

# THE EFFECTIVENESS OF PROJECT-BASED LEARNING METHODOLOGY IN AN EXTERNAL COMMERCE COURSE: A PRELIMINARY ANALYSIS FOR THE COLOMBIAN CARIBBEAN REGION<sup>1</sup>

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## ABSTRACT

*This research article compares a change of cross-curricular competencies and academic performance of two student groups in a Colombian Caribbean University in which one is implemented the Project-Based Learning Methodology (PBL) and the other the traditional teaching. The purpose of this study was to verify whether a change in the learning methodology improves the academic performance and cross-curricular competencies of a sample of 44 students. Data collection instruments included a diagnostic test, the teacher's field work, final academic grades and a focus group. It is found that the application of PBL improved students' academic performance, as well as their cross-curricular competencies increased, in comparison to the non-PBL group regardless of the geographical context.*

**Keywords:** Project Based Learning, Cross-curricular competencies, Higher education, Mixed design.

## INTRODUCTION

The implementation of new learning methodologies and teaching strategies in higher education are changing the university scenarios (Arias-Gundín et al., 2008: 440; Ayza & Rodríguez, 2010: 79; Stahl et al., 2006: 80). Higher education must incorporate learning strategies that facilitate the empirical contrasting of theories through varied methods of field research (Hanushek & Woessmann, 2012: 510; Ertmer & Simons, 2005: 89). The theory-practice relationship also makes an easier the opening of new paths that expands knowledge that brings students closer to the practical problems of the various sciences (Doppelt, 2005).

In Latin America the application of learning methodologies different from traditional teaching has been limited (mainly in the public sector) due to a greater concern in increasing the coverage of students attending schools and universities (Vila et al., 2010: 18). In some Latin American countries such as Colombia, the teacher's improvement in the application of innovative learning methodologies has been considerably low for several reasons such as public budget constrain after the fall in commodities, impacting several aspects the national education (Organization for Economic Cooperation and Development, 2015).

Colombian private universities have begun a process of adjustment to the way courses are taught in order to transform students into citizens who participate, debate and relate theory and

practice to a topic of their interest. It might be said that some Universities have considered the implementation of the PBL methodology as an initiative that fosters cooperation, autonomy and creativity, improving students' academic performance within the classroom through active learning (Lehman, et al., 2008: 289)

The following study exposes the result of an academic experiment that took place in Universidad del Norte (Colombia) located in the Colombia Caribbean with two groups of students that took the course Colombian External Commerce The Colombian in which one group was applied the PBL methodology through the elaboration of an export project while the other group receive the lessons through traditional teaching. This course was given to students who were enrolled in the following undergraduate programs: International Relations, Finances and Business Administration. Both groups had the task to work in the creation and design of an export business plan, which allowed the teacher to analyze both groups' processes and compare the academic results in order to determine whether the implementation of PBL improve both cross-curricular competencies and academic performance in the local context. The main objective is to analyze the impact of PBL in the following cross-curricular competencies through a mixed method: autonomy, innovation, risk taking, competitiveness and in the academic performance.

### **A Review of the Literature on Traditional Teaching and Learning, Project-Based Learning (PBL) and Cross-Curricular Competencies**

Traditional learning starts from the idea of total control of the teacher over students in the way a curricular content is taught (Novak, 2003: 128; Lulat, 2005: 179). In other words, the teacher conceives their students as "*empty holes*" in knowledge and only through their teachings the "*holes*" can be "*filled*". Recognized experts such as Dewey (1938: 114) and Robert (2009: 38) emphasize the passive role of the students in which a rigid explanation of phenomena given by the teacher is imposed. Besides, the repetition, memorization of concepts and written tests focused only on theory as instruments of evaluation of a course (Novak, 2003: 125). The traditional teaching, the students' interests are not taken into account and information is transmitted in the same way to everybody (Prudence, 2008: 304; Zeichner, 2002: 60).

Furthermore, authors such as Marcelo (2013: 27) and Prudence (2008: 303) consider that in the traditional methodology, the student-teacher relationship is limited to the purpose of teaching and the syllabus of a course, which closes the possibility of hearing the students' voices. That approach has been criticized due to the way it perceives the students, considering them as empty individuals that need the information given by the teachers in order to acquire the knowledge required (Freire, 1970: 36). Different learning methodologies and theories have been introduced, that clearly contrasts with the one presented above. One of such theories is the Project-based learning methodology, which will be briefly described below.

