
Strategies for environmental literacy in schools. The case of Neiva (Colombia)

Estrategias de alfabetización ambiental escolar. El caso de Neiva (Colombia)

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Abstract

Introduction. Since their incorporation into compulsory education in Colombia three decades ago, Environmental School Projects have been subject to constant redefinition, considering the different meanings, attributes, and controversies that have accompanied environmental education and sustainability in recent decades. Environmental School Projects have come to be considered a strategy for environmental literacy within the educational setting.

Method. The objective of this study is to characterize, from the perspective of the different actors involved in these projects, the determining factors for their success and to identify areas for improvement in their implementation. The methodological approach of this study is mixed; it combines in-depth interviews with a population-based questionnaire administered to 745 primary and secondary school teachers, with the collaboration of the Municipal Education Secretariat of Neiva (Colombia), the context in which this work is situated.

Results. The interpretive phenomenological analysis of the information collected through the interviews and the statistical analysis of the information collected through the questionnaire highlight internal and external aspects as determining factors for the success of these projects.

Conclusions. Institutional commitment, community participation, environmental training and awareness of the administrative and management teams of these projects, their contextualization and impact on the environment, and the sufficiency of resources are the key factors determining the success of these projects, and there is significant room for improvement in these areas.

Keywords: environmental education for sustainability, environmental literacy, educational strategies, educational assessment, evaluative research.

Resumen

Introducción. Desde su incorporación en la enseñanza obligatoria de Colombia hace tres décadas, los Proyectos Ambientales Escolares han sido objeto de constantes redefiniciones, en atención a los diversos atributos y controversias que han acompañado a la educación ambiental y la sostenibilidad en las últimas décadas. En este proceso, han pasado a concebirse como una estrategia de alfabetización ambiental cuyo alcance se extiende tanto al currículo como a la comunidad.

Método. El objetivo de este estudio es caracterizar, en opinión de los diferentes actores involucrados en estos proyectos, los factores determinantes de su éxito e identificar el margen de mejora en su implantación. El enfoque metodológico es mixto; se combinan entrevistas en profundidad con un cuestionario poblacional a 745 docentes de Educación Básica y Media con la colaboración de la Secretaría de Educación Municipal de Neiva (Colombia), contexto en el que se ubica este trabajo.

Resultados. El análisis fenomenológico interpretativo de la información recogida a través de las entrevistas y el análisis estadístico realizado de los datos recopilados a través del cuestionario destaca como condicionantes del éxito aspectos internos y externos a estos proyectos.

Conclusiones. El compromiso institucional, la participación comunitaria, la formación y conciencia ambiental de la administración y de los equipos gestores, así como la adecuada contextualización de los proyectos, su impacto en el entorno y la suficiencia de recursos disponibles, se identifican como factores clave determinantes del éxito de estos proyectos; factores cuyo margen de mejora es destacable.

Palabras clave: educación ambiental para la sostenibilidad, alfabetización ambiental, estrategias educativas, evaluación de la educación, investigación evaluativa.

Introduction

Since Environmental Education (EE) gained international visibility in the 1970s through various forums and conferences, it has become the focus of significant scientific and institutional gatherings, has generated profound debates, and has been included (though not always with the same level of prominence) in regional, national, and international political agendas. Over these decades, EE has acquired different meanings and attributes, ultimately becoming established as the ideal paradigm and strategy for restoring balance between the ecological, economic, and social spheres.

During this process of constructing and reconstructing EE, diverse concepts such as social equity, social justice, sustainable development, and sustainability, among others, have been incorporated. This last concept, understood from a systemic, complex, and interdisciplinary perspective (Macintyre et al., 2025; Nay-Valero & Febres, 2019), has become a necessary reference point for EE; a concept whose meaning is subject to ongoing critical review, and although its use may be considered excessive at present (Escrivá, 2023), it still constitutes a differentiating paradigm or approach, which is the one advocated in this work.

Environmental Education for Sustainability (henceforth EEFS) expands the scope for action of EE to include a political dimension, focusing on fostering critical thought among citizens and broadening the spaces for social management and citizen participation; an ecological dimension, promoting the sustainable use of natural resources and the generation and dissemination of scientific and technical knowledge about ecosystems; an educational dimension, guaranteeing quality education that facilitates the understanding of reality and its transformation on a personal and community level; an ethical dimension, rethinking the role of humans in the world and promoting an ethic based on cooperation, respect for nature, and dialogue; and an emotional dimension, recognizing the value of emotions in environmental literacy; an economic dimension by questioning the ecological impact of the current economic model; and finally, to include as well a cultural dimension by recognizing the value of cultural heritage, traditions and plurality (Sterling, 2009; Díez-Gutiérrez et al., 2025; González-Muñoz et al., 2024; Gutiérrez-Pérez et al., 2020; Rendón, 2018; Sudan & Zuin, 2018).

