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Agents and Multi-agent Systems: Technologies and Applications 2019

13th KES International Conference, KES-AMSTA-2019 St. Julians, Malta, June 2019 Proceedings

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Contents

Toward a Model of Management Processes to Support or Increase the Competitiveness of a University Professor

Nora Osuna-Millan, Ricardo Rosales, Felipe Lara-Rosano and Arnulfo Alanis Garza

Abstract This article proposes the revision of the information required to establish the management processes to support or increase the competitiveness of a University professor, where complex processes intervene that must be attended by means of a model based on agents; it also presents the need to identify the characteristics that can and should drive a substantial improvement in the teacher's performance, intelligent agents based on the perception of information from the environment, to produce a result that can be communicated to another or others through a model based on intelligent agents, which allow to strengthen the competitiveness of a teacher.

1 Introduction

An university professor today is committed to administrative and research activities, which complement his activity in front of a group according to [1], these are necessary for the functioning of the Faculty and the strengthening of it in its performance; the problem arises when these activities are not balanced, the professor may be demotivated by various environmental factors internal and/or external to the teaching-learning process and/or professional training of it.

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The fact that the teacher is assigned to different learning units—subjects without analyzing their protective characteristics, at the same time as their risk characteristics; where the first provide security and the second can generate a situation of insecurity for the same [2, 3].

There are several studies [1] that indicate that new teachers, assigned in an average term of subject or part-time and full-time teachers are minimizing their competitiveness by generating a state of comfort, lack of motivation, lack of training, generalized evaluation, insecurity, in consequence, the quality of teaching—education is diminished.

2 Background

The diversification of the tasks of a university teacher between the accumulation of extra or delayed work and cognitive effort has generated, in them, diverse health problems [1], for which reason it is necessary to generate tools and strategies that mitigate this problem and support the teacher in generating a more competitive environment that is reflected in quality education.

In Mexico, it is essential to develop strategies that support the best performance of students which will be fully related to the teacher's, this allows recognizing the level of competence that the teacher provides to their students, studied and reviewed by various measurement tools [4].

Education in Mexico allows us to observe the complexity involved in the quality of education, its volume and scope, and the participation of the main interest groups [5]. University professors must overcome the temptation of routine, the fact that the same techniques are considered applicable to all groups, there are characteristics that may coincide in some groups and/or students but there are characteristics that are unique to each group and/or student, routine, inertia, non-criticism of basic mental schemes repeated and applied by custom of teachers [6].

The multidimensionality and complexity of an educational institution require that its main actors innovate in order to seek new solutions to emerging problems in the educational field that strengthen their competitiveness [7].

The objective of the proposed research is to develop a process simulator for the management of the competitiveness of an university teacher as a knowledge base for quality university education, which will allow identifying the variables that increase or allow the competences of the professors to be maintained independently of the complexity of the interaction context and/or scenarios in which it performs.

3 State of the Art

3.1 Agents

The use of agents is increasingly required for the creation of intelligent and simulation systems, the need to make predictions and support in the prevention of current and future problems is of great interest for the whole society in general.

An agent can be defined as an entity that reacts to different perceptions or reception of information from the environment, to which it responds through decision-making based on experiences see Fig. 1 barely known or recognized at that time [8]. An agent is a container of software that has autonomy and behaves like a human being, that looks for the best solution for a problem, for a multi-agent system it is necessary that the agents relate to share information and generate reactions to it, all oriented to the collaboration among them to achieve a better result, these are social, reactive, adaptive, and autonomous [9].

3.2 Agent-Based Model

The complexity sciences allow to approach the emergent properties from the communication between diverse agents and this can be captured through a Model based on agents and its simulation [10].

The simulation can represent an imaginary activity, a reality, a probable scenario, which allows us to see realities that do not yet occur, a prediction [11, 12]. Computational simulation allows the identification of anticipated or predictive solutions in the near future, through the scenario of certain variables that can be found in the environment. This is part of agent-based modeling [13]. A model facilitates the understanding of a theoretical or imaginary description of a process, set of processes, or a complex reality [14].

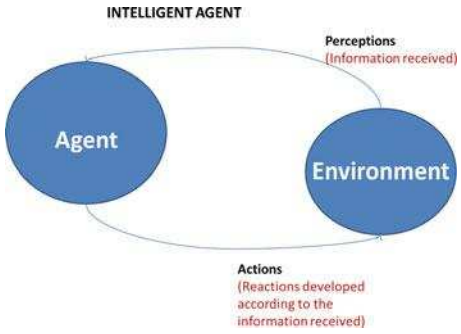

Fig. 1 Intelligent agent

3.3 The Complexity and An University Teacher

The complexity in which the university professor is involved can be grouped into the following sections: the teaching-learning process, interpersonal relations and the administration or the institutional context, these three elements allow the teacher to be competent in the activity developed, when performing in the best way the (efficient) processes for which it is responsible, confirm that its main stakeholders consider that the work it develops is the one that is required (effective) and is productive when performing the greatest number of activities in the smallest unit of time and possible costs.