Moving to the theoretical approaches of Project-Based Learning (PBL), it is an integrated and innovative teaching-learning approach that has been designed to engage students within the research and problem solving processes in a collaboratively way (Geier et al., 1991: 936; Moll et al., 2013: 337). The teaching and learning strategy responds to questions related to students' motivation to learn, and the approach through which they develop activities within the classroom; on the other hand, the strategy has been proposed as an alternative for the student to appropriate his/her learning process and to understand the course, and thus avoid memorizing (Geier et al., 1991: 923).

PBL has been presented as an alternative learning methodology inside and outside the classroom that improves cooperation, autonomy and creativity which allows the students to become more involved in the teaching-learning process (Gibb, 1987: 21; Barak & Doppelt, 2000: 21). PBL responds to a constant search for excellence in education; in addition, many teachers and researchers seem to distance themselves from traditional teaching and learning methodologies towards new alternatives that allow greater participation of students and encourage critical thinking (Prudence, 2008: 310).

Two significant aspects of PBL are claimed; first the delimitation of the problem which serves to organize and guide activities, and second the final product that answers the initial problem once the project has been completed (Palmer & Hall, 2011: 360; Dewey, 1933: 114). On the other hand, when students apply academic concepts to a project based on their interest, PBL could improve cross-curricular competencies and the academic performance (Ertmer & Simons, 2005: 103). Geier (2008: 923) mentioned that when the students do not know how to apply a research method or a certain concept, PBL is the most adequate tool for them to learn it and apply it throughout the developing process.

On the other hand, McMullan and Long (1987: 34), Núñez-Tabales et al. (2015: 34) argues that entrepreneurship education should include skill-building courses such as negotiation, leadership, creative thinking and exposure to technological innovation. In addition, Hung (2008) describes that a commercial entrepreneurship project through PBL must have a defined working group structure based on individual commitment of the members.

Mergendoller & Thomas (2005) emphasize that working group's need continuous feedback from other students while the teacher only serves as a guide. The student's enthusiasm might generate cooperation between groups, and spaces must be provided to collaborate with each other (Walker & Leary, 2009: 28). PBL varies depending on the purpose of the project. There are three general models of working projects for educational purposes (Kasper, 2008: 49; Sternberg, 1998: 14):

- 1) Project exercise: The students will apply knowledge and techniques that they have previously acquired in a discipline.
- 2) Project component: The project is more interdisciplinary in nature and generally the issues are related to real problems.
- 3) Project orientation: the curricular philosophy of a program of study will be determined by the demand or requirement of the students.

While the first type of project focuses more on a type of pedagogy where the teacher is the center of knowledge, items b and c correspond to a type of project in which the students are more engaged (Kasper, 2008: 51; Sternberg, 1998: 16). PBL strengthens a constructivist perspective of knowledge in the disciplines of interest compared to the traditional way that does a little follow-up to the development of cross-curricular competencies and skills such as creativity and innovation (Barak & Raz, 1998: 31; Barak & Doppelt, 2000: 24; Levin, 1992: 97).

Although PBL has many adepts that argue about the effectiveness of this methodology when it is implemented, some aspects must be considered before it is used. Lehman et al., (2007: 290) emphasize the importance of prior preparation and previous knowledge that students must have in aspects such as research methodology and the identification of text types (descriptive text, critical text, research text, among others) in order to make an easier implementation of PBL for them. The lack of understanding of these elements hinders the active role of students and the construction of independent knowledge. Moreover, the effectiveness of the PBL implementation within the classroom should bear in mind that it needs to focus on the

learning objectives, the skills and students' interests (Mergendoller & Thomas, 2005; Schneider et al., 2002: 419).

Moving to the theoretical approaches of Cross-curricular competencies, it must be learned throughout life by young individuals of any discipline in order to be prepared for the constantly demanding society and labor market. These competencies, also called generic, must be fully articulated to the curriculum in order to improve quality teaching that contributes to the construction of meaningful knowledge (Arias-Gundín, 2008: 432; Aristimuño, 2004: 142; Gomez, 2016: 58). The class should reflect achievable goals that help young people to train active, reflective, critical and ethical citizens.