The presence of EE in the Colombian academic arena materialized in the mid-nineties of the twentieth century within the framework of Decree 1743 of 1994, through which it was established that it would be included in the Educational Projects of each Educational Institution (IED), through Environmental School Projects (hereinafter ESPs), thus advancing towards an environmentally aware citizenship and facilitating the development of behaviours that promote sustainability through participation and community empowerment, thereby favoring the continuous improvement of the quality of life of people and the situation of the place in which they live (Mora-Ortiz, 2015; Niño-Barajas & Pedraza-Jiménez, 2019).

From the institutionalization of Environmental School Projects (ESPs) in formal education (Preschool, Primary and Secondary Education) to now, its concept and implementation strategies have been subject to political and scientific debates developed in recent decades about the environment and EE. Thus, they have gone from being initially conceived as a strategy to develop local, regional and/or national environmental diagnoses, with the purpose of contributing to the resolution of specific environmental issues, to being considered as a strategy for environmental literacy in formal Colombian school contexts, incorporating, from an interdisciplinary and transversal perspective, knowledge, skills, attitudes and behaviours that allow both students and

the remaining educational community to act in an informed and sustainable manner, recognize local and global ecosocial and environmental issues, analyse the causes and consequences of these problems and actively participate in their solutions and prevention (Burgos-Ayala, 2017; Mora-Ortiz, 2015; Gómez-Agudelo, 2018; MADS, 2021; Murillo-Montoya, 2022; Martínez-Aznar et al., 2022; Guerrero-Fernández et al., 2022).

The territorial contextualization of these projects, the suitability of their educational approach, their disciplinary transversality, the environmental literacy of the teaching staff, the absence of systematization and feedback, the specific nature of the proposed activities, the medium and long term impact of the project in the natural and social environment of the educational centre or the capacity of these projects to become educational tools for the effective management of local environmental issues are some of the considerations on which the current debate around these projects pivot (Burgos-Ayala, 2017; Bustamante-Gazabón et al., 2017; Cadavid-Velásquez et al., 2020; Espinosa-Rojas & Ospina-González, 2022).

Without losing sight of the catalytic effect that education has on the well-being of individuals and on the future of our planet, this study is approached from the conviction that Environmental School Projects (ESPs) should be conceived from the framework of environmental education for sustainability and be subject to systematic processes of review and improvement; in this way, they will become effective educational strategies for citizen training and an advancement towards solid environmental awareness and culture (Mora-Ortiz, 2015; Escámez & López, 2019; Ramírez-Pita, 2024).

The goal of this study is twofold: firstly, to understand how these projects are being implemented, exploring the factors that determine their success; and secondly, to identify areas for improvement in certain aspects related to their internal and external management. This study focuses on the perspectives of the Environmental School Projects (ESPs) held by the groups involved in their design and implementation in the municipality of Neiva, the capital of the Department of Huila (Colombia). The emic perspective used to address the first objective, through in-depth interviews, has allowed us to document and understand, from the specific characteristics of each of these projects, some of the controversies that fuel debate (Bergman & Lindgren, 2017). The population-based nature of the questionnaire used to address the second objective has provided us access to the opinions of a significant sample of 745 individuals (administrators, teachers, and ESPs leaders) working in Primary and Secondary Education who are involved, at different levels, in the design, management, and/or development of the ESPs in the municipality of Neiva.

School Environmental School Projects: an environmental literacy strategy in formal education in Colombia.

Latin American countries, and specifically Colombia, have participated in the meetings and conferences developed within the framework of EE and have responded to international commitments with different initiatives, some more successful than others, and with the celebration of multiple forums through which progress has been made in the epistemological and methodological discussion of EE, in its institutionalization, legislation and professionalization in the region (Murillo-Montoya, 2022).

At the curricular level, Law 1549 of 2012 states that Environmental School Projects (ESPs) contribute to the cross-curricular integration of local environmental issues as

educational content. As suggested by Obando-Guerrero (2011) and Murillo-Montoya (2022), these projects should be based on contextualized diagnoses of the territory, addressing not only the environment but also social, economic, and cultural concepts that contribute to human development and the achievement of the Sustainable Development Goals (SDGs). Climate change, biodiversity, water, soil management, risk management, and integrated solid waste management, among others, are core areas of focus in these projects.

Developing a student's critical thinking, problem-solving, and decision-making skills, among others, are some of the competencies associated with the educational purpose of Environmental School Projects (ESPs). Environmental projects are designed based on a prior needs assessment of the context, with the aim of contributing to the resolution of eco-environmental and eco-social problems in the surrounding area through the participation of the educational community. Every educational institution must design and develop an ESP each academic year and include it in its Institutional Educational Project; this project must address the identified needs, define the work plan, assign responsibilities, manage resources, and evaluate its impact.

In recent years, ESP projects have been the subject of various studies. Espinosa-Rojas and Castaño-Barrera (2022) highlight that most studies focus on their diagnosis and characterization, with fewer studies focusing on proposals, evaluation systems, and cross-sectional experiences.

