ELEARNING VIRTUAL ENVIRONMENTS MULTI-AGENT MODEL FOR MEDICAL STUDENTS

Luis Gaxiola Vega, Bogart Yail Márquez, José Magdaleno-Palencia, Manuel Castanon-Puga
Baja California Autonomous University, Chemistry and Engineering Faculty
Calzada Universidad 14418, Tijuana, Baja California, 22390, Mexico

Miguel A. Cadena Alcantar
Baja California Autonomous University, Cisalud Palm Valley, Blvd. San Pedro # 1000, Tijuana, Baja California, Mexico

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Abstract: In today's education it is becoming normal to talk about virtual learning, online and at a distance. Such environments are incorporated daily attendance practices that know, greatly enriching, with the potential of media and technology, educational opportunities in all areas, this paper explains how to implement the use of multi-agents. It will discuss how the curriculum can be enriched by activities involving problem-based learning, case studies simulations and virtual reality. This new model provides multiple uses for exploring knowledge and supporting learning-by-doing. It engages users in the construction of knowledge, collaboration, and articulation of knowledge in a virtual environment, especially in the teaching - learning.

1 INTRODUCTION

1.1 e-Learning

e-Learning comprises all forms of electronically supported learning and teaching. The information and communication systems, whether networked or not, serve as specific media to implement the learning process. The term will still most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum.

Electronic education is considered one of the most promising options for today and the future of education, which is why the development of learning environments needs to increase. A virtual learning environment consists of a digital space that interrelate various aspects of communication, education, technology and emotions, which helps students learn. Learning environments usually covered four areas: information, exhibition, production and board area: interaction.

E-learning is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual classroom opportunities, and digital collaboration. Content is delivered via the Internet, intranet/extranet, and others such as information technologies. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video, and audio.

1.2 Computer-based Training

Abbreviations like CBT (Computer-Based Training), IBT (Internet-Based Training) and WBT (Web-Based Training) have been used as synonyms to e-learning. Today one can still find these terms being used along with variations of e-learning, such as, elearning, Elearning, and eLearning.

E-learning has become common in specialties that use standardized treatment pathways, such as emergency medicine (Berne 2001). However, learning programs based on simulation using virtual

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rooms are still scarce, as they are expensive and laborious (Morin 2008)

1.3 Virtual Room

Simulation of Virtual Rooms (VR) today is a new technology applied to research of new methods, forms, techniques, and architectures that provide solutions to problems that occur in both medicine and industrial engineering, and thus create experience when actual cases are confronted.
Today education is heading toward virtual learning, online, and distance learning. These types of environments are incorporated into classroom practices that as we know, are greatly enhancing, with technology, the possibilities of teaching in all areas. There is no doubt that within a classroom learning environment, a process that always takes place is communication. Interaction takes place within the media.

1.4 Multi-Agent System (MAS)

MAS Multi-agent systems: it consists of autonomous agents working together to solve problems, characterized in that each agent has incomplete information or capabilities for solving the problem, there is no global system control, data is decentralized and computation is asynchronous. The agents dynamically decide to undertake tasks (Gilbert 2007).
MAS including the integration of global and individual perspectives and the dynamic adaptation of systems to environmental changes. As growth systems that include hundreds or thousands of agents (Artikis, Boissier et al. 2009).
Formal theories are needed to describe interaction and organizational structure and understand the relationship between the organizational functions of these agents. there are different definitions of a multi-agent system, several authors define it as a system in which multiple autonomous agents, heterogeneous, interacting with the environment, each seeking their own goals (Gilbert 1999). However it must be heterogeneous to be a multi-agent system, some authors (Gómez 2003), defined from the construction of programs that make up the distributed system applying a technology closely related to artificial intelligence.
This technique is accomplished by being autonomous and intelligent agents. It is when the systems become more distributed. The model using the MAS help the study of knowledge in virtual environments.

