

**Innovative Pedagogical Strategies for Strengthening Environmental Competencies in Rural Educational Settings
Related to Cajas National Park****Estrategias pedagógicas innovadoras para fortalecer las competencias ambientales en entornos educativos rurales
relacionados con el Parque Nacional Cajas***César Josué Carpio Pacheco***CIENCIA, TECNOLOGÍA Y
SOCIEDAD****Julio - diciembre, V°7 - N°2; 2026****Recibido:** 06-08-2026**Aceptado:** 06-08-2026**Publicado:** 11-08-2026**PAIS**

- Ecuador, Cuenca

INSTITUCION

- Universidad Estatal de Milagro

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Carpio, C. (2026). Innovative Pedagogical Strategies for Strengthening Environmental Competencies in Rural Educational Settings Related to Cajas National Park. *Revista G-ner@ndo*, V°7 (N°2). Pág. 2912 – 2935.

Abstract

Environmental education is essential for developing citizens capable of addressing ecological challenges and contributing to sustainable development. This research aimed to examine the contribution of innovative pedagogical approaches to strengthening the environmental competencies of students in rural educational institutions linked to Cajas National Park in Azuay, Ecuador. A qualitative methodology, with a descriptive and interpretive scope and an ethnographic design, was used to understand the educational and environmental dynamics of the studied context. The population consisted of children and adolescents aged 7 to 17 from the rural community of Soldados. Data collection methods included participant observation, open interviews, semi-structured surveys, field notes, and contextual analysis. The results revealed limited knowledge about biodiversity, ecosystem conservation, ecosystem services, and water source protection, as well as a scarcity of specialized teaching resources and limited application of innovative methodologies. However, the practical activities carried out in direct contact with the natural environment fostered participation, motivation, and understanding of environmental content. Furthermore, experiential, project-based learning, community education, and environmental interpretation contributed to strengthening knowledge, skills, values, and attitudes oriented toward conservation. It is concluded that innovative pedagogical strategies, developed in conjunction with the community and conservation institutions, strengthen rural environmental education and promote the protection of ecosystems in Cajas National Park.

Keywords: Environmental education, pedagogical innovation, experiential learning, rural education, Cajas National Park.

Resumen

La educación ambiental constituye un elemento esencial para formar ciudadanos capaces de afrontar los desafíos ecológicos y contribuir al desarrollo sostenible. La presente investigación tuvo como objetivo examinar la contribución de enfoques pedagógicos innovadores al fortalecimiento de las competencias ambientales de estudiantes de instituciones educativas rurales vinculadas al Parque Nacional Cajas, en Azuay, Ecuador. Se empleó una metodología cualitativa, con alcance descriptivo e interpretativo y diseño etnográfico, para comprender las dinámicas educativas y ambientales del contexto estudiado. La población estuvo conformada por niños y adolescentes de 7 a 17 años de la comunidad rural de Soldados. Para la recolección de información se utilizaron observación participante, entrevistas abiertas, encuestas semiestructuradas, notas de campo y análisis contextual. Los resultados evidenciaron conocimientos limitados sobre biodiversidad, conservación de ecosistemas, servicios ecosistémicos y protección de fuentes de agua, además de escasez de recursos didácticos especializados y limitada aplicación de metodologías innovadoras. Sin embargo, las actividades prácticas desarrolladas en contacto directo con el entorno natural favorecieron la participación, motivación y comprensión de contenidos ambientales. Asimismo, el aprendizaje experiencial, basado en proyectos, la educación comunitaria y la interpretación ambiental contribuyeron al fortalecimiento de conocimientos, habilidades, valores y actitudes orientados a la conservación. Se concluye que las estrategias pedagógicas innovadoras, articuladas con la comunidad y las instituciones de conservación, fortalecen la educación ambiental rural y favorecen la protección de los ecosistemas del Parque Nacional Cajas.

Palabras clave: Educación ambiental, innovación pedagógica, aprendizaje experiencial, educación rural, Parque Nacional Cajas

Introduction

The environmental problems currently facing the planet represent one of the most complex challenges for contemporary societies. Phenomena such as global warming, the progressive loss of biodiversity, the pollution of water bodies, and the deterioration of ecosystems have sparked growing concern worldwide, driving the search for alternatives geared toward sustainability. In the face of this reality, education has been recognized as a fundamental instrument for promoting behavioral changes and strengthening the environmental awareness of new generations.

