Simuladores de negocios como herramienta de enseñanza-aprendizaje en la educación superior

Business simulators as a teaching-learning tool in higher education

http://dx.doi.org/10.32870/Ap.v10n2.1401

Jessica Garizurieta Bernabe*
Arely Yazmin Muñoz Martínez**
Alma Delia Otero Escobar***
Rubén Alvaro González Benítez****

Palabras clave
Aprendizaje activo, enseñanza multimedia, tecnología de la información, formación profesional

RESUMEN

Los simuladores de negocios son una herramienta de enseñanza-aprendizaje que busca facilitar el aprendizaje activo basado en la resolución de problemas que fomenta en los estudiantes el análisis, la toma de decisiones y la evaluación. Este artículo presenta un estudio cuyo objetivo fue analizar los resultados de aplicación de simuladores de negocios a una sección de la Facultad de Contaduría y Administración, región Xalapa, de la Universidad Veracruzana. Mediante una investigación descriptiva transversal, se determinó si se logra un aprendizaje significativo a partir de su aplicación, autoevaluación de las temáticas abordadas y evaluación de resultados por parte del docente. Los resultados obtenidos retratan los simuladores de negocios como una herramienta única para crear un entorno de enseñanza-aprendizaje efectivo, puesto que propician una visión integral de los saberes teóricos con base en las relaciones dinámicas de mercado que surgen en la gestión empresarial; esto permite a los estudiantes poner en práctica conocimientos y técnicas proporcionadas en diversas materias que dan un valor agregado al hecho pedagógico. Con los hallazgos de este análisis, se dispone de materia prima valiosa para el diseño e implementación del proyecto de simulador de negocios propio de la Universidad, el cual se encuentra en proceso de desarrollo.

Keywords
Activity learning, multimedia instruction, information technology, vocational training

ABSTRACT

Business simulators are a teaching-learning tool that seeks to facilitate active learning based on problem solving, encouraging students to analyse, make decisions and evaluate. In this paper we present a study whose objective was to analyse the results of the application of business simulators to a section of the Faculty of Accounting and Administration, Xalapa region, of the Universidad Veracruzana. Through cross-sectional descriptive research it was determined if a significant learning was really achieved, apart from its application, through the self-evaluation of the techniques addressed and the evaluation of results by the teacher. The results obtained portray business simulators as a unique tool to create an effective teaching-learning environment, which offers a comprehensive vision of theoretical knowledge through the dynamic market relations present in business management practiced knowledge and techniques provided in various subjects, which gives it a greater pedagogical value. With the findings of this analysis, valuable raw material is available for the design and implementation of the University's own business simulator project, which is in the process of being developed.

Received: March 19, 2018
Accepted: June 19, 2018
Online Published: September 30, 2018

* Full-time professor. Universidad Veracruzana. Mexico.
** Lecturer. Universidad Veracruzana. Mexico.
*** Full-time professor. Universidad Veracruzana. Mexico.
**** Full-time professor. Universidad Veracruzana. Mexico.

INTRODUCTION

As a result of the constant evolution of the information technology and the growing demand upon higher education to form professionals with greater action competences (Martínez and Echeverría, 2009), universities have used different teaching-learning tools. Every day, different strategies and activities are implemented aiming at students achieving a deep and significant learning based on the use of information technologies.

Business simulators are valuable tools for teaching since they "teach students, in an entertaining manner, how to manage a global business in a competitive market" (Borrajo *et al.*, 2010, p. 498), by helping the students to learn how to think since the success or failure of virtual reality depends on the key decisions they take in regard to the prices, capital investment, marketing, among others.

Their background goes back to the 3000 BC Chinese board games, the 1934 Monopoly game and the 1950s simulation games (Borrajo *et al.*, 2010). As teaching tool in higher education institutions, business simulation games were found in 1956 in the United States of America and 1962 in Brazil (Lacruz, 2017). As of this decade, the quantity of business simulation games grew rapidly and by 1961, there were more than 100 business games (Mahboubian, 2010). After their initial use in English-speaking countries, simulation games, were no longer for entertainment only, they became an important resource in training the administrative personnel as well as exploring new strategic opportunities (Pando, Periañez and Charterina, 2016).

