enough about each other, each other's prior knowl-

edge and way of understanding (mental representations etc.). Clark's (1996) interest in the "common ground" that is built when partners communicate has, for instance, proven to be a very fecund approach to research preconditions for efficient collaboration (see also Clark & Marshall, 1981). CSCL research has taken up this line of thought by investigating the support and constraints that computers can bring into collaborative scenarios. Thus, collaboration as a more generic topic is addressed as well as the special case of having the support of a computer. This line of research includes studies about shared knowledge distributed over people as well as over technical databases.

On the other hand, research focusing more exclusively on learning regards collaboration as a mere vehicle to make cognitive processes of learning and knowledge building more explicit, more reflective, and more structured – which might otherwise not occur or only in a less intensive way. As a vehicle to improve learning and knowledge processes, slightly different forms of collaboration might be required, which raises again the question of how to influence the process of collaborating and thus of learning appropriately. Again, this generally applies to situations both with and without computer support. But not in the same way: if a computer is available, other forms or conditions of collaboration have to be taken into account. Considering that computer-mediated collaboration might be an extra task and cause extra cognitive load, the goal to benefit from using the computer might not be easy to reach in the context of CSCL.

What we know up to now is thus that fostering interaction for the sake of learning might mean something different than fostering interaction in its own right and that, additionally, anything we can say about the matter must be differentiated further as soon as computers are involved. But before turning to the issue of computer support, let's consider for a moment the underlying premise of why collaboration or, more generically, social interaction is at all relevant to learning.

The very idea that social interaction and learning or knowledge processes are genuinely linked is quite widespread and shows up in quite different forms. An instance is Hutchins' (1995) single-system perspective which considers interacting persons, their interactions and objects (artifacts) as a single socio-technological system. In this framework, individual actions are always seen from the angle of the whole unit. Another perspective which also considers a group (and its technical possibilities to store information) acting as a whole is Wegner's (1987, 1995) transactive memory approach where someone just knows where something can be found, be it in a technical database or in the knowledge base of other persons. Subsequently, persons can collaborate in a way allowing knowledge to be stored in different

persons or technical sources under the condition it will be accessible in the future.

Turning to the classics of education theory, it is Vygotsky (1978) who points out that even processes happening within a single person are always a consequence of inter-psychological social processes. One interpretation of his zone of proximal development looks at the difference in the state of knowledge of an individual learner to that of a more advanced other person (e.g., a teacher). The benefits of the diversity which social interaction entails are also emphasized in the tradition of Piaget (Piaget & Inhelder, 1969; Doise & Mugny, 1984). Based on his assimilation and accommodation approach, it is assumed that a cognitive conflict comes up more often in a social situation and can cause active and reflective ways of solving the conflict which then can lead to deeper understanding and better learning.

Social interaction as a means of deeper elaboration has also been the main idea of O'Donnell and Dansereau's (1992) "scripted cooperation" approach, which leads us to the more detailed ideas of *how exactly* social interaction must be designed to result in better learning. To achieve this goal, two learners are shifting the role of explaining (summarizing and giving examples) and listening (giving feedback in form of asking for clarification).

Collins, Brown, and Newman (1989) and Palincsar and Brown (1984) are not part of the tradition of scripted cooperation, but develop somewhat similar approaches by also starting from a social situation and determining who does what – this time by assigning roles. One could even call these approaches special forms of scripting. The Cognitive Apprenticeship approach by Collins et al. starts with the social interaction between a tutor and an apprentice and is followed by a script dealing with the collaboration between the two when following the sequence of modeling, coaching, and scaffolding. In each step there is a clear division of labor which serves the purpose of teaching by the tutor and learning by the apprentice. The "Reciprocal Teaching" approach by Palincsar and Brown is mainly applied to text understanding but follows a similar idea concerning social interaction to support learning and understanding and offers a similar script as Collins et al.

Up to now, one can assume that there is a benefit when becoming engaged in some structured forms of social interaction with the purpose of learning and further knowledge processing. However, we did not explicitly discuss the use of *computer-supported* ways of collaboration. In general, this will bring up the question if things are just similar or different, better or worse when we use computer support. There might be no single general answer to it as it depends on the concrete form of social interaction. However, there are some features of computer support which, if brought to bear, can be beneficial for collaborative learning. To a certain extent, these features have to do with overcoming space and time limitations. But there's more to it than

just simply being at different places at different times when collaborating. Especially having control over the time dimension allows to stop a process, trace it back and revise something and thus become more reflective. Furthermore, face-to-face communication and collaboration without any technical means does not allow for having permanent protocols to refer to or to read again. This also might lead people to write better structured and organized messages because they know they are permanent. And, finally, computer-mediated scenarios offer opportunities for guiding and influencing the interaction that face-to-face cannot provide.

