

COMPUTER VIRUS COURSEWARE USING ANIMATED PEDAGOGICAL AGENT

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ABSTRACT

This paper describes a framework for practical application of interface agent technology as means of solving some persistent problems in educational environments. The system that has been developed is called a Computer Virus Educational System Using Animated Pedagogical Agent or CAPA. CAPA will cover a range of subjects from learning the basics computer virus to handling and management of computer system in response to virus attacks. When integrated into more conventional web-based course support system, a pedagogical interface agent can provide an educational environment which is not only flexible and interactive, but also personalized, emotionally responsive, and adaptive to a student's unique needs for structured learning and feedback. The CAPA agents would perform three main functions within the course of support application namely as a tutor, an expert and a motivator. As a tutor, it promotes active learning by offering facilities and coaching which help the student learn to teach himself. As an expert, it helps direct the student through the learning environment in the manner revered by users as professional in the field. Lastly, as a moderator it displays some emotional responsiveness and problem solving capability. CAPA tries to create a computer-based environment that learners will perceive a student to agent relationship with the computer.

Key Words: Animated pedagogical agents, Learning, Role, Virus, Educational system

INTRODUCTION

A promising form of information technology for enhancing learning is the use of animated pedagogical agents. Even though there is a large amount of studies in respond to agent system development principles, there is a significant lack of systematic and controlled research on the value of pedagogical agent features for supporting learning related results.

According to Marriot (2001), the growth in internet use and the market for online education have created a demand for computer-based delivery of educational content. Associated with this demand has been experimentation in development of character-agents with the potential to deliver education content. Much of this development has concentrated on achieving realistic or lifelike agents, yet there is little research on the relationship between the way in which a character-agent is represented and its effectiveness as a communicator.

Therefore, given the need for systematic examination of the role of pedagogical agent features in promoting learning and motivation, a system is sets out to conduct this systematic controlled study to investigate the role of pedagogical features in contributions to learning and motivation and consequently, develop an Animated Pedagogical Agent (APA) within the field of computer virus educational character-agent. This system is called a Computer Virus Educational System Using Animated Pedagogical Agent or CAPA.

BACKGROUND THEORIES

The term pedagogical agent is used to refer to agents that are designed to support human learning. Although pedagogical agents build upon previous research on intelligent tutoring systems (Wenger, 1987), these agents bring a fresh perspective to the problem of facilitating on-line learning, and address issues that previous intelligent tutoring work largely ignored.

The following areas have been studied in order to understand the need for developing CAPA:-

- Personification in computer-based agents
- Agent Development Tools
- Intelligent Tutoring System
- Reusability of Agents
- Artificial Intelligent

Personification in Computer-Based Agents

A personification is a fictional character or narrative agent who is the embodiment of conceptual entities such as classes, ideas, faculties of the mind, thoughts and feelings, speech acts, values, or field of knowledge (Paxson, 1994). One famous example, is when users browse through the World Wide Web (WWW), sometimes they do come across the virtual Microsoft wizard known as Merlin, an animated agent who controls the environment with the magical presence.

Personification is focused to reach the cognitive components within students through agent as a communicator and motivational tutor.

Agent Development Tools

Improvements in artificial intelligence techniques and the growing need for better interface metaphors have led to two converging major areas of research on agents.

One research focus is on the use of Artificial Intelligent (AI) techniques to create software that performs information filtering and other autonomous tasks for users. However these agents may or may not display any explicitly anthropomorphic features.

The second research emphasis is on the agent as an interface metaphor that assists both the developers and users. This agent's essential function is to act as effective bridges between a person's goals and expectation within the computer's capabilities. The agent metaphor is used to make the interface more intuitive and to encourage types of interactions that might be difficult to evoke with a Graphical User Interface (GUI).

There are many agents' examples such as search agents, web agents, monitoring agents, virtual assistant agents and webmaster agents. Some agent development tool such as StauriFAQtaur, Mash (Microsoft Agent), Network Query Language, AgentSheets, MadKit, EVO, and Zeus provide lots of features to build an Agent application.

CAPA development used two tools, which are the Microsoft Agent used to produce an agent interface and Stauri Solo from Victauri's Stauri Technology used to create the interactiveness in agent.