Simulation games as a learning technique "allow the students to experience virtual worlds that reflect the reality by playing, observing, creating and thinking about the undertaking" (Ruskovaara & Pihkala, 2013, p. 206); these games do not only "connect the action (concrete experience) and knowledge (abstract conceptualization)" (Lacruz, 2017, p. 53), but they also increase the students' motivation by arousing their curiosity and end with the monotony of the material used by traditional teaching methods (Prensky, 2003; Fu *et al.*, 2009, quote by Matute and Melero, 2016). Likewise, they "are a practical tool to develop economy and management subjects" (Vorontsov & Vorontsova, 2015, p. 1152), since they allow the students, through the simulation of different scenarios and multiple factors, to address different educational contents and, at the same time, acquire skills and managerial competences necessary in the business world without the risks and costs of implementing their decisions in the real world (Pando, Periañez and Charterina, 2016).

Business simulators are a tool used as a teaching method in different environments; however, in higher education, the optimization and impact that these processes have on the learning of educational contents is unknown. Hence the following question: To what extent do business

simulators allow practicing the theoretical knowledge in the teaching-learning process? More specifically: what level of practice of the theoretical knowledge do business simulators foster? And: what business simulators contribute to a significant learning in students?

In order to respond to the main question it is necessary to establish a general objective which is to identify the impact business simulators have on the teaching-learning process of higher education students through an analysis of the extent to which they allow practicing theoretical knowledge.

To do so, the research focuses on the students of Accounting of the Accounting and Administration Department, Xalapa region, of the Universidad Veracruzana. We consider necessary to examine, from the perspective of each student, the level of practice of the theoretical knowledge business simulators allow and undertake a methodical revision of the decisions adopted by the students in every business simulator and the consequences of these measures. This brings us to determine if business simulators allow completing not only the theoretical training of the students but also allowing them to become familiarized with businesses and the terminology of economics.

DESIGN

Employers are looking for and need experienced professionals capable of responding, managing crisis and being pro-active; however, university students lack the spaces, time and resources to generate professional practices that provide them the experience necessary to meet these expectations. In this sense, the implementation of virtual simulators offers university students the opportunity, during their academic training, to experience scenarios derived from the exercise of the profession. However, to ensure the learning expected, it is necessary to assess the theoretical knowledge being practiced and acquired during the simulation processes.

Given the foregoing, this study addresses this assessment by means of a mixed-type research based on a qualitative-type hermeneutic phenomenological interpretation to end with a quantitative descriptive analysis that facilitates showing the relative and combined influence of theoretical knowledge in the students' learning through the dynamics of business simulation.

The study was applied directly to university students that used these simulators in an educational experience of the Bachelor's degree in Accounting of the Accounting and Administration Department, Xalapa region, of the Universidad Veracruzana. We collected different data through two strategies:

- Structured interviews at the end of the semester, in which the students were asked to complete, in an anonymous manner, a survey about their perception of the level of application of theoretical knowledge allowed by business simulators.
- Assessment of the theoretical knowledge based on the results obtained in each business simulator by the teacher.

In order to define the indicators to be assessed in the simulation exercise, we are taking into consideration the contents that are practiced in the simulation process of the three virtual platforms used during the educational practice (See Table 1).

Table 1. Theoretical knowledge put into practice in each business simulator

Basic (Lemonade Tycoon; collaborative work)	Intermediate-Advanced (Capitalism II; collaborative work)	Intermediate (Acci-trade; student's individual work)
• Product Design • Place and distribution channels • Promotion (advertising strategies and sale) • Price • Market and market segments • Inventories • Equipment • Production • Costs • Inputs management	• Decision making • Place and distribution channels • Promotion (advertising strategies and sale) • Price • Market and market segments • Inventories • Equipment and machinery • Inputs management • *Benchmarking* • Types of product	• Market and market segments • *Benchmarking* • Strategic alliance • Stock analysis • Share purchase and sale • Market participation • Negotiation • Assumptions and crisis management • Asset purchase and sale • Bank loans • Audit

	• Types of products • Brand design and corporate image • Strategic alliance • Diversification • Stock analysis • Purchase and Sale of shares Production • Market participation • Staff training • Negotiation • Assumptions and crisis management • Costs • Asset purchase and sale • Bank loans • Leadership • Innovation and development • Competitiveness • Investment returns	

Source: Self development.

