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## ***The investigation as an environmental education strategy***

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### **ABSTRACT**

This article presents a meaningful experience developed in the Agrotécnico Mixto High School in Caquetá Colombia with the participation of students, teachers and some representatives from the community which aims researching practices about environmental education towards taking care of the Pescado river as a water resource. The methodology used in this case was qualitative with a descriptive - interpretative approach. Several stages were developed: information gathering, systematization and analysis and interpretation of results. One of the most important findings was to find out that researching as an environmental education strategy can generate attitudinal changes in the students towards taking care and conservation of natural resources.

**KEYWORDS:** Strategies for environmental education, research, systematization of experiences, Belén de los Andaquíes, Colombia.

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# *La investigación como estrategia de educación ambiental*

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## RESUMEN

Este artículo presenta una experiencia significativa desarrollada en el Colegio Agrotécnico Mixto de Caquetá (Colombia), con la participación de estudiantes, maestros y algunos representantes de la comunidad. Su objetivo consistió en investigar prácticas sobre educación ambiental para cuidar el río Pescado como un recurso de agua. La metodología utilizada en este caso fue cualitativa con un enfoque descriptivo - interpretativo. Se desarrollaron varias etapas: recolección de información, sistematización, análisis e interpretación de resultados. Uno de los hallazgos más importantes fue determinar que la investigación es una estrategia de educación ambiental, que puede generar cambios de actitud en los estudiantes hacia el cuidado y la conservación de los recursos naturales.

**PALABRAS CLAVE:** Estrategias para la educación ambiental, investigación, sistematización de experiencias, Belén de los Andaquíes, Colombia.

## Introduction

The Agrotécnico Mixto High School is located in the municipality of Belén de los Andaquíes department of Caquetá, Colombia. It receives around 900 students from pre-school to eleventh grade. The agro-technical modality was implemented due to characteristics of the region, aspect which has given recognition at the local level for the training of students as a technician of agriculture with competencies developed in the framework of the preservation of natural resources, as established in the Educational Institutional Project “PEI” (2015), which quotes textually in one of its sections:

Training within an ecological culture with awareness of protection, conservation and improvement of the environment in favor of quality and rational use of natural resources, disaster prevention and the defense of the region and nation’s cultural heritage (p. 42)

Therefore, the commitment of the institution is to carry out training processes focus on researching processes in order to train students on discovering, exploration and capacity for amazement around their context.

In relation to processes of environmental education, the Agrotécnico Mixto High School has developed during three years a research project called “El río Pescado”: Gift and commitment in the present and future”, which has sought to develop a research process through learning collaborative strategies by creating a group of safeguards, which can generate knowledge for improving, caring and conservation of “El río Pescado” in Belén de los Andaquíes. In view of the above, this article presents the systematization of an experience that involves development of a research

process in environmental education with the participation of students, teachers and the community.

The document is presented in three moments: the first one, gather theory aspects related to conceptions of environmental education experiences and the approach to research as an environmental education strategy.

The second one, describes the method used to carry out the d systematization of the experience, which in this case, was qualitative with a descriptive - interpretative approach. Finally, results are presented for analyzing the information obtained highlighting meaningful findings of the researching experience.

## **1. Environmental education meaningful experiences**

Although researching and environmental education converge to meaningful situations it is necessary to order and present developments for processes and findings that can be taken up and improved in similar contexts. In the same way, it is considered that it has a great number of interactions that cannot be limited due to huge expectations so that it is important to be presented as sociohistorical, complex and dynamic processes (Gutiérrez, 2008; Rojas-Bahamón, Arbeláez y Prieto, 2017).

Consequently, one of the greatest challenges in the practice of systematization meaningful experiences goes beyond the “descriptive or narrative description of the experience to achieve an interpretative reading focus on a theoretical reflection on it”. Carrillo (2011, p.47). Thus, in order to achieve the most important experiences not being limited by activism could transcend systematization, according to Jara (2001), the following challenges have been identified:

- Understand the situation analytically to know and learn from the experience in relation to the context, linking practice and theory.
- Identify interactions and critical contributions of social actors.
- Generate clues, provocations to encourage the development of new experiences through exchanging knowledge and construed learnings.
- Identify improvements to transform environmental education practices.

In this regard, Renteria (2008) argues that environmental education (EE) is understood as a process promoting, formation of values and development of social attitudes, allowing individuals to interpret relationships and interactions with the environment while promoting attitudes of respect for the environment. In this way, the EA is emerging as a strategy of cultural, social and environmental interaction in a way of equity, socio-environment responsibility and sustainability.

