

Construction of environmental knowledge by applying project-based learning with students from the El Corazón educational institution

Abstract

Currently it is possible to affirm that the work of a professor is not easy, a reason that should lead us to value our work, but being a professor is not just a job, it is a vocation, a profession and an art, a vocation that has no meaning in it. that one must be aware that the work of a teacher contributes to the training of two students on a physical, mental, intellectual, social and cultural level; A profession that has its own knowledge of a specific area of knowledge, strategies, teaching methods and art, once one must be very creative to teach, motivate different people who have different expectations, with different styles and rhythms of learning. Therefore, we must “think not as an artistic gesture” opening spaces for the cultural, linguistic, cognitive, social, artistic dimension in the development and training of students, reinforcing their knowledge, emancipating their motivations and supporting their dreams. For all the reasons mentioned above, this research aims to build environmental knowledge through the application of project-based learning (PBL) with students of the El Corazón Educational Institute, in which it was verified that this type of learning provides strategies for the identification and solution of problems, creates competencies of knowledge of discipline, development of critical thinking, autonomous learning, integration between student-teacher and, above all, the ability to integrate acquired knowledge into everyday life.

Keywords: project-based learning, natural sciences, education, pollution, community

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Introduction

Being a vocational teacher implies, among many things, being the possessor of qualities, attitudes and values that enhance one's work, always seeking the most pertinent way to train students, diversifying methodologies, innovating their pedagogy and motivating them to be the ones who They build knowledge, who interact with their reality and transform it for the well-being of humanity. Apart from this, the teacher has an unwavering will to carry out his work, he has knowledge of his area, the context in which he is and presents the charisma to transform the teaching and learning processes that facilitate the achievement of in-depth knowledge. The vocational teacher, trains both at an academic and citizen level, transcends classes and the school, through real spaces, such as the context where the students live, he is the one who accompanies, not directs, he is not the central axis in teaching, he is only a facilitator, does not verbalize monologues, rather, assumes a listening posture. In the words of Würth (2015), the teaching vocation is understood as carrying out one's work with commitment, responsibility and enthusiasm for a double commitment; that of teaching and educating, based on active and constant dedication.

On the other hand, regarding the Project Based Learning (PBL) today, It is a methodology that allows the teacher to teach knowledge and skills through research and teamwork over a period of time, through an extensive research process structured between complex, authentic questions and carefully designed projects or tasks, according to with Causil et al.² in order to respond to a contextualized challenge, question or problem, which leads to the formation of new skills. In tune with Pan et al.³ The application of PBL in teaching processes not only seeks for students to take what they have learned from a situation and apply it in new situations, but also results in a change in the classic teacher who transmits information to a facilitator of learning.

PBL usually begins with a driving question that seeks possible solutions to contextualized problems. Subsequently, students initiate and participate in an exploration of the main question, learn and apply important ideas in relevant disciplines, then teachers and community members engage in collaborative activities to find solutions and with the help of learning technologies they create tangible results that address the main question (Markham, 2003).

It has been shown that students in the project framework are more creative, acquire the ability to take initiatives and work as a team in such a way that they design projects that involve experimental practices, as established by Vivescas et al.⁴ Converting the classroom into a laboratory, or using laboratories, as a teaching strategy can improve learning and teaching processes. There has been great interest in the area of Natural Sciences to find mechanisms that allow the development of skills, rather than the memorization of data, dates or formulas. Causil et al.² establishes that, the PBL emerges as a strategy to increase students' analytical capacity and contribute to solving problems in the environment that surrounds them. Likewise, as established by Atehortúa C. and Bonilla G et al.⁵ In the teaching and learning of Biology, if the aim is to achieve solid and effective knowledge to use it in favor of environmental care, or in the search for autonomous individuals with significant knowledge, teaching practice should be directed towards activities where students develop active roles and be the ones who build knowledge from the analysis of contextualized situations and discussion with their peers.⁶

Methodology

This article shows the results of a research carried out in 2021, at the El Corazón Educational Institution, commune 13 of the municipality of Medellín, department of Antioquia, whose objective was to identify the factors that influence the students of this official

institution. , in the construction of knowledge based on project-based learning in Natural Sciences and the application of these in daily life. The study was carried out with 14 students divided into two groups, one experimental, to which the PBL methodology was applied (group A) through active methodologies, a STEAM approach based on field trips, in addition to the use of the laboratory as a strategy. learning and another group -control- (group B), using a traditional strategy with the use of boards, books and master class. The topic worked on in both groups was the environmental problems that arise in commune 13, the Corazón neighborhood towards the west of the city of Medellín. With the students of group A, the following stages were worked on:

1st Stage - Identification of the problem:In this stage, the students identified an environmental problem close to the area where they live (pollution by garbage from the Ana Díaz stream) through focused interviews and carried out socialization among their classmates in order to look for possible solutions (Figure 1–3).