From the list of knowledge shown on Table 1, we selected 23 theoretical knowledge based on two criteria: the frequency of application of each one of the simulators used and the level of impact on the programs of study of educational experiences that make up the plan of studies of the Bachelor's degree in Accounting in pursuit of that profile. Consequently, we consider educational experiences of the area of disciplinary training such as entrepreneurship development, ethics and social responsibility, human talent management, marketing and production strategies, audit and cost accounting, as well as the programs of study of final optional educational experiences of the Bachelor's degree, such as tax strategies, risk analysis and operational audit.

As we have mentioned, the study was conducted in a section of the Bachelor's degree in Accounting with 39 students enrolled in the Department of Accounting and Administration, Xalapa region, of the Universidad Veracruzana. Therefore, the type of sampling is considered as non probabilistic for convenience.

RESULTS

We use three simulators with different levels of difficulty (basic, intermediate and intermediate-advanced); to do so, we organized teams of three and four participants for simulation phases one and two (basic and

intermediate-advanced levels); for the third simulation phase at intermediate level, the participation was individual.

In order to identify the theoretical knowledge (knowledge) applied in each of the simulation phases, and the frequency at which each one was addressed during the simulation stages, we elaborated an instrument based on the Likert scale, and asked the students to indicate the perception they had of each simulator. Table 2 shows the instrument with the knowledge cited by the students for each simulator.

We assigned the following values to the scale mentioned above:

Level 0: Was never put into practice

Level 1: Was almost never put into practice

Level 2: Was sometimes put into practice

Level 3: Was frequently put into practice

Level 4: Was always put into practice

Table 2. Likert instrument to assess the knowledge coverage in simulator

Theoretical knowledge	**Level**				
	0	1	2	3	4
Product design					
Place and distribution channels					
Promotion (advertising strategies and sale)					
Price					
Market and market segments					
Inventories					
Equipment and machinery					
Inputs management					
Benchmarking					
Types of products					

Brand Design and Corporate image	
Strategic Alliance	
Diversification	
Stock analysis	
Shares purchase and sale	
Production	
Market participation	
Staff training	
Negotiation	
Assumptions and crisis management	
Costs	
Asset purchase and sale	
Bank loans	

Source: Self development.

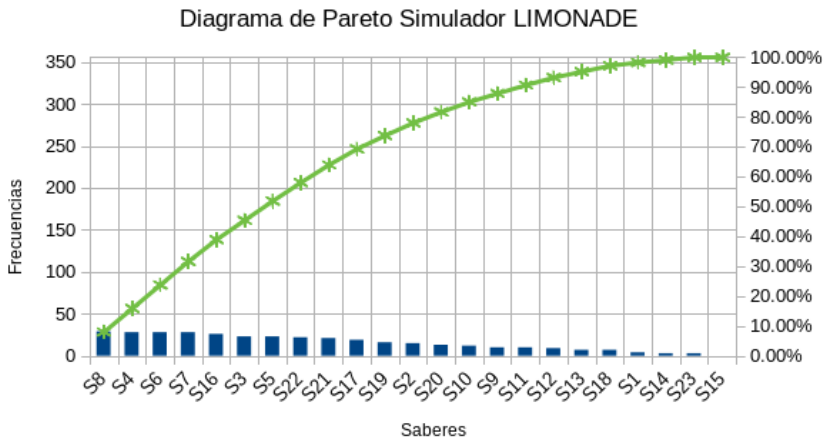
To approach a basic level of simulation, we use the Lemonade Tycoon simulator, which is a simulation game through which business skills are developed from selling lemonade [1]. The platform offers three types of simulation: race, challenge and championship, which increase the level of complexity in decision making (Wikipedia, 2009) [2]. The game starts with a limited budget, initial supplies and a lemonade stand in the suburbs. During the simulation, the participant can modify the lemonade recipe depending on the demand (hence, the locations and the time prognostic of the virtual world must be taken into account), acquire or improve the production equipment, or, acquire and improve the sales points in different locations: suburbs, beach, park and city (stadium), hiring of personnel and advertising, considering the inputs fixed costs.

In order to pursue the research objectives, we grouped the students into teams and we implemented the career modality in which the company has no rivals; the game objectives revolve around the revenues of the company regardless of her expansion; hence, once the resources have been acquired and improved, the decision making becomes cyclical and boring.