Likewise, the idea presented by Castillo (2010) through environmental education it is possible the following: a) Encourage and facilitate the understanding of knowledge in relation to social, economic and cultural problems, b) Stimulate values, critical attitudes, environmental constructivists, c) Encourage participation,

shared responsibilities towards the environment. Therefore, to boost the process of environmental education strategies have been identified in accordance with what was proposed by Rengifo, Quitiaquez and Mora (2012):

- Problem-solving by selecting priorities for promoting commitments and changes. This strategy involves a series of research tasks.
- Development of workshops, field research, campaigns and ecological groups, made up of community groups to encourage actions and thinkings through contact with nature. They provide situations for coexistence and understanding of the environment.
- Development of workshops, field research, campaigns, and ecological groups, made up of community people to encourage actions and ponder through contact with nature. They provide situations for coexistence and understanding the environment.
- Communication of experiences as well as exchange of knowledge.

Additionally, it is considered that researching in EA converge those works that combine environmental, educational and educative, promoting development of unpublished social practices in scenarios of social participation of a pro-environmental nature (Benayas, Gutiérrez and Hernández, 2003). In. Thus, as a result of investigative process about understanding relationships between people - environment and solving environmental issues.

## **2. Methodology**

This research was carried out by a qualitative methodology and a descriptive - interpretative approach. It was developed in several stages: information gathering, systematization and analysis of data. We sought to answer the researching question about: How has meaningful experiences about environmental education in Belén de los Andaquíes been developed in relation to the preservation of Pescado river?

The first stage was documentary and inquiring. For data gathering, two techniques were used: documentary reviewing and interviewing. We inquired about documents related to the study topic, logs and the research reports presented in the framework of this project. Likewise, interviewing teachers who were leaders during the project.

The second stage was called: classification and digitalization of data. This stage was developed by selecting relevant information which was classified according to time, context and theoretical relevance.

The final stage was analysis. at this phase, the information gathered in the exploratory phase was managed with theoretical information, after that, results were written down to be presented.

### **3. Results**

According to the framework of this research, systematization of a meaningful experience in the Agrotécnico Mixto in Belén de los Andaquíes related to protecting El Rio Pescado was done. The following outcomes were found.

#### **3.1. Geographical context and ecosystem**

The meaningful experience presented in this article was developed in Belén de los Andaquíes which was recognized by department law number 03 on the 12<sup>th</sup> of November in 1985. This municipality is located at south of the department of Caquetá which also is part of the Colombian Amazon.

The municipality of Belén de los Andaquíes is known by its warm climate and a huge water sources, as well as its enormous hydro-power potential due to its water sources, given that it is surrounded by the rivers: Pescado, Sarabando, San Juan, San Luis, Bodoquero and Bodoquerito rivers; all these factors have given the municipality a local reputation to be called “The tourist capital of Caquetá” it is also be recognized as the town with the most beautiful name of Colombia.

Municipality’s water supply for its population is made through a municipal aqueduct which was built in 1970 and it is supplied by the Genoa and La Resaca creeks which come from the last ridge of the Eastern mountain range, these rivers join in the upper part of El Rio Pescado. So, due to the importance of water in this municipality, the main aim of this research is to provide environmental education as a strategy to preserve El Rio Pescado given its high pollution rates.

#### **3.2. Experience: Research as an environmental education strategy**

Documentary review allowed to determine that this research strategy of environmental education carried out in the Institución Educativa Agrotécnico Mixto has the following characteristics:

#### **3.3. Purposes and objectives**

The origin of this research arises from the idea of students in a classroom, who asked themselves what solutions could be planned to tackle the problematic of El Rio Pescado? Thus, the project was proposed with the purpose of identifying solutions to the environmental problems of the river, from the students’ point of view.

Additionally, the objective of this project was to propose solutions to the problem of El Rio Pescado in Belén de los Andaquíes with the following specific objectives:

- Identify sources of contamination of El Rio Pescado in the municipality capital of Belén de los Andaquíes.

- Create an environmental agenda for the improvement of water source conditions to outline actions that can be incorporated into the institutional PRAE document.

### 3.4. Methodology developed along the experience

The environmental education experience was developed according to the framework of a research process with the following phases:

- a) Diagnostic: In 2015, teachers and students of the Institución Educativa Agrotécnico Mixto worked together as a team to point out problems related to the contamination of El Rio Pescado. As a result of the discussion objective of the problem under study was outlined.
- b) Exploratory: A preliminary study was carried out to identify antecedents that belong to the problem in mention in order to identify ongoing activities, planning actions and find arguments to validate the need for researching process.
- c) Field operations: Actions carried out by the students and teachers as field trips to observe and verify contaminating foci of El Rio Pescado, activities which allowed researchers approaching, observation and description of the object under study.