Figure 1 Collection of water samples in the Ana Díaz stream.



Figure 2 Qualitative analysis of the water from the Ana Díaz stream.



Figure 3 Tour of the territory, rural area.

2nd Stage – Planning and development of activities:Based on the identification of the specific problem, a schedule of activities was proposed, which helped reduce the problem (Figure 4–6).



Figure 4 Eafit University Laboratory. Analysis of water samples.



Figure 5 Work in the community in order to improve common green spaces.



Figure 6 Construction of messages alluding to caring for the environment.

3rd Stage - Socialization of results:After the development of activities, through the use of technologies, the students shared the results obtained with the academic community, seeking environmental awareness and respect for nature.

In group B, the master class strategy was used where some environmental problems that exist in the communities were explained and how the classification of waste should be carried out and what methodologies exist to combat some types of contamination (Figure 7–9).



Figure 7 Inter-institutional collaborative work, in order to join efforts in the environmental care of commune 13.

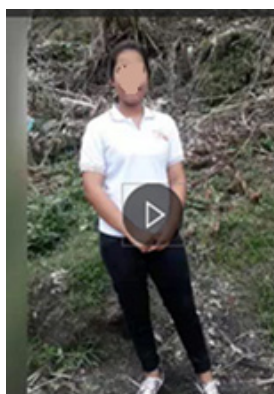


Figure 8 Making a video to train the community and report on the progress of the research.



Figure 9 Return to the community about what was investigated in the Ana Díaz ravine and the environmental problems of the environment.

For both groups after one week, variables of specific knowledge (conceptual knowledge), interpersonal competence (knowing how to do) and impact on society (knowing how to be) were evaluated.

Below are some images of the different stages.

Results

After applying the proposed evaluations on the topic of “environmental pollution” in order to validate the knowledge acquired, Table 1 shows the summary of the evaluation criteria and classification levels.

Table 1 Evaluation criteria and classification levels

Competence	Description	Group A	B Group
Conceptual	Design, structuring, data collection and tabulation of interviews	High	Very Low
	Project structure	Half	Very Low
Intrapersonal	Identification of the different concepts applied	High	Half
	Generation of ideas and clear points of view regarding the problems highlighted	High	Low
Interpersonal	Socialization of the problem and community awareness	High	Low

Analysis of results

The results show that the students in group A, where the PBL was worked, obtained a higher percentage per level in the different competencies evaluated with respect to group B, so it can be suggested that the PBL is a very appropriate tool to increase the ability to identify problems, acquire knowledge, analyze results and socialize

results. At a general level, we can say that the PBL methodology allows the construction of real spaces with problems from the same environment of the students, to strengthen knowledge in knowing, doing and being. Below, some advantages of the projects carried out are explained. with secondary school students from the El Corazón Educational Institution, commune 13 of the city of Medellín during 2021 and 2022.

Creativity is evident in great splendor, while students build alternatives to carry out field trips, analyze contextual situations in environmental terms and create solutions to different problems that are of a social nature within their environment, such as; careful management and ecosystem experience with other living beings. Motivation, which is quite marked in group A, since their learning arises from observation, analysis and work in context, transforming the regular classroom into real spaces where the situations and phenomena studied arise. On the contrary, in group B, the motivation is not significant, because the work is carried out from the classroom with masterwork, videos and photos, which does little to strengthen collaborative work for the construction of significant knowledge.

Conclusion

Collaborative work, the development of roles and the impact on society in a positive way, is far away in group A unlike group B, since the former, by working and facing reality, manage to develop communicative, citizenship and of course, cognitive. Sometimes, the classroom is too small to confront students with truly motivating situations that lead them to analyze, propose and solve environmental problems of the context, many times, it only remains in utopian exercises or paper simulations, but when they are faced with reality, awareness and attitudinal change towards environmental care are deeply strengthened.

The active and leading role is assumed by the students in group A, they are the leaders of the processes, strategies and development of the activities, because they want to stand out, excel in the premise “I want to do something good for myself.” neighborhood, my commune”, just look at their enthusiasm when touring the natural spaces and citizens that make up their territory, how gratifying it is when they are the ones who empower themselves and call on their people, their neighborhood to change behaviors and lifestyle habits. , for those who contribute to the care and preservation of the environment.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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