Alonso (2021) points out that education for sustainable development enables people to acquire knowledge, skills, values, and attitudes that foster the construction of more resilient and sustainable societies. From this perspective, educational systems have the responsibility to train citizens capable of addressing environmental challenges through responsible decisions and active participation in the conservation of natural resources.

From a pedagogical standpoint, Acuña Ortigoza (2021) argues that education must be closely linked to the social reality of students and oriented toward the transformation of their environment. According to this author, learning acquires true meaning when it allows for an understanding of the problems affecting the community and promotes actions aimed at improving living conditions. This approach is especially relevant in environmental education, as it fosters a connection between academic content and the ecological situations present in students' everyday lives.

Furthermore, Cedillo (2025) argues that 21st-century education must promote complex thinking, enabling an understanding of the interactions between social, cultural, economic, and environmental factors. Consequently, ecological problems require comprehensive approaches that facilitate an understanding of the complexity of ecosystems

and the human activities that influence them. Likewise, Murcia & Suarez (2026) consider environmental education to be a process oriented toward building a new environmental rationality based on principles of sustainability, social equity, and ecological responsibility. From his perspective, the contemporary environmental crisis arises as a consequence of development models that have prioritized the intensive exploitation of natural resources without considering their ecological limits. Therefore, education must play a decisive role in generating new forms of interaction between society and nature. In the case of Ecuador, environmental education holds special significance due to the extraordinary biological diversity characterizing the national territory and the presence of ecosystems that perform functions essential to the population's well-being. Prominent among these areas is Cajas National Park, recognized as one of the most important **páramo** (high-altitude moorland) ecosystems in the country's southern region. This protected area harbors a significant diversity of flora and fauna species and plays a fundamental role in regulating the water resources that supply both the city of Cuenca and numerous nearby rural communities.

According to Doumet-Chilán et al. (2023), Cajas National Park constitutes a strategic ecosystem for biodiversity conservation and the provision of various ecosystem services—particularly those related to water capture, storage, and regulation. However, the conservation of this natural heritage depends largely on the environmental awareness and commitment developed by the populations living in the areas surrounding the protected site.

During monitoring, control, and conservation activities carried out in areas such as the Soldados community, it has been observed that many students possess limited knowledge regarding topics such as biodiversity, ecosystem conservation, ecosystem services, and the protection of water sources. This situation may be linked to several factors, including a lack of specialized educational resources, the limited implementation of ongoing

environmental education programs, and the persistence of traditional teaching methods focused primarily on the transmission of content.

Various studies have shown that innovative educational approaches foster meaningful learning and the strengthening of environmental competencies Ortiz et al. (2023) maintain that experience is the central axis of learning, while Centurión (2023) posits that knowledge is constructed through a continuous process integrating experience, reflection, and action. These perspectives support the implementation of active methodologies that allow students to learn through direct observation and interaction with their natural environment. Consequently, it is essential to strengthen environmental education processes in rural communities linked to Cajas National Park through the application of innovative pedagogical strategies that promote active participation, critical thinking, and a sense of territorial belonging. Developing environmental competencies from an early age can significantly contribute to ecosystem conservation and the sustainable development of local communities.

Educational institutions located in rural areas face various challenges related to the quality of educational processes, the availability of teaching materials, and the implementation of innovative methodologies. These limitations directly impact the holistic development of students and hinder the construction of meaningful learning related to the social and environmental reality of their communities.

This situation is particularly relevant in rural communities near Cajas National Park, as many students live in an environment of high ecological value without possessing sufficient knowledge about the importance of conserving the ecosystems that surround them. During community interaction activities and conservation [activities] carried out in the community of Soldados, it became evident that many children and adolescents struggle to

grasp concepts related to biodiversity, climate change, ecosystem services, and the protection of water sources.

Similarly, a lack of ongoing environmental projects within educational institutions was observed, alongside a scarcity of specialized materials and limited participation by community stakeholders in educational processes. These conditions reinforce traditional teaching models focused on rote memorization and hinder the implementation of active methodologies centered on inquiry, observation, and direct student participation.

