Learning in Marketing Simulation

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Abstract. This study intends to determine the variables influencing the learning of students when they use business simulators in class. To this end, an exploratory stage is conducted to create a model, which proposes that students' knowledge and skills related to information and communication technology, their motivation for using a simulator during the subject, productive feedback from teachers, simulation realism, perceived ease-of-use and perceived usefulness determine their degree of learning. Then, a conclusive stage is carried out, in which 120 Industrial Engineering students and former students were surveyed. These students had taken the Marketing subject between 2011 and 2016, where Markops business simulator was used. The results show that students' motivation and the usefulness perceived from using the simulator as a learning tool are the variables that influence learning degree the most. In addition, feedback from the teacher, simulation realism and ease-of-use of the simulator also positively influence learning. On the contrary, the impact of knowledge and skills related to ICT's is non-significant. Finally, the consequences of these structural relationships are discussed.

Keywords: Academic performance · Software use · Learning methodologies Marketing

1 Introduction

Simulation-based information consists in "learning-by-doing" or "making decisions in real scenarios". This kind of learning facilitates the adherence or retention of information as well as the development of increased intuition when making real decisions [8].

Evidently, the use of business simulators should be implemented in the business departments of higher education institutions to improve the education outcomes of students. In this regard, Ruiz et al.[9] proposes that simulators enable an environment favorable for building knowledge, developing cognitive skills, enrichening the teaching field by means of educational technology, constructing a new dynamic learning way, showing the inter-disciplinarily between different fields and increasing the options for more innovative lessons.

The initial idea of using information and communication technologies in the classroom gives rise to several methods, such as the flipped classroom methodology, which consists in making students use these technologies before class so they have beforehand knowledge of the contents to be addressed. Additionally, ICTs are related

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to active learning [1], because they are used as teaching tools through which students can perform their tasks in the classroom.

Therefore, we decided to conduct a study on the use of ICTs, specifically simulators, to determine to which extent these variables are positively related to students' academic performance and learning results. The simulator selected for this study is Markops, a marketing simulation software designed for teachers who seek bringing real world experience to their students or to business people who are new to the marketing field [13]. This software is used as part of the Marketing I subject imparted to Civil Industrial Engineering students from Universidad Técnica Federico Santa María.

Finally, based on the concerns about how to make better decisions about the use of CITs in the classroom, we arrived at the following question: what factors influence and condition learning in the Marketing I subject attended by Civil Industrial Engineering students when the software Markops one is used? How can the learning associated with this tool be assessed or measured?

2 Literature Review

The advance information and communication technologies (ICTs) have experienced over the years has been fundamental to the current society and educational systems. In the higher education context, ICTs are key for a change toward a new teaching model. In fact, there is an ongoing implementation process of new technological tools in different learning and training settings related to health sciences, engineering, among other fields [6].

Nowadays, knowledge about ICTs plays a fundamental role in globalization, but also in the culture and learning development of people. ICTs has been widely accepted as tools for student learning, and as an indicator of the development of a region or country. However, although some teachers are still reluctant to use them, the use of these technologies has increased steadily [3].

The term ICT is fairly new. It was first used in 2008 (Deterding, Dixon, Khaled, & Nacke, 2011) in the business area and referred to the use of game elements to attract, convince, encourage or persuade users to perform certain actions. In educational contexts, gamification refers to using game elements with the purpose of making students engage, motivating them to action and promoting learning and problem-solving [4].

Simulations have always been present in the life of human beings, regardless the time or place, as their nature is emulating actual situations before acting or making decisions in real life. This may been seen in several areas, such as sports, the army, civil protection, aviation, space missions, etc. [8].

According to Ruiz and Ruiz [10], current higher education should lead to the training of efficient and effective professionals who respond to the needs of society and solve the problems identified in their different areas of action. In this sense, simulation allows students to learn in a practical way, by discovering and creating hypothetical situations. Therefore, using simulators has the advantage of stimulating students to develop decision-making skills and to learn to work in teams. Additionally, students have the opportunity to deal with situations from a practical standpoint. In connection,

the efficacy of an educational game depends to a great extent on the quality of the simulation, i.e., how accurately represents behavior in the real world [5].

