Praxis & Saber Revista de Investigación y Pedagogía

Research article

ISSN 2216-0159 e-ISSN 2462-8603
2025, 16(44), e15957
https://doi.org/10.19053/uptc.22160159.v16.n44.2025.15957

# Evaluation of Problem-Based Learning in Rural University Education: Student Perception on Inclusiveness

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Recibido: 21/Enero/2024
Revisado: 29/Noviembre/2024
Aprobado: 12/Enero/2025
Publicado: 14/Marzo/2025

## Abstract

In Colombia, the rural population experiences difficulties in accessing higher education and suffers from high dropout and low graduation rates due to its socioeconomic challenges, difficult-to-reach locations, and low-quality secondary education, thereby generating inequality and exclusion. This study explores how project-based learning (PBL) affects the sense of inclusion for rural students in higher education, an area with limited existing research. Specifically, it examines the perceptions and experiences of students in the Special Program of Admission and Academic Mobility (PEAMA) at the Universidad Nacional de Colombia SUMAPAZ campus and how this teaching method impacts their inclusion. The data from the semi-structured interviews with open questions was analyzed through thematic analysis, and three key themes related to inclusion were identified: aspirations and opportunities, adaptation, and problem-solving attitudes. These topics allowed us to conclude that the students are grateful for the inclusion opportunity that the Program offers them, since without it, they would not have had access to Higher Education.

**Keywords:** rural population; higher education; inclusive education; thematic approach; solving problems; autonomous learning



Uptc Universidad Pedagógica y Tecnológica de Colombia

**Para citar este artículo:** Sánchez-Sáenz, C. M. (2025). Evaluación del Aprendizaje Basado en Problemas en la Educación Universitaria Rural: Percepción de los Estudiantes sobre la Inclusión. *Praxis & Saber*, 16(44), 1–19. https://doi.org/10.19053/uptc.22160159.v16.n44.2025.15957

## Evaluación del Aprendizaje Basado en Problemas en la Educación Universitaria Rural: Percepción de los Estudiantes sobre la Inclusión


### Resumen

En Colombia, la población rural experimenta dificultades para acceder a la educación superior y sufre de altas tasas de deserción y baja graduación debido a sus retos socioeconómicos, lugares de difícil acceso y baja calidad de la educación secundaria, generando así desigualdad y exclusión. Este estudio explora cómo el Aprendizaje Basado en Proyectos (ABP) afecta al sentido de inclusión de los estudiantes rurales en la Educación Superior, un área con escasa investigación existente. Específicamente, examina las percepciones y experiencias de los estudiantes del Programa Especial de Admisión y Movilidad Académica (PEAMA) de la Universidad Nacional de Colombia campus SUMAPAZ y cómo este método de enseñanza impacta su inclusión. Los datos de las entrevistas semiestructuradas con preguntas abiertas se analizaron mediante análisis temático, y se identificaron tres temas clave relacionados con la inclusión: aspiraciones y oportunidades, adaptación y actitudes para resolver problemas. Estos temas permitieron concluir que los alumnos agradecen la oportunidad de inclusión que les ofrece el Programa, ya que sin ella no habrían tenido acceso a la Educación Superior.


**Palabras clave:** población rural; enseñanza superior; educación inclusiva; enfoque temático; resolución de problemas; aprendizaje autónomo

## Avaliação da Aprendizagem baseada em Problemas no Ensino Universitário Rural: Percepções dos Alunos sobre a Inclusão


### Resumo

Na Colômbia, a população rural tem dificuldades de acesso ao Ensino Superior e sofre com altas taxas de evasão e baixas taxas de graduação devido a seus desafios socioeconômicos, locais de difícil acesso e baixa qualidade do ensino médio, gerando assim desigualdade e exclusão. Este estudo explora como a Aprendizagem Baseada em Projetos (ABP) afeta o senso de inclusão dos alunos rurais no Ensino Superior, uma área com poucas pesquisas existentes. Especificamente, ele examina as percepções e experiências dos alunos do Programa Especial de Admissão e Mobilidade Acadêmica (PEAMA) no campus SUMAPAZ da Universidade Nacional da Colômbia e como esse método de ensino afeta sua inclusão. Os dados das entrevistas semiestruturadas com perguntas abertas foram analisados por meio de análise temática, e foram identificados três temas principais relacionados à inclusão: aspirações e oportunidades, adaptação e atitudes de resolução de problemas. Esses temas levaram à conclusão de que os alunos apreciam a oportunidade de inclusão oferecida pelo Programa, sem a qual eles não teriam acesso ao ensino superior.


