Production management education technology: generation of a simulator game uses the procedures management

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Abstract
The objective of this study was to develop a game simulator process management, for teaching. It is a game business simulator, based on the production system. The research was structured in five steps. The main results are a game online, for use in class and also in companies.

Keywords: online game, simulator, process management.

LEARNING, BUSINESS AND GAMES: PROBLEM DESCRIPTION

Business games are intended to assess the levels of cohesion between the members of a team. Directed at academics as support in learning, being a convenient way to manage the issues and decision-making. In the US this work has been performed since 1987, aiming to develop high-level managers with knowledge in various areas that demand a particular Organization. This reality came to Brazil 23 years later, since it is a significant delay showing the difficulties the country is facing are linked to mismanagement, given that developed countries have tried to solve these same problems for decades.

The Production courses need to train qualified people and develop systemic learning of diverse content and assist in job performance. The professional production management decide on numerous circumstances and problems using their experiences, knowledge, skills and values. To this end, they have sought better structured and more objective ways to understand and deal with uncertainty and unpredictability in decision making and ensure the competitiveness of enterprises. It is noticed that the university has difficulties to offer a significant qualification, which may be the lack of adequate integration between universities and businesses, the gap between the required skills and abilities and what is spent in the classroom. Corrêa (2008) in their research concludes there is a gap between the academic and the expectations of the labor market.

As Brun (2013) the classes focused on the education, traditional education is the teacher as the central figure in expository and dialogued or classes. It is a unilateral way that hinders the development of critical thinking of the student. This form of learning limits the student in the development of key features for the profession: creativity, proactivity and their self-management. As Oliveira (2013) the student becomes passive, memorizer concepts and unprepared to resolve practical issues. The reason is that knowledge is not interactive and can not adequately understand the contents using standard actions or through a process of information dissemination. It must build educational environment focused on student learning a profession, different from traditional education. This change could allow the increased interest of students in disciplines, which makes it appropriate to implement strategies that provide subsidies chain of ideas that transcend the teaching and enhance learning environments, placing students in a central position (Fisher, 2006).

Thus, it is proposed to insert in the process of teaching and learning, strategy games and simulation companies. The game will be based on software representing the production system of a company, which requires solid theoretical design, based on consistent references, able to support learning. The challenges are to organize this information and relate them to each other in order to set up a system integrated production management. To this is added the need to seek software features, which should be developed specifically given the innovative theoretical nature of the proposal. There is, therefore, three Challenge steps: a theoretical concept; assembly production management logic (likened to a game of logic companies); and the physical structure (aimed at enabling teaching and training).

Therefore, this study aimed to develop a game to be a means of applying the concepts of disciplines and should be a way to teach and to learn. The aim is to create scenarios with real problems, because as Rogers (1976) we need to invent and create problems where students seek solutions by establishing an interaction between the content and what is found in practice. Envisions that is training tool and training, which makes a lot closer to reality environment, allowing the development of many business features in the students, using concepts of management.

According to Palombo (2011) the creation of the simulation is a very careful process that involves the design of a computer model, the rules of the game, programming, implementation and test the necessary adjustments. In this proposal the game is an alternative for the consolidation of teaching and learning, a way of doing the student create, to think, not memorize content. The game becomes a teaching tool that produces objective data guaranteed by the theories. It is dynamic and provides evaluate behavior and also a way to unite the classroom learning with experiential, which facilitates the examination of important organizational issues of interest to society.

The general objective of this study was to develop a methodology for innovation in teaching and learning in production management disciplines. Therefore, it is theoretically designed a system of process management, based on categories, considering a methodology able to sustain it and, with this information, you developed a proposal for a business game on process management, based on the system developed and theories learning.

THEORETICAL FRAMEWORK

According Gramigna (1993) game is an activity that can be developed by one or more persons, where the application of strategies determines who will be the winner. Through the game you can experience the spontaneity of attitudes and behaviors that arise due to the permissive environment which will determine who stands out more with appropriate situations. The great interest in simulation games is because through them you can have behaviors of different companies in various situations. Choose to use this method does not have high costs, it is easy to program and usually have quick return.