In this platform, the students simulated a period of fifteen calendar days which they registered in a simulation log in which they indicated the decision making undertaken per team every day.

We applied the data collection instrument to the 39 students participating in the simulation exercise. As our intention was to assess the coverage of the knowledge the simulator required in the course, we decided to use only the frequencies of the fourth level of the Likert scale. Then, we developed an analysis and a Pareto graph to identify the knowledge best covered by the simulators and their coverage percentage. Since the objective of our study is to set the bases for the design and the development of our own simulator, the foregoing allowed us to identify the areas of opportunity to offer a more complete simulator.

Graph 1 shows the Pareto diagram for the Lemonade Tycoon simulator. On the left "Y" axis, we note the frequencies at which the students gave their opinions at level 4 of the Likert scale for each of their knowledge.



Graph 1. Pareto diagram of the Lemonade simulator.

The knowledge, for the purpose of a statistical treatment and their subsequent graphing, were codified as S1, S2, S3 up to S23; S1 corresponding to the "Product Design" knowledge; S2 to the "Place and Distribution Channels", and so on up to S23 which represents "Bank Loans". Each knowledge and its codification appear on the "X" axis of Graph 1. The "Y" axis on the right represents the percentage. The Pareto diagram establishes the hierarchy (from left to right) of the knowledge charted as bars according to the students' evaluation in regard to the level of use during the application of the simulator. In the same graph, we note that one line shows the percentage accumulated which helps us assess the contribution of each bar or knowledge in this case.

From the Pareto diagram of this simulator, it is clear that if we trace an imaginary line at 80% accumulation, we find eleven knowledge to which little attention has been paid; i.e., almost half of the knowledge enquired through the Likert scale concentrate in 20% of use in the application of the simulator according to the students' assessment. Table 3 contains the knowledge that received little attention.

Table 3. Knowledge with less coverage in the Lemonade simulator.

Code	Knowledge
S20	Assumptions and crisis management
S10	Types of products
S9	*Benchmarking*
S11	Brand design and corporate image
S12	Strategic alliance
S13	Diversification
S18	Personnel training
S1	Product design
S14	Stock analysis
S23	Bank loans
S15	Shares purchase and sale

Source: Self development.

The overall results of the group simulation were high: 82% of the teams established their own game strategy in the first seven days which helped them achieve a high profit index during the second week. In 75% of the cases, the students did not establish roles to develop the simulation; they

preferred everyone's active participation in every decision making. On the other hand, 93% of the teams considered that the strategies in Lemonade Tycoon stuck to the business reality but that the simulator did not offer the degree of difficulty experienced in a real-world market.

To work at an intermediate/advanced simulation level, we executed the Capitalism II simulator. This is a business simulation game with a high level of complexity, changing scenarios and constant challenges. The platform is designed to implement complex strategies and involves different areas of the company and different markets.

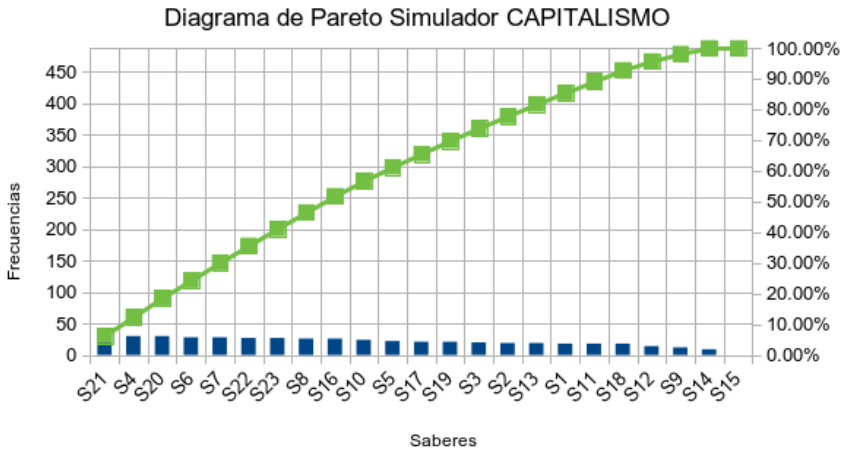
Decision making requires a complex analysis given its immediate impact on the different areas of the company and the industry (industries) in which it participates; i.e., it offers a more realistic scenario. Several of these scenarios (cities) present particular circumstances; the strategies and actions undertaken cannot be the same for any of them. In this platform, the participation of other competing companies influence the performance of the virtual organization; moreover, the company diversifies its activities (it generates a simultaneous participation in different markets) and faces crises related to the personnel, suppliers or supplies. Even though the ultimate goal is the company's revenues, its participation in the market and the stock market can provide a greater advantage.

