Section 3

IT AND THE LEARNING PROCESS
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The changing conceptions of learning and the rapid advancement of technology have led to the development and expansion of a model of education through which learners are engaged in social construction of knowledge and meaning in learning environments and communities, supported by information and communication technology (ICT) (Pea, 2002; Salomon and Almog, 1998). How, and under what conditions, digital and communications technologies can be successfully adopted to enhance the learning processes in primary and secondary schools thus has become a key focus in educational research in the last three decades (Selwyn, 2000). In this section of the Handbook, several key research areas on ICT and the learning process, which have been extensively studied, are reviewed:

– Design of interactive learning environments and multimedia-networked environments
– Computer-supported collaborative learning
– Online learning communities
– The use of ICT as a cognitive and metacognitive tool to support learning

The chapters included in this section review and synthesize exemplar studies to illustrate how technology can be used to support a variety of learning environments, such as problem-based (Savery and Duffy, 1996), discovery-based (de Jong and van Joolingen, 1998), and knowledge-based (Scardamalia and Bereiter, 2006) learning environments and communities. They also review the use of ICT as a cognitive and metacognitive tool to support students’ communication, collaboration, reflection, and knowledge creation. In synthesizing research findings on the outcomes of ICT-supported learning environments, attention has been paid to the learning principles, which underpin the design of these environments, pedagogies employed to facilitate learning, software used to support knowledge inquiry, communication and collaboration, as well as the role of the teachers and learners in the learning environment.
Chapter 3.1 provides an overview of how ICT has been used to support learning, within the context of the changing conceptions of learning. A range of promising and effective ICT tools embedded in learning environments are reviewed in this chapter. Chapter 3.2 synthesizes research on the design of interactive environments on the basis of the understanding of the learning and teaching process, and provides a framework to conceptualise the key concepts in their design. Chapter 3.3 reviews the concept and boundary of research on online learning communities, identifies the major trends of research, and suggests pertinent issues for future research. An in-depth review on the design principles and characteristics of four online learning communities, namely Knowledge Building communities, Quest Atlantis, Virtual Math Team, and Web-Based Inquiry Science Environment are presented in this chapter. In Chapter 3.4, the concept of collaborative learning and the issues involved in using information and communication technology to support collaborative learning is reviewed. This chapter also discusses the potential of computer-supported collaborative learning (CSCL) environments, and addresses the challenges CSCL environments face. Chapter 3.5 reviews the most frequently documented metacognitive learning outcomes including recall/memory, content learning/problem solving, and social interactions as knowledge acquisition and examines the potential of computer tools in supporting these learning outcomes. Chapter 3.6 reviews the integration of networked multimedia environments into classroom learning, focusing on inquiry, collaboration, and knowledge building, with exemplary environments (including CoVis and Knowledge Forum) discussed. Theoretical changes in learning and how these changes have influenced the design of multimedia-networked environments, as well as theoretical, pedagogical, and methodological implications are also discussed in this chapter.

References