Martinelli (1987) conducted a survey to compare games of existing companies, focused to the teaching of administration. He conceptualizes the games as an exercise for decision making, structured business situations where the main function of the players is to manage the presented environment. To Schafranski e Tubino (2013), through the simulation can try out new ideas and concepts, which would be more costly and would bring major risks and waste if they were tested in practice. Using this method, game, students can develop technical skills and improve their social relationships. The use of this tool allows to insert the games in education, in order to balance the learning of theory and practice. Associates, thus enhancing the content knowledge and memorizing. So students can develop practice what they learned conceptually and get closer to the actual conditions and situations they will face.

The game is established and rules are created, which in turn, should be clear and easy to understand so that competitors deem their best in different situations. Business games use them, for example, the simulation to represent real situations of business scope, approaching students in the conditions of an organizational environment in which they are placed to solve work problems. The activities that can be developed with the simulator games are diverse, within organizations, ranging as focus or area for which the game was created, it can be for the administrative part, planning, inventory control, raw materials, or even a joint activity developed jointly by a group of people.

Pereira Junior (2013) says that industries are undergoing radical change due to new technologies and innovations, mainly by globalization and fierce competitiveness between companies, customer requirements, quality and access to products. With these changes comes the

need for reorganization of the enterprises, which must innovate to meet demand globally and face the new market situations.

For the game, according Piana (2013), it is first necessary to define what are the main managerial skills to be explored in the game, and what are the decisions to be taken by the participants. After that, we proceed to the development of a mathematical model to simulate the business environment which students will be inserted. The third phase is based on the programming, where tests will be conducted to maintain a user-friendly interface that is interactive and able to promote motivation for learning. The fourth phase is where adjustments and modifications are made to improve the game. The last phase of the process is to develop systems that will help to understand and help in the game, namely, manuals, online help, documentation and system logs. As described in Table 1, Schafranski e Tubino (2013) has advantages and limitations in business games:

Table 1 - Advantages and limitations of using games in learning

Advantages	**Limitations**
Encourage creativity by the working opportunity with a problem.	Does not guarantee that a good player is a good administrator and vice versa.
Possibility of developing a behavior adaptive as each situation.	Risk of believing that there is only one correct solution to the problem, resisting renovations.
Communication exercise at work, interaction of working groups.	Rainfall that may arise if participants do not have a due clarification of the simulated model, leading them to lacking concepts.
Exchange of experiences among participants.	
Decision-making under conditions of risk and uncertainty (time and resource constraint).	Learning is a dynamic process. Simple games do not challenge the participant.
Constructive learning, due to the dynamic scenario involved.	Game companies can not be treated as unique learning tools. The goal is to assist in the completion of education.
Development of new skills, through the decision making.	

At the moment the game is implanted with the intention to add knowledge, one must take into account the environment where the game is being applied, because for each environment depicts different educational goals.

As for the games business, you must divide them between development of group work or teamwork. Team is a group of people with interindependentes activities that work toward a common goal. As Lewinski (2011), a team needs a group of people to exist, but not the reverse. According to Moscovici (2002, p.5), staff is "a group that understands your goals and is engaged in reaching them, in a shared manner." Team is an advanced stage of the group, ie, "a group becomes a team when it starts to pay attention to their own way of operating and tackle the problems that affect its operation."

Lewinski second (2011), so that a team can achieve their goals successfully, are due to set some parameters and requirements, to reach a common goal, making it relevant participation of each member who makes up the team. Many people who work in various organizations follow a group of positioning and no team where all are targeted, as in a production line, with work divided into small tasks and each does its part without worrying about the other. Unlike the teamwork in which everyone is concerned with the performance of all and know the importance of the participation of each to job success. They have common goals and develop collective goals that tend to go beyond what has been given, making the effective work not only efficiently.