**Palavras-chave:** população rural; ensino superior; educação inclusiva; abordagem temática; foco temático; resolução de problemas; aprendizagem autônomo

## Introduction

Overcoming inequality and exclusion, as a strategy towards the sustainable development of societies, is perhaps the most pressing and important challenge in these times for countries and Institutions of Higher Education, particularly in developing countries. One of the United Nations goals in its agenda for sustainable development is to "Reduce inequality within and among countries" (UN, 2015). Thus, inclusion, participation, and greater equity relate to the expectations and goals of some societies (Aponte-Hernández, 2008).

To understand how this plays out in Colombia, in 2007, the Development Research Centre (CID) of the Colombia National University developed, with the support of the Ministry of National Education, a study to identify the conditions of access, permanence (completing the studies) and graduation of the diverse population in the educational subsystem (CID, 2007). Five groups were identified as experiencing difficulties in access, permanence, and graduation in higher education:

- People with disabilities and exceptional abilities or talents;
- Ethnic groups: black communities, Afro-Colombians, *raizals*[1] and *palenqueros*[2], indigenous;
- Victim population, as defined in the third article of Law 1448 of 2011[3];
- Demobilized population in the process of reintegration[4];
- Border population (the rural population located in areas of difficult access is included in this group).

In 2014, the Government of Colombia presented the National Development Plan 2014-2018: "*Todos por un nuevo país. Paz, equidad, educación*" ("All for a new country. Peace, equity and education) (DNP, 2014). One of the fundamental aspects on which this Development Plan focuses is transforming the educational system: "Colombia requires a training system that allows students not only to accumulate knowledge, but to know how to apply it, innovate, and learn throughout life to develop and update their skills" (DNP, 2014, p.67).

The principles of project-organized, problem-based learning (PBL) have the potential for helping to prepare students for a world where success depends less on knowing content than knowing how to discover and manage information, increase research skills, and solve problems (Gallagher et al., 1995). PBL could be effective in rural education, due to its main characteristics: it is experiential, it implies cooperative learning, and it occurs within a meaningful authentic

1 The Raizals are a Protestant Afro-Caribbean ethnic group, living in the Colombian Caribbean Coast. They are recognized by the Colombian authorities as one of the Afro-Colombian ethnic groups under the multicultural policy pursued since 1991 (website: https://en.wikipedia.org/wiki/Raizal. Retrieved 2019-04-03)

2 Palenquero or palenque (Palenquero: Lengua) is a Spanish-based creole language spoken in Colombia. Palenquero is the only Spanish-based creole in Latin America (Romero, Simon (2007-10-18). "San Basilio de Palenque Journal - A Language, Not Quite Spanish, With African Echoes - NYTimes.com". www.nytimes.com. Retrieved 2019-04-03).

3 Victims are considered those who have suffered damage due to events that occurred during the internal armed conflict (Colombian Law 1448 of 2011).

4 That person who voluntarily abandons his / her activities as a member of armed organizations outside the law (guerrilla groups and self-defense groups) and surrenders to the Colombian authorities (ACR, 2016. p 15).

context (Beellant et al, 2006). In addition, rural people can develop PBL skills, which with traditional education may not have been developed.

Given the scarcity of literature exploring the impact of PBL on the inclusion (defined as access to higher education for the purposes of this paper) of rural students in higher education, a study was designed to evaluate the students' perceptions and experiences of PBL, to understand the impact of this educational approach on inclusion. Therefore, this study will be focused on evaluating the impact of PBL on the students' feeling of inclusiveness in order to answer the following question: To what extent does the application of PBL principles in a rural university can impact students' perception of inclusiveness (access to higher education)?

