Teaching and Learning Management through Managerial Simulation

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Abstract: The rapid development of computer science and technology has changed these days the educational practices. The aim of this paper is to reveal recent research focused on the education of economists specialized in management science. The paper discloses the main rationale for applying computer simulations in economic and managerial education. Furthermore, this paper summarizes an experience in teaching Management to undergraduate students using computer simulation. This article could provide interesting practices for those who are teaching Management.

Key words: computer simulation, education, teaching Management, managerial simulation, PRELEM XXI.

1. Introduction

Nowadays economic and managerial education is profoundly changing by integrating information and communication technologies (ICT) into the process of teaching and learning. The new generation of students find modern technology very useful when they search things of their own interest [1]. They handle their lives differently, spending a great amount of time online everyday. They are intensely using new technologies such as computers, internet, cell phones, and computer games. [2]

ICT facilitates creation of learning environments that have added value compared to traditional learning tools and environments and respond to the learning needs of 21st century students [3]. In the last few years, there has been a growing understanding of the important role of information and communication technologies in education. Various new models of education are evolving in response to the new opportunities [4] that are becoming available by integrating new technologies and computer applications into the process of teaching and learning. The new educational model is characterized by the interdependence of communicative interaction, new technologies, the development of computer applications, the design of computer-based tasks and focused activity for learners to become critical thinkers and creators of knowledge. [5]

Knowledge-based society needs major changes in the educational programs, being necessary to prepare teachers from all fields, in such way to use the information technologies in computer assisted learning [6]. When teachers are using the ICT in learning activities these become more attractive [7], but not all teachers are convinced that ICT should be an integral part of their teaching strategies and this is one of the most difficult barriers for effective ICT integration [4]. However, this resistance to change is more specific to older teachers that were not used to the new technologies.

The process of learning is characterized by constant exchange of information. While information exchange can be performed on paper, it is reasonable to use computers for this purpose. [8] Many possibilities are available for communicating information in education using computers. One of them is computer simulation that could be used successfully in economic and managerial education.

2. Computer simulations application in educational environment

Since the early 1960's, simulation has been one of the methods used to aid strategic decision making within industry. The reason for this was the ability of the simulation to imitate complex real world problems or systems (economic, managerial, mechanical etc.) and to analyse the behaviour of the system in time. In today's world computer simulations and games are being implemented and integrated within several fields like military, health, business, education etc.

In economic and managerial education it is very useful to simulate the activities of a company in order to develop students' competences and skills they need for their real activities. Since the real environments are not always available, the virtual

environments can be effective alternative. Simulation is based on the principle of "learning by doing", meaning creating a virtual environment in which to operate a model previously built. In such virtual environments, students will be forced and encouraged to behave, speak, think and write in the same way of real life. [2]

Simulations are to a certain extent important to assimilate the theoretical concepts, but it is known that a real time process enriches the teachings and will become more attractive for the student. [9] Simulations enhance learning through group interaction and if this is used realistically, the experiential nature and the intensity and motivational aspects of learning should make the learning experience superior to any other learning activity. A dynamic and authentic learning environment provides a self-directed learning experience, where the teacher acts as a facilitator for learning. [3]

One of the necessary conditions to effectively leverage technology for learning is student-centred learning, meaning use of ICT to facilitate engaging approaches to learning. The goals of today's education emphasize on creativity and innovation, as well as on communication and collaboration. Students should be able to demonstrate creative thinking, to construct knowledge as a means of individual or group expression, to use models and simulations to explore complex systems and issues, to interact and collaborate using a variety of digital environments and media in order to support individual learning and contribute to the learning of others [10]. Technologies that support teacher-student and student-student interaction, whether real time or asynchronous, promote and support collaboration and discussion [11]. People have now more diverse and frequent interaction opportunities than they have ever experienced before, due to the development of the Internet and its communication possibilities (Email, chat, Web discussion forums) [12]. This fact could lead to a better teaching-learning process and also to the creation of new and attractive methods for teaching and learning. Educational process could be improved with communication tools that provide synchronous and asynchronous opportunities for interaction and collaboration. Blogs, podcasts, real time interaction, and virtual worlds could be incorporated in education to create a learning environment that strengthens teaching and motivates learners, resulting in an increase in student satisfaction and retention rates. [11]

Modern students will require regular updating of their knowledge, skills and competences [13]. Therefore, teachers should redesign their courses by adopting new educational methods and appropriate technologies to fully exploit the benefits of web-based learning environments [14], and computer simulations in education. Flexible and innovative teaching and learning based on computer simulations will expand and will change the educational process. Within a knowledge-based society teachers have a changing role, but they also need to manage the processes associated with the creation of their knowledge assets and to benefit from the use of computer simulations. [15]

