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Project-based learning in the subject Strategies of Operations

Aprendizaje basado en proyectos en la asignatura de Estrategia de Operaciones
Aprendizagem baseada em projetos na disciplina de Estratégia de Operações

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Abstract
Introduction: Project-based learning in a teaching strategy that promotes experiential and situated learning in students. **Objective:** the objective of this research is to know the perception of students regarding the implementation of Project-Based Learning (ABP) in the subject of Operations Strategies at the Universidad del Norte in the period 2020-03. **Method:** a quantitative research method was implemented to 65 students using a form with both open and closed Likert-type questions as a tool, where inquiries are made about their degree of satisfaction and position regarding various aspects related to the subject. **Results: s**how a high degree of student satisfaction with the online class methodology as well as with the business simulation exercise framed in the PBL, in such a way that they find the exercise useful for learning the subject and related topics. **Conclusion:** It can be concluded that the changes and improvements had a positive effect on the variables studied, specifically on satisfaction with the learning experience and motivation.
Keywords: Project-based learning- business simulation- Skills development- self-study.

Resumen
Introducción: El aprendizaje basado en proyectos en una estrategia de enseñanza que promueve el aprendizaje experiencial y situado en los estudiantes. **Objetivo:** La presente investigación tiene como objetivo conocer cuál es la percepción de los estudiantes frente a la implementación del Aprendizaje Basado en Proyectos (ABP) en la asignatura de Estrategias de Operaciones de la Universidad del Norte en el periodo 2020-03. **Metodología:** para tal fin se implementó un método de investigación cuantitativa a 65 estudiantes utilizando como herramienta un formulario con preguntas tanto abiertas como cerradas tipo Likert donde se busca indagar sobre su grado de satisfacción y posición frente a diversos aspectos referentes a la asignatura. **Resultados:** Los resultados demuestran un grado alto de satisfacción de los estudiantes frente a la metodología de clase en línea como también frente al ejercicio de simulación de empresa enmarcado en el ABP de manera en que encuentran el ejercicio útil para el aprendizaje de la asignatura y las temáticas relacionadas. **Conclusión:** Se puede concluir que los cambios y mejoras tuvieron un efecto positivo en las variables estudiadas, específicamente en satisfacción con la experiencia de aprendizaje y la motivación.
Palabras Clave: Aprendizaje basado en proyecto; Simulación empresarial; Desarrollo de competencias; Autoaprendizaje.

Resumo
Introdução: A aprendizagem baseada em projetos é uma estratégia de ensino que promove a aprendizagem experiencial e situada nos alunos. **Objetivo:** A presente pesquisa tem por objetivo saber qual é a percepção dos alunos em relação à implementação da Aprendizagem Baseada em Projetos (PBL) na disciplina de Estratégias de Operações na Universidade do Norte no período 2020-03. **Metodologia:** Para tanto, foi implementado um método de pesquisa quantitativa com 65 alunos, utilizando como ferramenta um formulário com perguntas abertas e fechadas do tipo Likert que busca indagar sobre seu grau de satisfação e posicionamento em relação a vários aspectos da disciplina. **Resultados:** Os resultados mostram um alto grau de satisfação dos alunos com a metodologia da aula on-line e com o exercício de simulação de negócios enquadrado no PBL, de modo que eles consideram o exercício útil para o aprendizado da matéria e dos tópicos relacionados. **Conclusão:** Pode-se concluir que as mudanças e melhorias tiveram um efeito positivo sobre as variáveis estudadas, especificamente sobre a satisfação com a experiência de aprendizagem e a motivação.
Palavras-chave: Imigrantes, refugiados, latino-americanos, qualidade de vida, integração.

Introduction

Operations Strategy is a compulsory basic disciplinary course belonging to the Department of Industrial Engineering. It consists of four credits and theoretical contents are carried out. It is a prerequisite to take the course Work Study and is normally taught in the fourth semester. On average, four courses of 30 students each are taught per semester. Its objective is to teach organizational theory and its trends (Porto & Álvarez, 2017), which will be useful to students when approaching professional training subjects. Likewise, it will help them supply those skills that are part of the backbone of the preparation of every industrial engineer.