## Literature Review

### *Education in the Rural Area and Inclusion Policies*

In 2014, the National Planning Department (DNP) established that the Colombian population living in rural areas corresponds to 30.4% of the country's total population (DNP, 2014b). The rural population in Colombia is made up of farmers, fishermen, artisans and those engaged in mining activities, as well as the indigenous people and a large part of the members of the Afro-Colombian communities.

The rural areas in Colombia have been characterized by poverty. This is manifested mainly in the lack of access to health services, education, social security, and efficient public services. The situation of violence in the country, and especially the forced displacement had further aggravated the conditions of poverty (Perez & Perez, 2002).

The National Survey of Quality of Life conducted in 2013 (Martinez-Restrepo et.al, 2016) showed that only 32% of men and 36% of women between 18 and 24 years old in rural areas have finished high school and are studying higher education.

In 2016, the report "The situation of rural education in Colombia, the challenges of the post-conflict and the transformation of the countryside" was presented. This report presents the current situation of rural education in Colombia and discusses the main strategies that have been proposed to overcome the lack of opportunities in this area (Martínez-Restrepo et al., 2016). The proposals in the educational matter of the MTC (Mission for the Transformation of the Countryside) suggest creating a Special Rural Education Plan that allows the productive permanence of young people in the countryside and where educational institutions contribute to rural development (Delegados de Gobierno de la República de Colombia - FARC-EP, 2014).

The educational situation in rural Colombia reflects the great challenges for the post-conflict to close the rural-urban division. To develop the countryside and reduce poverty levels, it is crucial to improve educational coverage and the quality and relevance of the education received by rural children and youth. Characteristics of the dispersed rural environment, such as the increasingly low number of students per grade, the long distances between villages and municipal towns, or the presence of child labor during harvest seasons, are complex problems that require creative solutions (Tieken, 2014).

The MTC stablished the strategy of social inclusion. This strategy seeks to eliminate the main gaps between the rural and urban areas in terms of access to quality education in 15 years. The document developed by Martinez-Restrepo and colleagues (2016) describes the main actions to comply with the MTC proposal:

"a) The need to "ruralize" not only the programs, but the public policy. Design flexible models appropriate for areas with different degrees and characteristics of rurality.

b) Design of a rural educational infrastructure master plan.

c) Creation of a Zero Illiteracy program in rural areas.

d) Guarantee a pertinent and quality education that incorporates "food security components and productive pedagogical projects that promote associative capacities, entrepreneurship and the formulation of productive projects" (*Misión para la Transformación del Campo*, 2014).

e) For higher education, it is proposed that the Ministry of Education have a specialized team to review the relevance of higher education programs for the rural sector, certify the competencies of the training programs, organize the offer to make it understandable for the population and entrepreneurs and follow up the offer and quality of higher education in rural areas." (Martinez-Restrepo et al., 2016, p.7)

The proposals of the MTC respond very closely to the proposals on rural education contained in the first point of the Havana Agreements. These proposals aim to raise universal coverage with comprehensive attention to early childhood; the implementation of flexible models of pre-school, primary, and secondary education; construction, reconstruction, improvement, and adaptation of rural educational infrastructure; the availability of qualified teaching staff; and access to information technologies (*Misión para la Transformación del Campo*, 2014).

*Fedesarrollo* estimates (Ramírez et al., 2015) the costs of the strategies recommended by the MTC, to reach the goals described in Table 1. An amount of 1.2% of the GDP is required for fifteen years, that is, close to $1.2 billion per year, for a total cost of $ 17.7 billion. This includes investments in education and management ($ 10.3 billion), quality ($ 2.3 billion), and infrastructure ($ 5 billion).