3. Teaching and learning Management by means of PRELEM XXI managerial simulation

Teaching and learning Management is a very complex process because the students need to develop different skills related to psychology, communication, economic and social thinking, decision making, critical thinking etc. [15]. In order to properly respond to knowledge-based economy and society, education was reorganized to improve problem solving ability through critical thinking. [3] Students should be able to use critical thinking skills in order to: identify and define authentic problems and significant questions for investigation; plan and manage activities to develop a solution or complete a project; collect and analyze data to identify solutions and/or make decisions; use multiple processes and diverse perspectives to explore alternative solutions [10].

This study is the result of some years of personal experience in teaching Management for Romanian students and using managerial simulation named PRELEM XXI in class in order to develop the skills that students need for their future professional economic and/or managerial activities.

The motivation for this study was justified because business and economics involves a social dimension, meaning that people learn, work and live both as individuals and as teams, as society. Another reason is that PRELEM XXI was designed to produce real situations within the processing of wood industry. It supports multi-player interactions as well as individual thinking and learning. All these factors make this computer simulation a viable vehicle for the study of Management, providing tools for creating realistic economic and managerial environments.

3.1. Overview of PRELEM XXI managerial simulation

PRELEM XXI managerial simulation was created and developed by a group of teachers from the Faculty of Management from the Academy of Economic Studies in Bucharest. This managerial simulation has some features such as [16]:

- It is a general managerial game which simulates most of the activities of a company in the wood industry processing in order to achieve the main objectives of that enterprise;
- It is a team managerial simulation, because the students work in groups;
- It is a computational managerial simulation which processes information using the computer;
- It is an interactive managerial simulation, because the actions and decisions adopted by the participants are influencing each other to some extent;
- It is a medium-superior managerial simulation, because it simulates management and execution processes within the company made by the medium-level and superior-level managers.