The most important cross-curricular competencies include developing a personal life plan, solving problems, learning on their own, working collaboratively and interacting in multicultural environments and being capable of setting short-medium- and long-term goals

## METHODOLOGY AND HYPOTHESIS OF THE STUDY

A mixed research methodology was used to combine the results of the teacher's class notes and group tutoring, the focus group at the end of the course, the Likert-type questionnaire and the statistical comparison of the academic grades based on the T-Student, the Kolmogorov-Smirnov and F-Fischer tests to indicate if a change in the learning methodology influences the academic performance and the development of cross-curricular competencies of both groups regardless of the geographic context. According to Creswell (2013: 55) mixed designs represent the highest degree of combination of qualitative and quantitative approaches that include non-quantitative factors such as geographical disparities and cultural boundaries.

The contextual framework of the study is in Colombia, in a private institution of higher education located in a city of the Caribbean region of the country. The objectives, techniques and instruments used in the study are described below (Table 1).

<b>Table 1</b>		
<b>SPECIFIC OBJECTIVES, TECHNIQUES AND INSTRUMENTS OF THE STUDY.</b>		
<b>Specific Objectives</b>	<b>Techniques</b>	<b>Instruments of Study</b>
Identify the prior knowledge of both groups (PBL and non-PBL) related to Colombian external commerce.	Diagnostic test.	Diagnostic test.
Evaluate the academic grades of the PBL and non-PBL groups.	Normality test., comparing variances, comparing academic means.	Final grades of PBL and non-PBL groups.
Analyze if the competencies and abilities of autonomy, innovation, risk-taking, and competitiveness are developed in the PBL group.	Triangulation of focus group with Student Questionnaire and the teacher's notes.	PBL group questionnaire. Focus group, teacher's tutoring notes.

This study works with the hypothesis that based on the international bibliography on the effectiveness of the PBL as a method of transforming students into active agents in different geographical contexts compared to traditional teaching, it is expected that the instruments used to measure the academic performance and cross-curricular competencies show that the students who took the course with a PBL approach show a better academic performance and improve cross-curricular competencies because they became protagonists of the learning process developing their export projects based on their interests through collaborative work regardless of the geographical context.

## Participants

A total of 44 students (22 from the PBL group and 22 from non-PBL group) enrolled in the course Colombian External Commerce were involved. They ranged in age from 18 to 22 years old. Here in Table 2 the classification according to their undergraduate studies.

<b>Table 2</b> <b>CLASSIFICATION OF PBL GROUP AND NON-PBL GROUP ACCORDING TO UNDERGRADUATE STUDIES.</b>			
<b>PBL Group</b>		<b>Non-PBL Group</b>	
Undergraduate program.	Number of students	Undergraduate program.	Number of students
International Relations.	16	International Relations.	15
Business Administration.	3	Business Administration.	5
Finance.	3	Finance.	2

## Procedures

The research was divided into three phases. In the first one, a diagnostic test was applied which examines previous knowledge in Colombian External Commerce to PBL and non-PBL groups. The purpose was to verify if both student's groups had the same knowledge level to implement the experiment. The scores ranges from 1 to 5 (1 is the lowest level and 5 is the highest level). The diagnostic test was created by Martinez Valencia (2015).

The second stage analyzes qualitatively the progress of the PBL group in the elaboration of the export business plan from the teacher's class notes and group tutoring. The tutoring sessions given by the teacher were reduced in order to allow more autonomy in the elaboration of the project following the Ertmer and Simons' views (2005: 93) who mentioned that students must have enough independence to solve problems in groups. In the third phase, a focus group was made with the PBL group (22 students), the teacher in charged and two external peers who helped in the planning process (see Appendix 1). The tutoring and teacher's classwork notes and a combination of the focus group and the Likert-scale items were used in order to determine qualitatively if the implementation of PBL improved cross-curricular competencies compared to traditional teaching. The Student-T Test, the Kolmogorov-Smirnov and F-Fischer tests were used in order to compare quantitatively the academic grades of PBL and non PBL groups and confirm if PBL improve the academic grades versus traditional teaching.