This issue is particularly significant given that Cajas National Park is a primary water source for the city of Cuenca and nearby communities. A lack of environmental awareness and a failure among younger generations to take ownership of these issues could jeopardize future conservation and sustainable management efforts in the area. In light of the foregoing, this research aims to analyze the contribution of innovative educational approaches to strengthening environmental competencies among students in rural school settings near Cajas National Park. The findings are expected to facilitate the development of context-specific pedagogical proposals that foster a responsible environmental culture committed to conserving one of the most important ecosystems in southern Ecuador.

The study is significant for its contribution to strengthening teaching and learning processes related to environmental education in rural contexts. Its execution will help identify innovative methodological strategies capable of promoting meaningful learning and active student participation in environmental conservation efforts.

From a social perspective, the research helps strengthen ties between schools, families, and communities, thereby encouraging greater civic engagement in environmental protection. Developing students with environmental competencies fosters the growth of

communities that are more conscious, responsible, and committed to the collective well-being.

In environmental terms, the research is particularly important given the ecological value of Cajas National Park. This ecosystem performs essential functions related to water regulation, biodiversity conservation, and carbon sequestration. Consequently, environmental education serves as a strategic tool to ensure that future generations understand the need to protect these natural resources.

Finally, the study is scientifically significant, as it provides contextualized information on the application of innovative educational approaches in rural Ecuadorian communities—a subject that has received limited research attention to date. The results may serve as a reference for future studies and for the design of educational programs focused on environmental sustainability.

THEORETICAL BASIS

Innovative educational approaches

Educational innovation involves incorporating methodological strategies that seek to optimize teaching and learning processes through active, participatory practices focused on student needs. These approaches aim to move beyond traditional models centered exclusively on content transmission, instead fostering educational experiences that facilitate the meaningful construction of knowledge.

Sánchez Fuentes et al. (2022) maintain that learning becomes more significant when it arises from the student's direct interaction with their reality and surrounding environment. From this perspective, experience is essential for acquiring knowledge, as it allows theory

to be linked to concrete, everyday situations. This concept forms one of the fundamental pillars of experiential learning.

Complementing this view, Méndez Puenayán (2024) proposes that learning unfolds through a cyclical process comprising four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. According to Centurión (2023), knowledge is constructed by transforming experience into meaningful understanding. In the realm of environmental education, this approach enables students to develop a deeper understanding of natural phenomena through direct observation and active participation in activities related to their environment.

Furthermore, Palomino et al. (2022) highlight the fundamental role of social interaction in knowledge construction. From his sociocultural perspective, learning occurs through collaboration among students, teachers, and the community. This perspective is particularly relevant to environmental education in rural settings, where the participation of diverse social actors fosters the collective construction of knowledge and strengthens the bond between the school and the community.

Likewise, Arguello et al. (2023) note that active methodologies boost student motivation, foster autonomy, and promote meaningful learning. These strategies allow students to engage in identifying and solving real-world problems within their own context, thereby strengthening both their cognitive capabilities and their decision-making skills.

Active methodologies

Project-Based Learning (PBL)

Project-Based Learning (PBL) is a methodology that enables students to build knowledge and develop competencies through the investigation and resolution of real-world

situations Drouet et al. (2023) assert that this strategy fosters critical thinking, creativity, collaborative skills, and the practical application of acquired knowledge.

In the field of environmental education, PBL facilitates student participation in initiatives related to ecosystem protection, solid waste management, environmental monitoring, biodiversity conservation, and the protection of water resources. Through these experiences, students strengthen their sense of environmental responsibility and develop a deeper understanding of the ecological issues facing their local area.

Furthermore, this methodology promotes the integration of various fields of knowledge, allowing environmental problems to be addressed from an interdisciplinary perspective. In this way, students not only acquire theoretical knowledge but also develop practical skills to make a positive impact on their environment.

The Flipped Classroom

The Flipped Classroom method can be employed in schools near Cajas National Park—such as the Soldados community—to strengthen students' environmental competencies through meaningful learning experiences. Prior to in-person classes, students engage with educational materials such as videos, readings, or presentations covering the importance of the commons, biodiversity, water sources, and key environmental issues affecting the protected area.

This allows them to arrive in the classroom with prior knowledge that fosters more active participation. Class time is dedicated to practical, collaborative activities—including debates, community mapping, analysis of local environmental issues, and field trips to observe the surrounding ecosystems firsthand. This experience bridges theoretical content

with the reality of communities near the park, promoting contextualized learning and developing skills in observation, analysis, and environmental problem-solving.