Many studies have found that there is limited participation of the educational community in the development of these projects, a lack of cross-disciplinary integration, territorial decontextualization, an absence of systematization and feedback, a one-off nature of the proposed activities, a lack of resources, or an absence of leadership, support, and authorization from the relevant administration, among other aspects (Burgos-Ayala, 2017; Bustamante-Gazabón et al., 2017; Cadavid-Velásquez et al., 2020; Espinosa-Rojas & Ospina-González, 2022; Herrera et al., 2006; Mora-Ortiz, 2015; Ramírez-Pita, 2024).

These studies warn that these projects urgently require improvements in their planning and implementation. They emphasize that developing Environmental School Projects through isolated activities is insufficient, as they fail to generate impact and profound changes in attitudes and behaviours within the educational community. They highlight the priority of developing results evaluation processes from an internal and participatory perspective that allows for identifying weaknesses, proposing improvements, and showcasing the strengths of these projects.

Method

This study is approached from a mixed approach, situated in two paradigmatic research contexts, that of interpretation and that of explanation; the combination of results and the triangulation of sources and instruments constitute the guarantee strategies of the multi-method approach of this study (Wisdom & Creswell, 2013).

Population and sample

The professional relationship with the subject of study, expert knowledge and commitment to the environment and sustainability, have been the criteria followed in the

selection of the 18 expert subjects interviewed representing the government entities, municipal organizations and leading teachers of ESPs within the municipality.

Of the 745 participants in the questionnaire (72% women and 28% men), 91% are teachers, 7% are administrators, and 2% are Environmental Education Project leaders. Of these 745 respondents, 61% belong to the public sector and 39% to the private sector; 87% are from schools located in the urban area of the municipality and 13% in the rural area. The total sample represents 23.85% of the teachers in the municipality of Neiva, according to data provided by the Neiva Municipal Education Secretariat in 2023. Informed consent was obtained from all respondents.

Information gathering techniques: design, quality and structure

Two instruments were used for data collection: semi-structured interviews and questionnaires. Two interview protocols were designed, one for the group of external collaborators of the ESPs (8 respondents) and another for the teachers leading the ESPs (8 respondents). The objectives that guided the design of both protocols were to reveal the reality of the ESPs, understand the internal and external dynamics involved in their development, analyse their impact, identify their needs, and explore the key factors for their successful implementation. The study's objective, a review of contributions from the scientific-theoretical and regulatory fields, and the researchers' professional experience served as the basis for designing the interview protocols.

The online, rating scale questionnaire, was designed specifically for this study and administered to all primary and secondary school teachers (3,123) during the 2023 academic year, in collaboration with the Neiva Municipal Education Secretariat, which reports to the Mayor's Office. The instrument was designed taking into account scientific literature, regulations, a review of other instruments used in different studies (Burgos-Ayala, 2017; Burgos-Paredo, 2011; Bustamante-Gazabón et al., 2017; Mora-Ortiz, 2015), as well as the contributions made by various stakeholders through out interviews conducted during the first phase of this study.

This questionnaire is structured in two main sections. The first section allows for the characterization of the participants and the educational context of the ESPs (gender, age, academic qualifications, contractual profile, years of experience, knowledge of Environmental Education, type of school, etc.). The second section contains four Likert-type scales, which gather participants' opinions on the implementation of the ESPs in the municipality's educational institutions. Specifically, Section III, the subject of this article, uses a 5-point Likert scale (from 1 = No improvement needed to 5 = Significant improvement needed) to identify areas for improvement related to the management and quality of the ESP. Each section is structured into dimensions that group the items according to the factor being analyzed. Section III consists of two dimensions: pedagogical and organizational management, and institutional support and resources. These dimensions were theoretically defined during the instrument's design and refined through the factor analysis carried out to ensure construct validity.

The quality of the instrument has been ensured through its reliability and validity (content and construct). Content validity is guaranteed by the consultations and references used in its design, as previously mentioned. Factor analysis has allowed us to confirm the construct consistency of three of the four sections that make up this questionnaire (the Section IV scale is excluded due to its small number of items). An Exploratory Factor Analysis (EFA) was carried out using the Principal Components method with

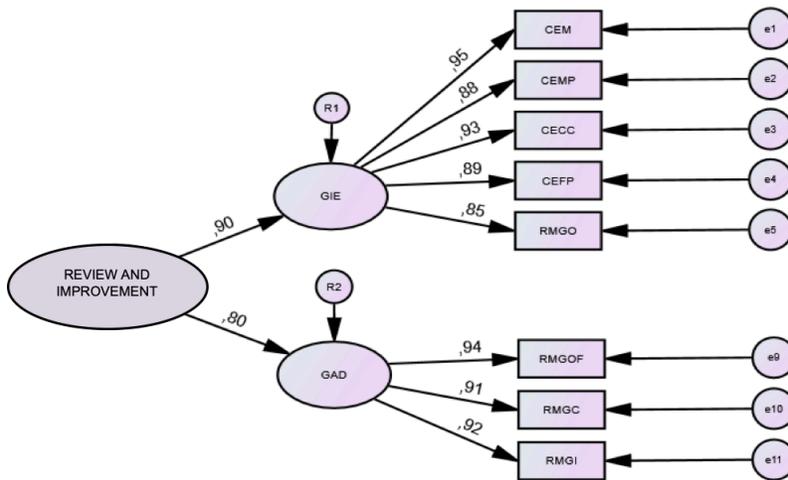
Varimax rotation and Kaiser normalization to extract the factors within each section. The results obtained are positive for all three sections, with KMO values close to 1 and Bartlett's test values, all below 0.005, and the explained variance is above 60% in all cases.