Intelligent Tutoring System

For a computer based educational system to provide individualized attention that a student would receive from human tutor, the concept of Intelligent Tutoring System (ITS) has been introduced. It is an automated system meant to teach students predefined lessons.

ITS over the World Wide Web (WWW) offer great prospects in moving closer to the goal of providing personal tutoring experience to a broader audience. The system achieves its "intelligence" by representing pedagogical decisions about how to teach as well as providing information to the learner.

A web-based ITS can be deployed according to a number of architectures. The common solutions include: - (Sherman & Alpert, 1990).

- Java-only
- HTML
- CGI
- distributed client-server

A Java-only solution would be to create the Tutor as an applet and allows students to download it from specific URL. The user would interact with HTML entry forms in the web browser in HTML CGI architecture. This consists of a server that possesses total functionality. A client-server model, on the other hand, distributes functionality between a client and a server. This would consist of a downloadable applet that delivers the user interaction module and communicates directly with a server application.

Reusability of Agents

According to Mikhail Esteves (1999), reusability is one of the simplest and the oldest concept of programming. When implemented correctly and purposefully, it can save time and money, as well as create an inventory for valuable and reusable software asset. There are two possibilities of reuse. First

is reusing readymade components (component reuse), and second is reusing a complete system that is customized by using new components instead of old components (framework reuse). Bergenti (2003). Reusability also helps in maintainability, modularity, portability, productivity, commonality, interoperability, adaptability, reliability and quality. Hence, CAPA is applying component reusability when developing its agent.

Artificial Intelligent

Artificial Intelligent (AI) is a simulation of human intelligence processes by computer systems. Edutainment is one of the applications where AI has contributed significantly from the casting of autonomous semi intelligent agents as entertaining character. Thus, this area of application is very suitable to the development of CAPA.

SYSTEM FRAMEWORKS

CAPA explores a new paradigm for education and training which is face-to-face interaction with APA in interactive learning environments. This paradigm joins two previous distinct areas:-

- **Animated interface agent**

Provides a new metaphor for human computer interaction based on face-to-face dialogue

- **Knowledge-based learning environment**

Instructional software that can adapt to individual learners through the use of artificial intelligence.

CAPA act as instructional agents. Thus, it does not transmit “knowledge”, but help students achieve their learning goals by recognizing the learner’s affective and motivational needs. The CAPA agents would perform three main functions:-

- **Tutor**

CAPA would encourage active learning through a series of interactive and individually paced presentations. The agent would guide a student through practice lessons using a series of hints, suggestions and demonstrations. Depending on the level of scaffolding required by particular students, the agent would provide more or less detailed or general guidance.

A genie tutor is programmed to speak (in musical tune, voice, word balloons or gestures) with concrete, non-technical, language as much as possible.