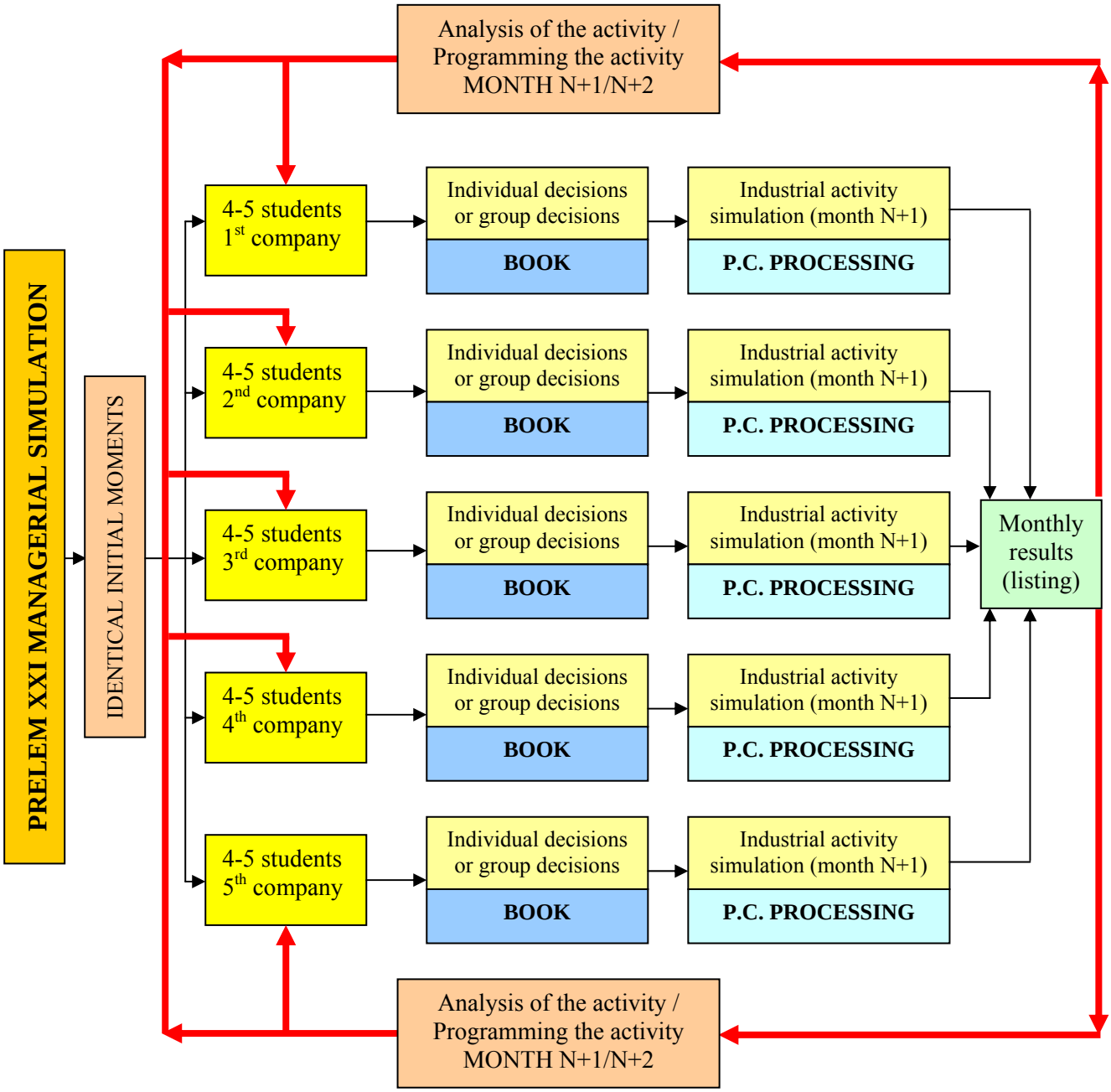

Fig. 1 Framework of PRELEM XXI managerial simulation

Within managerial or industrial simulations such as PRELEM XXI each student is a member of a group (virtual company) and the class is split into 4-5 groups (virtual companies) that act like competitors on the same market. Each round of the simulation represents a virtual month and usually the students are simulating 12 months of industrial activity.

The final decisions are the sum of individual decisions first and group decisions second. The initial data (inputs) are identical for each of the 4-5 companies. However, the big number of decisions adopted (circa 60-65 decisions per simulated month) rapidly differentiates the behaviour of each company.

Figure 1 shows the general framework of PRELEM XXI managerial simulation, emphasizing the phases of the simulation and also the fact that the simulation is an iterative process. In essence, playing the game involves three different phases:

- First, students analyse the activity of their company and take on decisions based on calculations and foundations executed by each group;
- Second, the students introduce their decisions into computer and the results of the simulation for each company are obtained through processing decisions of all virtual companies. An important issue in this phase is that all 4-5 companies should introduce their decisions into computer so that the managerial simulation to work;
- Third, the managerial reports that contain the results of the simulation are sent by E-mail to each virtual company.

Simulated activities within PRELEM XXI simulation are: foresight (prevision), technical conception, investments, supply, production programming, production, equipment maintenance and repairs, sales, products marketing, financial activities, accounting, and human resources.

The students take on decisions for each simulated activity, based on the PRELEM XXI book, on their previous learning and on their managerial knowledge. Basically, the students from each simulated company must adopt many decisions, such as: annual forecasting; monthly forecasting; supply decisions; scientific research decisions; new products assimilation decisions; production decisions; marketing and sales decisions; human resources decisions.

After taking on the decisions, the students must introduce the data into a computer in order to be processed and wait for the managerial reports with the results of the simulation.