The EFA grouped the 11 variables initially proposed for Section III (the subject of this article) into two components; the first factor grouped eight items, and the second factor contained three.

Next, a Confirmatory Factor Analysis (CFA) was performed to test and refine the previously detailed exploratory factor model. Initially, the incremental fit indices were adequate (CFI=.917; NFI=.909; TLI=.895), supporting the suitability of the two-dimensional model obtained in the EFA. However, some absolute fit indices (CMIN/DF=10.749; RMSEA=.114) showed limited value, highlighting the need for further modifications. Considering these limitations and following the recommendations of Byrne (2016) and Hair et al. (2019), the model was simplified by removing items with less significant factor loadings, while preserving the theoretical coherence of the constructs, so Section III ultimately consisted of 8 items, as shown in Figure 1.

Figure 1

Confirmatory Factor Analysis Section III



This model is supported by the fit values shown in Table 1.

Table 1

Expected fit indices for a structural equation model and indices obtained for the confirmatory factor analysis of Section III.

Fit indices	Expected	Obtained
Chi-square	> .03	112.233
CMI/DF_ Discrepancy	<5	4.489

Fit indices	Expected	Obtained
RMSEA_Squared_error	< .05/ .08	.068
Índice_CFI	.90-1	.978
Índice_NFI	.90-1	.973
Índice_NNFI o TLI	.90-1	.969

The model exhibits a high Chi-square value (112.233) due, as Kline (2016) suggests, to the large sample size. The RMSEA value (.068) is acceptable according to Bollen (1989), as are the CFI, NFI, and TLI values, exceeding the minimum threshold of .90 suggested by Hu and Bentler (1999) and Byrne (2016). This analysis confirms a very acceptable regression weight ($R > .7$) for all variables (see Table 2).

Table 2

CFA regression of the Section III model

Regression			Estimate
GIE	<---	RME	.899
GAD	<---	RME	.797
Methodology	<---	GIE	.955
Motivation	<---	GIE	.876
Syllabus	<---	GIE	.927
Training	<---	GIE	.892
Organization	<---	GIE	.846
Training_Offer	<---	GAD	.936
Administration's_Commitment	<---	GAD	.911
Infrastructures	<---	GAD	.918

In light of the results obtained, the final dimensional structure of Section III is shown in Table 3.

The high value of Cronbach's Alpha Coefficient for the two factors of Section III, as in the other sections of the questionnaire, informs us of their reliability by internal consistency, see Tables 4 and 5.

Table 3*Final structure. Section III*

Dimensions	Items
Pedagogical Educational and organizational management	<ul style="list-style-type: none"> •The methodology used in the development of the ESPs (Environmental School Projects) at the educational institution. •The motivation and commitment of the teaching staff in the development of the ESPs. •The curriculum, competencies (knowledge, skills, abilities, values), and learning outcomes established for the ESP. •The teaching and pedagogical qualifications of the teaching staff in Environmental Education and Sustainability. •The internal organization, operation, and distribution of competencies in the implementation of the ESPs at the school.
Institutional support and resources	<ul style="list-style-type: none"> •The offer of training in Environmental Education and Sustainability for administrative staff and teachers of the municipality provided by the Administration. •The commitment of the municipal administration to the efficient and effective implementation of the ESPs in the schools (IEDs). •The infrastructure and equipment available to the schools (IEDs) for the development of the ESPs.