## FINDINGS AND DISCUSSIONS

### Diagnostic Test

The results of the diagnostic test were analyzed based on the previous external commerce knowledge that students had from 1 (lower score) to 5 (higher score). The results of the diagnostic test of PBL and non PBL groups are displayed below (Table 3):

**Table 3**  
**RESULTS OF THE DIAGNOSTIC TEST OF PBL AND NON PBL GROUPS DIVIDED BY SCORES FROM 1 (LOWER SCORE) TO 5 (HIGHER SCORE).**

<b>Non-PBL Group</b>	<b>Results of the Diagnostic Test</b>	<b>PBL Group</b>	<b>Results of the Diagnostic Test</b>
Students with score of 1	0	Students with score of 1	0
Students with score of 2	0	Students with score of 2	0
Students with score of 3	9	Students with score of 3	11
Students with score of 4	10	Students with score of 4	9
Students with score of 5	3	Students with score of 5	2
Arithmetic mean of non-PBL group	3.68	Arithmetic mean of PBL group	3.58

In both groups there is a similar arithmetic mean (3.68 in the first group and 3.58 in the second group). Both groups start under similar previous knowledge's about Colombian external commerce and the proportion of students with a score of 3, 4 and 5 are similar regardless of the academic program that they are attending.

### **Teacher's Tutoring and Classwork Notes**

During the first group tutoring to the export projects, it was found that 8 groups did not apply correctly a research methodology which made it difficult for them to write the project. The problem was revealed in the first draft in which 7 groups wrote a descriptive report on the product or service that they want to export, instead of a research project draft. It was also found that 9 projects mentioned secondary sources and 2 include primary sources such as interviews with exporters and quantitative data directly from export companies. The following table identifies difficulties at the beginning of the elaboration of the export project through the following classification categories: (1) Data management; (2) Identification of types of texts; (3) Application of research method (Table 4).

**Table 4**  
**CATEGORIES ENCOUNTERED IN DIFFICULTIES AT THE BEGINNING OF THE PROJECT.**

<b>Export Project Group</b>	<b>Export Project Title</b>	<b>Difficulties Found</b>
1	Banana export to Madrid (Spain).	Data management
2	Handicrafts export to Miami (USA).	Data management
3	Orthodontic accessories to Mexico City (Mexico).	Application of a research method.
4	Export of hair extensions to Lima (Peru).	Application of a research method.
		Data management.
5	Export of swimsuits to Barcelona (Spain).	Identification of types of texts.
		Application of a research method.
6	Export of shoes to Montreal (Canada).	Data management.
7	Export of tourism services to Boston (USA).	Data management.
8	Export of underwear to Paris (France).	Identification of types of texts
		Application of a research method.
9	Export of mangoes to San Francisco.	Data management.
10	Export of medical tourism services to Moscow (Russia).	Application of a research method.

11	Export of software to Brasilia (Brazil).	Data management.
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6 Groups had difficulties handling quantitative and qualitative data which difficult an economic analysis of the viability of the export project. Besides, 5 projects did not correctly applied a commercial research method, and three projects did not correctly identify the different types of texts as students wrongly mixed descriptive reports with commercial entrepreneurship research projects.

The students of International Relations showed difficulties in the application of a commercial research methodology because of the lack of courses related to the field. They also had problems managing quantitative and qualitative data.

On the other hand, the students of finance did not apply a correct research methodology. Regarding the initial difficulty of intergroup cooperation, the professor encouraged the students to cooperate with others in explaining technical concepts of commerce, analysis of projects economic viability and identification of external markets. The majority of business administration students helped their classmates explaining a research methodology. It could be due to the fact that students of business administration studied a course called “*Corporate Entrepreneurship*” where they learned how to present a research project with entrepreneurial characteristics.

In contrast, finance students helped others identifying the economic viability of the projects, while the students of international relations showed a better performance in the identification of tax benefits in selected markets where Colombia have trade agreements. In the second tutorial session, the students applied a qualitative research method for commercial purposes correctly (Table 5). They also conducted quantitative and qualitative data properly after group cooperation in different course sessions giving them greater self-confidence in the elaboration of the project.

<b>Table 5</b> <b>DIFFICULTIES FOUND BY THE TEACHER IN THE SECOND TUTORIAL SESSION.</b>		
<b>Students According to their Undergraduate Studies</b>	<b>Difficulties Found in Export Projects</b>	<b>Students Contribution According to Undergraduate Studies</b>
International Relations.	Management of qualitative and quantitative data.	Identification of tax benefits in selected markets where Colombia have trade agreements.
Business Administration.	Identification of tax benefits in selected markets.	Implementation of a research methodology.
Finance.	Identification of types of texts.	Identifying the economic viability of the projects.