Simulators or business games are an e-learning method that is relevant to management training, and through which students can acquire certain skills and competences beyond the skills promoted by traditional methodologies. Their use, as in the case of ICTs, has progressively increased over time, especially in business schools, universities, and professional associations around the world [2].

Fitó et al. [2] analyzed the relationship between generic competences (e.g., decision-making, creativity, group or individual conflict resolution, use of new technologies, among others) and the learning results perceived by students through a business game. Serradell [11] researched the effect of using business simulators on competence and concluded that simulators exhibit a series of positive elements related to the competences acquired and developed by people participating in simulations. In addition to the competences associated with the use of technologies, those related to personal competence, such as time management, delegation of tasks, or integration of ethics to decision-making, stand out. Group competences such as conflict resolution, making deals or accepting others' influence also add to the positive effect of simulators.

Urquidi & Calabor (2014) studied the factors determining the efficacy of simulation games as teaching tools and concluded that the realism of simulation games allowed for achieving the learning goals of the course. In the same line, Tao et al. [12] demonstrated that the perception of the game and learning outcomes positively influence students' satisfaction, which increases the intention to use computer simulation games. Additionally, the sense of use and perceived attraction play a critical role in perceived happiness or joy. Ease-of-use perception was also positively influenced by perceived attraction. The results of students' perspective provide a strong support for adopting or continue using simulation games in the classroom [12].

3 Methodology

The methodology of this work comprises two stages. The first one consists in an exploratory stage aimed at collecting data on previous models for assessing the use of ICTs and business simulators in the classroom to create a research model and an assessment instrument for the following stage.

After the first stage, based on Uriquidi and Calabor [14] and Tao et al. [12] works, the model shown in Fig. 1 is proposed. The model considers that the following independent variables influence students' learning: knowledge and skills, motivation, productive feedback, simulation realism, perceived ease-of-use and system usefulness. On the other hand, the dependent variable taken into account is learning degree.

Based on the model shown in Fig. 1, the following causal relationships are established as hypotheses:

H1: The student's knowledge and skills related to the use of ICTs have a significant impact on the degree of learning through the business simulator.
H2: Productive feedback provided by the teacher about the business simulator has a significant effect on the learning degree of students.

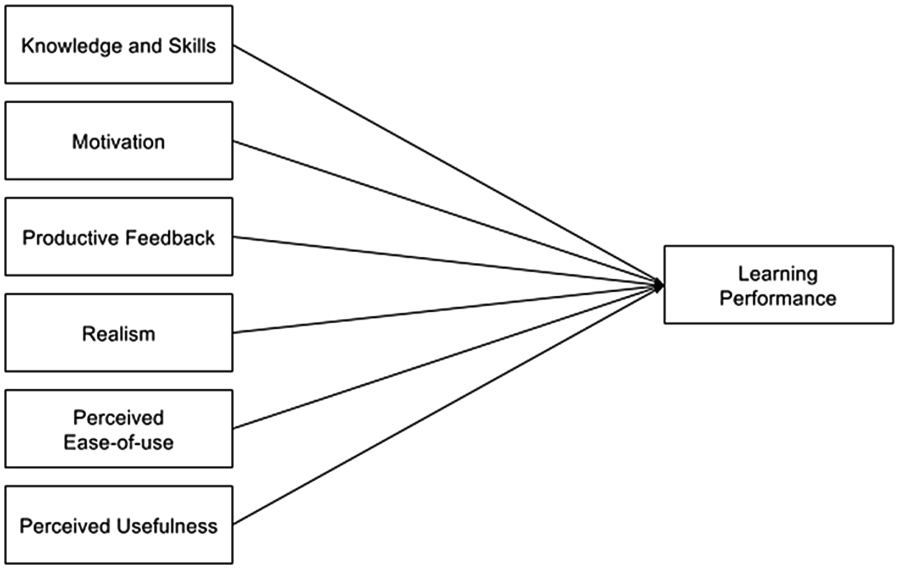

Fig. 1. Proposed model

H3: The realism of the market simulation provided by the software has a significant effect on the learning degree of students.
H4: The ease-of-use perceived from the market simulator has a positive impact on the learning degree of students.
H5: The business simulator perceived usefulness has a significant impact on the learning degree of students.
H6: The student's motivation for using the market simulator has an effect on the learning degree of students.