With the growth of market competitiveness restructuring becomes necessary in political organizations, when they follow a group orientation hardly stand out in the market. With the

arrival of the larger view that teamwork provides makes it possible to perform the duties optimally, saving resources. When it decides to join the collective work we must distinguish what is teamwork and teamwork. Staff commitment means it is a group of people with a common goal that battle by a mutual achievement, respecting the individual characteristics and skills of each employee. Without overlapping responsibilities and activities of co-workers. Working together, take advantage of what each has to offer. Every individual has something to offer to transform, the secret is to leverage these skills to get a good result in the collective.

It can happen to change a working group to a team, everything will depend on the maturity and also the determination of each team member. According to Moscovici (2001), key components for the functioning of the group are: goals, motivation, communication, decision-making, relationship, leadership and innovation. These components influence the climate of the group, considering that people who make up the group previously have their values, their philosophy and life orientation.

There are many types of business games that can be defined and used in different times and with different applications within the organizational context. The ratings range from games tailored, industry functional, via computer, manuals, etc. The same game can be developed from the composition of several different types of games, united in a single goal.

Thus, depending on the situation and the context it is in, or where you want to deploy a business simulator game using the classification is easier to define what the best option. In the case of education, the game becomes a mix of different games to cover different situations, to compose a real simulation of what actually happens in the labor market, so that students somehow can understand and deal with situations that probably will face.

Composition of a game

To Gramigna (1993) and Kirby (1995) games must have well-defined methodology because it includes various steps: presentation of the simulation interface, presentation of the rules, definition of teams, development of decisions, processing of decisions, winning team. Business games contribute to the learning content and the development of skills and competencies. Martinelli (1987) defines four views that should be considered:

a. elimination of psychological blocks;
b. development of abstraction skills, forecasting, planning, combination of specialist and generalist roles and work with others;
c. developing the capacity to process information;
d. flexibility to try new ideas and concepts.

Kirby (1995) states that the use of games in education is based on the principle that the student is an active agent and learn better by doing than just reading or listening. Through the learning rules, the facilitator's role is to guide the group or to indicate alternatives that can solve the problem in this way students will have a point to which start investing your idea and come up with a better result than expected.

There are several business games applied in education. An example is the Romero Tavares da Silva, of the Federal University of Pernambuco – UFPE, which provides a set of physics simulators applicable to high school. Addresses rectilinear motion, energy, waves and thermodynamics in small interactive applications that allow the user to enter different values for variables and monitor the result in the animations of the simulator. After the procedure it can check the results of experiments in graphs automatically generated.

Savi (2011) states that some undergraduate and graduate courses are using games as a teaching resource. One example is the Innova8, 3D game developed by IBM to help university students and MBA students to develop business skills and learn about information technology. The game puts the student in a business environment to visualize how technology and business strategies affect an organization's performance. Players can analyze business processes, identify bottlenecks, and explore what-if scenarios before implementing certain technologies. The game is designed to last about one hour in the laboratory as complement of management disciplines of Business Processes, Business Strategy and IT Management.

METHODS AND PROCEDURES

To Gil (2008), scientific research proceeds according to methods based on logic and technical basis, consolidated from the verified efficiency in the past. The method means the way to come to an end and all the research must have one, which is fundamental to explain how it is structured and the description of how it was prepared. Demo (2008, p.11) states that methodology "means, the origin of the term, study of ways, the instruments used to do science." The author also emphasizes that a lack of methodological concern leads to fatal mediocrity.

This study was initiated in order to continue a technology development project for teaching learning of operations management which provided for the development of technical and instructional resources that subsidize teaching strategies with theoretical and practical grounds. Now, progress is on course subjects production engineering, and the game developed work different content and will be a way to use a broad and consistent framework for games and about learning.