In this class, students are taught to understand a company as an open system with feedback in which it is necessary to constantly analyze the environment and respond to its changing needs. The company must be competitive and seek to improve its productivity through a good implementation of its strategic planning. To this end, they are taught to plan, organize, direct and control, always seeking to be competitive.

The teaching process of the subject is theoretical, which is carried out with the help of visual materials such as videos, slides, explanations by the teacher, theory readings assigned to the students outside of class, etc. In addition, using project-based learning (PBL) as a strategy, each course simulates a company with the objective of generating competence and applying the concepts seen in class. Generally, to achieve this, in the first week clear instructions are given as to the sector in which they will work, which is the same for all four courses. They are also introduced to the markets and scope of the company to be simulated. Each student assumes a role within the company and proceeds to work on corporate image, market launch and thus be ready to apply the theory as it is taught in class.

Students are in charge of grading their peers with 180 or 360 degree evaluation, as the case may be, at different moments of the activity and under established instructions. In addition to this, students will have to answer questions associated with the theoretical part of the activity that are related to the simulated company. At the end of the semester, each company presents to the others how their experience was and what they can take away as positive and negative from it.

The main advantage of this methodology is that the student is able to develop a theoretical management of the concepts learned in class and relate them to the simulation of a company. During the course of the project, the student is able to demonstrate a series of difficulties and design strategies to overcome them, in the same way that happens in a real business.

At the beginning, the course was carried out by means of an evaluative laboratory where students searched for a company in order to demonstrate the concepts taught in class. To account for this, a report was made according to the information obtained. However, this method eventually had problems with aspects related to the control of the activity, the appropriation of the concepts and the search for companies suitable for the exercise. For this reason, it was decided to implement a new strategy, explained above, to solve the problems and improve the dynamics of the class.

In this regard, the students of the course say they are very satisfied with the simulation of the company. However, this is not the case when the theoretical part is evaluated. In fact, students often perform poorly in the midterm exams, where they are evaluated on the theory presented in class. According to the above, the problem question is: What is the students' perception of the implementation of PBL in the Operations Strategies course at Universidad del Norte in the 2020-03 period?

THEORETICAL FRAMEWORK

Project-based learning is a pedagogical tool through which the student works to respond to a problem or challenge within a real experience (Mateo and Sevi- llano, 2018). In this sense, it is based on the fact that students obtain a deeper understanding of the material when they construct it through action and use of their own ideas (Krajcik and Blumenfeld, 2005). Thus, it is intended to consolidate learning by putting knowledge into practice. Students encounter and learn the central concepts of the discipline through the project (Thomas, 2000). Authors such as Rodríguez-Sandoval et al. (2010) and Mutakinati et al. (2018), show that PBL is an active method where students have a participatory role and develop a project that starts from their research.

Its importance lies in the fact that, according to theory, better results are obtained through the active construction of learning. Likewise, when learning is placed in a real context, it is more effective and the interaction between students and teacher plays an important role in the process (Krajcik and Blumenfeld, 2005). Moreover, the projects implemented are real, lead the student to find and construct a definition of the key concepts of the class, are meaningfully student-driven, and involve students in constructive inquiry (Thomas, 2000; Kokotsaki et al., 2016; Villarreal et al., 2017).

Among the benefits in the training of university students are the skills for problem solving, the development of critical thinking, autonomy and better understanding of the topics addressed in class (Thomas, 2000). Other skills acquired in PBL are cooperation, teamwork, decision making, leadership and self-directed learning (Mateo and Sevillano, 2018).

- **State of the Art**

Project-based learning has been implemented from different disciplines and it has been possible to prove its effectiveness in the teaching-learning process. A study conducted by Farrell and Carr (2019) with engineering students in a statistics class showed that students gave positive feedback on the process. In addition, they claim to have acquired or strengthened skills such as problem solving and teamwork. Likewise, they affirm that it allowed them to understand statistics from a real experience.

In this context, PBL as a dynamic method favors the achievement of diverse competencies in which the teacher directs, guides and stimulates learning; on the other hand, students plan and develop their own learning process.

collaboratively organize and solve scenarios that apply in real-world contexts (Bramwell- Larol et al., 2020).