At this stage, techniques implemented were: observation, field trips, sampling, laboratory analysis, filling notebooks and logs.

- d) Reflective: during this stage teachers and students discussed about findings, according to the object under study, the background and actions to be followed in order to encourage actions aimed at creating an environmental agenda for the improvement of water source conditions.
- e) Discussion: Finally, outcomes found were presented in the academic community and municipality government sectors in Belén de los Andaquíes.

In relation to topics under study those which aroused interest in the environmental education were contamination of the water resource and the approach of solutions related to problems affecting El Rio Pescado.

### 3.5. Findings

Elements found in this research as an environmental education strategy are:

- Identify several sources of contamination along el rio Pescado, among which are contamination by solid waste from swimmers, contamination by car washing and the most serious one, sewage water. Thus, visits to the river helped to notice the existence

of a sewage treatment plant out of operation. However, after discussing the project to the community, the awareness of this issue puts authorities of the municipality to work in favor of water conservation and led a community representative to reactivate the sewage treatment plant again.

- Personal and institutional responsibilities in relation to pollution processes were identified; it was found that the aqueduct and sewerage company was responsible for the destination of wastewater that directly contaminated the agricultural laboratory of the Institucion Educativa Agrotécnico Mixto, putting at risk the health of students, workers, teachers and animals.

-Creation of an environmental agenda for improving the conditions of the water source, these actions were incorporated to the School Environmental Project (PRAE) document.

-Promote a public awareness campaign about contamination of water sources. The campaign was addressed to the school community (teachers, students and parents) and was carried out in partnership with the commission for protecting water and living earth.

-There was the need of recognizing Belén de los Andaquíes as a green municipality and protector of water.

-The following workshops were discussed in different grades and classrooms:

March against pollution “everyone protecting water sources”

Water’s pilgrimage in favor of water sources.

Public awareness campaign in the Institucion Educativa Agrotécnico Mixto addressed to students against different polluting factors as: used water coming from households, pollution caused by tourism and current conditions of El Rio Pescado.

Cleaning campaign and reforestation around the Guayabales pond of el rio Pescado.

### **3.6. Meaningful impacts**

- From the environmental point of view: In accordance with the objectives set, this investigation found a direct pollution impact on the water source, caused by several sources of contamination among them the most serious one was dumping of wastewater on the river. However, after presenting this project to the community, the impact of its results led the authorities of the municipality and the Commission for protecting water to reactivate the wastewater treatment plant which was out of service.

- From the educational point of view: Learning from research processes. Meaningful learning processes were identified when questioning about the aim of this research, the problem to be investigated, development of strategies to research and elicit knowledge. Actions done in this research were understood by students as social, communicative and scientific skills.

-From researching point of view: curiosity is ignited because questions are generated, problems are framed, hypotheses and possible solutions are given through inquiring, consultation, questioning and work on problems and its possible solutions.

-From a social point of view: Students learn and practice social skills through teamwork and taking care for each other. The different activities performed allowed sharing of social and educational experiences by encouraging communication skills through dialogue, writing processes and presentations.

Finally, through presenting this project, it was identified that 274 students of the Basic Secondary and technical modality, teachers and administrative staff took advantage from the workshop performed in partnership with the Commission for protecting water.

### **3.7. Difficulties and strengths**

Regarding the difficulties, it was suggested that the field trips were affected by the local climate, given that the rains prevented the displacement of the group of young researchers. Likewise, safety of researching students was not the best one because the teacher was the only accompanying person available during most of the planned field trips. Additionally, there was a lack of teachers with experience in environmental topics that would strengthen the skill of students involved in researching.

Regarding the strengths, it was stated that the students already had experience in this type of research since they had participated in the INVESTIC CAQUETA project, developed previously in the school within the framework of the ONDAS COLCIENCIAS calls; this allowed researching to be developed openly according to the experience that young students had in this type of investigative process.

## **Conclusions**

The systematization of this experience led to conclude that environmental education research has greater impact when it arises from concerns and queries from the community because without being imposed commitment and participation is more effective. Thus, it generates results of greatest impact.

Questions are very important tools to start a research process through them children and young people get to know a problem better, come up with solutions, given that “the imagination and creativity of children is an unlimited source of possibilities for the stimulation of scientific knowledge “(Charpak y Lena, 2018)

Promoting research as an environmental education strategy creates a sense of belonging in students, as well as looking after their natural resources, even more, if one of them has had contact with nature. The community’s recommendations are retaken to be developed within all community sectors.

Meaningful experiences need to be systematized and spread in order to know the impacts on environment, it also to encourage social groups and communities to

develop ecological and environmental education activities.

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