- **Agent as an Expert**

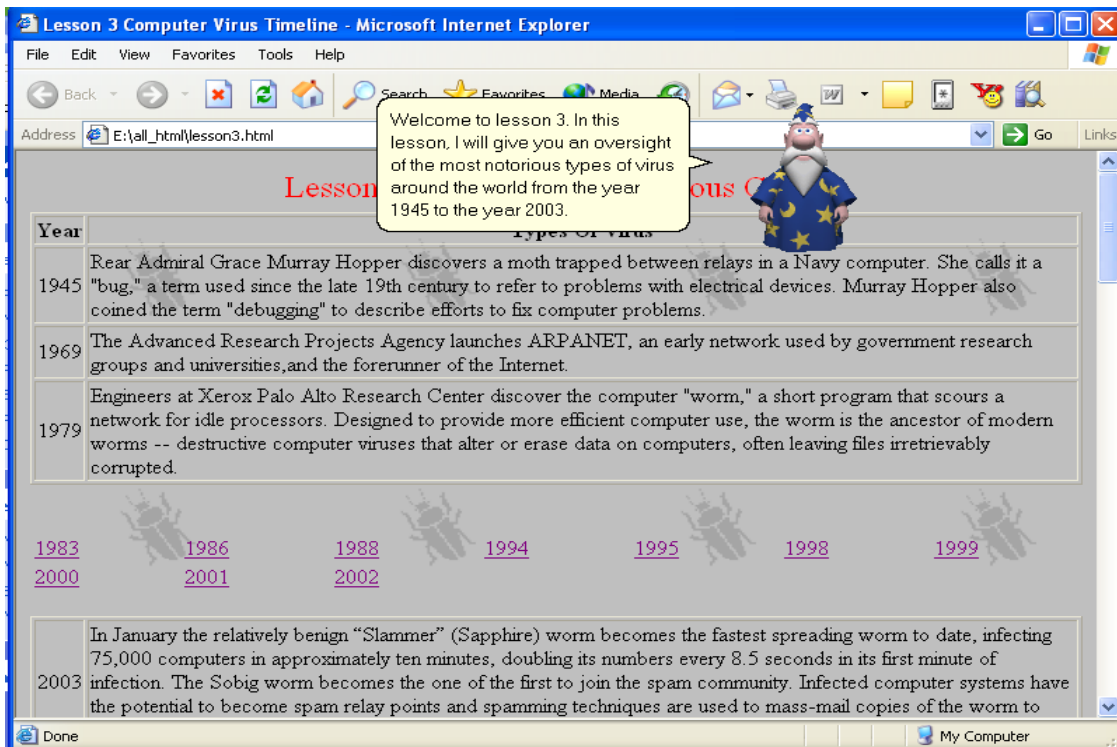
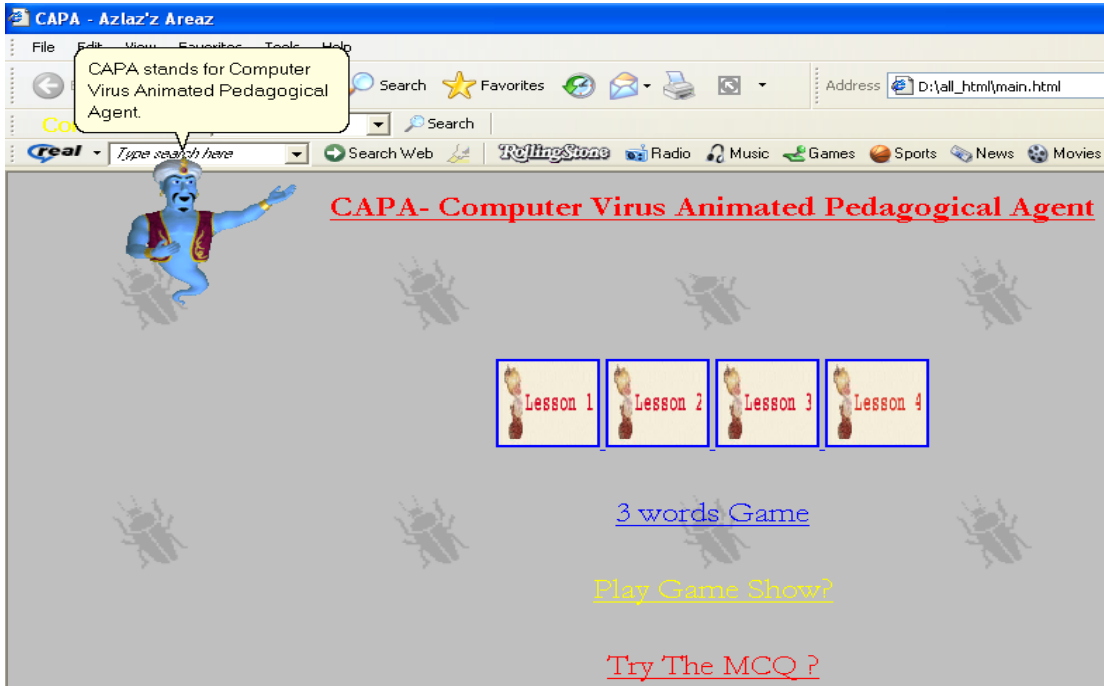
The genie tutor exhibits extensive knowledge and are viewed upon by users to be able to offer professional help within a computer virus domain. CAPA has designed the Genie and Merlin character agent in such a way that these agents will be viewed upon by users as commanding expert to lecturer the lesson.