On the other hand, a research conducted by Mateo and Sevillano (2018) with me- dicine students enrolled in the Research Project class, allows to account for the students' perceptions regarding the implementation of the PBL. In this regard, it was found that students felt at ease with the exercise and motivated by it and maintained to have a good relationship with the whole process carried out. Likewise, a study conducted by the American Journal of Distance Education (2020), where the students' perception of the implementation of PBL in a virtual modality was evaluated, it is possible to highlight that the students were satisfied with the exercise and the implementation of the 360° evaluation within the course. In addition, students highlighted the role of the teacher and his role in the whole process.

Ngereja et al. (2020) affirm that PBL has a positive impact on student learning, motivation and performance in the short and medium term, since it allows the creation of real experiences to develop specific topics that are immersed in a subject, which stimulates the development of indispensable competencies for their professional life.

Figura 1.
Descripción de la Propuesta (Patrón Pedagógico)

Fase y tiempo asignado	Actividades	Productos
Primera entrega Presentación Análisis del problema	El equipo trabaja en torno a los lineamientos del proyec- to para detectar como hacer frente a las necesidades que se le plantean y de esta manera dar solución al problema. El equipo elabora la planeación y organización para implementar y operacionalizar de la mejor manera sus estrategias.	Primer entrega. Presentación de la empresa, planteando a los clientes cómo puede Ella abordar la empresa
Segunda entrega Solución del problema	Diseñar las estrategias necesarias para abordar la presentación de las licitaciones y poder conseguir la adjudicación de las mismas.	Presentación de las licitaciones con todas las especificaciones y requerimiento de diseño necesario.
Tercera entrega Presentación del proyecto	Ingreso al link que se asigne del proyecto de acuerdo a los lineamientos generales publicados en el catálogo web.	Presentación del proyecto Presentación ejecutiva.

Fuente: elaboración propia

METHODOLOGY

In accordance with the problem question and the established objectives, the present research is qualitative, with a cross-sectional design and a descriptive scope. The participants were 65 Industrial Engineering students of the Universidad del Norte enrolled in the course Ope- ration Strategies in the period 2020-03. For data collection, a satisfaction survey developed in Google Forms was used with 19 questions of which 1 corresponded to the consent of the students, 1 on the name of the company they belonged to, 7 were with open response, 7 with a 5-level Likert-type scale and 3 with "yes" or "no" response options.

The following steps were followed to carry out the process:

1. Problematization: The problem question that would guide the research and its context was defined.
2. Conceptualization: A literature search was carried out regarding the research problem.
3. Creation of associated hypotheses and learning outcomes of the subject and the business simulation exercise.
4. Design of the proposal through the creation of the pedagogical pattern.
5. Establishment of objectives.
6. Design of the instrument: Elaboration of the survey from the Google Forms platform. Check the following link https://forms.gle/YbntrUY8Lrx1Etio7
7. Data collection: The link to the survey was shared with the students.
8. Transcription and coding of open-ended responses.
9. Analysis of the results obtained and conclusions.

RESULTS

According to the students' responses to the survey, where students were first asked about their voluntary participation, the following results can be reported:

Student satisfaction with the subject matter

Tabla 1.
División de estudiantes por empresa

Número de estudiantes por empresa.				
Impronta	**Píxel C&M**	**Lagom**	**Indeean**	**Total**
11	15	19	17	65

Fuente: elaboración propia

Table 1 shows the number of participating students from each company. With a total of 62 responses, 11 students belong to the Impronta company, 15 students belong to the Impronta company and 15 students belong to the Impronta company.

Pixel C & M company, 19 students belong to Lagom company and 17 students belong to Indeean company.

Tabla 2.
Satisfacción de los estudiantes

Grado de satisfacción de los estudiantes frente a la clase en la modalidad en línea.		
Grado de satisfacción	**Número de estudiantes**	**Porcentaje**
1	0	0 %
2	1	1,5 %
3	12	18,5 %
4	36	55,4 %
5	16	24,6 %
Total	65	100%

Fuente: elaboración propia

According to Table 2, which shows the results of the question *"From 1 to 5, how satisfied are you with the methodology of online classes in the subject",* it can be seen that, with a total of 65 responses, 52 students said they were satisfied with the methodology of the class. Thus, 36 students were positioned in level 4 and 16 students in level 5. This indicates that 55.4% of the students are satisfied with the methodology implemented and 24.6% of the students surveyed are very satisfied with it. On the other hand, 12 students were positioned at level 3, which means that 18.5% of the students surveyed are at a medium level of satisfaction. On the other hand, one student was positioned at a medium-low level of satisfaction, which implies that only 1.5% of the students surveyed are dissatisfied with the methodology.

