Chapter II

Intelligent Agents Supporting Distributed Collaborative Learning

Weiqin Chen
University of Bergen, Norway

Barbara Wasson
University of Bergen, Norway

Abstract

In the context of distributed collaborative learning, it is usually difficult for students to be aware of others’ activities and for instructors to overview the process and regulate the collaboration. In order to facilitate collaborative learning, intelligent agents were developed to support the awareness and regulation of the collaboration. This chapter discusses the facilitation role of intelligent agents and how they support students and instructors in distributed collaborative-learning environments. By monitoring the collaboration, the agents compute statistics, detect possible problems, and give advice synchronously and asynchronously to the students and instructor based on their activities and requests. In so doing, the agents not only help students to self-regulate their activities but also help instructors to maintain an overview of the collaboration so that they can intervene when necessary.
Introduction

Agent technology has been used in educational environments for some time, and a number of agents and multiagent systems have been designed specifically for educational purposes. In these systems, agents play different roles, such as tutors (Johnson et al., 2000) or co-learners (Chan, 1996). Another role for an agent is that of a facilitator (Chen & Wasson, 2003). For example, in a distributed collaborative-learning environment where users are geographically distributed and collaborate through a Web-based learning environment, an agent can facilitate collaboration processes such as coordination, teacher intervention, group interaction, etc.

In computer-supported collaborative work (CSCW), facilitation was studied in group supporting systems (GSSs) (Hirokawa & Gouran, 1989; Pollard & Vogel, 1991; Antunes & Ho, 1999). The activities of the facilitator in supporting group work have been identified. They are, among others, ensuring member identity and maintaining a discussion focus and a procedure for that focus; ensuring everyone has an opportunity to contribute to the discussion and decision regarding focus, procedures and decision issues; providing structure to focus group limits and boundaries; intervening when appropriate; and maintaining awareness of own feelings as an indicator (Chilberg, 1989; Shelli & Hayne, 1992). The facilitator is thought of as a servant to the group rather than a master (Jay, 1976). In the context of distributed collaborative learning, where students and instructors are geographically distributed, intelligent agents have been developed to support group learning (Okamoto et al., 1995; Ayala & Yano, 1996; Dillenbourg et al., 1997; Soller, 2001). Our research is partially inspired by these previous works and aims at testing the facilitation role of agents in both synchronous and asynchronous environments. It is also inspired by work on awareness within the CSCW field (Dourish & Bellotti, 1992; Gutwin et al., 1995).

In the DoCTA-NSS project (http://intermedia.uib.no/projects/docta), we developed intelligent agents for both asynchronous (Chen & Wasson, 2002) and synchronous (Dragstnes et al., 2002) collaborative-learning environments and used these environments to support student collaboration in a learning scenario on gene technology, where Grade 10 students in two Norwegian cities collaborated through a groupware system.

The chapter is organized as follows. After the background of facilitation agents in distributed collaborative learning, Section 2 discusses design issues of agents
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