This leads directly to considerations about how one can make sure that, by using the means of a computer, collaboration is beneficial for learning and understanding. At this point, two different strategies could be taken. Strategy I (which I refer to as the 'scripting approach') assumes that the designer has enough and solid knowledge about what is the right way, the best procedure, the best support to guide an output-oriented collaboration. If this is true, it would be possible either to tell or instruct subjects how to proceed or to design a computer-based environment in a way that certain procedures are enforced or at least elicited. Subjects are thus guided or scripted to follow the right procedure.

This strategy has to face a couple of possible drawbacks:

- The "right way" might be wrong
- The "right way" might be quite different for different persons and different conditions/situations
- The "right way" might be a good advice only for a very limited time, e.g., in the very beginning
- The "right way" might lead to less motivating activities
- The "right way" asks for following certain rules and is thus adding to the cognitive load of the learner and distracting from the "real task" to be done.

What could be an alternative to scripted cooperation? Just not scripting the cooperation? In CSCL, this doesn't seem to be an option as the need for a coordinating structure appears to be even more urgent in computer-mediated settings than in face-to-face ones. In that respect, computer mediated communication is deficient as compared to face-to-face communication. So there is a need to compensate for it. However, the compensating features implemented in the computer environment at the same time offer a potential for influencing interactions that face-to-face situations cannot provide. Both the 'scripting approach' and the alternative strategy which I will present in the following exploit this unique potential, but they do it in different ways.

Strategy II, which I will call the "awareness approach", differs from the scripted cooperation approach in strategy I. Awareness might be defined as the perception of or knowledge about situational affordances (Buder &

Bodemer, 2005), or as simply "knowing what is going on" (Endsley, 1995, p. 36).

This approach does not deliver explicit instructions, but instead enriches the available information about the group, participation of group members, activities, and e.g., even interest of the collaborators. Strategy II relies completely on making relevant features of the collaborators and activities "aware" and expecting that the collaborators either know themselves how to proceed or are able to develop a good way of collaboration by themselves (Gutwin & Greenberg, 2002).

Awareness also has to take into account that, in order to avoid cognitive overload, only that information should be made available/aware which can be helpful to adequately organize one's own proceeding. This of course is based on a difficult decision to be taken. The technology itself might be much more powerful than human senses are in a face-to-face setting. Thus, in principle, it would be possible to deliver a broad range of measures as there is e.g.

- group awareness (who is around, who is active and participating and to which extent),
- situation awareness (where one is located, how the conditions are and what a task looks like),
- history awareness (how have things developed, what has been done before).

For other forms or taxonomies of awareness see Gross, Stary, and Totter (submitted), Gutwin and Greenberg (2002), Jermann, Soller, and Mühlenbrock (2001), Carroll, Neale, Isenhour, Rosson, and McCrickard (2003).

Publishing a book about "Scripting Computer-Supported Collaborative Learning" has to reason about these two strategies. This book does it and especially in this section. All four chapters address scripting as well as becoming self-regulated as it is needed if the learner is not told, but just being aware of something. In the following overview, I will not highlight in which ways scripting is addressed in these chapters. To change the perspective, I reveal the presence of the second aspect in each of them, that is: awareness and its effects.

The first chapter by Alison King about "Scripting Collaborative Learning Process: A Cognitive Perspective" has a very clear understanding about the purpose of scripting as she reflects explicitly what cognitive, meta-cognitive, and socio-cognitive processes are intended to be supported. So well known cognitive activities like e.g., repetition, rehearsal, retelling, summarizing, and paraphrasing are addressed. Even more complex activities like analogical thinking, integration of ideas and reasoning are part of the intended cognitive activities. However, above all these very reasonable cognitive activities she is questioning to what degree these activities can be accomplished

by the learner alone – without social interaction – and to what degree script-ing can be turned into self-regulation.

The second chapter in this section by Nikol Rummel and Hans Spada about the question if "People Can Learn Computer-mediated Collaboration By Following A Script" tries to compare the script approach with a model approach. Interestingly, having a model to observe does lead to the same advantages as explicit scripting. Obviously people can derive on their own how to process without an explicit guidance. Some of the questions dis-cussed by the authors of this study were concerned with how the motiva-tional situation might be when being scripted. They did not say, the motiva-tion is better when only getting a model to see, but this could be an interest-ing speculation. A model approach is not directly something we might call an awareness approach but it equally relies on having partners being able to decide on their own how to proceed instead of being scripted.