After obtaining the model proposed, a questionnaire with 37 questions was created; out of these, the first 8 initials were about demographic information and the rest 29 about the observable and latent variables, measurements on a likert scale of 1 to 5, as shown in Tables 1 and 2. A univariate analysis was applied to the first 8 questions to characterize the sample.

The field operation was conducted between April and June 2017. Invitations to participate were sent via e-mail to students and formers students who attended Marketing I between 2011 and 2016, as the simulator was part of the subject's methodology. The questionnaire was applied to more than 700 students and former students from the Industrial Civil Engineering daytime and night time program, who were attending Casa Central Valparaíso and Vitacura campus. In total, 210 students completed the whole questionnaire. Afterwards, a reliability analysis was conducted on the scales used, and Cronbach's alpha was calculated for each dimension. Then, a structural equation modeling was computed for the proposed model using IBM SPSS Amos. Finally, results were discussed.

Table 1. Observable variables of the model [12]

Perceived usefulness
Business simulation games allow me to complete my studies faster.
Business simulation games increase my learning efficiency.
Business simulation games improve my learning performance
Perceived ease of use
Business simulation games are easy to use
Interacting with business simulation games is unambiguous and easy to understand.
Using business simulation games to complete course related tasks are easy.
Learning motivation
I would rather opt a course that makes me curious even if it is more difficult.
I feel that the contents of the business simulation games are practical and are worth the effort to learn it.
I believe that I can learn all the concepts in a class which uses the business simulation games.
I feel that my performance is better than the others when I use business simulation games.
Learning performance
I can learn new skills if I use business simulation games.
Business simulation game helps me improve my results.
The learning periods are more flexible if I use business simulation games.

Table 2. Observable variables of the model [14]

Realism
It adequately represents reality
Thanks to the simulation I have a clearer vision of what happens in a company
The consequences of my decisions are logical
Provides an integrated vision of the company
Productive Feedback
Motivates the study and understanding of concepts
The tutor's comments allowed me to better understand my mistakes
Appropriate introduction of the subject and learning objectives was made
It allows the integration of multidisciplinary concepts and knowledge
Knowledge and Skills
I have knowledge about the functioning of various internet programs, such as browsers, emails, multimedia games, among others.
I easily find what I'm looking for in internet programs
I have the capacity to analyze and make decisions
I have the ability to solve problems

4 Results

First, according to the descriptive analysis of the sample, 74% of students are regular students from the Industrial Civil Engineering program, and the remaining percentage is distributed among employees (22%) and entrepreneurs (4%) as shown in Fig. 2.