Tabla 3.
Satisfacción respecto a la interacción

Grado de satisfacción de los estudiantes frente la interacción estudiante – profesor en modalidad en línea.		
Grado de satisfacción	**Número de estudiantes**	**Porcentaje**
1	1	1,5 %
2	1	1,5 %
3	15	23,1 %
4	27	41,5 %
5	21	32,3 %
Total	65	100%

Fuente: elaboración propia

Considering the results obtained in Table 3 to the question *"from 1 to 5, how satisfied do you feel with the student-teacher interaction in the online modality",* it is possible to show that, out of 65 responses recorded, a total of 48 students state that they are satisfied with the student-teacher interaction. In this sense, 27 students are located in level 4 and 21 students in level 5 of the scale. This means that 41.5% of the students surveyed are satisfied with the student-teacher interaction and 32.3% of the students surveyed are very satisfied. Likewise, 15 students were placed at level 3, indicating that 23.1% of the students surveyed are at a medium level of satisfaction. On the other hand, 1 student was placed at level 2 and 1 student at level 1 of satisfaction. This implies that, in sum, 3% of the students surveyed are dissatisfied with the student-teacher interaction.

Tabla 4.

Satisfacción respecto a las plataformas

Grado de satisfacción de los estudiantes frente a las plataformas utilizadas en la clase en modalidad en línea.		
Grado de satisfacción	**Número de estudiantes**	**Porcentaje**
1	2	3,1 %
2	4	6,2 %
3	5	7,7 %
4	29	44,6 %
5	25	38,5 %
Total	65	100%

Fuente: elaboración propia

Table 4 shows that, in response to the question *"from 1 to 5, how satisfied are you with the platform(s) used to develop the classes?",* out of a total of 65 responses, 54 students said they were satisfied with the platforms used for the classes. Thus, 29 students placed themselves at level 4 and 25 students placed themselves at level 5 of satisfaction. This indicates that 44.6% of the students are satisfied and 38.9% of the students surveyed are satisfied with the platforms used for the development of the classes. However, 5 students are located at level 3, which means that 7.7% of the students are at a medium level of satisfaction. On the other hand, 4 students are in level 2 and 2 students in level 1. This indicates that, of the total, 9.3% of the students surveyed are not satisfied with the platforms used.

Tabla 5.
Satisfacción y recursos audiovisuales

Grado de satisfacción de los estudiantes frente a los recursos audiovisuales utilizados por el profesor en la clase en modalidad en línea.		
Grado de satisfacción	**Número de estudiantes**	**Porcentaje**
1	0	0 %
2	0	0 %
3	3	4,6 %
4	37	56,9 %
5	25	38,5 %
Total	65	100%

Fuente: elaboración propia

According to the results presented in Table 5 to the question "From 1 to 5, how satisfied do you feel with the audiovisual resources used by the teacher in the development of the subject?", it is possible to see that 62 students are satisfied with the audiovisual resources implemented by the teacher for the development of the classes. Thus, 37 students are located at level 4 of the scale and 25 students are located at level 5 of the scale. This means that 56.9% of the students surveyed are satisfied and 38.5% of the students are very satisfied with the audiovisual resources used. Likewise, 3 students are located at level 3, indicating that 4.6% of the students surveyed are at a medium level of satisfaction with the audiovisual resources used in the classes.

Tabla 6.
Satisfacción y apoyo monitores

Grado de satisfacción de los estudiantes frente a el apoyo de los monitores en la clase en modalidad en línea.		
Grado de satisfacción	**Número de estudiantes**	**Porcentaje**
1	2	3,1 %
2	4	6,2 %
3	17	26,2 %
4	22	33,8 %
5	20	30,8 %
Total	65	100%

Fuente: elaboración propia

Taking into account the results shown in Table 6 in response to the question "From 1 to 5, how satisfied do you feel with the support received by the monitors during the class period? It is possible to affirm that, out of a total of 65 responses, 42 students are satisfied with the support provided by the monitors, with 22 students in level 4 and 20 students in level 5. Likewise, 17 students are placed in level 3, which means that 26.2% of the students surveyed are moderately satisfied. On the other hand, 4 students are located in level 2 and 2 students are located in level 1. This indicates that, in sum, 9.3% of the students are not satisfied with the accompaniment of the monitors during the academic semester.