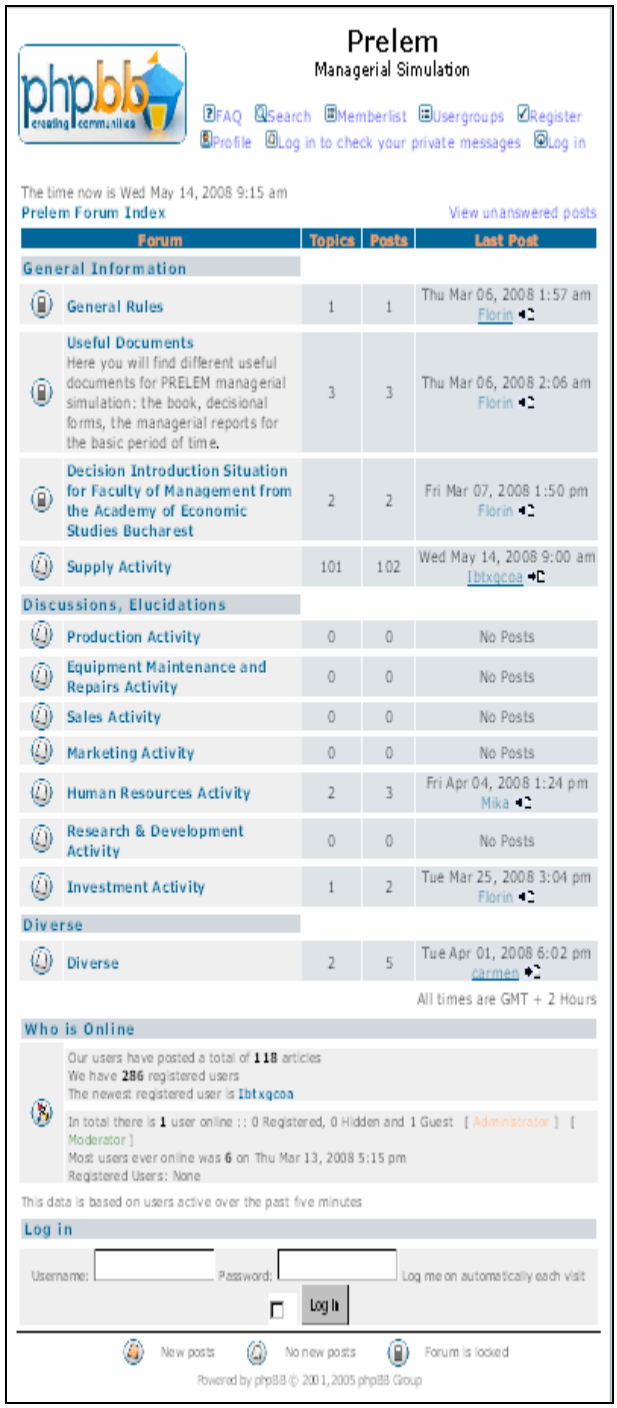

Fig. 2 PRELEM XXI Forum Index

For PRELEM XXI managerial simulation was created a forum (figure 2), where the students and other people interested could find information related to the simulation. The forum is structured as follows: General Information (general rules, useful documents, the situation of decision introduction for the Faculty of Management from the Academy of Economic Studies in Bucharest), Discussions (about supply, production, equipment maintenance and repairs, sales, marketing, human resources,

research and development, investments), and Varied other subjects (diverse) [17].
Managerial reports are E-mailed by the simulation coordinator to each company after the managerial decisions processing. These reports contain the results of the simulation for a simulated month, grouped on the following activities: forecasted objectives situation; validated decisions situation; processed decisions situation; products assimilated in fabrication situation; functioning technologies situation; research activity situation; starting material situation; production situation; human resources use and equipments use situation; selling and products stocks situation; marketing studies situation; costs and profit situation; financial activity situation; achieving forecasted objectives situation. These reports are the subject of students' analysis when a new round of simulation starts on.

3.2. Feedback from students

The analysis of the empirical data collected during the class through personal observation, interviewing and questionnaire showed that students are more enthusiastic and motivated to learn Management because they felt more close to reality when the simulation was used. In addition, the students said that participating to this computer simulation was an opportunity for them to prepare to manage a real company.
Teaching and learning Management by means off PRELEM XXI managerial simulation has proved to have various advantages, such as:

- PRELEM XXI managerial simulation is to some extent uncomplicated to use, due to the advantage of not having to learn a new language. Therefore, the students could concentrate on the analysis and the decision-making;
- Students have all electronic study materials and information available altogether in one environment. The relevant information about the simulation is accessible anytime and anywhere. This way, students are able to follow the simulation even if they are not attending to class. Students seems to appreciate the accessibility to their monthly results;
- The simulation promotes competition between the companies (groups of students), but in the same time, it promotes teamwork inside the companies. In business subjects, the inevitable outcome of creating common projects is teamwork. The virtual simulation environment is well-suited to this because the students can communicate with the teacher and to each other, and discussions are accessible to members of the team only;
- The forum allows discussion between students and teachers;
- PRELEM XXI managerial simulation is enhancing knowledge acquisition, retention rate and motivation for learning. It supports the development of skills like strategic thinking, critical thinking, planning, communication, collaboration, and group decisions making. Students seemed to enjoy the simulation, basically because they can put in practice their management theoretic knowledge through real process;
- The simulation becomes an aid during the teaching-learning process to reinforce the theoretical concepts.

4. Conclusion

Computer simulations, such as PRELEM XXI, could be used to produce rich educational materials which support collaborative learning. Thus we can see the simulation is important to assimilate the theoretical concepts in Management and to put them in practice. Moreover, the managerial simulation enhances the teaching and is more attractive for the students.
Using PRELEM XXI computer simulation to teach Management has proved to be a successful and popular choice. It seems highly motivating and makes simulation enjoyable for students. They gained considerable experience in managing a company which for some will be an asset for their future professional career.
The results of this study confirmed that teachers could integrate into their teaching activity technological tools like computer simulation that promote interaction and critical thinking among students. This suggests that more research should be done in the area of using computer applications in economic and managerial education in producing new ways of learning.

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