A Model of Virtual ‘Learning to Learn’

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Abstract

Event though Information and Communications technology arises as a powerful tool for the improvement of education, at present, e-learning does not improve learning methods but merely repeats the problems of traditional education.

This work proposes a new educational model that tries to tackle these problems. Through the use of a global ontology as basis of a Knowledge Management System, this system allows us to establish the largest number of relationships within the available information, and its classification. From this knowledge support, learning is planned through action, which results in the execution of tasks that are based on computer games strategies. The system interacts with the student to motivate him, showing him the information adapted to his preferences.

1. Introduction

The learning process consists of a modification of our conduct that, by extracting knowledge from acquired experience, enables us to tackle problems. The definition shows the two basic aspects of this process: knowledge acquisition, and its representation.

After having studied the information management systems currently in use, we have reached the conclusion that the best currently available approach is Knowledge Management System (KM). A KM system (KMS) not only stores information, it goes further by making the users part of the system itself and includes mechanisms that allow us to share tacit knowledge [1].

Unfortunately, the intents to include KM in learning systems [2] have so far been limited to including only certain aspects of KM, such as lists of “Frequently Asked Questions”, or mechanisms for the exchange of tacit knowledge, but without including these contents in the KM’s Knowledge Base (KB), or allowing the feedback of the student’s experiences.

However, Knowledge handling facilitates the improvement of learning and teaching methods: from a model in which the teacher is the monopolising agent, we must move towards a model that offers the student opportunities for individual exploration and self-learning. The student needs to build relations, discover the process from within, and feel stimulated to draw his own roadmap. Thus, he will not only learn, but will learn to learn.

This kind of learning can only be obtained through action strategies. Contents should be represented not as an objective but rather as necessary elements towards a series of objectives that will be discovered along the course. A good example is given by computer games, which make their users learn to proceed from one phase to another on the basis of obtained experience and improved dexterity, in a trial and error strategy.

2. Proposed Model

2.1. Information Management

One indispensable element of a KMS is the Institutional Memory, which will contain the contents, theirs relations, and the learning method. To develop it, we must identify thematic units and the processes the student is supposed to control in each of the units. After detailing these processes down to the most basic level of the course, the relations between the processes are charted in a Knowledge Map, to associate the knowledge elements to each process, assign a pattern problem to each of these processes and relate a series of real problems to each pattern problem.

Once the elements are organised, they must be included in the KB. To implement the relations, we will use a global ontology that separates the conceptual structure from the storage structure. To facilitate the transfer of tacit knowledge, we propose aschronic and technology-based communications, but taking into account personal meetings (e.g. videoconferencing), and the revision of already held meetings.
2.2. Design of the interaction

We propose a method to join the non-linear structure of the information and the active experience-based learning [3]. Instead of directly presenting the contents to be studied, we present tests that, in order to be carried out, require the aimed knowledge. If the student cannot carry out these tests, they will be divided into easier subtests. The student disposes of a series of helping tools: basic material to resolve the tests, links to related subjects, examples of similar problems, solutions proposed by other students, hints concerning what he should (and should not) do and whom he could ask for help. This way, the student gradually constructs his own knowledge through practice. Once he finds the solution to a problem, he will be confronted with more complicated tasks that require the previously acquired knowledge. In the course of the learning process, he will be able to use communication tools and to increase the information stored in the system.

The design of the tasks follows computer game strategies, whose characteristics stimulate motivation and action: the student knows the final aim, but not the intermediate steps, which keeps his interest level constant; there is a high level of interaction; errors and successful actions are detected immediately; the rhythm of the study is self-regulated; and the user manual is replaced by an interactive demonstration of the rules.

The student disposes of a series of help tools like yellow pages (images, videos, texts; recommended bibliographies, lists of experts in the field, students that have achieved a similar level, solutions of similar tasks, related or similar tests), learned lessons (best practices, worst practices, false manoeuvres), frequently asked questions and communication tools (e-mail, discussion, chats, video conferencing). The student will also have access to information on related subjects, and his evolution will be recorded in an evaluation report.

2.3. Integration of the components

To make the technology transparent for the user, we propose the use of a web environment where both the information and the student’s evaluation are stored in the remote server. The bigger part of the work, however, can be carried out at the student’s local computer to avoid an overcharge of the system.

The integration between components and communication with the student is optimised by five types of Intelligent Agents: a student monitor which works locally to control changes in the state of the student and to personalise the presentation of the information; a monitor of the Knowledge Base to control changes in the KB that could influence the other students; a strategis agent to manage learning strategies according to the students’ level and preferences; an Information agent to gather information from the KB and process it according to the strategy’s indications; and a visualisor agent which generates the visualisation adapted to each user.

The proposed model incorporates the contents in the Institutional Memory of a KMS in order to improve their assimilation, and uses an ontology to maintain the information and its categorisation independently. It also proposes learning through action, while guaranteeing that the acquired knowledge is used in the execution of tasks adapted to the level of the learner.

The study is still in course and on going approximations with reduced prototypes [4] show, by now, that the use of the environment allows the student to extend or improve his problem-solving methods and his abilities to apply already known strategies to new problems.

3. Summary

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4. References