

## User Interaction with Web-based Agents for Distance Learning

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*Design of user interaction of web-based agent systems necessitates new approaches in relation to control, task allocation, transparency and user's privacy protection. This paper investigates interaction of users with multiple agents with special focus on web-based learning systems. A proposed new architecture is described, which allows for adaptive agents' participation in the educational process, while maintaining the user as the principal locus of control in user-system interaction. The issue of user modelling, the characteristics of the conceptual model of the user and the implications of the heterogeneity of resources are also discussed in the frame of an open web-based learning environment.*

*Keywords: user model, web-based learning, distance learning, multi-agent system, user interface design*

### 1. INTRODUCTION

According to Huhns and Sing (1998), agents are active, persistent software components that perceive, reason, act and communicate with their environment and other agents. Agents have been used in many contexts and the developed systems present considerable diversity. However two distinct uses of the term have been observed (Lieberman, 1997): (a) *user interface agents* that support the user and (b) back-end *autonomous computational agents* that interact and collaborate among themselves in problem solving. More specifically, in web-based multi-agent systems, a computational architecture that appears often combines the two branches of agent technology. It consists of agents representing or supporting the users, agents that represent services and act as facilitators and agents that represent data and knowledge resources. In this context, a typical scenario of operation involves the recourse agents advertising their existence and capabilities to the facilitator agents, the user agents seeking information through the facilitator agents and the information agents offering information to the user-agents. This pattern is widely used in electronic commerce, peer-to-peer collaboration and information exchange. Definition of the role of the user and the design of user interaction in multi-agent applications is not a trivial task as discussed in Avouris (1992) and Bradshaw (1997). This is particularly the case in new emerging application areas, like that of distance learning, where agents can play the role of personal assistants, user guides, alternative help systems, human-system mediators, etc.

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