Instructional Support for Collaborative Activities in Distance Education

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INTRODUCTION

Distance education is facing many challenges nowadays. One of them relates to a different perspective on knowledge: Current policies and economies emphasize the need for lifelong learning and the learners' ability to apply their knowledge in working contexts. Furthermore, knowledge is nowadays one of the motors of economy and several of the world's most valuable companies merely sell goods based on knowledge (like software) rather than physical products. Authors reflect this impact of knowledge by the usage of terms like knowledge society (e.g. Nonaka, 1994) or knowledge age (e. g. Bereiter, 2002). Even if information and communication technologies allow access to an indefinite amount of information, it is up to the learners to develop key skills to information processing and exchange to transform the information to personal and shared knowledge. According to the European Commission (2007), such kind of digital literacy is therefore the key skill of the current century. But knowledge society does not only require learners to develop digital literacy, it also requires individuals as well as the whole society to engage permanently in keeping their knowledge up to date—a process of continuous knowledge generation (see Nonaka, 1994). Thereby, it is not more sufficient to just acquire knowledge; learners also have to get familiar with skills regarding knowledge construction, exchange, and rebuilding. This has also consequences for distance education because it has to overcome traditional teacher-student scenarios in which a teacher passes "knowledge" to learners who try to memorize and rehearse. To meet the requirements of knowledge society, distance education needs a new perspective on learning and teaching (see Ertl, Winkler, & Mandl, 2007).

Moderate constructivist approaches provide such perspective and focus on particular learner activities that are necessary for learners' individual and collaborative knowledge construction. They build on learners' active knowledge construction and postulate that learning requires learners' active participation. Approaches like situated learning (Lave & Wenger, 1991) or cognitive apprenticeship (Collins, Brown, & Newman, 1989) describe this new kind of relation between learners and the learning environment. This is in contrast to traditional approaches, which set learners in a receptive role. According to constructivist approaches, learning is mediated by learners' individual prior knowledge, their motivation and other individual learning prerequisites. Reinmann-Rothmeier and Mandl (2001) describe several key-elements for construction of knowledge according to this philosophy (see also Ertl et al., 2007). They state that a learning process is

- Active, because only active involvement enables learning.
- Self-directed and learners have to take active control and responsibility for their learning activities.
- Constructivist, which means that learners have to embed new knowledge in their existing knowledge structures.
- Social and knowledge acquisition requires a social context.
- Situated because knowledge acquisition happens in a specific context and is linked to this context.
- Emotional; the emotional component is particularly important for the motivation of the learners.

Besides these constructivist aspects, learning environments require a certain amount of instruction (Ertl et al., 2007; Kirschner, Sweller, & Clark, 2006; Reinmann-Rothmeier & Mandl, 2001). Consequently, learning environments need to find a balance between

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construction and instruction. This balance can be realized by the design of problem-oriented learning environments (see Mandl, Gräsel, & Fischer, 1998) and case-based learning scenarios (Kolodner et al., 2003). Such learning environments can benefit from new technologies; they can provide tools for supporting the active construction of knowledge (Roschelle & Teasley, 1995), provide an authentic situational context by the display of video-cases (CTGV, 1997), enable the social context for spatially divided learners (Mandl, Ertl, & Kopp, 2006), and motivate learners by the provision of gimmicks and animations (Mayer, Hegarty, & Mayer, 2005). However, none of these benefits are caused by the technology itself—they are introduced by the instructional design of the learning environment including the use of the new technologies.

This article focuses on two particular aspects how the instructional design can apply new technologies for the improvement of learning environments: on collaboration-specific methods structuring learners' collaboration, and, on content-specific methods that are supporting learners' active construction of knowledge.

BACKGROUND

To enable learners' collaborative knowledge construction, particularly in distance education scenarios, they need environments that support collaborative activities. This means, that learners need an environment not only for exchange, but also for specific processes of collaborative knowledge construction. According to Fischer, Bruhn, Gräsel, and Mandl (2002), core processes of collaborative knowledge construction relate to learners *externalization* of knowledge, to the *elicitation* of knowledge from their learning partners and to processes for resolving socio-cognitive conflicts. The negotiation with these conflicts is of particular importance, because these processes go beyond the mere exchange of information but support the synthesis of different perspectives. Fischer et al. (2002) call these processes *conflict-oriented negotiation* and *consensus-oriented integration*. Yet, such processes only can happen when learners have the chance for differentiate elaborations. Therefore the environment has to support learners in elaborating as well as in an interaction frequency high enough to allow these discursive processes (a meta-study on this topic is presented by Jeong and Hmelo-Silver (2010)). During collaborative knowledge construction, learners build a shared knowledge base that can be seen as a joint product or mental artifact (see Bereiter, 2002). This can be a goal of a learning scenario, e.g. in the collaboration of interdisciplinary teams (see Rummel & Spada, 2005), as well as the base for further collaboration as it happens in learning communities (see e.g. Winkler, 2004). Studies have shown that such kind of collaborative knowledge construction can evoke beneficial learning activities (see e.g. Ertl, Fischer, & Mandl, 2006; Lou, Abrami, & d'Apollonia, 2001; Roschelle & Teasley, 1995). Modern technologies can support e-collaborative knowledge construction (see Ertl, 2008, 2010a, 2010b) for distance education settings. Yet, hereby the learning environment has to provide more than just materials and means for collaboration. Kirschner et al. (2006) emphasize the need for instructional design and a shared motivation as a prerequisite for beneficial learning. One aspect of the instructional design is the provision of specific instructional methods as support for learners' e-collaborative knowledge construction. Mayer (1994), e.g., shows the impact of visualization aids, Fischer, Kollar, Mandl, and Haake (2007) show different structures for collaboration, and Pata, Sarapuu, and Lehrinen (2005) discuss the role of tutoring. Diziol and Rummel (2010), provide a framework for such support methods.

COLLABORATION-SPECIFIC METHODS

Methods for facilitating learners' collaboration may be associated with several tools, particularly software products that aim at enabling collaborative work or at supporting particular collaborative tasks (e.g. collaborative drawing or text editing). These tools can support collaboration between learning partners, yet the fact remains that collaborative skills often do not come naturally to the individual learner and must therefore be acquired (see Salomon & Globerson, 1989). Instructional approaches focusing on the improvement of collaboration often refer to methods such as *scripted cooperation* (O'Donnell & King, 1999). Such scripts sequence learners' work on the task. Furthermore, they may provide roles for the learners and encourage them to apply beneficial strategies for solving a task.

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