Both the teacher's classwork and tutoring notes showed that there were more cooperation between working groups when students had more quantitative and qualitative information about the product or service that they wanted to use in their export project. A visible students' empowerment was perceived by the teacher regarding the application of a research methodology and during the discussion with classmates about the projects. After that, students clarified their doubts which are showed in Table 5. Finally, there was an increase in the class participation from an average of 1 student's participation at the beginning of the course to 4 at the end.

## Comparison between Likert-Scale Questionnaire and the Focus Group

For each assessment question, a combination of Likert-scale items and focus group questions were used to the PBL group. The focus group followed the protocol set out in Appendix 1. The first question addressed whether the classroom provided a favorable environment for students to feel more autonomous and capable of making decisions in uncertainty situations. Students felt more confident in their own judgment even when their risk aversion was low. In addition, they believed that teamwork allowed their opinions to be evaluated by their classmates creating new paths for the elaboration of the export project. Here the most shared opinions by the students in the focus group:

- 1) Student 1 (student of International Relations): *"This exercise teaches us to be more autonomous."*
- 2) Student 2 (student of Business Administration): *"I consider that after the course I am riskier and I am willing to make decisions having only the information that I consider necessary".*
- 3) Student 3 (student of Finance): *"Relationships based on trust with the working group is important to make a successful export project. Without that, it is not possible to identify errors or consider new creative ideas".*
- 4) Student 4 (student of International Relations): *"We had a lot of autonomy during the course, and our project was developed since we had previous information and analysis of comments from our classmates".*
- 5) Student 5 (student of Business Administration): *"When we explained the export project to our classmates, we saw things that they can be done better than just looking by ourselves, so new opportunities to make the project even better were offered throughout the course".*
- 6) Student 6 (student of Finance): *"This course led us understand the importance of trusting our feelings about an opportunity based on the current and future market trends".*

The results of the questionnaire related to autonomy items using the Likert scale are shown below (Table 6).

Table 6 STATISTICAL ITEMS FOR AUTONOMY.					
Statistical Items for Autonomy	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel more capable of making decisions independently.	0	1	3	8	10
I rely more on my own judgment and instincts than on advices from others.	0	2	2	7	11
I developed a trusting relationship with my team.	0	0	3	8	11

The 45.5% of the students strongly agreed that they felt more confident in making decisions thanks to the autonomy offered by the teacher during the pedagogical exercise. The 50% strongly agreed that they (the students) relied more on their own judgment and the 50% completely agreed that they developed a relationship of trust with their working group due to the empathy that was generated throughout the project.

On the other hand, the most shared opinions around the improvement of competitiveness, innovation and risk assumption through PBL method and specifically the export project were mostly positive.



- 1) Student 1 (Business Administration): *"I learned to work with people. I had problem to work in groups from different disciplines"*.
- 2) Student 2 (Finance): *"You have to trust in your own criteria, and you need the classmates help to make a successful project."*
- 3) Student 4 (Business Administration): *"Many of us were happy to implement a commercial entrepreneurship project and I believe that that project was very helpful"*.
- 4) Student 5 (International Relations): *"One situation that I liked the most was the readings provided by the teacher who shared his experiences. It helped us to clarify many doubts"*.
- 5) Student 6 (Finance): *"This class obliged me to work with people who were not in the same area. That was good. That's exactly what you're going to face when you start your job"*.

Students shared the idea that autonomy is limited and they needed the support from their classmates to implement their ideas in the export project; even when they felt that the course based on a PBL approached led them be more independent. They also thought that innovation was tied to a competitive environment between groups and it is the competition pressure created by them that creative and alternative export ideas are presented. The project helped them to take risks, feeling freer than in courses where traditional methodology is taught. Table 7 shows the statistical items for innovation, risk assumption and competitiveness (Table 7).