Finally, students apply what they have learned by implementing nature conservation projects and awareness campaigns, or by developing educational materials and proposals for the stewardship of their community's natural resources.

Game-Based Learning

Game-based learning (GBL) is an innovative method that uses games and playful dynamics as tools to facilitate learning and boost student motivation. At the Soldados community school, this strategy can be employed to teach topics such as environmental conservation, biodiversity, water management, and the protection of natural ecosystems through recreational activities that foster active participation and teamwork.

Throughout the educational process, students can engage in board games, scavenger hunts, quiz competitions, simulations, or environmental challenges focused on the park's flora and fauna, local environmental issues, and best conservation practices. These activities allow students to learn in a fun way while developing skills in observation, analysis, communication, and decision-making within real-world environmental contexts.

Implementing game-based learning contributes to the development of environmental competencies by creating meaningful experiences that strengthen knowledge, ecological awareness, and a commitment to protecting nature. Furthermore, linking educational content to the reality of communities near Cajas National Park fosters a greater appreciation for natural heritage and encourages more active participation in its preservation.

Environmental competencies in education

Environmental competencies encompass the set of knowledge, skills, values, attitudes, and behaviors that enable individuals to understand ecological issues and act responsibly regarding them Machaca et al. (2025) maintain that these competencies should foster a balanced relationship between society and nature, promoting active citizen participation in the conservation of natural resources.

According to Penagos et al. (2022), sustainability competencies include capabilities related to critical thinking, responsible decision-making, complex problem-solving, collaborative work, and civic engagement. These competencies are essential for addressing global challenges such as climate change, biodiversity loss, and environmental pollution.

Within an educational context, strengthening environmental competencies contributes to developing students who are capable of identifying ecological issues in their surroundings, analyzing their causes, and actively participating in the search for solutions. Furthermore, it fosters the development of values such as responsibility, solidarity, respect for nature, and a commitment to future generations.

Environmental education as an instrument of social transformation

Environmental education is a fundamental tool for fostering societies that are more sustainable and committed to the protection of natural resources. According to Lema-Blanco (2021), this educational process must equip individuals with the knowledge, skills, values, and attitudes that enable them to act responsibly in the face of current and future environmental challenges. From Acuña Ortigoza (2021), education must be built upon the students' reality and foster processes of critical reflection regarding the issues present in their environment. Under this view, environmental education should not be limited to the transmission of information but must instead become a process of raising awareness that drives behavioral changes and encourages social participation.

In line with this approach, Delgado et al. (2021), maintain that contemporary problems require an education based on complex thought—one capable of grasping the multiple interrelationships among social, economic, cultural, and environmental factors. This perspective is particularly relevant for addressing the ecological challenges faced by rural communities linked to strategic ecosystems.

For his part, Patiño Solfredy (2025) argues that environmental education must contribute to constructing a new environmental rationality that allows for an understanding of the close interdependence between nature and society. According to this author, the contemporary environmental crisis cannot be interpreted solely as an ecological problem but also as a cultural, economic, political, and educational issue.

Environmental education in protected areas: Cajas National Park

Protected natural areas serve as prime settings for educational initiatives focused on conservation and environmental sustainability. Neto (2024) notes that these areas act as learning environments where individuals can gain a direct understanding of the importance of ecosystems and the benefits they provide to society.

In this context, Cajas National Park is a highly valuable setting for implementing environmental education programs. Its significance lies not only in the biodiversity it harbors but also in its strategic role in water regulation and the supply of water for human consumption, agriculture, and other productive activities.

The relationship between rural educational institutions and this protected area offers significant opportunities to develop contextualized pedagogical experiences that strengthen students' sense of place, ecological awareness, and commitment to the environment. Direct

interaction with the park's ecosystems fosters experiential learning and helps build competencies geared toward natural resource conservation.

Against this backdrop, incorporating innovative educational methodologies into environmental education programs within rural communities near Cajas National Park represents a relevant strategy for promoting sustainability, strengthening community participation, and contributing to the conservation of the ecosystems found in this important protected natural area.