Building on the Learning Virtual Learning Environments, expert systems, social simulation systems, robotics etc. among other areas. Research is performed after the creation of a multi-agent model that allow us to represent the process of learning and artificial intelligence techniques in the area with Student Health.
This work can be part of the beginning of a multidisciplinary learning process, in order to achieve meaningful learning (Ausubel 1983), there will be iterative work between students of the Department of Health CISALUD Palm Valley, Tijuana, Mexico, where knowledge can be generated through the simulation of learning environments. Needs that are required are able to have an RV, for working in collaborative or cooperative, also were used computational techniques intelligent hybrid techniques for the rules are changed adaptively.

2 BACKGROUND

For over twenty years, the simulation has been used to solve health problems in the U.S. and the United Kingdom. For example, (Pitt 1997) flows simulated patient in a hospital based on State Transition Networks. (Spry and Lawley 2005) developed a model to assess the pharmacy staffing and work scheduling and (Jun, Jacobson et al. 1999) applied multidimensional performance measurement of a Family Medicine Clinic and Community Health by simulation. Jun (Jun, Jacobson et al. 1999) presented a study of 117 applications of simulation applications in health care clinics.
Most simulation studies on health have focused on relatively well-constrained operational environments of care (eg, organization of accident and emergency departments (Miller, Ferrin et al. 2004) or have been necessary to greatly simplify the domain modelling to produce usable results. In general, these studies have been directed to specific problems of interest within the institutions identified in attention (Pitt 1997).
One of the common areas of concern in any healthcare institution is to reduce the waiting time or length of stay of patients. This is also part of the management quality of health care organization. Today, many health organizations have adopted various quality management techniques, such as Business Process Reengineering, Total Quality Management and continuous improvement to improve their processes. As simulation can model complex and highly variable environments, it is a useful tool in these studies.

A significant percentage of hospital admissions come through the Emergency (A & E) Unit and also serves the most urgent cases is now essential that the service department is efficient at all times. A number of case studies have been performed on A & E units. (Garcia, Choren et al. 2005) proposed the use of simulation to study the possibility of reducing the time in an emergency room via a fast track.
Some other studies, suggests the use of an additional patient care coordinator at peak
times, making an alternative space for patients. (Takakuwa and Shiozaki 2004) simulated the flow of patients with ARENA and found that patients in A & E unit spent most of his time waiting for treatment and the wait in emergency beds, doctors, drips and beds accounted for the bulk of the timeout. (Miller, Ferrin et al. 2004) illustrates the use of simulation for continuous improvement in A & E Unit and in particular EXTEND used to apply experimental design techniques.

2.1 Issues in Virtual Rooms

One of the problems of simulating clinics such as an A & E is the unit that accurately represents the arrival rates of patients. Random walk-ins "(and emergencies) are superimposed on scheduled appointments (for review, etc.) and it is very difficult to predict and therefore manage patient arrivals at any time. In previous studies patients are usually grouped in situations of appointment and Random Walk-ins. In patients who have scheduled appointments leads to hours, while arrivals from walk-in patients are randomly generated. The developed a probabilistic model to predict potential patient arrivals to an emergency department. However, these approaches do not take into account the possibility of peaks and troughs in the day called "random" arrivals. For example the peak in arrivals of patients often occurs in late morning and afternoon.

2.2 Modelling

The purpose of the paper is on modelling through simulation in order to strengthen their student's meaningful insight into virtual environments. Using a multi-agent model that allows it to be the computational tool to help us shape the learning problems and to evaluate or measure, the proposed model of meaningful learning.
The aim is to represent the knowledge of agents to help shape the problems faced by students. And being able to interpret the knowledge learned in the simulation of multi-agent systems. The development of a multi-agent model implemented in a virtual environment to assess and demonstrate significant learning in the area enabling students to improve their health knowledge is required.