The game begins with funds coming from a family inheritance to be used to build a new corporate power. After defining the corporate image and name, the player must indicate the city or cities where he will participate, the industry or industries in which he will invest, the products he will develop in each one of these cities or industries, the prices, suppliers (ultimately, he can become his own supplier) and the investment allotted to advertising and staff training, since, regardless of the level of difficulty of the simulation, the game does not allow that the businessman stalls or executes cyclical processes, i.e, the simulator creates different types of "crises" in order for the businessman to execute different strategies each time. These crises may be strikes, fires, pest or loss of market value, among others.

In comparison with other simulators, Capitalism II has competitors on the market. The player can set up the number of competitors to face, but the system establishes the level of rivalry and positioning of the latter.

This platform had a four-week simulation period and a weekly report was drawn up to register the equipment performance. Based on the results, Capitalism II is the most complete simulator with three simulation phases. Students mentioned that, to the exception of the stock market analysis, shares purchase and sale and *benchmarking*, the simulator fosters learning and active decision making of all the topics. According to Pareto's analysis, the simulator yielded Graph 2. This is the product of an analysis similar to the one performed for the Lemonade Tycoon simulator. By

tracing an imaginary vertical line on the 80 accumulated percentages, we can identify which knowledge are less attended, thus considered by the students.



Graph 2. Pareto diagram of the Capitalism II simulator.

Table 4 shows the seven knowledge less attended or used in developing the simulation and which would represent the weakness of the simulator.

Table 4. Knowledge with less coverage in the Capitalism II simulator**.**

Code	Knowledge
S1	Product design
S11	Brand design and corporate image
S18	Personnel training
S12	Strategic alliance
S9	*Benchmarking*
S14	Stock market analysis
S15	Shares purchase and sale

Source: Self development.

Since the simulator has been designed to generate response in the participant, each team faced different business crises over the four weeks; none of the teams was capable of establishing a strategy that would work continuously which yielded weekly changing results. The group did not reach satisfactory results in regard to the value of the revenues; however, they overcame the crises and all the teams avoided losses.

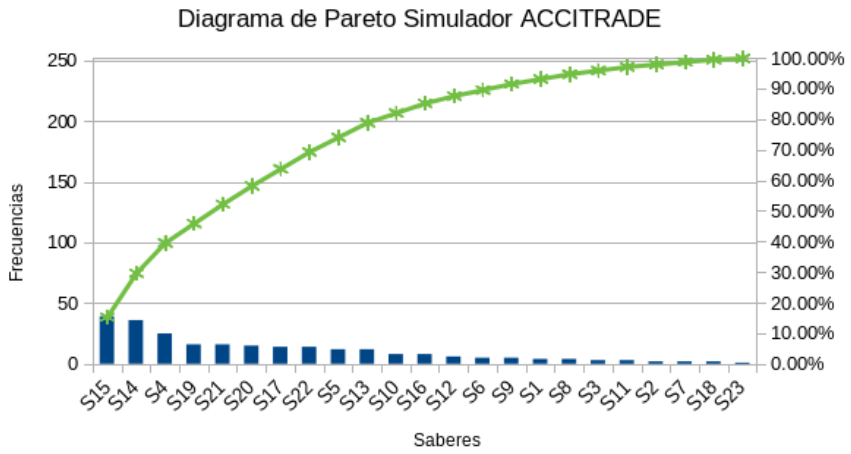
All the students considered that Capitalism II did not only offer a realistic scenario but provided them with a space for analysis and very complex decision making. Every decision was related to some other field or area of the virtual organization. 87% of the teams required defining roles in their collaborative work in regard to decision making, and in 50% of the cases, it was necessary to conduct a research using external sources to develop strategies.