<b>Table 7</b> <b>STATISTICAL ITEMS FOR INNOVATION, RISK ASSUMPTION AND COMPETITIVENESS.</b>					
<b>Statistical items for Innovation, Risk Assumption and Competitiveness.</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
My team was able to complete the projects independently.	4	6	1	10	1
I hope to implement the export project in real life.	2	7	5	4	4
This course improved my ability to work in teams.	0	2	3	8	9
My communication skills have improved as a result of this course.	0	4	2	3	13
The competition environment made me more creative and innovative.	2	3	2	8	7
I consider myself to be more risky after the implementation of the project-based learning methodology.	5	4	4	2	7

The 45.4% of the students believed that the export project could not be completed individually. It is due to the class dynamic in which intergroup cooperation was required to solve problems during the project. However, students felt autonomous in making decisions about the way they want to develop the export project as evidenced by the most shared views of the focus group. In the second item, the 40.9% do not hope to implement the export project while 36.6% consider it as an input for future plans. It is validated with the findings of Okudan & Rzasa

(2006) in which PBL applied to commercial entrepreneurship project increased student's autonomy and facilitated a future implementation in real life.

On the other hand, 77.2% of the students strongly agreed that PBL helped them to improve their teamwork skills. Also, the 72.7% considered that they improved their communication skills with other groups. Finally, the 68.18% strongly agreed that the competitive environment between groups made them more creative and innovative. However, the result of this last item implied that the classwork allowed them to be more risky.

### Statistical Comparison between PBL and Non-PBL Group Academic Grades

The final academic grades of the PBL and non-PBL groups are compared through arithmetic means in order to determine whether a change in learning improve the academic performance. For the comparison process, it was necessary to know the arithmetic means through a T-test for independent samples. It is considered two initial tests: the normality test and a variances test. The following table depicts the statistical inputs that were used (Table 8):

<b>Table 8</b> <b>STATISTICAL RESULTS.</b>		
	<b>Non-PBL Group</b>	<b>PBL Group</b>
Recount	23	22
Average	3.83	4.03
Standard deviation	0.3	0.44
Variance of coefficient	7.85%	10.92%
Minimum	3.1	3.4
Maximum	4.2	4.9

Before comparing variances, it is necessary to check the normality condition of the grades. Since the small amount of data, the Kolmogorov-Smirnov test was used. The results are the following (Table 9):

<b>Table 9</b> <b>NORMALITY TEST RESULT.</b>		
	Statistical Value	P values
Traditional teaching	0.154	0.650
PBL	0.206	0.307

Since the P values are high in both tests, the scores are normally distributed with the values of the estimated parameters. To compare the variances a F-Fisher test was used. The value of the statistic  $f=0.47$ . Value  $P=0.082$ . At a significance level of 0.05, the hypothesis of equality of variances is rejected; it is possible to consider that the variances are different. A T-test for the difference of means is used from independent samples.

The value of the statistic:  $t=-1.78$ .  $P\text{-value}=0.083$  at a significance level of 0.05. Since the calculated P-value is greater than 0.05, the hypothesis can be rejected. In other words, there are differences between means. However, as the P-value and significance level are very close the difference is not significant. The mean sample found with the PBL methodology is higher than

the one found with traditional teaching, which indicated that the methodology improved the academic performance.

The improvement in the academic performance was due to the enhancement of student's cross-curricular competencies throughout the export project elaboration's process that encouraged them to learn through a cooperative approach.

The hypothesis presented in this study is confirmed through the three specific objectives. The first one was whether the PBL group and non-PBL starts in similar Colombian external commerce's knowledge, is fulfilled given the information in the first phase of the study. Regarding the second specific objective on whether the PBL group improves the following cross-curricular competencies: cross-curricular competencies of autonomy, innovation, risk taking and competitiveness, it is found that PBL help to enhance it through group and intergroup work once the students manage quantitative and qualitative data regardless the geographical context, apply a research methodology correctly, and identify the different types of texts as exposed above.

Regarding the third specific objective, PBL improves the academic performance compared to the non-PBL group. This finding is corroborated by Jiménez et al., (2013: 63) in which PBL stimulates student's active participation through the presentation of real life problems. The developing of cross-curricular competencies (autonomy, innovation, risk taking and competitiveness) improves the academic performance *versus* non-PBL group in which students are only "recipients" of information and no spaces are provided for becoming active agents who build knowledge from their own experience.

