ON THE ROLE OF (MATERIAL) TECHNOLOGY IN CSCL

adapted from Hoppe (2007)

The CSCL community is methodologically heterogeneous with varied backgrounds between humanities on the one hand and formal sciences and technology on the other. If CSCL is at all considered a field of scientific study, then it is of the type "design science" or "science of the artificial" (Simon, 1969) in that it does not describe, analyze, and explain given phenomena but creates its own objects of study. This is clearly the case for both the technology-oriented engineering as well as the normative pedagogical approaches. And even from a psychological perspective it is almost impossible to set up computerized collaborative learning experiments without implicitly or explicitly designing and inventing a specific setting. Irrespective of common theoretical foundations, as e.g. currently sought in social constructivism, there is no way of deterministic or taxonomic reasoning that would guide us from these foundations directly to the concrete design of artifacts and scenarios for collaborative learning. These foundational theories are much more reflections of certain innovative practices than they are themselves generators of innovation. Indeed, the field of CSCL is driven and shaped by available and trendy technologies without really being able to influence these trends very much. The technological "hot spots" of interest today are in turn: "social software" supporting large web-based communities, multi-user technologies such as group archives or synchronous co-construction environments, embedded interactive technologies in the spirit of ubiquitous computing, and modeling tools based on rich representations.

Although the current interest in CSCL and in collaborative learning in general is nurtured by technological innovation and the search for new applications, the different perspectives on CSCL lead to very different attitudes with respect to the role of technology. We can distinguish the following prototypical attitudes related to the new "material" technologies:

1. Technologies, namely ICT, are taken as given. They are used, mainly for text-based communication and archiving in group learning scenarios. Typically, the technologies used are "consumer-ready" services on Internet and browser platforms. The perspective on technology is a consumer-user perspective; the technology is not modified or subject to a re-design process.
2. Existing technology is "appropriated" in a collaborative learning setting in that its functions and its way of embedment in the learning context is subject to design and investigation. The technology itself may be unchanged or only superficially modified by using available parameterization or configuration mechanisms. Often, also the interaction and "social interoperability" of different systems or tools is investigated. The experience is evaluated in such a way as to help re-designing technology and/or its forms of usage.
3. New technologies, such as software tools or communication mechanisms, are designed and developed to support certain forms of cooperation and particularly of collaborative learning. Practical testing and evaluation is part of an iterative redesigning process in which technological and social, organizational, or particularly educational aspects are closely intertwined.

Taking computer-"C" in CSCL seriously, we would favor research of type 2 and 3 over type 1 research. However, since our shared goal is better education, we would not accept such types of merely technology-driven research in which unspecific system mechanisms are developed or improved and for which educational applications are sought "ex post". We want to see an appropriation of the material technology for educational purposes. Appropriating the material technology for a specific purpose is a dialectic process in which the meaning of technology may be augmented or it may be modified in that the inherent logic or "message" of the medium (cf. McLuhan, 1964) is changed. On the other hand, the culture of a (learning) community into which new "expressive" technologies, such as interactive media, are inserted will also be modified under the influence of these media. We want to see this dialectic reflected our scientific contributions. Imagine a new compression algorithm which

improves video transmission bandwidth is available, and now applications applying this technology in distance learning are suggested without clearly elaborated educational goals. According to current standards in the CSCL community, rejection of this latter type of research would be predictable, yet the acceptance of type 1 research is not a rare case. If true - is this adequate?

With respect to technology-rich approaches in CSCL, we can identify a variety of strong and interesting prototypical functions of technology in CSCL (as well as in other types of technology enhanced learning environments):

- facilitation and enabling, i.e., either technology facilitates known types of learning in new or alternative ways, or it enables new kinds of learning experiences;
- integration, i.e., technology is used to integrate learning activities and learning results and thus allow for a smooth "learning flow";
- modeling, i.e., computational techniques are used to model or formally describe (collaborative) learning processes;
- analysis, i.e., interaction traces or situational data from learning environments are analyzed using computational techniques.

It is particularly the modeling perspective that has a largely unexplored potential, also in the sense of model-based design as well as model-based user feedback. In this sense, existing "systems that support the management of collaborative interaction" have been compared and classified by Jerman et al. (2001). Whereas the practical benefit of analysis-based symbiotic support mechanisms is still subject to speculation, the development of analytic methods is in itself a theoretical contribution to the advancement of modeling and understanding the structure and process of collaborative learning.

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