Tabla 7.

Satisfacción y resultados

Número de estudiantes conformes con los resultados de la clase en modalidad en línea.	
Conformidad con resultados de la clase	**Número de estudiantes**
Si	57
No	8
Total	65

Fuente: elaboración propia

In Table 7 it is possible to see that, out of 65 students surveyed, 57 consider that in this new modality the learning outcome of the class has been met. However, 8 students consider that it has not been fulfilled.

Tabla 8.

Resultados de aprendizaje

Razones por las que los estudiantes consideran que no se ha cumplido el resultado de aprendizaje.	
Razones	**Número de estudiantes**
Modalidad virtual	4
Aprendizaje afectado	4
Sobrecarga académica	2
Otros	3

Fuente: elaboración propia

Taking into account the answers given in Table 8 by the students to the reasons why they consider that the learning outcomes in the class have not been met, it is possible to affirm that three of the students consider that the virtual modality is one of the reasons, as indicated by participant #1 when he says that "With the virtuality issue, I feel that one does not live the same experience". In this sense, 4 of the students surveyed stated that their learning has been affected; in this regard, participant #59 alleges that "it is more difficult to learn". Likewise, 2 of the students surveyed claim that they have felt a greater academic load, as participant #7 affirms when he says that "these virtual semesters I have felt more workload". On the other hand, other reasons mentioned were loss of interest and difficulty in maintaining attention.

Tabla 9.

Satisfacción con la metodología y simulación de empresa

Aspectos que los estudiantes destacan de la metodología utilizada en la clase.	
Aspectos	**Número de estudiantes**
Contextualización de la teoría	11
Recursos audiovisuales	11
Clases grabadas	3
Exposiciones	6
Aprendizaje/lecturas previas	4
Quices	6
Interacción/comunicación	9
Promoción del aprendizaje	3
Compromiso del profesor	5
Cualidades del profesor	3
Otros	18

Fuente: elaboración propia

According to the answers given in Table 9 by the students to the question "What aspects do you highlight of the methodology used in the course in this modality?", it can be seen that the aspects that students highlight the most are the contextualization of the theory by means of applicable examples and the audiovisual resources implemented in the classes, of which 11 students mentioned each one. Thus, participants #19 and #28 state that "I find it an excellent technique how the teacher uses examples so that we can better understand and relate the concepts" and "the use of audiovisual material to give the student the necessary perspective of the topics covered" respectively. Likewise, 9 students mentioned the interaction and communication between the teacher and students and among students (participant #45, "the ease of communication with the teachers" and "the use of audiovisual material to give the student the necessary perspective on the topics covered").

6 students mentioned the quizzes done during the classes (participant # 29, "I think the quizzes before and after the topics are very good because in this way we prepare ourselves in advance") and the presentations, 5 students highlighted the teacher's commitment, 4 students mentioned the learning or previous readings assigned and 3 students mentioned the recorded lectures, the teacher's qualities and the promotion of learning and entrepreneurship as aspects to highlight of the methodology implemented by the teacher. Other aspects mentioned were the didactic nature of the classes, the reviews made, the explanations, among others.

Tabla 10

Oportunidades de mejora

Mejoras que consideran los estudiantes debe implementar el profesor para el próximo semestre.	
Mejoras	**Número de estudiantes**
Mayor dinamismo	4
Mayor acompañamiento	2
Ninguna	6
Mejor redacción de preguntas	2
Más ejemplos	4
Menor carga académica	9
Mayor plazo de entrega	5
Promoción del aprendizaje	4
Retroalimentación	2
Clases pausadas	3
Otros	27