"Scripting In Net-based Medical Consultation: The Impact Of External Representations On Giving Advice And Explanations" by Anne Runde, Rai-ner Bromme, and Regina Jucks in the next chapter conceives scripting more in the sense of representational guidance and thus as a form of implicit scripting. One could even interpret their approach rather as a form of making something aware as of scripting. If there is scripting then it is more self-de-veloped and self-regulated. Their main expectation has been that the infor-mation depicted in the concept map used in this study helps to focus the communication more strictly to the depicted content and terms. These results support the idea of having this special form of "implicitly scripting" as they call it even if it might be more in the tradition of making something aware as scripting someone's behavior.

"Scripting Laypersons' Problem Descriptions In Internet-based Commu-nication With Experts" by Matthias Nückles, Anna Ertelt, Jörg Wittwer, and Alexander Renkl is based on the idea that the dialogue partners can profit from following a problem formulation script. Probably two mechanisms have been effective in their study. One mechanism can be seen in having a "template" available about what constitutes a complete problem description. One of their results was due to having this more complete description. Addi-tionally, the authors point explicitly to the effect of sequencing the steps to lower the cognitive load in developing a problem description. Insofar, we are close to the awareness perspective if one refers to a shared understanding what constitutes a complete problem description by having a template for it available. However, we are beyond this perspective if one looks at the ef-fects of *sequencing* which is a quite original feature of scripting.

Getting back to the title of this chapter, we now can state that what I re-ferred to as the 'awareness approach' can indeed be regarded as an alterna-tive to scripting. When reflecting on critical aspects of scripting – as script-

ing might be e.g., too rigid or lead to motivational problems – the chapters in this section often come up with alternatives which contain a lot of aspects of the awareness approach. Neither the four chapters before nor this chapter can definitely answer if one approach is superior to the other.

However, scripting approaches are facing their limits, whereas the awareness approach seems to have some potential which has not been tried out enough. Perhaps future research might even plead for the two of them – scripting and awareness features – in a balanced combination.

REFERENCES

Buder, J., & Bodemer, D. (2005). Augmented group awareness tools for collaborative learning: In T. Okamoto, D. Albert, T. Honda, & F.W. Hesse (Eds.), *The 2nd Joint Workshop of Cognition and Learning through Media-Communication for advanced e-Learning (JWCL)* (pp. 34-39). September 28-30, 2005, Tokyo, Japan.

Carroll, J. M., Neale, D. C., Isenhour, P. L., Rosson, M. B., & McCrickard, D. S. (2003). Notification and awareness: Synchronizing task-oriented collaborative activity. *International Journal of Human-Computer Studies, 58 (5)*, 605-632.

Clark, H. H. (1996). *Using language*. Cambridge: Cambridge University Press.

Clark, H. H., & Marshall, C. E. (1981). Definite reference and mutual knowledge. In A. K. Joshi, B. L. Webber, & I. A. Sag (Eds.), *Elements of discourse understanding* (pp. 10-63). New York: Cambridge University Press.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction. Essays in the honour of Robert Glaser* (pp. 453-494). Hillsdale: Erlbaum.

Doise, W., & Mugny, G. (1984). *The social development of the intellect*. Oxford: Pergamon Press.

Endsley, M. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors, 37*, 32-64.

Gross, C., Stary, C., & Totter, A. (submitted). User-centered awareness in computer-supported cooperative work-systems: structured embedding of findings from social sciences. *International Journal of Human-Computer Interaction*.

Gutwin, C., & Greenberg, S. (2002). A descriptive framework for workspace awareness for real-time groupware. *Computer Supported Cooperative Work, 11*, 411-446.

Hutchins, E. (1995). *Cognition in the wild*. Cambridge: MIT Press.

Jermann, P., Soller, A., & Mühlenbrock, M. (2001). From mirroring to guiding: A review of the state of art technology for supporting collaborative learning. In P. Dillenbourg, A. Eurelings, & Kai Hakkarainen (Eds.), *Proceedings of the European Conference on Computer-Supported Collaborative Learning* (EuroCSCL-2001) (pp. 324-331). Maastricht, The Netherlands, March.

O'Donnell, A. M., & Dansereau, D. F. (1992). Scripted cooperation in student dyads: A method for analyzing and enhancing academic learning and performance. In R. Hertz-Lazarowitz & N. Miller (Eds.), *Interaction in cooperative groups: The theoretical anatomy of group learning* (pp. 121-140). New York: Cambridge University Press.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 1*, 117-175.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. NY: Basic Books.

Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185-208). New York: Springer.

Wegner, D. M. (1995). A computer network model of human transactive memory. *Social Cognition, 13*, 319-339.