Chapter 17
Software Agent Systems for Supporting Student Team Project Working

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ABSTRACT
This chapter describes the trial of an experimental software agent system, designed to help students to get started on their team projects, by allocating tasks to individuals and agree on ground rules for the team. Students taking Information Technology degree programmes tried the system over several years, providing feedback on the suitability of this sort of system for supporting the process aspects of team project working. Findings from this research showed that students used the output from the system in different ways according to their previous experience and suggested additional features that students would like to see in a system for supporting their team working, which could be incorporated into future development of the system.

INTRODUCTION
Technology enhanced learning promises to change the ways in which students learn through enabling a wider variety of learning activities. In higher education, team project working or problem based learning is used as a method of teaching students to engage with the theory they are learning in a practical way. Although virtual learning environments and groupware are available to provide tools to help their activities, they help with the product, but not specifically the processes of team working. Intelligent software systems, based on agent technology, have the potential to provide tailored help to students who are working on team projects, and support both the product and process aspects.
Software Agent Systems for Supporting Student Team Project Working

when combined with other tools. At the same time the support should preserve the autonomy of the student teams to act in different ways.

The sections in this chapter provide a background to software agent technology, an outline of using team project working as a learning activity, a description of an experimental software agent system to support students in their team projects and a trial of this system. At the end of the chapter the findings from the trial are presented, and suggestions for enhancing the functionality of the software agent system are given, as the basis of future development of the agent system.

AGENT TECHNOLOGY FOR SUPPORTING LEARNING

Except within a few domains, such as Eliza or geological surveys, the emergence of practical applications of Knowledge-Based Systems (KBS), Expert Systems or Intelligent Systems, has been disappointing. Subsequent research into artificial intelligence (AI) arrived at the concept of a software agent, proposed as a more “acceptable” form of AI, in that it more closely resembles ways in which humans work to solve problems.

Intelligent systems are based on a set of fixed rules, compiled to simulate the sort of thinking that a human expert would go through to solve a problem. A system capable of changing or adding new rules, through learning about the environment or the user, can be personalised to an individual or particular situation. There has been some success with Intelligent Tutoring systems (ITS), which can learn something about the user being tutored, can provide material in an appropriate format for an individual learner, based on previous experience and performance (Hwang, 2003; Negoita & Pritchard, 2004).

Systems for individual learning are useful for providing online tutorials for on demand learning. However, learning through collaboration within small teams of learners, building up knowledge between them as they work on projects, with advice and help from a tutor, requires a different design of intelligent tutoring system, which is more complex (Strijbos, Martens et al., 2004).

Software agents stemmed from software that learns and can adapt its behaviour according to the present circumstances. The word “agent” was chosen for its definition as:

“something that acts for or on behalf of someone by their authority”.

The concept of an agent originates from human agents that provide services, such as estate agents and travel agents. These agents have specialist skills, access to relevant information, contacts for obtaining information and are focused on a particular task. Software agents are autonomous systems that work on behalf of a user, able to recognise what support the user needs to accomplish a task, and can react to the user’s input, so are personalised to the user. Agent systems operating in isolation do so within narrow domains, but these are more reactive than rule based expert systems, because they also learn and adapt their rules (O’Leary 1998). A fuller agent definition is:

“.. a self-contained, concurrently executing software process, which encapsulates the current state in terms of knowledge, and is able to communicate with other agents through message passing” (Wooldridge, 1995).

Some notable applications of software agent systems are in knowledge management (Ferneley & Berney, 1999) and Internet searchbots, e.g. MySpiders (Pant & Menczer, 2002), which facilitates knowledge sharing and searching. There have been some developments of software agent systems for learning, such as enabling students to navigate through virtual environments (Nijholt, 2001). Software agents communicating with other agents to fulfil tasks they would be unable to complete alone are called multi-agent systems (Ferber,