Fuente: elaboración propia

In response to the question (see Table 10) "What improvements do you think the teacher of the course can make for the next semester, taking into account the possibility that it will be developed in the online or hybrid modality?", the students responded to various aspects, which could be categorized as follows
11. On the one hand, 9 students mentioned that communication should be improved, especially the response to emails. In this regard, participant #53 says "improve communication with students (regarding e-mails)". Likewise, 6 students responded that they would not make any improvement to the class and 5 students mentioned that the academic load should be decreased, as stated by participant #31 when he says "less academic loads (bids)". On the other hand, 4 students mentioned that the class could be more dynamic, change the platform and increase the deadlines. In this sense, 3 students stated that more examples should be given during classes and that classes should be given slowly. For their part, 2 students mentioned the feedback of activities and exams, the accompaniment and the writing of questions as aspects to be improved. Other aspects mentioned were motivation, assertive communication, among others.

Tabla 11.
Satisfacción y Simulación

Grado de satisfacción de los estudiantes frente al ejercicio práctico de simulación de empresa.		
Grado de satisfacción	**Número de estudiantes**	**Porcentaje**
1	0	0 %
2	0	0 %
3	6	9,2 %
4	30	46,2 %
5	29	44,6 %
Total	65	100%

Fuente: elaboración propia

According to the results shown in Table 11 to the question "How satisfied do you feel with the practical exercise of the company simulation?", it can be seen that, out of a total of 65 responses, 59 students feel satisfied with the practical exercise. Thus, 30 students are at level 4 and 29 students at level 5 of satisfaction. This implies that 46.2% of the students surveyed are satisfied and 46.4% of the students are very satisfied with the implementation of the exercise. Likewise, 6 students are at level 3 of satisfaction, which means that 9.2% of the students surveyed are at a medium level of satisfaction with the simulation exercise implemented.

Tabla 12.
Oportunidades de mejora y Simulación

Conformidad de los estudiantes frente al ejercicio de simulación de empresa de acuerdo con los resultados de aprendizaje.	
Conformidad con ejercicio de simulación	**Número de estudiantes**
Si	63
No	2
Total	65

Fuente: elaboración propia

Considering table 12, it is possible to show that out of 65 students who responded to this question, 63 consider that the exercise of simulating a company facilitated the fulfillment of the learning outcomes in class. However, 2 students consider that this exercise does not facilitate the fulfillment of these results.

Tabla 13.
Simulación y objetivos de la clase

Razones por las que los estudiantes consideran que el ejercicio de simulación facilitó el cumplimiento de objetivos de la clase.	
Razones	**Número de estudiantes**
Mayor aprendizaje	10
Mayor motivación	4
Puesta en práctica de conocimientos	40
Conocimiento de la estructura empresarial	7
Otros	6

Fuente: elaboración propia

According to the results shown in Table 13, it is possible to see that 40 of the students who consider that the simulation exercise facilitated the fulfillment of the class results argue that it is because it allows putting theory and knowledge into practice. In this regard, participant #3 claims "yes, because this exercise encourages us to apply the knowledge acquired in class". Likewise,10 students argue that it is because it allows them to improve their learning. Thus, participant #23 affirms that "it does facilitate the learning of the topics seen...". For their part, 7 students affirmed that it is because it allows them to learn how a company works. In this regard, participant #25 says "it allowed us to better visualize how a company works". On the other hand, 4 students argue that it is because it motivates them, as mentioned by participant #26 when he says that "because we put ourselves in the role of already an entrepreneur, it motivates us to continue with this and have a company in the future". Other arguments mentioned were that it promotes the development of social skills and allows us to perform all the responsibilities.

Tabla 14.
Oportunidades de mejora en simulación

Razones por las que los estudiantes consideran que el ejercicio de simulación no facilita el cumplimiento de los resultados de aprendizaje.	
Razones	**Número de estudiantes**
Falta de integridad de funciones	1
Irresponsabilidad	1

Fuente: elaboración propia

Considering table 14, it is possible to show that 1 of the 2 students who considered that the simulation exercise does not facilitate the fulfillment of the results of the class argue that it is because the integration of functions is missing. Thus, participant #16 says "if the company were face-to-face, probably yes, but virtually, everyone focuses on their own department and does not have a clear idea of how to integrate the functions.

did not know what was happening in general or in other areas". On the other hand, the other student argued that the irresponsibility of the students did not facilitate compliance with the results, stating that "in my area wewere 5 people and the same 3 of us always worked".