Table 4*Cronbach's Alpha coefficient by factors for Section III*

Factor	α	Items
1	.928	3
2	.909	5

Table 5*Cronbach's alpha coefficient by questionnaire sections*

Section	α	Items
I	.849	11
II	.953	10
III	.915	8
IV	.878	3

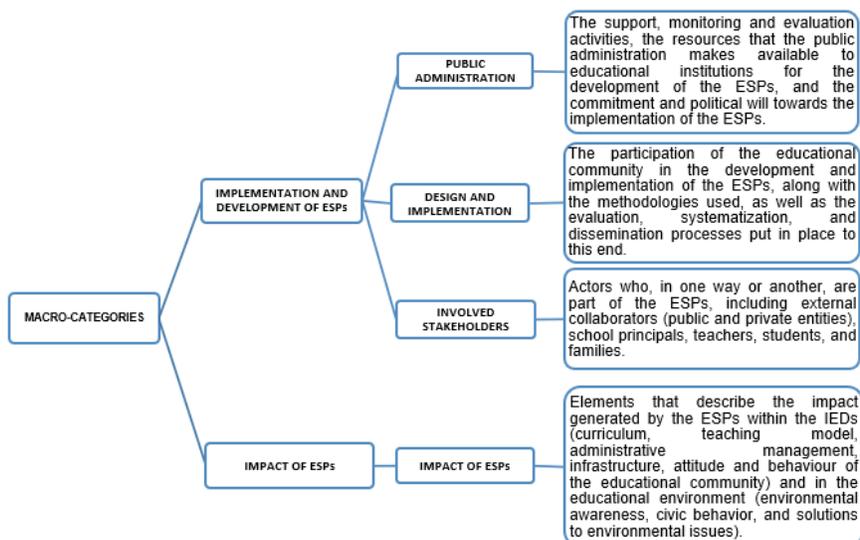
Analysis of the information

The analysis of the information gathered through the interviews was approached from an interpretive perspective supported by textual quotations; the methodological strategy followed for this analysis was content analysis, and the tool used was a system of categories. The guidelines followed in the interpretive analysis process were those proposed by Spencer et al. (2014) and Miles et al. (2014).

The quality of the analysis process, in terms of confirmability and reliability, was ensured by following the guidelines of the previously cited authors, as well as those cited by Bernard and Ryan (2010) and Wood and Smith (2018). To this end, several strategies were implemented, including detailed explanations of the procedure followed, shared reading and coding, and triangulation of interpretations. The analysis was performed using MAXQDA V24 software.

The system of categories designed for this analysis is of a mixed type and is structured in two macro-categories: Implementation and Development of the ESPs; macro-categories composed of four categories: Public Administration, Design and Execution, Agents Involved and Impact, see Figure 2.

Figure 2
System of categories



The statistical analyses carried out on the information collected through the questionnaire were descriptive (mean and standard deviation) and inferential (non-parametric tests) and were supported by the use of the SPSS 27.0 program. The former allowed us to understand the general trend of the opinions collected and the latter permitted us to make some contrasts of interest for the study, by considering how these fit with the statistical requirements.

Results

Conditioning factors for the implementation of Educational School Projects (ESPs) and impact

According to those interviewed, the biggest obstacle to the successful implementation of ESPs is the fact that EE and ESPs are not a priority in the plans and programs of the Municipal Administration; assessments that are repeatedly reflected in the opinions of the interviewees include: “there is a lack of commitment from the public administration to encourage ESPs and strengthen EE processes in formal education” (MunicipalOrganization_3); “in the Administration, the environmental issue unfortunately takes a back seat and is not given the importance it requires” (LeadTeacherESP₂), and “there is a great lack of support and interest from territorial entities towards institutional educations and Environmental Education” (MunicipalOrganization_3).

The lack of resources stands out as a particular limitation in both the design of the ESPs and their implementation and development. As one of the teachers interviewed, a leader of a ESP, indicates, “we don’t receive any resources from the administration, no funding at all; the resources we have come from the teachers who reach into their own pockets to contribute [personal funding] and other activities carried out to raise funds” (LeadTeacherESP_3). This lack of resources can effectively eliminate the freedom to choose the issues addressed in the project, forcing educational institutions to adapt the topics to their own capabilities. Furthermore, the scarcity of tools for working with these projects causes demotivation and frustration among those leading them: “We don’t have any resources whatsoever. We’ve had investment problems, and that’s why we didn’t continue with the project, because there were no materials to work with” (LeadTeacher_2). The scarcity of services offered by the municipal administration for support and technical assistance to the educational institutions is also noteworthy: “We don’t have any support from the administration. There’s no one who says, ‘I’m the person assigned to support the Educational School Projects at your school. I’m here to help. How do we do this?’ We don’t receive any visits; we’re on our own in this” (LeadTeacher_5).

Municipal and educational organizations are raising concerns about the need for trained and environmentally aware public officials: “It is necessary to have more qualified personnel (...) who can have a direct impact and provide greater support. Because the people assigned to these processes also have other responsibilities. So there isn’t a full-time commitment to the ESPs” (GovernmentEntity_3). Another requested mechanism of support is specific teacher training in the design and development of ESPs: “The Department of Education should provide training in these areas. I have never received any training on what an ESP is; however, one develops it based on what one already knows” (ESP_LeadTeacher_5). Furthermore, it is proposed that the Administration allocates a dedicated long-term budget for ESPs, in addition to promoting competitions, awarding prizes to projects, and creating working groups with environmental organizations to motivate and raise the profile of school initiatives.