**Table 1.** *Rural coverage goals - MTC educational strategy*

| EDUCATION | 2015 COVERAGE | 2030 COVERAGE |
|---|---|---|
| Primary | 92% | 100% |
| Secondary | 72% | 100% |
| High-school | 36% | 100% |
| Superior | 8% | 79% |

*Adapted from: Ramírez et al., 2015*

However, to meet the goals established in these proposals and develop them in an appropriate manner, it is important to first analyze the inclusion problem within the country. According to the CESU (2014), in Colombia, access to higher education is difficult due to the diversity of the population, the plurality of cultures and territories, the armed conflict, and the multiple expressions of inequality in the regions (social, economic, political, cultural,

linguistic, physical and geographical circumstances).

The requirements for considering higher education as a right that must be accessed by different population groups are: 1) to understand what it is to give access to higher education to all those who have sufficient motivation and preparation, and 2) to use various forms of intervention to guarantee this right (CESU, 2014).

### *Problem Based Learning (PBL)*

Research in education today recognizes as necessary ways of learning those where teachers play a role of guidance and support on the type of knowledge acquisition that students achieve from their own action and construction (Prensky, 2001; Mora, 2004). However, the conception of learning as a quantity of knowledge received prevails in many educational environments and makes it difficult for teachers to adapt and participate in the design and implementation of forms of active learning for students (García-Gómez, 2005; Rodríguez & Kitchen, 2005; Lucarelli, 2008; Blin & Munro, 2008; Monereo-Font, 2010; Brownell & Tanner, 2012).

The educational methods most often employed in creating interdisciplinary learning opportunities include the PBL (Baldwin Jr., 1998; Shepard et al.,1985).

To be successful in PBL it is necessary to focus activities on collaborative learning. The main characteristics are: sharing learning experiences; learning information-searching skills; having peer support; learning presentation skills; having authentic opportunities; providing opportunities for cognitive conflict within a team, which encourages learning; and simulating a real work environment (Barrows & Tamblyn, 1980).

However, it is not easy to understand the contexts of collaborative learning, since they are influenced by social, psychological, and personal factors (Almajed et al., 2016). Students' personal relationships with each other directly affect the quality of interpersonal interactions during group activities and the success of their collaboration (Skinner et al., 2012).

Evaluating the implemented actions and the development of PBL and its effect on inclusion in Higher Education has been of great interest. This is the case of the research carried out by Arguiñano et al. (2018) where they concluded that the educational practices where PBL was included generated better academic results, showing a significantly lower percentage of students with below-average results, which can be understood as a higher level of inclusion.

Actually, digitization in higher education and emerging trends, such as personalized lifelong learning and flexible curriculum models, are challenging existing traditional PBL practices. According to Bertel et al. (2021) "new frameworks are required to envision future practice in higher education based on an understanding of their local environment context and the inclusion of multiple stakeholders and relevant professionals, not only to co-create potential scenarios suitable for a particular educational institution, but also to point directions for initiating and sustaining this process of change at a systemic level." (Bertel et al., 2021, p. 200).

## Methodology

This chapter describes the methodology of the current study. It includes the description of the PBL in the evaluation period, research design, and a description of how the participants were selected and how the interviews were conducted as a method of data collection. It also specifies the procedures employed for data analysis.

### *Description of the PBL in the Evaluation Period*

The study comprised PEAMA students of the Sumapaz Campus who entered the program in 2016-II and 2017-I. The Special Program of Admission and Academic Mobility (PEAMA) of the Universidad Nacional de Colombia (UNAL) was created with the purpose of facilitating the entrance to higher education for young people living in rural regions, by offering undergraduate curricular programs in these places. Sumapaz is an agricultural region, located in the *paramo* (alpine high-altitude ecosystem found in the Andes Mountains of South America).

The PEAMA - Sumapaz Program was offered only for the academic programs of Agricultural Engineering, Agronomic Engineering, Veterinary Medicine, Zootechnics, and Nursing. During the academic period, the students lived in Sumapaz, where the program was developed.

When planning each semester, the needs, problems, and potential of the region were considered, including the protection and conservation of the *paramo*, which provided an ideal environment for learning based on problems. The educational problems were organized in the form of projects executed by the students in small groups (3 to 4 students) during each academic semester. The university provided an "Experimental Farm" where the students could put into practice the proposals they had developed as a solution to their educational problems. Each project was carried out cooperatively through at least five different professional disciplines, guaranteeing interdisciplinary work.

