

Mapping the range of ALE techniques

Agents and Avatars

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Jennings & Wooldridge (1998)

An agent is a computer system that is situated in some environment, and that is capable of autonomous action in this environment in order to meet its design objectives. Autonomous means not only independent once deployed, but also, if intelligent, *flexible*:

- responsive
- proactive
- social

Pedagogical Agents

- set of normative teaching goals
- plans for achieving these goals
- associated resources in the learning environment

Types of Pedagogical Agents

- tutor
- mentor
- assistant

So, all ITSs have some kind of *agent* (even if not always independent of the other components).

Avatars can be used as virtual embodiments of agents.

Motivation

- expressive power
- demonstrate tasks
- guide for simulations
- engage students

Why?

Agents

- have the capabilities of communication and interaction (agents can adapt and learn during an instructional session)

Avatars

- can communicate affectively and therefore add a social dimension to the tutoring

Where?

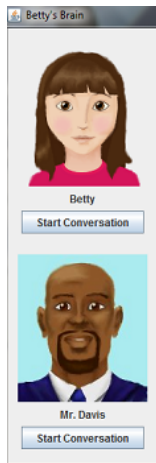
In general, most ITSs have at least one agent (the AI bit that models the student and reacts through feedback or adapting otherwise).

More advanced systems have also employed avatars to embody agents.

- uses mixed initiative dialogue to tutor dialogue actions and affect.
- constructivist theory
- emotions strongly impact learning, the system (tutor) can respond to student affect, through an *Affective Loop* :
 - 1.Real-time detection of student affective state
 - 2.Selection of appropriate tutor actions
 - 3.Synthesis of tutor expression, to try to engage with the students affect
- the agent emulates a human tutor, to save time and resources.



Betty's Brain - Learning by Teaching



Agent(s)

Still a Pedagogical Agent overall, but with 2 avatars

- mentor
- teachable agent

interactions with Betty

- teach Betty
- query Betty
- quiz Betty

Role of Mr. Davis

- direct the students to construct concept maps
- respond to queries, provide answer & explanation
- grade the quiz and provide corrective feedback

Crystal Island

- Middle-school level microbiology science curriculum
- 2 goals: content learning and engagement with the topic
- Inquiry Learning
- Focused on affective modelling and tutoring



Agents

- a cast of virtual agents, which have distinctive personalities, expressions and motivations.
- "Tutor" agents provide cognitive and motivational scaffolding via expert knowledge and advice.
- Recognition and prediction of students goals help to drive narrative and tutorial interactions.