Materials and methods

This research employed a qualitative approach, as it enabled the understanding and interpretation of the perceptions, experiences, and knowledge regarding environmental education among students from rural communities located within the area of influence of Cajas National Park. According to Osorio et al. (2025), this approach facilitates the study of social phenomena within their natural context, fostering a deep understanding of the realities being analyzed.

The research had both a descriptive and an interpretive scope. The descriptive component allowed for the identification of characteristics related to the students' level of environmental knowledge and the educational conditions present in the participating institutions. Meanwhile, the interpretive approach made it possible to understand the meanings, perceptions, and experiences constructed by the involved stakeholders regarding environmental education.

An ethnographic design was used for the study. According to Romero Jurado et al. (2024), this design allows for an understanding of a community's social and cultural dynamics through direct observation and interaction with participants within their everyday

context. Its application facilitated the analysis of practices, knowledge, and experiences linked to environmental education in the rural communities near Cajas National Park.

The research was conducted in the community of Soldados, located within the area of influence of Cajas National Park in the province of Azuay, Ecuador. This territory maintains a close relationship with the *páramo* ecosystems and the water resources that supply the city of Cuenca and various nearby rural communities.

The study population consisted of children and adolescents aged seven to seventeen from rural schools in the study area. Participants were selected using non-probability convenience sampling, taking into account the accessibility of the groups and their availability to collaborate during the research process.

Various qualitative techniques were used to gather information. These included participant observation, carried out during monitoring, conservation, and community interaction activities in different sectors of Cajas National Park. This technique allowed for the recording of behaviors, knowledge, and attitudes related to the environment.

Additionally, open-ended interviews were conducted with students, teachers, and community members to understand their perceptions regarding environmental education, local ecological issues, and the educational strategies implemented in the schools.

Semi-structured surveys and field notes were also used to complement the information obtained through observation and interviews. The combined use of these techniques facilitated a comprehensive understanding of the phenomenon under study and strengthened the reliability of the results.

Análisis de resultados

The research findings made it possible to identify various aspects related to the development of environmental education in rural communities located within the area of influence of Cajas National Park. Analysis of the collected data revealed both strengths and limitations regarding the students' environmental knowledge, attitudes, and practices, as well as the importance of implementing innovative pedagogical strategies to strengthen environmental competencies and foster greater participation in the conservation of the natural environment.

Students' level of environmental knowledge

One of the most significant findings of the research was the identification of major gaps in the environmental knowledge of a substantial number of the participating students. Interviews and observational activities revealed that many children and adolescents struggled to grasp fundamental concepts regarding biodiversity, ecosystem conservation, ecosystem services, climate change, and the sustainable use of natural resources.

Although most students were aware of Cajas National Park and recognized it as an important site for tourism and recreation, only a small group could accurately describe its ecological function, its contribution to species conservation, and its importance in regulating and supplying water to the city of Cuenca and surrounding rural communities.

It also became evident that several students were unaware of the direct link between the conservation of *páramo* ecosystems and water resource availability—a matter of great importance, given that they live in areas closely connected to these strategic ecosystems.

Students' perception of the environment

The results indicated that, generally speaking, students maintain a favorable attitude toward nature and show interest in actions aimed at environmental conservation. However, this interest is not always backed by sufficient knowledge to enable a comprehensive understanding of the ecological issues present in their surroundings.

During the activities, many participants expressed concern about issues such as environmental pollution, solid waste accumulation, forest fires, and the degradation of water sources. Nevertheless, a limited understanding was observed regarding the root causes of these problems and their consequences for ecosystems.

Furthermore, the research revealed that students who had previously participated in reforestation activities, interpretive tours, or educational programs demonstrated higher levels of awareness, commitment, and responsibility regarding the conservation of natural resources.

Pedagogical resources available in educational institutions

Another significant finding concerned the availability of educational resources for environmental education initiatives. Observations revealed that several rural educational institutions have limited resources for the ongoing implementation of activities focused on environmental education.

A scarcity of educational materials specializing in biodiversity, *páramo* ecosystems, protected area conservation, and ecosystem services was noted. Furthermore, it was observed that environmental topics tend to be addressed only sporadically within specific subjects, rather than being integrated as a permanent cross-cutting theme throughout the educational process.

The teachers interviewed expressed a need for greater access to training opportunities, up-to-date materials, and institutional support to help strengthen the teaching of environmental topics at their respective schools.