The success of the autonomous learning of the students was assured thanks to the collaborative work of the group of participating professors who assumed the role of facilitators. At the end of each semester, the projects executed were shared with the community of the Sumapaz Region and with the academic community in the Bogota Campus. The students gave poster presentations and discussed the results. For the academic community, they gave oral presentations and answered questions from other students and professors.

Planning the activities has been a constant work carried out by the interdisciplinary group of professors that have participated in the program. The activities and the sequence of tasks that the students had to perform to assure a good execution of their projects were monitored and planned weekly. In these planning meetings, the constant evaluation of the implementation of the PBL is also carried out. From the difficulties faced every day, arduous sessions of reflection take place to decide on improvement actions.

### *Research Design*

Considering that this research focused on assessing the students' perception of inclusion

(access) in rural university education, a qualitative research approach was chosen. Thus, the qualitative in-depth interview was the main method of data collection (Patton 2002). According to Sampieri and colleagues (2013, p.376), qualitative research aims to "understand and deepen the phenomena, which are explored from the perspective of the participants in a natural environment and in relation to the context", that is, it presents a subjective character explored from the participant's perspective on its reality.

Semi-structured interviews were used, which is an interview style open in structure, but involving a set of questions that are explored with each participant (Patton, 2002). The interviews were developed from the research question and the characteristics of the study and were used as a guide throughout the interviews.

### *Selection of Participants*

The maximum-variation sampling (Patton, 2002) was used to select the participants for the interview. According to Patton, the maximum-variation sampling technique allows researchers to select participants that vary widely in particular features, in order to identify issues that cross a diverse sample. The students (two students from each academic program) were selected according to the suggestions of three professors involved in the program, who had more contact with the students and knew their learning process. In total, 12 interviews were conducted.

### *Carrying Out the Interviews*

After selecting the students, they were contacted, and the interviews were scheduled according to their availability. The meetings were conducted individually and recorded with the consent of the participants. The interviews were conducted in Spanish, and at the end of the thematic analysis, the most relevant aspects were translated into English.

The meeting began by asking the participants what they understand by the word "inclusion". Once the term was elucidated, the purpose of the study was explained. Next, the Free and Clarified Consent Term (FCCT) was presented to each participant. This document presented the objective of the study, the clarification about their voluntary participation in the research, the confidentiality regarding the data collected, and the dissemination of results only for scientific and academic purposes. Then, the participants were invited to answer the questions of the interview, reporting the impact of their experiences of university education on the characteristics of PBL and their perception of inclusion (access) in higher education. Each meeting lasted approximately 50 minutes per participant.

### *Data Analysis Methods*

After compiling the information, the recordings were transcribed verbatim in English by the responsible researcher, and the transcribed raw data was analyzed following the process of thematic analysis. The thematic analysis is a method that allows to identify, organize, analyze in detail, and provides topics from a careful reading and re-reading of the information collected and, thus, infer results that propitiate the adequate understanding/interpretation of the phenomenon under study (Braun & Clarke, 2006). The six phases of the thematic analysis

described by Braun and Clarke (2006) were followed (Familiarizing yourself with your data, Generating initial codes, Searching for themes, Reviewing themes, Defining and naming themes, and Producing the report).

## Findings and Discussion

After completing the six phases of thematic analysis, three main themes and sub-themes emerged: Aspirations and Opportunities (Quality education and economic and social conditions), Adapting to the study environment (Personal differences and personal problems), and Problem-solving attitudes (Connection with the Sumapaz region and turning academic knowledge into community practice).

### *Aspirations and Opportunities*

This theme emerged from the students' descriptions of the previous studies they had followed before entering the PEAMA program, exploring their decision to study at UNAL. In addition, their perceptions of inclusion (access) in higher education were also considered

### *Quality Education*

The students related facing difficulties in entering Higher Education, with the public education represented by the UNAL. This difficulty was related to the insufficient level of education they received in secondary education as a result of living in rural areas.