3 IMPLEMENTATION

Using the NetLogo software, StellaThing for interpretation of agents implemented in multi-agent model and compares the students to see the results generated. First identify the problems that may occur in the process of model development. In reproducing the student's behavior in different scenarios, through intelligent agents. And so to establish a method or technique of intelligent computation according to the proposed model is applied to social simulation eLearning Virtual Environments NetLogo (Wilensky 1999).

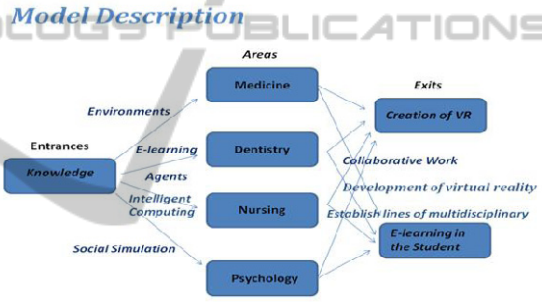

Figure 1: ELearning simulation for medical students.

When creating the virtual cave for VR simulation. (Rooms Virtuals) where students work health area, simulations are carried out in the virtual cave where they can reproduce the behavior of students and to obtain data that can compare with actual behavior. Experiments are underway to train students who work in the laboratory of virtual teaching and learning in the area of health sciences in the State of Baja California, Mexico.

4 CONCLUSIONS

The proposed Project to have objective to investigation and research on theoretical and practical about how to behave in a group of students, such as learning in different learning environments for troubleshooting. We can adapt to our needs.
We propose further research, develop meaningful learning. Hence, the project aims to develop tests

results with agents in the students, what is learning and performed as research and also be elearning assessment to develop, under the proposed multi-agent model.
This would provide us with feedback and intelligence using meaningful and collaborative learning in different environments.

REFERENCES

Artikis, A., O. Boissier, et al. (2009). Handbook of research on multi-agent systems: semantics and dynamics of organizational models New York, Hershey Pa. : *Information Science Reference.*

Berne, E. (2001). The structure ans dynamics of organizations and groups. Beaconsfield, Australia, *Freemantle Publishing.*

Garcia, A., R. Choren, et al. (2005). Software Engineering for Large-Scale Multi-Agent Systems - *SELMAS 2005: workshop report, ACM.*

Gilbert, N. (1999). The Simulation of Social Processes. *SMAGET Conference. Clermont-Ferrand, France.*

Gilbert, N. (2007). Computational social science: Agent-based social simulation. Agent-based modelling and simulation. D. Phan and F. Amblard. *Oxford, Bardwell: 115-134.*

Gómez, J. (2003). Metodologías para el desarrollo de sistemas multi-agente. Inteligencia Artificial, *Revista Iberoamericana de Inteligencia Artificial. No.18 (2003), pp. 51-63.*

Jun, J. B., S. H. Jacobson, et al. (1999). "Application of Discrete-Event Simulation in Health Care Clinics: A Survey." *The Journal of the Operational Research Society 50: 109-123.*

Miller, M. J., D. M. Ferrin, et al. (2004). Fixing the emergency department: a transformational journey with EDSIM. Proceedings of the 36th conference on Winter simulation. Washington, D.C., *Winter Simulation Conference: 1988-1993.*

Morin, E. (2008). "Restricted Complexity, General Complexity."

Pitt, M. (1997). A generalised simulation system to support strategic resource planning in healthcare. Proceedings of the 29th conference on Winter simulation. Atlanta, Georgia, United States, *IEEE Computer Society:* 1155-1162.

Spry, C. W. and M. A. Lawley (2005). Evaluating hospital pharmacy staffing and work scheduling using simulation. Proceedings of the 37th conference on Winter simulation. Orlando, Florida, *Winter Simulation Conference*: 2256-2263.

Takakuwa, S. and H. Shiozaki (2004). Functional analysis for operating emergency department of a general hospital. Proceedings of the 36th conference on Winter simulation. Washington, D.C., *Winter Simulation Conference*: 2003-2011.

Wilensky, U. (1999). "NetLogo Software." from http://ccl.northwestern.edu/netlogo.