In the third and last phase, we worked with the students individually at an intermediate simulation level with Accitrade Coach in which decisions are made in the stock exchange area which requires data analysis and business diagnosis. Accitrade Coach is an AcciTrade virtual simulation platform for financial education and entertainment. It offers tools to help making decision at the moment of investing and the player can make use of the publications prepared by the Accival analysis team such as information of the financial market, the summary of the main macroeconomic indicators and the stock exchange behavior.[4]

The platform provides comprehensive information on financial analysis; however, decision making is cyclical. The participants invest or sell shares depending on the research and analysis they make but they do not intervene in any other type of business activities. The simulation phase lasted one week and its main objective was to attain the highest investment portfolio. To do so, they submitted a final report describing the actions taken on a daily basis.

Based on the students' perspective, Accitrade was the simulator that addressed less theoretical knowledge and did not encourage their active practice. This is shown in Graph 3.

In the same way as in the previous simulators, the less attended knowledge represented 20%, an important majority. The students considered that thirteen knowledge were almost never used with Accitrade. However, knowledge S15 "Shares purchase and sale" and S14 "Stock exchange analysis" were rated as those of better use when simulating. This is consistent with the primary purpose of this simulator which is asset management.



Graph 3. Pareto diagram for the Accitrade simulator.

Table 5 shows the knowledge that students used the least when using this simulator. As we can see, the vast majority are knowledge that should have been used according to the course requirements. Without a doubt, Accitrade is a stock market-oriented simulator hence its strength as shown in the results of the Pareto analysis. However, we consider as an area of opportunity the fact that other areas of knowledge can be reinforced and trigger a more complete and realistic scenario for students.

Table 5. Knowledge with less application in Accitrade

Code	Knowledge
S10	Product types
S16	Production
S12	Strategic alliance
S6	Inventories
S9	*Benchmarking*
S1	Product design
S8	Inputs management

S3	Promotion (advertisement strategies and sale)
S11	Brand design and corporate image
S2	Place and distribution channels
S7	Equipment and machinery
S18	Personnel training

Source: Personal development.

The group performance was very satisfactory since all the portfolio values were higher than 1'900,000.00. The values of the three first positions were 2'048,715.50, 2'039,754.88 and 2'023,854.88.

Contrary to the results, the group did not promote strategies that would allow greater competitive advantage. The individual work influenced the decision making process which, in 93% of the cases, were not developed based on a process of analysis. 13% of the students only conducted an external research on the companies presented in this platform, and 96% of the students considered this phase of the simulation as lacking attractiveness and dynamism.

All the students mentioned that the development of the professional practice through a virtual space offered greater strengths and advantages than documentary research which is frequently used throughout their training. Students performed better in dynamic virtual spaces with a greater level of risk that allow assigning roles for the collaborative work.

DISCUSSION

According to Garizurieta and Córdova (2017), 55% of the students enrolled in the Administration educational program of the same academic institution, prefer didactic materials that promote practice, since they believe they can learn more this way and they can acquire more skills on what they learn.

Based on the foregoing, we proposed the design of the SENUV business simulator, a simulator of the Universidad Veracruzana business environment, as a learning tool by analyzing different types of teaching models that can be carried out in the classroom. The constructive model allows the students to practice what they learn and make decisions within real scenarios. The SENUV simulation project aims at generating an

experience close to the work environment of the students in the Business Administration, Management and Direction Department of the Universidad Veracruzana as well as developing innovative teaching methods to carry through the educational model in effect in that institution and adapt the world trends to the students' professional training (Garizurieta, Muñoz, Otero and González, 2017).

Therefore, we have set up three simulation phases with different complexity levels and used three different platforms in order to identify the main theoretical knowledge being executed in the existing virtual spaces and identify the needs (topic areas) that the Accounting students need practicing to exercise their profession.

The first phase developed a basic simulation level. The teams limited their decisions to managing products, production, distribution and promotion. The options were limited by the platform and the never changing virtual world. Once some of challenges of the simulation have been overcome, the decision process becomes a routine and, even though the platform offered interaction, the team's dynamic lacked complexity. The link between topics was minimal, hence, there was no need of dividing the work among the teams and there was no exchange of information within the group.

The level of group performance per score obtained was high given the limitations of the platform; i.e., by not stimulating the participant with different challenges made it easy to identify the variables that influenced the final result. The students executed strategies with a restricted options portfolio.