Some schools in the rural area have agreements with the *Servicio Nacional de Aprendizaje* (SENA), a Colombian public institution responsible for providing complementary training programs at the vocational level. Many of the students interviewed had the opportunity to follow these studies before entering the PEAMA program. Some of the students commented on their experiences:

> "With this practice [PBL] you learn a lot, as it helps you to move forward and be able to reach the level of those students who already arrived with a higher level"

> "At the beginning, you are aware of the problems, but you don't know what is causing them. As you begin the research process, you identify possible solutions. However, as a technician, you recognize the problems and can provide a potential solution right away."

In these comments, it is emphasized that the education received in the SENA does not lead them to analyze a problematic situation. While with PBL one must study the context, the causes and effects of a problem before proposing a solution.

For many students, the quality of education received in school was not enough to enter Higher Education. They said:

> "I was aware that with the knowledge I had from school, the score on the admission test that I was going to take wasn't enough for me to enter"

> "Education in rural schools isn't bad, but it doesn't meet those standards, so you fall short in some chemistry topics, for example. And that's why most of us find it difficult to enter"

The students emphasize that thanks to the PEAMA program they had the opportunity to

enter Higher Education, and the skills and knowledge developed with PBL helped them to gain continuity in their studies. They highlight the knowledge, preparation, and capacities acquired. This is the most relevant perception of inclusion. The students described:

> "Now, it has helped me to level up my knowledge and thus be in the same conditions of knowledge as my colleagues from other Campuses"

> "Public education in schools has poor quality compared to what should be received, and the program can help them to open that space and really see what they need to know and learn"

*Economic and Social Conditions*

Students shared their experiences of facing poverty and their aspirations for financial stability once they finish their university studies. Dreams, aspirations, hope, love, family, and purpose are very important characteristics that stand out in the stories of students. Some of their comments were:

> "Taking into account the economic and social conditions in which you live, it is quite difficult to access higher education"

> "Feel part of your community and rurality. Don't feel ashamed of being part of the rural area, but instead take that with pride and project yourself in the future, giving a benefit to your community and yourself. Take a decision of what career to study, always looking for the benefit of that community in which you grew up and that gives you this opportunity to enter the University through the PEAMA Sumapaz"

### *Adapting to the Study Environment*

This topic emerged from the descriptions of the students when asked about their study behaviors, and group learning experiences, and their perception of inclusion in both the program and the PBL environment. Collaborative work is an environment where teamwork skills are developed, and the PBL structures and processes support this learning.

In Sumapaz, each semester, the students had the opportunity to work in different groups on the projects of their interest. In the study developed by Westcott and colleagues (2010) it is suggested that to facilitate effective teamwork, a continuous commitment throughout the curriculum is required.

*Personal Differences*

Students explained the influence of belonging to different academic programs and having different points of view, skills, personalities, customs, traditions, and expectations. This makes collaborative work a process of adaptation. However, the importance of this type of work in the PBL environment was highlighted, which allowed the students, who at the beginning were hindered, to change their perception and give value to this experience when they saw the results at the end of each semester:

> "Having the opportunity to share with people who are part of other careers and who have different views of the problem that arises and the possible solutions that you can give them, it really is enriching at a personal and also professional level"

> "Teamwork has helped me to develop the ability to work in a team, to listen to other people, understand them, and see their point of view. It also helped me realize that what you believe isn't always true"

It has been found that students' personalities and preferences impact the learning environment, with levels of engagement depending on the perceived reactions of colleagues (Cockrell et al. 2000). Seymour (2013) in her work also found that personal differences impact the development of a collaborative group: "The diversity of individuals' experiences and opinions was highly valued in this process and several students felt that this was what had made them better team workers in terms of being able to appreciate, accept and seek out opinions before making decisions "(Seymour, 2013, p.11). Previously, Hutchings and colleagues (2003) found that students reported positive experiences in understanding how different teams worked and how team members deal with professional differences.