Tabla 15.
Simulación y responsabilidad social

Conformidad de los estudiantes frente al ejercicio de simulación como práctica que promueve la responsabilidad social.	
Conformidad	**Número de estudiantes**
Si	57
No	8
Total	65

Fuente: elaboración propia

Table 15 shows that in response to the question *"Do you consider that the business simulation exercise promotes social responsibility?"* it is possible to see that, out of 65 responses, 64 students consider that it does promote social responsibility. However, only 1 student considers that it does not promote the practice of social responsibility.

Tabla 16.
Categorías Simulación y responsabilidad social

Razones por las que los estudiantes consideran que el ejercicio de simulación promueve la responsabilidad social.	
Razones	**Número de estudiantes**
Generación de conciencia	14
Visibilidad de la empresa	2
Actividades implementadas	15
Promoción de la empatía	2
Deber de la empresa	8
Promoción del compromiso	6
Mayor motivación para ayudar	10
Otros	10

Fuente: elaboración propia

According to the results shown in Table 16, it is possible to see that of the students who consider that the simulation exercise promotes social responsibility, 15 of them argue that the activities carried out allow for this. In this regard, participant #20 says "yes, through the activities carried out". Likewise, 14 students argue that it generates

awareness, as can be seen in what participant #36 states when he mentions that "it allows us to create awareness and see how we can get along with society". On the other hand, 10 students argue that it motivates them to help others, as participant #6 mentions in the following fragment: "it motivates us to contribute to foundations, and for example I did not know before that this aspect was so important for companies". On the other hand, 8 students argue that it is the duty of the company to be socially responsible, 6 affirm that it promotes commitment and 2 students claim that it highlights the company and promotes commitment. Another reason mentioned was that they were able to organize themselves in the company to carry out the activities related to this aspect. However, the student who stated that the exercise does not promote responsibility argues that it is an obligation of the students to comply with this aspect.

Tabla 17.
Aspectos positivos simulación

Aspectos de los estudiantes destacan del ejercicio de simulación de la empresa	
Aspectos	**Número de estudiantes**
Trabajo en equipo	16
Distribución de tareas	5
Funcionamiento de la empresa	7
Comunicación	4
Licitaciones	7
Interacción	8
Aplicación de conocimientos	11
Compromiso	5
Otros	21

Fuente: elaboración propia

Taking into account the results obtained in Table 17 to the question "*What aspects of the business simulation exercise do you highlight?"* and the present table, it is possible to show that, out of 65 responses, 16 students consider teamwork as one of the aspects to be highlighted in the exercise.

In this regard, participant #4 says "teamwork and synergy". Likewise, 11 students affirm that it allows the application of knowledge, as mentioned by participant #30 when he says "we apply the concepts learned". For their part, 8 students highlight the interaction, 7 the bids and the functioning of the company, 5 students the commitment and distribution of tasks and 4 the communication. Other aspects highlighted were the accompaniment of the monitors, competition, among others.

Tabla 18.
Aspectos de mejora simulación

Aspectos que los estudiantes consideran se pueden mejorar del ejercicio de simulación de empresa.	
Aspectos	**Número de estudiantes**
Modalidad	12
Retroalimentación	6
Nada	10
Comunicación	6
Instrucciones claras	8
Plazo de entregas	5
Otros	18

Fuente: elaboración propia

With respect to the results shown in Table 18 to the question *"What aspects do you consider that could be improved in this practice?"*, it is possible to see that, out of 65 responses, 12 students mention the modality used for the development of the class, as evidenced in the following fragment of participant #13: "within the circumstances, nothing, the realization in person is more appropriate in the same way". On the other hand, 10 students affirmed that they would not improve anything from the exercise. In this regard, participant #27 affirms that "none, the activity complies". On the other hand, 8 students mentioned the realization of clearer instructions as mentioned by participant #23 when he said "give a better explanation on how this activity will be carried out throughout the semester". Likewise, 6 students highlight feedback and communication as an aspect to improve and 5 students the deadline for the delivery of activities. Other aspects mentioned were student commitment, control by the teacher, motivation, among others.