The second simulation phase dealt with an intermediate-advanced level. Despite the constant change of virtual settings, the students' experience during the second phase had greater advantages in comparison with the two others. The results show that not only did the students address a greater number of contents but they also faced greater complexity in the decision making analysis processes. This was due to the relation between the topics offered by the platform; i.e., the student lived a real decision making process in regard to the impact generated by every action undertaken in the different areas of the company and the external setting.

During the second phase, more communication and organization between each team and the group was perceived, since everyone faced different challenges with specific characteristics. The students, through personal initiative, established an exchange process to learn and develop strategies, and anticipated that what the other teams were facing could also occur to them. Most of the teams established an internal organization system through role playing in which responsibilities were assigned to every participant and which promoted efficient team collaboration.

In the second simulation, the group performance per score obtained was acceptable; this is largely due to the constant crises generated by the game which caused losses. However, none of the teams ended the period with losses or "red numbers". Unlike the first phase, it was not possible to establish one strategy only and the game required the students to be proactive.

Lastly, the simulation in the third phase ended by an individual process; consequently, a simulator offering a basic simulation experience was used. Unlike the two first games, in the third phase, the students had access to the competitors' concrete information; hence, the decision making was based on a complex data analysis. Even though the decisions were limited by the platform, the students were encouraged by the daily presentation of a new data bank.

The students were more confident despite the lack of collaborative work. The strategies were defined in most of the cases in the first part of the simulation and the students operated them without difficulty and attained high scores. Unlike the first stages, in the third simulation phase, the students achieve similar values but there was no exchange of information within the group and the interest in the virtual practice diminished rather markedly. The group performance per score obtained was high.

One of the main challenges in executing the simulation process was the student's previous training in the topics being addressed by the simulator. Given the flexibility of the educational model, the educational experiences of the group were not taught by the same professor and even in some cases, not taken in the same faculty; hence, the topics were addressed differently.

The technological capacity represented another challenge. Even though the spaces for using the computer equipment were sufficient, the simulation required follow-up at home which represented an obstacle for some students who did not have the adequate equipment or were foreigners. Despite these inconveniences, the group's previous technological training was optimal since no additional training was needed to handle the three simulators. In this exercise, the students did not experience any barriers toward the simulation; on the contrary, the possibility for them to put their previous knowledge into practice and take decisions in a secure space was considered an advantage since they executed processes based on real-life business environment.

The results of the research show the strength for the design of a platform that would facilitate the diagnosis of data on the internal and external environment for decision making, with a greater degree of complexity and attachment to the theoretical contents addressed in educational experiences of the educational program that ensures the successful exercise of a profession when graduating from the institute.

The Pareto analysis conducted in each simulator has allowed us to distinguish the opportunity areas for SENUV to be a simulator as complete as possible that contributes to the students having a better and more integral simulation experience that comprises the knowledge of different subjects of the economic-administrative area. One example is that we were able of identifying in a conclusive manner that the three simulators do not promote the knowledge of product design, *benchmarking*, brand design and corporate image, strategic analysis or personnel training.

CONCLUSIONS

Prior research has shown that the business simulation represents an important opportunity area for the innovation of teaching-learning strategies at the professional training stage. The attachment to the demand of the labor market where professional practice and experience are required, business simulation represents an excellent option for a higher level of training capable of offering a real competitive advantage to the graduate by putting into practice their theoretical knowledge which is often neglected in business spaces when training the student.

Students need a dynamic platform that promotes proactive training for decision making and crisis management and avoids routine practices. A platform that presents a real content to help the student relate to contents addressed in different educational experiences and, that also fosters interdisciplinarity. It is important to promote the innovation of teaching-learning processes that offer the students a higher level of competitive advantages in the labor market that ensures the sound learning and development of competences and guides them toward the correct execution of knowledge in their professional practice.

The implementation of three simulators in the Accounting group allowed us to know the positive features, the needs and the opportunity areas in regard to the practice of the theoretical knowledge addressed in this program. Likewise, we identified the topics frequently visited on virtual simulation spaces and the level of complexity students prefer. This information will help us pursue the design and construction of a virtual platform according to the educational programs and needs of the students of the Universidad Veracruzana.