*Personal Problems*

Students shared their experience of conflicts, controversies and competition during the collaborative work in the development of the projects. They also described how they managed to overcome these difficulties, which allowed them to succeed in their projects. Some of the students' experiences were:

> "However, there was a process, always towards improvement. In the beginning, it was as if everything became chaotic, everyone fought, but there were solutions to develop things. Later, the work got better and now we work better"

> "There are people who are very rushed so sometimes we collide, but we always try to get everything right then that is what drove us to tolerate ourselves; we expected everything to go well"

These aspects were brought under control gradually thanks to dialogue, tolerance, respect, and communication. This allowed coexistence, sharing, family, friends, value, better attitudes, and positivity to improve in the end. Conflicts within groups are a normal part of team working and their dynamics, and are useful to resolve issues and improve group cohesion. Being able to do this in a PBL group is a beneficial skill to develop (Hendry et al., 2003; Holen 2000). The students commented:

> "It affected me; they [the other students] said that we were not working at the same rhythm, but they also were patient with us, and little by little, they helped us, and we managed to adapt to the rhythm they had, and we were able to improve our ideas"

> "It is enriching, and you must have a good attitude and know how to tolerate others and respect their opinions. Sometimes you think you know all, then you start to impose your ideas a lot"

Sometimes the differences between them generated fear, frustration, discouragement, and demotivation, which was also reflected in their behavior and performance of collaborative work. Seymour (2013) says: "The PBL group seems to be a testing ground for students to try out new ways of behaving within a group or team situation" (Seymour, 2013, p.12). Some of the comments were:

> "There was discouragement due to the difference in careers, and excuses were generated to avoid working"
>
> "I had moments when I didn't want to continue in the program because of the distance I had from my family, then I didn't act in the best way. That was reflected in the semester project"

For professors or researchers who act as facilitators, it is important to know that in the process of group work, students experience these stages of frustration through the learning process. Thus, facilitators should generate strategies and actions that are beneficial to the learning process itself. Westcott and colleagues (2010) call this aspect of PBL the "mid-curriculum blues", as it is a phenomenon that is often seen halfway through a course when the initial enthusiasm and commitment to PBL can often wane.

In general, the teamwork and communication skills that the students were able to identify clearly reflect that these skills were developed through the implementation of PBL principles. It is also highlighted that, when identifying the themes, opportunities, and adaptation as main axes that favored inclusion in Higher Education, it shows that these initiatives generated by the University (PEAMA-Sumapaz Program) are fundamental to reducing the inequities that currently exist in access to higher education.

### *Problem-Solving Attitudes*

Students focused on proposing possible solutions to real problems of the region; they expressed why it is important to share these experiences with the community. The theme is also developed based on the perceptions of inclusion in the program, its motivations, and suggestions.

*Connection with the Sumapaz Region*

The Sumapaz region is a very important ecosystem, and understanding it and knowing it is essential for students. This knowledge of where the educational problems were identified, served to inspire solutions and developments within the students' projects. The rural students are aware of the negative impact that some farming practices have on the ecosystem and the economy of the region. Some of their comments were:

> "Personally, I am very motivated by the field trips we had; having the possibility of knowing the reality of the country and seeing how necessary it is that you, as a professional, can contribute to change"
>
> "If you don't know your reality then you are distant from the needs of your community, your country, and even the world"

Students that felt part of their region, also felt more affinity and commitment to the projects developed during their learning process. As a result, they proposed to do the farming experimentation both in the traditional way and with the proposed alternative to better understand the context and the results of the projects. Shamah and MacTavish (2009, p. 1) said: "Youth benefit from developing place-based knowledge and engaging with a place in multiple ways in both psychological and social realms of development". Some of their observations were:

> "Now, with the Sumapaz program, we began to analyze from the biography what was happening with the territory, what was happening, what were the dynamics of the same region, and the projects that were carried out were giving solution, or a possible solution."

> "We tried to do things as the farmer does, to understand and try to do it in a different way, to show them that it can also be done that way"

> "They also have their ancient and ancestral knowledge that can serve us. Then there is the exchange of knowledge that can benefit both parts of the locality"

With these comments, the sense of belonging they feel towards their communities and local landscapes is also highlighted. In the working experience with young people in Eastern Oregon, Shamah and MacTavish (2009) had the opportunity to learn about the "meanings youth give to nature and the natural spaces that surround them" (Shamah & MacTavish 2009, p.1.).