Analysis of results

The results described above are related to the literature reviewed. On the one hand, it is possible to see that most of the students are satisfied with the implementation of the company simulation exercise, which is framed in the PBL because it facilitates learning results. In this sense, they emphasize aspects such as teamwork, learning how a company works, interaction, among others. Likewise, authors such as Farrell and Carr (2019), where similar results were obtained and students also highlighted the teamwork of the experience with project-based learning.

On the other hand, the results also show that students are satisfied with the student-teacher interaction. This is related to the findings of the *American Journal of Distance Educa- tion* (2020), where the students participating in their research affirmed that the role of the teacher during the course of the course was not as important as that of the student-teacher.

The students found PBL to be important and highlighted it within the process. Likewise, this same research shows that students are very satisfied with the implementation of PBL virtually. However, one of the aspects to be improved for the next semester that the students mentioned most was the modality of the project, assuring that it could be carried out in a better way in person.

DISCUSSION AND CONCLUSIONS

The remote class modality brought with it new challenges in order to adapt the practical activity that was traditionally developed in the subject and to articulate it to the theoretical part in a way that would achieve motivation and apprehension of knowledge by the students.

It can be concluded that the changes and improvements had a positive effect on the variables studied, specifically on satisfaction with the learning experience and motivation. To achieve the above objectives we worked on:

- Designing rubrics to evaluate teamwork and individual work in such a way that the students were clear about the evaluation methodology was very positive since 80% of the self-evaluation coincided with the teacher's evaluation.

- It should be noted that the vast majority of students perceived the activity and its development positively.

- Short evaluations were prepared at the beginning of a topic and then another one at the end of the professor's explanation and it was agreed that they would be averaged for each cut and the students who had 4 or more in their grade would have a bonus of 0.5 for the respective midterm. In the analyses that were carried out, no correlation was found between the evaluations and the midterm. However, they describe in the survey that this was a very positive aspect that motivated them to read in advance. Therefore, for the next semester, we plan to design a bank of questions for these short evaluations in order to overcome this objective. Since these evaluations were done in five minutes and with five multiple-choice or single-answer questions, it is possible that they will exchange information.

- A format with the commitments for the semester was developed and published in the catalog in the second week of class and in it it was clear week by week the topics to work on, the anticipated commitments and the activities they had to develop related to the project and articulation with the theory of that week.

- The organization and clarity of the objectives, the measurement rubrics and the interaction with students, essential elements of PBL, stand out as strengths.

- The importance of PBL lies in the fact that students acquire an active role and academic motivation is favored. The teaching function was not only focused on communicating technical knowledge to students or developing professional skills, but also on the continuous strengthening of their values and competencies through this methodology.

On the other hand, the impact on the student depends on the degree of student participation in all the components of the course, the permanent review and research of the concepts addressed by the subject and a greater development of the skills required to perform satisfactorily as a student and as a worker in a company; therefore, this process is not free of difficulties for the students. As a teacher, we try to design strategies that allow participation in all activities.

Resistance to change is one of the problems that the teacher must face, since students come with a scheme of work developed in the course of their student life that is different from that proposed by the PBL process in the real simulation.

The problems (expected and desired) during the organization stage of the companies, generate difficulties such as:

- Most companies make losses in the first month
- Lack of communication between departments
- Resistance and lack of commitment of some members (students).
- Assigned functions may not be understood or performed correctly.
- Lack of coordination and communication between functional departments (e.g., design, commerce and finance).
- Allocation of financial resources.
- New virtual scheme

Other types of problems are related to the fact that not all students are in the same semester or belong to the same academic program, making communication, coordination and planning of internal activities more complex. In addition, there is evidence of excessive trust and power given to the manager, who conditions the good performance of the organization and therefore the success of the simulation, since he/she has all the power. On the other hand, there is a risk of demotivation in some of the members of a company due to lack of leadership in their manager, since when students choose a manager, their selection criteria are based more on his or her popularity than on the students' knowledge of the skills, competencies and capabilities.

From the moment this type of PBL was incorporated at the Universidad del Norte, the normal learning process was transformed and, therefore, the behavior of those involved, such as: those who teach and those who learn. In this process, the traditional role of both the teacher and the student is modified, since teaching under this modality originates a stimulus for the student's autonomous work and in turn requires the teacher to be a motivator and a tutor of the student's process.

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