The Pareto analysis allowed us to recognize the strengths and weaknesses of the simulators implemented according to the level of application of theoretical knowledge students require. The findings of this analysis have made available valuable raw material for the design and implementation of the SENUV project which is currently being developed. This will strongly benefit both the quality of the product and the students by providing them with a more comprehensive and integral environment that contributes to their professional training with the development of competences.

It is worth mentioning that even though the study does not address the impact on the student during the simulation phases, a change in attitude was predictable since the simulations promoted management skills and formal communication in the group; hence, the simulation exercise not only influenced the student's professional practice but also his social and managerial skills.

[1] The unloading link is available at the end of this paper.

[2] The complete documentation of this simulator is to be found in Wikipedia.

[3] The unloading link is available at the end of this paper.

[4] The unloading link is available at the end of this paper.

REFERENCES

Borrajo, F.; Bueno, Y.; De Pablo, I.; Santos, B.; Fernández, F.; García, J. & Sagredo, I. (2010). SIMBA: A simulator for business education and research. *Decision Support Systems,* núm. 48, pp. 498-506.

Garizurieta Bernabe, J.; Muñoz Martínez, A.; Otero Escobar, A. y González Benítez, R. A. (2017). SENUV: Simulador de entornos de negocio de la Universidad Veracruzana como herramienta de aprendizaje. En G. Ramírez Elías y A. Moreno Barrera. *Casos selectos para consolidar a las empresas* (vol. 1, pp. 300-313). Tlaxcala, México: Universidad Autónoma de Tlaxcala.

Garizurieta Bernabe, J. y Córdova Romero, A. S. (2017). El impacto de programas de estímulo al desempeño a docente: evidencias de una institución de educación superior en Veracruz México. *Revista Global de Negocios,* vol. 5, núm. 5, pp. 25-36.

Lacruz, Adonai José. (2017). Simulation and Learning Dynamics in Business Games. *RAM. Revista de Administração Mackenzie*, vol. 18, núm. 2, 49-79. http://dx.doi.org/10.1590/1678-69712016/administracao.v18n2p49-79

Mahboubian, Maziar. (2010). Educational aspects of business simulation softwares. *Procedia Social and Behavioral Sciences*, vol. 2, núm. 2, pp. 5403-5407. https://doi.org/10.1016/j.sbspro.2010.03.881

Martínez Clares, Pilar y Echeverría Samanes, Benito. (2009). Formación basada en competencias. *Revista de Investigación Educativa*, vol. 27, núm. 1, pp. 125-147. Asociación Interuniversitaria de Investigación Pedagógica. Murcia, España.

Recuperado de http://www.redalyc.org/pdf/2833/283322804008.pdf
Matute, Jorge & Melero, Iguácel. (2016). Game-based learning: Using business simulators in the university classroom. *Universia Business Review*, núm. 51, pp. 72-111. https://doi.org/10.3232/UBR.2016.V13.N3.03
Pando Garcia, Julián; Periañez Cañadillas, Iñaki & Charterina, Jon. (2016). Business simulation games with and without supervision: An analysis based on the TAM model. *Journal of Business Research*, vol. 69, núm. 5, pp. 1731-1736. https://doi.org/10.1016/j.jbusres.2015.10.046
Prensky, M. (2003). Digital game-based learning. ACM Computers in enterteinment,1, pp. 1-4. https://doi.org/10.1016/j.sbspro.2010.03.881
Ruskovaara, Elena & Pihkala, Timo. (2013). Teachers implementing entrepreneurship education: Classroom practices. *Education + Training*, vol. 55, núm. 2, pp. 204-216. https://doi.org/10.1108/00400911311304832
Vorontsov, Andrey & Vorontsova, Elena. (2015). Innovative Education in Russia: The Basic Tendencies Analysis. Procedia-Social and Behavioral Sciences, vol. 214, pp. 1147-1155. https://doi.org/10.1016/j.sbspro.2015.11.731

Recursos digitales

AcciTrade Coach. (s/f). Disponible en https://www.accitrade.com/AcciTradeCoach/home.action
Capitalism II. (s/f). Disponible en http://www.enlight.com/capitalism2/Cap2_in_Education.html
Lemonade Tycon. (2015). Disponible en https://lemonade-tycoon.programas-gratis.net/