Those interviewed also called for an active Environmental Education policy that educates citizens on conservation and sustainability. This requires an administration committed to EE and ESPs: “There is no Environmental Education policy in the municipality (...) it is necessary for the municipality to have a commitment toward Environmental Education” (MunicipalOrganization_3); “to encourage an environmental culture

among citizens that allows for improvements in equity, equality, and environmental sustainability" (GovernmentEntity_2). tion is complex and requires of teacher training: "There is a lack of a clear structure for the ESPs; teachers need to learn how to integrate them across disciplines and not just treat them as documents in the Institutional Educational Project" (GovernmentEntity_1); "The main thing (...) is for students and teachers to be trained (...) and have clear objectives and goals" (GovernmentEntity_4). Likewise, it is necessary for the committees and territorial corporations designated for this task to function properly.

Finally, the interviewees highlight the limited participation of teachers from different subject areas in the Environmental School Projects. There is a lack of interest and collaborative work, as individual initiatives predominate: "It's about welcoming all subject areas and involving everyone, but there are some teachers who say, 'But how am I going to do that, if that's environmental?' It's difficult!" (ESP_LeadTeacher_7).

The teachers and government entities interviewed emphasize the importance of addressing the multidisciplinary nature of the Environmental Education Projects. Heavy workloads, limited school time, the project's connection to a specific subject area, and a lack of consensus within the educational community are factors that hinder their development. Ensuring that an ESP achieves cross-curricular integration is complex and requires of teacher training: "There is a lack of a clear structure for the ESPs; teachers need to know how to integrate them across disciplines and not just treat them as a document in the Institutional Educational Project" (Government Entity_1); "The main thing (...) is that students and teachers are trained (...) and have clear objectives and goals" (Government Entity_4).

In this regard, some of the teachers interviewed warn that the lack of knowledge amongst teachers and school management teams about what an Environmental School Project is leads to its flawed implementation through isolated activities (recycling days, commemoration of environmental dates, among others) with the aim of fulfilling the commitment established by the regulations, but without achieving the true objectives of the ESPs: "Different activities and commemorations of ecological dates are undertaken; all of this is linked to the ESPs to comply with this regulation" (ESPLeadTeacher_8). Furthermore, the evaluation and systematization of the work, with internal and community socialization processes, is considered necessary: "Educational institutions need to systematize the work(...) because the information is lost" (Government Entity_1).

The respondents highlighted the key role that motivation of teachers and administrators play: "It can be noticed that the projects initially arise from personal motivations, but then they become collective initiatives" (Government Entity_3). However, ESPs leaders expressed concern about the low level of teacher involvement and the perception of the projects as additional burdens: "It's up to the teacher's discretion whether or not to contribute to the projects" (ESPLeadTeacher_1). The lack of institutional incentives was also emphasized: "It's necessary to give greater recognition to teachers (...) because they do it out of passion and love" (Municipal Organization_1).

Likewise, teachers propose strategies to involve families and the community in environmental education processes in order to achieve collective environmental transformations: "It would be very interesting to develop projects with the community" (ESPLeadTeacher_9). Regarding educational institutions, it is recognized that curricular environmentalization is the expected impact, although it is difficult to achieve it without greater institutional commitment. Interdisciplinarity is highlighted as a good

practice: “We have managed to link geography, history, and politics to environmental education processes. We have received an award from the CAM as a significant ESP project” (ESPLeadTeacher_4).

In most institutions, the impact is evaluated in terms of physical improvements (green areas, recycling, gardens): “We have worked on planting trees (...) and in the primary school’s flowerbeds” (ESPLeadTeacher_7). Generating scientific knowledge about the territory, helping to solve its environmental problems, and fostering ownership, leadership, and civic awareness constitute the desired impact of these projects at the community level. To this end, the representatives of the government entities and municipal organizations interviewed indicate that it is necessary to improve efforts and achieve coordination among different municipal agencies: “I think there is still a long way to go; I don’t think there is an impact at the municipal level. Because that depends a lot on the inter-institutional coordination that takes place. We need to improve our efforts through bodies like CIDEA” (GovernmentEntity_3). Specific cases are identified where Environmental School Projects (ESPs) projects have managed to transcend the boundaries of educational institutions and positively impact the community, based on a correct understanding of their nature, getting community participation, and the development of appropriate strategies at each stage of implementation.

Aspects that can be improved in the management of Environmental School Projects

For the participants in the questionnaire, the margin for improvement in the pedagogical and organizational management of the ESPs is greater (3.77/5;1.13) than the margin for institutional support and resources (3.66/5;0.97); however, the value of the standard deviation informs us of a greater convergence in the opinions on this second dimension.

For over 80% of respondents, the methodological approach used in the development of these projects (3.55/5), the qualification and preparation of teachers to address them (3.54/5), the objectives and curricular content worked on in these projects (3.53/5) and the motivation and commitment of teachers (3.53/5) with the ESPs constitute the aspects of pedagogical and organizational management with the greatest room for improvement, see Table 6.