The management of the competitiveness of a university teacher as a knowledge base for quality university education through a computer simulator is undoubtedly a strategy that will make it possible to address in a different way the evaluation of the experience, teaching-learning process, attention to students, attention to teaching and administrative activities, through the analysis of the abstraction of processes, the emergence of processes, activities, interpersonal relationships in various scenarios; At the same time it will allow the coordinators of career area, immediate superiors or top management the efficient decision-making, which will be focused on generating strategies that strengthen the variables that allow the teacher to maintain and/or increase the competitiveness of the same and generate a quality education in the applicable field.

Implementing a science-oriented approach of complexity to this project will allow a disruptive approach to the process in which university teachers are developed, which will influence the achievement of quality education.

4 Methodology

The proposed methodological strategy allows the development of work through an approach to the surroundings of the main actor; the previous will generate a scenario of reality that occurs in the university world of the teacher and thus efficiently shows the skills, behavior, performance, interests, competencies, and objectives, as well as the simulator.

The interaction of the main interest groups, as well as the communication at all times with the client, is essential to obtain the information required for the development of the model.

The work will be carried out in four stages: Start, Planning, Execution and Monitoring and Control; Delivery and retrospective [14, 15], each of them is presented below.

1. The Start stage includes the definition of the conditions in which the project is generated, problems to solve, resources involved, identification and determination of the main interest groups, risks, scope, costs, time, restrictions, criteria

of Acceptance if applicable and equipment. Where the creation of the Project Charter and/or project case, simplifies or summarizes this stage.
2. Subsequently, the Planning phase begins, which includes the completion of the General plan for the administration of the project resources and/or the plans for the management of the development of small functionalities to be delivered; These include times needed for the efficient fulfillment of the activities, as well as the sequence in which they will be developed.
3. In the stage of Execution, Monitoring and Control will develop the activities aimed at creating the deliverables or functionalities for this project will start the modeling based on agents for a simulator of management processes that support and/or increase the competitiveness of a university professor.
4. Delivery and Retrospective: Once the scope of the work is completed, the product is delivered to the client or in this case to future work, on the results a retrospective should be performed that allows to visualize the activities developed correctly so that they can be replicated in projects or following tasks and the tasks carried out incorrectly so that they do not repeat themselves, finally the final report will be developed that complements the development of the project.

The methodology used allows managing to work through a combination of traditional and agile methodologies of project management.

4.1 Teacher System

The multiple scenarios in which a University Teacher can develop are diverse, see Fig. 2, so creating the design to simulate a real environment will allow to visualize in a more efficient way the needs, experience, preparation, interests, capacities, personalities that allow improving the competitiveness toward higher quality education in the process of teaching and learning.

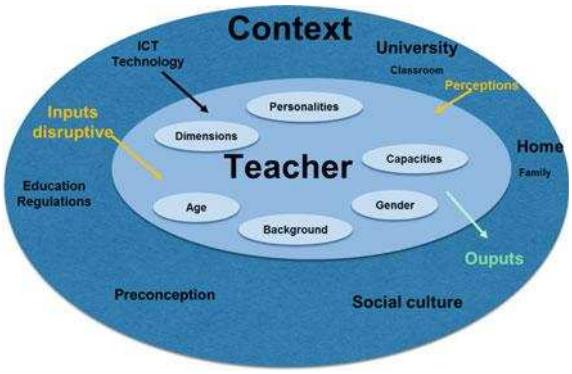

Fig. 2 Teacher system

The emergence of situations that strengthen the skills and self-motivation of a University Professor are diverse and include many disciplines, which will allow a complex simulation of the Factors that support the teacher and those that affect them, this will allow managers to generate strategies that allow the University Professors not to lower the level of quality that the institution itself requires [16].

5 Conclusions

The generation of a model of management processes that support or allow to maintain or increase the productivity of a teacher will undoubtedly generate great support to those in charge of managing the relationship of teachers with students in the teaching-learning process. The system that describes a teacher illustrates the parameters that have been identified at the time and that can affect this positively or negatively. Once the model is concluded, it will help to identify the relationships with other actors and the way in which different scenarios, interactions and shared information support the teacher.

6 Future Works

The work to be developed will be the realization of the Management Process Model that allows to increase or maintain the competitiveness of a professor, as well as the subsequent construction of the computational social simulator, the implementation of the platform with the simulator, the realization of tests and validation and finally the publication of results.

Another of the future lines is to include the formal description of each of the agents involved in the model that are included in the environment surrounding the university professor so that this allows a better understanding of the teacher's interaction in their environment, as well as identifying themselves Personality, capabilities, age environment, gender, experience and dimensions presented by the Professor, which will allow to develop a knowledge base based on logic rules. Fuzzy define the tuples of the agents, implement the knowledge base based on fuzzy logic with rules Type 1 and Type 2.

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