## CONCLUSION

The general objective of the study was to compare two learning methodologies (PBL and traditional teaching) in the effectiveness of improving a good academic performance and the following cross-curricular competencies in a Colombian Caribbean university: autonomy, innovation, risk taking, competitiveness and academic performance in a group of students enrolled in the "*Colombian foreign commerce*" course based on a mixed methodology where quantitative data (students' grades) were analyzed statistically and qualitative data (focus groups and teacher's field notes) were interpreted. All of the above applied to a geographical context in order to verify if previous results showed in the references can be repeated regardless the geographical context.

The combination of several study instruments such as a focus group, a Likert-type questionnaire and the teacher's class notes allowed for a closer approach to the analysis of curricular performance of the two groups of students. This study validates the previous approaches of Okudan & Rzasa (2006: 198) in which the implementation of PBL not only improves curriculum performance but also the cross-curricular competencies applied to an export project. This is because students became active agents and were interested in the development of their projects based on their particular interests regardless of the geographical context. The most shared opinions in the focus group showed on the one hand a satisfactory perception that the PBL methodology improves both its curricular performance and its transversal competencies, and on the other hand, it satisfies its academic and professional interests.

However, nothing is conclusive. The course was found to be less effective in stimulating autonomy. The feedback provided by the students will be used to refine the course in the following areas (1) a need to verify if they know how to implement a research methodology, and (2) a more creative incorporation of risk to the course.

Finally there is a shortage of studies that analyzes the impact of the application of the PBL method on the improvement of cross-curricular competencies in students in the context of Colombian Caribbean higher education institutions.

### ENDNOTES

1. This research paper is the result of the third call for education Project research of the Higher Education Teacher's Office of Universidad del Norte called PBL vs. Traditional Teaching: An Experiment in the Colombian External Commerce Class. Project No. 2017013.

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### APPENDIX

Appendix 1 FOCUS GROUP PROTOCOL.	
Focus group protocol	
1. Introduction.	1.1. It begins with the presentation of each student mentioning his/her name and undergraduate studies.
2. Positive experiences of the course.	2.1. Students talk about the positive experience of the course. 2.2. Students discuss the simulation of the export process. 2.3. Students discuss about whether the export project brings them closer to the economic reality of Colombia. 2.4. Students comment about the effectiveness of PBL through the export project for improving cross-curricular competencies.
3. Class project opinions.	3.1. The difficulties of implementing an export project are discussed. 3.2. The students give their opinion on the handling of competition and cooperation for the elaboration of the export project.
4. Teaching style.	4.1. Students think about how they felt about the learning methodology used in class.
5. Things about the class that need to be changed.	5.1. The students highlight the elements they did not like and propose aspects to improve the course through PBL. 5.2. Students analyze the class resources to work on the elaboration of the export project.
6. Summarize.	6.1. Students and the teacher mention final aspects of the course.

### Appendix 2: Background questionnaire and Likert-type scale.

Major: \_\_\_\_\_

Minor (if applicable) \_\_\_\_\_

Semester standing: \_\_\_\_\_

Future career goals: \_\_\_\_\_

Why did you decide to take this class? \_\_\_\_\_

Are you planning to complete the E-SHIP minor? Why or why not?\_\_\_\_\_

Please place an X in the appropriate box to respond to the items using the following scale: (1) Strongly Disagree; (2) Disagree; (3) Neutral; (4) Agree; (5) Strongly Agree.

Appendix 2 BACKGROUND QUESTIONNAIRE AND LIKERT-TYPE SCALE.					
Statistical items for Autonomy.	1	2	3	4	5
1. I feel more capable of making decisions independently.	0	1	3	8	10
2. I rely more on my own judgment and instincts than on advices form others.	0	2	2	7	11
3. I developed a trusting relationship with my team.	0	0	3	8	11

Appendix 2 BACKGROUND QUESTIONNAIRE AND LIKERT-TYPE SCALE					
Statistical items for innovation, risk assumption and competitiveness.	1	2	3	4	5
1. My team was able to complete the projects independently.	4	6	1	10	1
2. I hope to implement the export project in real life.	2	7	5	4	4
3. This course improved my ability to work in teams	0	2	3	8	9
4. My communication skills have improved as a result of this course.	0	4	2	3	13
5. The competition environment made me more creative and innovative.	2	3	2	8	7
6. I consider myself to be more risky after the implementation of the project-based learning methodology.	5	4	4	2	7

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