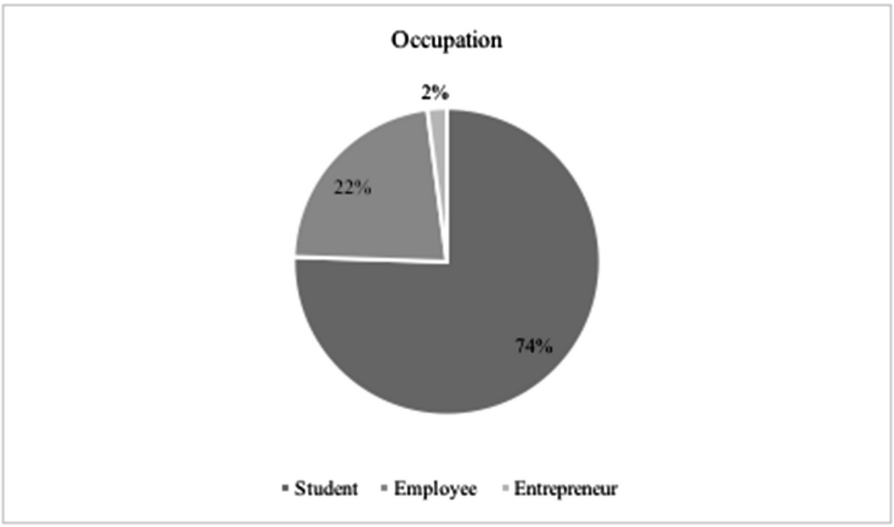

Fig. 2. Occupation of the respondent

In addition, 80% of respondents currently study or studied in the daytime regime while the other 20% study or studied in the evening regime. Besides 77% attended Casa Central Valparaíso while the other 23% attended Santiago Vitacura campus. Furthermore, 42% of the sample was aged from 21 and 23 years old, while 35% was between 24 and 26 years old. Moreover 69% of respondents were men.

The results of the reliability analysis subsequently conducted show that the scales used exhibit a good reliability [7]. Table 3 contains the results of each latent variable from this model.

Table 3. Scale reliability

Variable	Cronbach's alpha
Knowledge and skills (CYH)	0.705
Simulation realism (RS)	0.790
System usefulness (US)	0.788
Ease-of-use (FU)	0.830
P feedback (RP)	0.789
Student's motivation (MM)	0.684
Student's learning degree (GA)	0.824

After calculating the reliability of the scales used for assessing the factors that condition or influence the academic performance or learning degree of students when they learn through a business simulator, a confirmatory factor analysis was carried out, whose results are shown in Fig. 3.

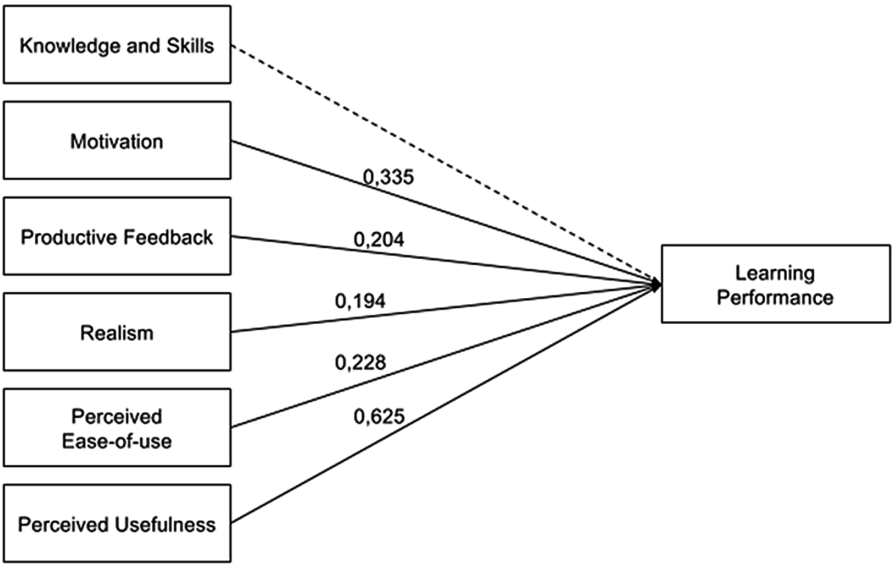

Fig. 3. Resulting model.

Then, the statistical significance of the proposed relationships was analyzed. In this analysis, the relationship between the exogenous latent variable "knowledge and skills" and the endogenous latent variable "learning degree" of students is not significant ($p = 0.166$). This implies that student's knowledge and skills related to the use of ICTs, problem solving and decision-making are not decisive for the degree of learning achieved.

Subsequently, the impact of each of the remaining exogenous latent variables on the "learning degree" endogenous latent variable was assessed. On the one hand, the most important variables were "system usefulness" (0.625), which was followed by "motivation" (0.335). Therefore, students have to feel that the simulator is useful and that the activity motivates them to achieve good learning outcomes. The variables "perceived ease-of-use" (0.228), "positive feedback" (0.204) from the subject's teachers and "simulation realism" (0.194) of the software do affect the degree of learning but to a lesser extent. In this sense, a software that is easy to use and that represents reality accurately by means of logical consequences from decisions favor the better performance of students, as well as a motivating attitude of teachers, who should introduce the topic and learning goals, integrate the knowledge to be used and provide timely feedback to their students.