The importance of solving problems in the context where learning takes place guarantees a sense of belonging for the students, greater motivation, and better results. The connections that the students could identify in the learning process were fundamental for the development of skills and good academic performance.

*Sharing Academic Knowledge into Community Practice*

The students contemplate sharing as an opportunity to bring alternative forms of production to the farmers of the region. This allows farmers to change their perception and reflect on the progress of the community, with a view to lessening their environmental impact and improving the wellbeing of the local wildlife. Their comments were:

> "So, if we didn't share, there is no communication between the students and the community, and we wouldn't contribute anything as students" "And I think that, as a University, sharing with the community of the region is very important"

> "It is important to share with the community to make them aware of the results obtained during the development of the projects and also to encourage or motivate them to take these types of practices or to execute these types of projects in their homes as they will have more benefits, for them and for the environment"

This interaction was also reported in the research conducted by Shamah and MacTavish (2009). The authors highlight that by interacting with the land that is in production and by personally knowing the families that work on the land, young people learn about agricultural good practices and solve any difficulties that may arise. The research conducted by Chawla (2007) proposes that youth who use and interact with natural spaces are more likely to become environmental stewards in the future.

The students also highlighted the importance of participation by the farmers, support in their projects, and good communication when they said:

> "Reaching out to the community and telling them 'we can participate with you; you can implement, and we can practice our knowledge and learn from you as a community"

> "Also, for them to know what we do inside the University, it isn't only to stay at the

> University but also to go out in order to gain more knowledge. In the sharing, you also learn from them"

However, there were students who commented that for some farmers, these activities were not of interest. If they implemented them and they did not work for them, they kept their traditions.

## Conclusion and Implications

This project used a qualitative interview method to obtain the perceptions of a group of students from the rural area belonging to the PEAMA - Sumapaz Program with regard to inclusion in higher education in a PBL environment. From the thematic analysis carried out on the interview transcripts, three key themes that relate to inclusion were identified: Aspirations and opportunities, adapting to the study environment, and problem-solving attitudes.

The results showed that the 12 students interviewed identified the main changes they have had in their learning process, which have allowed them to be successful in their studies and well-prepared to continue with their professional careers. They also identified their inclusion in the higher education system and changed their perception of the opportunities that are generated.

Another interpretation that can be made of these results is that, in their first experience, with rigorous, autonomous, and collaborative work when facing a problem, they recognized a different and better type of learning, which has allowed them to relate academic content to their better performance and feel able to face the student challenges within the university environment. They are beginning to reflect upon their learning and to understand it as a personal internal process that allows them to make decisions and achieve things. Collaborative work is recognized as fundamental for the development of learning, and communication with the community at all stages is indispensable for the development of their projects.

All the interviewees are very grateful for the opportunity offered by the Program to be included in Higher Education, since without it, they would not have been able to do so. This generates great motivation and expectations for their lives.

The results obtained support the answer to the research question posed as the starting point of this study, since it was evident that the application of the principles of the PBL in the program highly impacted the perception of inclusion of students.

## Final Statements

**Author contributions.** The author developed the following stages of the research: Conceptualization, Methodology, Data curation, Formal analysis, Research, Writing – original draft.

**Conflict of interest statement.** The author declares that there is no conflict of interest regarding the publication of this article.

**Financing and support.** This paper was derived from the Master's thesis in Problem Based Learning in Engineering and Science from the Aalborg University, Aalborg, Denmark. The Master's degree was funded by an agreement between the Universidad Nacional de Colombia – Faculty of Engineering and the University of Aalborg – Denmark.

**Ethical considerations.** The paper is original, has not been previously published and has not been simultaneously submitted for evaluation to another journal.

**Acknowledgments.** The authors acknowledge the support of the Faculty of Engineering - Universidad Nacional de Colombia and the Department of Development and Planning, Aalborg University, Aalborg, Denmark, especially professors Mona-Lisa Dahms and Virginie Servant-Miklos.

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