Regarding its nature, the research can be classified as applied, since researchers are driven by the need to contribute to practical purposes, immediate or not, seeking solutions to concrete problems. To Gil (2008) this type of research concern is less focused on the development of theories and more to the application a reality. From the point of view of the shape of approach to the problem, research is descriptive and qualitative. Gil (2008) explains that in this case the researchers tend to analyze the data inductively with the process and its meaning are the approach focuses.

As to the objectives, this research is exploratory, which, according to Gil (2008) involves literature review and analysis of examples that encourage understanding. The research from the standpoint of technical procedures is literature. The research was structured in steps, with steps that follow; with comings and goings the theoretical part and practical parts, with a framework, based on the concrete reality felt to then proceed to the next stage, which is the development of actions. For this are followed a few steps:

Step 1 - Identify the problem: Based on the cited studies, assumptions about the assumptions of teaching and learning in production management are converted into problems, as the basis for structuring this study.

Step 2 - Search theoretical framework: after the research objectives defined, we seek to authors, checking out what they thought and wrote. The literature review is to determine how and what is done for students to learn the content.

Step 3 - analysis and theoretical definition: after the theoretical survey, frames are designed to summarize the key concepts of different authors. From these frames are detected authors who worked the subjects of study.

Step 4 - Generate the proposal: the analysis of the theoretical framework must demonstrate what the current literature, to systematize the ideas of thinkers in the form of a proposal or model that incorporates the theories.

Thus, using the analysis of step 3, the proposal of the game and an application methodology will be developed. The proposal will be applied in the classroom, and the results of the proposal and learning will be scanned through a questionnaire.

RESULTS AND / OR EXPECTED PRODUCT

The business simulator game has feature to be used in classes of management courses, the Federal Technological University of Paraná, Campus Medianeira/Pr. The game looking as Palombo (2011), creating scenarios where students will solve concrete problems, managing to establish interaction between theoretical content and what will be found in practice. The game should simulate a production system as a set of processes and subprocesses that interact with competitive factors. And, based on the process analysis to identify the points of improvement for improving organizational efficiency.

The game should be presented as a training tool for students because it will present scenarios of organizational reality, providing the development of entrepreneurial characteristics. It will be a resource applied to the teaching process and learning and help to make the academic environment and the classroom, close to the reality of organizational environments, which is one of gaps in undergraduate courses.

Table 2 - Development of Games

Before you begin the game	Context of the Game; Sort the input data provided by the advisor; Clarification of the tools used; Information and calculations developed by the students in addition to the initial problem.
First definitions	Tip of the analysis of an industrial environment; Definition of the type of product to be marketed; List and search of suppliers; Type and quantity of raw materials; Packaging (Primary and Secondary); Equipment / Machinery / Tools; Market analysis; Definition of processes involved (flowchart); Audience.
Input Data	Net amount available for administration; Maximum capacity of the company; Demand; Setup time; Maintenance time; Production time; Lot size - 1 lot of production time; Takt Time - Number of employees in each activity; Working days worked during the month; Number of shifts of the day; Specify type of process (pushed - pulled).
Steps	Identification of steps that add value to the process; To analyze the constraints, bottlenecks, weaknesses; Apply tools and strategies seen in the room to fix the problems: change in the layout, 5S, setup reduction, MRP method.
Possible problems	Dealing with unforeseen situations experienced on a day-to-day; Eg machine that stopped working, lack of raw material, without electricity.
Game completion	The game provides a final report according to the decisions and score the teams. - Each phase presents a partial report on the decisions taken at the stage.

With the business game, the students will be on modern management techniques that make it possible to optimize the production process and reduce waste. For Netto (2004), process management enables the provision of value, defining objectives, goals and organizational performance monitoring, providing continuous process improvement.

For the game to happen, it needs to follow a sequence of steps and collect various data to start the play. Some information will be provided by counselors, but students will have to find

the data needed to run the game with the help of tools seen in the classroom, which will help in the decision-making process. As described in steps, the game aims to help the development of students and facilitate the understanding of the contents seen in the classroom, applied way. Situations like these will be seen in the labor market, and need to be practiced to bring better results in the future.

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