5 Conclusions

Taking into account the objectives and subsequent work carried out in this study, we conclude that the model had a good scale reliability [7] and acceptable adjustment indexes, which validate the proposed structural model. In other words, the model is adequate to determine the variables influencing the performance or learning degree of students when a business simulator is used in the Marketing I subject. Therefore, the results show that the usefulness perceived from the system or business simulator, as well as the students' motivation for using this kind of learning tools, are the variables that contribute most to students' learning degree. These variables are followed by positive feedback from teachers, perceived simulation realism and ease-of-use perceived from the software. On the contrary, the students' perceptions about the knowledge and skills related to the use of information and communication technologies and solving of problems inherent to the discipline have no significant effects on learning degree.

Finally, in line with our general objective, we conclude that the use of the market simulator Markops positively influences the learning degree of students, and that motivation and perceived ease-of-use also play a pivoting role in this process.

References

1. Connolly, A.J., Lampe, M.: How an active learning classroom transformed IT executive management. Inf. Syst. Educ. J. **14**(1), 15 (2016)
2. Fitó, À., Hernández, A.B., Serradell, E.: Comparing student competences in a face-to-face and online business game. Comput. Hum. Behav. **30**, 452–459 (2014). https://doi.org/10.1016/j.chb.2013.06.023
3. García, H., de la Hoz, G.: Efectividad del uso de las estrategias pedagógicas basadas en las tecnologías de la información y comunicación para el aprendizaje significativo de los conceptos urológicos de los estudiantes de Medicina. Urología Colombiana **25**(2), 88–94 (2015). https://doi.org/10.1016/j.uroco.2015.12.010
4. Kapp, K.M.: The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education. Wiley, San Francisco (2012)
5. Larreche, J.C.: On simulations in business education and research. J. Bus. Res. **15**(6), 559–571 (1987). https://doi.org/10.1016/0148-2963(87)90039-7
6. Martínez, J., Peña, P., Gálvez, A., Delgado, M.: Metodología basada en tecnología de la información y la comunicación para resolver los nuevos retos en la formación de los profesionales de la salud. Educación Médica **17**(1), 20–24 (2016). https://doi.org/10.1016/j.edumed.2016.02.004
7. Oviedo, H.C., Campo-Arias, A.: Aproximación al uso del coeficiente alfa de Cronbach. Revista colombiana de psiquiatría **34**(4), 572–580 (2005)
8. Ruiz, S., Chaparro, E., Ruiz, A.: Uso de un simulador de negocios como herramienta de aprendizaje para desarrollar la capacidad de toma de decisiones y trabajo en equipo a estudiantes de la facultad de contaduría y administración de la UAEM (2009)
9. Ruiz, S., Hernández, C., López, F.: Uso de un simulador de negocios como herramienta de aprendizaje para desarrollar la competitividad y la toma de decisiones en estudiantes de una institución de educación superior (2015)

10. Ruiz, S., Ruiz, J.: Uso del simulador de negocios como herramienta para el aprendizaje en alumnos de educación superior de la UAEM (2013)
11. Serradell, E.: El uso de los juegos y simuladores de negocio en un entorno docente. Oikonomics, Revista de economía, empresa y sociedad **1**, 86–92 (2014)
12. Tao, Y.H., Cheng, C.J., Sun, S.Y.: What influences college students to continue using business simulation games? the Taiwan experience. Comput. Educ. **53**(3), 929–939 (2009). https://doi.org/10.1016/j.compedu.2009.05.009
13. Trespalacios Gutiérrez, J.A.: Juegos de empresa en la formacion de directivos de marketing: el modelo Markops, p. 6. Revista Asturiana de Economía, RAE (1966)
14. Uriquidi, A., Calabor, M.: Aprendizaje a través de juegos de simulación: un estudio de los factores que determinan su eficacia pedagógica. Revista Electrónica de Tecnología Educativa **47**, 1–15 (2014). http://dx.doi.org/10.21556/edutec.2014.47.75