Table 6

Results of pedagogical and organizational management

Pedagogical and organizational management	1(%)	2(%)	3(%)	4(%)	5(%)	\bar{x}	σ	CV	RIC
The internal organization, functioning and distribution of responsibilities in the implementation of the ESP in the educational institution.	6.80	11.80	29.50	32.00	19.90	3.46	1.13	32.8	1

Pedagogical and organizational management	1(%)	2(%)	3(%)	4(%)	5(%)	\bar{x}	σ	CV	RIC
The didactic and pedagogical qualifications of teachers in Environmental Education and Sustainability	3.20	9.70	31.10	41.80	14.20	3.54	.95	27	1
The methodology used in the development of the ESP in the educational institution	2.90	9.80	30.80	43.00	13.60	3.55	.94	26.5	1
The curriculum, competencies (knowledge, skills, abilities, values) and learning outcomes established for the ESPs	2.90	9.80	31.70	42.30	13.30	3.53	.94	26.6	1
Teacher motivation and commitment in the development of ESPs.	4.00	8.80	32.20	40.00	14.90	3.53	.98	27.8	1

Note. (1: No improvement needed / 2: Minor improvement needed / 3: Improvement needed / 4: Major improvement needed / and 5: Significant improvement needed)

For almost 50% of respondents, the training offered to teachers (3.47/5), the commitment of the Administration towards the ESPs (3.45/5) and the sufficiency of resources and equipment (3.39/5) constitute aspects that can be improved regarding the institutional support and resources of these projects, see Table 7.

The values of the coefficient of variation (CV) and the interquartile range (IQR) inform us of the consistency and homogeneity of the opinions collected, especially regarding the pedagogical and organizational management of these projects

Table 7

Results of institutional support and resources

Institutional support and resources	1(%)	2(%)	3(%)	4(%)	5(%)	\bar{x}	σ	CV	RIC
The commitment on the part of the municipal administration for the efficient and effective implementation of the ESPs in the Educational Institutions	3.40	11.20	36.00	36.00	13.40	3.45	.97	28	2

Institutional support and resources	1(%)	2(%)	3(%)	4(%)	5(%)	\bar{x}	σ	CV	RIC
The provision of training in Environmental Education and Sustainability for managers and teachers of the municipality offered by the Administration	5.10	13.80	28.90	33.70	18.60	3.47	1.09	31.5	2
The infrastructure and equipment available to the educational institutions for the development of the ESPs.	7.10	13.20	30.20	32.60	16.80	3.39	1.12	33.2	2

Note. (1: No improvement needed / 2: Minor improvement needed / 3: Improvement needed / 4: Major improvement needed / and 5: Significant improvement needed)

As shown in Table 8, the non-parametric contrast tests performed (Mann-Whitney U and Kruskal-Wallis) revealed no statistically significant differences based on gender, location of educational institutions (urban/rural), or professional profile (management team, ESP leader, and teacher). Statistically significant differences were found in seven of the eight factors analyzed ($p < .05$) based on educational institution type (public/private), with "training offerings" being the only aspect not influenced by educational institution type ($p = .103$).

Table 8

Significant differences by type of educational institutions

Review and improvement factors	U-Whitney	W-Wilcoxon	Z	Sig.asin (bilateral)
Internal organization at the Educational Institution	47402	83987	-2.833	.005
Didactic and pedagogical qualification	52018.5	90244.5	-2.109	.035
ESPs Methodology	51143.5	89093.5	-2.187	.029
Curriculum and learning outcomes of the ESPs	47823.5	86049.5	-3.495	< .001
Teacher motivation and commitment	51590	89540	-2.304	.021
Administration's commitment	50399	88074	-2.027	.043

Review and improvement factors	U-Whitney	W-Wilcoxon	Z	Sig.asin (bilateral)
Training offerings	49569	85347	-1.63	.103
Resources and equipment	49087	85402	-2.099	.036

Discussion and conclusions

The research results show that the determining factors for the success of the implementation of the ESPs are different elements that revolve around three areas: administrative management, academic management and educational community; all of these having been discussed in the previous section.

Regarding administrative management, the groups involved with the Environmental School Projects (ESPs) in the municipality of Neiva consider it essential that politicians and those responsible for their management understand the importance of Environmental Education (EE) for consolidating a civic environmental awareness. The commitment and political will of the municipal, departmental, and national governments to promote and properly implement the ESPs (mentoring, training, funding, technical support, etc.) must be accompanied by adequate EE management, preventing it from being “the result of chance, whim, and coincidence” (Calvo & Gutiérrez, 2012, p. 54). We cannot lose sight of the fact that the management of EE in Colombia is the responsibility of state institutions, as indicated in Law 1549 of 2012, Articles 6 and 7, which clarify the responsibilities of the environmental and educational sectors and strengthen the integration of EE into formal education.

Another determining factor in the success of ESPs is the direct allocation of resources that allow the development of quality projects; as Ramírez-Pita (2024) indicates, one of the great challenges faced by ESPs, along with the lack of commitment from public administrations, is the scarcity of resources.

