Category: IT Education

Instructional Support for Distance Education

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INTRODUCTION

During the late '90s, distance education and e-learning were believed to be able to solve almost every problem associated with the further qualification of employees in organizations. Distance education was credited with saving costs for companies, by reducing time and expenses for traveling and with flexible time management. Consequently, many companies started programs for distance education. However, after this initial euphoria, several organizations experienced problems with their programs (e.g., Haben, 2002). The costs for distance education courses exploded, employees refused the new style of learning, and the general question arose as to the effectiveness of distance education (see, e.g., Bernard et al., 2004). Looking at the range of distance education courses at this time, one could see that they used a broad variety of technologies to deliver learning contents to the learners, for example, videos, Web pages, dedicate software for learning, Weblogs, wikis, collaboration tools, videoconferencing, chat, and discussion boards. However, in contrast to the variety of technologies available, the instructional design of these courses was elementary and traditional (see Ertl, Winkler, & Mandl, 2007). Many courses offered recorded classroom lectures and streamed them to participants, or they just presented texts or slides in the style of a book. Such courses experienced a lack in acceptance and thus several efforts of distance education failed because the instructional design of these courses was not able to take advantage of the innovative technologies.

BACKGROUND

To take advantage of the emerging technologies, a new philosophy of learning and teaching is necessary. Moderate constructivist approaches focus on several activities of learners that are necessary for the successful implementation of distance education courses. They build on learners' active knowledge construction and postulate that learning requires learners' active participation. 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, Winkler, & Mandl, 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 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 chapter 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.

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.

As an example, the MURDER-script (Dansereau et al., 1979; O'Donnell & Dansereau, 1992) is comprised of several different aspects, and will therefore demonstrate the potential elements of scripts and their combination. This script relates to a collaboration process in which learners work collaboratively on text comprehension. It divides the collaborative learning process into six phases that focus on individual as well as on collaborative activities. The first phase relates to learners personal motivation for the task ahead (*M*ood). The second phase focuses on individual text comprehension (*U*nderstand). In the third phase, one partner repeats contents of the text from his memory (*R*epeat) while the other partners try to find difficulties and give feedback (4th phase; *D*etect). In the following, learners reflect and elaborate about the content to link the learning material with their prior knowledge (5th phase; *E*laborate). Finally, they check their work against the original text material (*R*eview, 6th phase). Learners may repeat these six phases for several text paragraphs and for each cycle, a different learning partner takes the role to repeat the text contents.

Technologies can integrate such scripts into collaborative learning environments. They may structure the collaboration process or the proceeding in the work on the task. Baker and Lund (1997), for example, report a script, which specifically directed the collaboration process. Their learning environment provided a shared graphics editor for working on a collaborative product and the instructional design added several *speech act buttons* to this editor. Each time a learner had made changes to the collaborative product, the learning environment required both partners to agree on these changes before continuing. They were required to demonstrate this by pressing the respective speech act buttons. The intention of this mechanism was that both learning partners increased their grounding (Dillenbourg & Traum, 2006) and their collaborative commitment to the joint product (Baker & Lund, 1997).

Ertl, Reiserer, and Mandl (2005) showed a different example for scripting in distance education using a videoconferencing scenario. The aim of this script was to facilitate learners during the task of collaborative teaching. This script structured the collaborative proceeding on the task, the roles of the learners, and the application of beneficial strategies regarding the collaborative negotiation. Therefore, the script assigned two different roles to the learners, the role of a teacher, and the role of a learner. Furthermore, it divided the collaboration process into four different phases. Learners worked with a shared application in this scenario, and this application offered learners a space for written externalizations. Furthermore, the application was pre-structured with instructional elements that guided learners according to the script. In the first phase, the participant in the teacher role explained the text material while the partner in the learner role asked comprehension questions. In the second phase, the learner rehearsed the concepts acquired and fixed important aspects in the shared application. The teacher supported the partner and clarified misinterpretations. In the third phase, both partners reflected individually, and in the fourth phase, they discussed the learning material. In this phase, the learner also noted important aspects in the shared application. After these four phases, learners switched their roles and continued with another text.

Results of the study showed that the learning environment with the script was able to facilitate learners' negotiation with theoretical concepts during collaboration. With respect to the individuals' learning outcomes, the script particularly facilitated learners in the learner role. They acquired more knowledge during collaboration than learners without a script (see Ertl, Reiserer, & Mandl, 2005). Other studies also report beneficial effects of scripts in distance education courses. These were related to the learning processes (Baker & Lund,

Table 1. Taxonomy of support methods with different goals

Goal of support	Collaboration-specific methods	Content-specific methods
Improving collaborative processes	Scripts	
Understanding impact factors		Simulations
Understanding structures		Templates
Understanding relations		Conceptualization tools