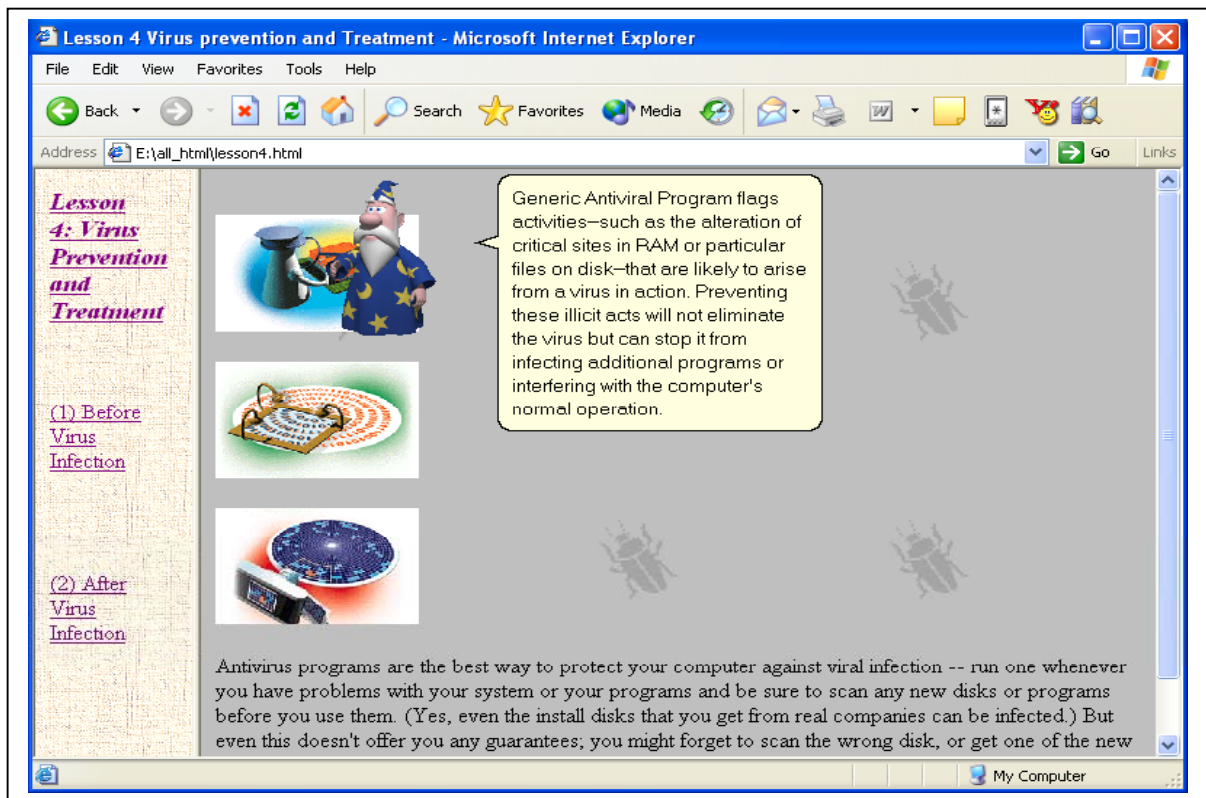
- **Agent as Motivator**

Learning and motivation are enhanced when learners observe a social model that consists of attributes similar to them. In CAPA, genie has been chosen based on the image of a companion in the age of twenties considering the target populations are

university students. The agent's appearance is casual and gestures are expressive and enthusiastic. Genie is not only knowledgeable but also suggests own ideas, and verbally encourage the learner to sustain the tasks. Emotional expression such as disagreement, agreement, dislikes and enjoyment are also included throughout the learning process.

Below are the snapshots that show the features in CAPA.





CONCLUSION

Animated pedagogical agents (APA) combined artificial intelligent with sophisticated animation can produce effective learning environments. Offering great potential for improving learning effectiveness and efficiency, APA provides students with problem solving advice that is constructed to different individual's learning capabilities. It also provide a low-pressure learning environment that allows users to study at their own pace.

CAPA endeavors collaboration of the delicate balance from the best aspects of a human tutor and the best aspects of a computer-based intelligent tutoring system. For example, the user do not need to feel intimidated or embarrassed approaching the agent if the users need to ask the same question repeatedly on various occasion.

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