Several conditioning aspects of the Environmental School Projects related to their academic management show a clear margin for improvement. As Mora-Ortiz (2015) states, ESPs have a responsibility towards the socio-environmental context of the educational institution in which they are developed; they constitute educational tools that contribute to the generation of local environmental management processes and to community and citizen empowerment regarding the built and natural environment, providing alternatives for solving the socio-environmental problems of said environment.

As Sáenz-Rico et al. (2023) (in Fernández & Gutiérrez, 2014) argue, working on EE from a sustainability perspective requires designing and developing learning and training spaces focused on finding critical and creative responses to socio-environmental conflicts. This will facilitate the generation of a social culture based on cooperation and communication, responsibility, and participation. Therefore, the training processes and curricular content that accompany Environmental Education Projects must be based on a prior diagnosis of the contexts and their socio-environmental situations. As the MADS (2021) indicates, one of the aspects that demonstrates the profile of a

meaningful ESP is having a curriculum that clearly situates the environmental problem within the context and is linked to families and the entire educational community (p. 18).

The transversal integration of ESPs across the curriculum and the involvement of teachers from subjects other than Natural Sciences in these projects are aspects that contribute to their success and, as indicated in the previous section, present some room for improvement in practice. Again, reality falls short of what is stipulated in the regulations; Law 1549 of 2012 states that ESPs should be incorporated into curricular dynamics in a cross-curricular manner and with the participation of the entire educational community.

In line with the observations made two decades ago by Herrera et al. (2006), currently the need to undertake actions to systematize the experiences of Environmental School Projects in educational institutions remains, as well as the need to create spaces for socialization, reflection, and feedback with communities and municipal organizations. We agree with Espinosa-Rojas and Ospina-González (2022), Espinosa-Rojas and Castaño-Barrera (2022), and Ramírez-Pita (2024) that it is a priority to develop an evaluation system for ESPs that enables their results and impact at both the local and national levels to be assessed. Studies are needed to help define guidelines and criteria for constructing an evaluation protocol with clear guidelines, framed within the National Environmental Education Policy (NEEP) and the 2030 Agenda, with the participation of the educational community, public administration, and environmental authorities, enabling a timely and contextualized evaluation of ESPs.

Another important factor is providing quality training to all teachers and administrators in environmental education, as well as equipping them with the tools to develop environmental literacy strategies (Gómez-Agudelo, 2018; Tovar-Mora et al., 2022). We wish to emphasize that, although this was one of the challenges set forth in the Environmental Education Policy in 2002, it remains an unmet need in 2025. Likewise, teacher training is a key element for the institutionalization of meaningful Environmental School Projects (ESPs), as outlined in the document "*Resignification of ESP*" (MADS, 2021).

Similarly, it is essential that educational institutions have environmentally aware leadership teams committed to environmental education and sustainability, capable of managing resources and promoting the presence of Environmental School Projects (ESPs) within the institution. As Cadavid-Velásquez et al. (2020) argue, without full awareness and conviction of the fundamental role of environmental education in the educational process of students, it will be difficult to develop the necessary institutional will to undertake genuine EE projects. The attitudes and behaviours of administrators and teachers are vital to the success of these projects. Their proper development depends on the level of interest, motivation, and commitment of educators and demands a high degree of willpower, willingness, and teamwork.

In agreement with Mora-Ortiz (2015), it is necessary to emphasize community processes and empower residents to act in regard to their environment in order to develop transformative environmental projects. The integration, participation, and commitment of the entire educational community in the implementation of Environmental Education Projects is fundamental. Educational institutions urgently need to implement strategies that promote the collaboration of all stakeholders across the different stages of the project, as indicated in Decree 1743 of 1994, Article 3, which states that students, parents, teachers, and the educational community in general share re-

sponsibility for the design and development of ESPs. This study highlights the role of these projects in rural areas, where they constitute a tool that allows the community to recognize and utilize its environment and preserve traditions. However, those interviewed do not perceive a significant impact of ESPs in terms of generating environmental awareness and modifying behaviors within the educational community for the benefit of the environment.

According to Murillo-Montoya (2022), the success of an Environmental School Project (ESP) is determined by the degree of cohesion among stakeholders, community participation, the integration of its content across all areas, the achievement of its goals, the resolution of environmental problems, and the generation of environmental awareness within the educational community. Ensuring this success requires an administration that is aware of and committed to Environmental Education (EE) and ESPs, effective inter-institutional coordination among all relevant organizations, as well as motivated, environmentally aware, and trained administrators and teachers in EE and ESPs. Above all, however, a precise evaluation of the impact of these projects at both the local and national levels is essential.

We conclude this work by insisting that it is the responsibility of formal education, as a powerful engine of change, to promote environmental literacy throughout the educational community, playing a fundamental role in building a resilient society; only in this way will strategies such as ESPs go from being perceived as a legal obligation to being considered to be an effective instrument for generating a collective awareness based on the principles, values, competencies, skills and knowledge of EAPS and whose scope is situated both in the educational community and in the curriculum (Martínez-Aznar et al., 2022; Tovar-Mora et al., 2022).

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Conflict of interest

There is no conflict of interest.

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