Community participation in environmental education processes

The results revealed a positive willingness among families and various community stakeholders to engage in environmental protection activities. However, such participation remains limited and tends to focus on specific activities promoted by educational institutions or government bodies.

Furthermore, cooperation among schools, communities, and environmental conservation organizations was identified as a potentially effective strategy for strengthening learning processes. The involvement of park rangers, community leaders, and local organizations was viewed favorably by both teachers and students, as it facilitates the integration of academic content with real-world experiences within the local area.

Application of innovative methodologies

The research revealed that traditional methodologies continue to predominate in teaching-learning processes across various rural educational settings. However, pedagogical experiences incorporating practical activities yielded considerably more favorable results regarding student participation, motivation, and comprehension of the subject matter.

Activities involving flora and fauna observation, interpretive walks, school environmental projects, collaborative exercises, and experiences conducted outside the classroom sparked greater student interest and contributed significantly to a better understanding of environmental education concepts. In particular, experiential learning

enabled participants to establish connections between theoretical knowledge and situations observed directly in the natural environment. This interaction fostered the construction of meaningful learning and strengthened the understanding of environmental topics from a practical and contextualized perspective.

Environmental issues identified by the students

The participating students were able to identify various environmental issues present within their communities and in the areas surrounding Cajas National Park. Among the most frequently identified situations were

- Accumulation of solid waste on roads, trails, and in natural areas.
- Unauthorized burning in rural areas.
- Contamination of water sources.
- Reduction of vegetation cover.
- Illegal hunting of wildlife species.
- Overgrazing in specific areas near the protected area.
- Forest fires during dry seasons.

Identifying these issues demonstrates that students possess empirical knowledge regarding the environmental situations affecting their territory. However, the results also highlight the need to strengthen educational processes to provide tools that enable them to gain a deeper understanding of the causes, consequences, and potential solutions regarding these environmental challenges.

Potential of innovative educational approaches

The findings indicate that implementing innovative educational approaches holds significant potential for strengthening environmental competencies among students in rural settings. Approaches grounded in experiential learning, project-based learning, community education, and environmental interpretation fostered higher levels of student participation, motivation, and interest, as well as a more robust understanding of concepts related to environmental conservation.

Furthermore, these methodologies helped strengthen students' sense of belonging to the local area and promoted a deeper appreciation of the ecological importance of Cajas National Park. Students showed a greater willingness to engage in conservation activities when given the opportunity to interact directly with ecosystems and connect classroom material to real-world situations within their community.

Overall, the results suggest that enhancing environmental education through innovative methodologies can significantly contribute to developing environmental competencies, fostering ecological awareness, and shaping citizens committed to protecting and conserving the ecosystems within the area influenced by Cajas National Park.

Discussion

The results of this study demonstrate that students from rural communities located within the area of influence of Cajas National Park exhibit significant knowledge gaps regarding biodiversity, ecosystem services, environmental conservation, and the protection of water resources. These findings align with the position of Alonso (2021), which identifies the insufficient integration of environmental content into educational curricula as a major challenge for environmental education across various educational settings. From this

perspective, it is argued that sustainable development requires an education system capable of fostering the knowledge, skills, values, and attitudes necessary for environmental protection—an area that remains a significant challenge for many rural communities.

Furthermore, the results reveal that a large proportion of students acknowledge the existence of Cajas National Park and its importance as a protected natural area; however, they possess limited knowledge regarding its ecological functions, particularly those related to biodiversity conservation and water resource regulation. This situation can be analyzed through the lens of Patiño Solfredy (2025), who argues that traditional environmental education tends to convey knowledge in a fragmented manner, hindering a comprehensive understanding of the interrelationships between natural systems and human activities. According to this author, developing an environmental rationality requires educational processes that integrate scientific knowledge with the communities' everyday experiences.

Furthermore, findings from observations and interviews revealed a favorable attitude toward nature and a positive willingness to participate in activities aimed at environmental conservation. However, this predisposition does not always translate into concrete actions, due to limitations in the environmental education provided within educational settings. This result aligns with the views of Machaca et al. (2025), who argue that environmental education must go beyond the mere transmission of information and focus on developing competencies that enable individuals to act responsibly regarding the ecological issues in their environment.

Regarding the pedagogical methodologies implemented in educational institutions, the research confirmed the continued predominance of traditional strategies centered on content delivery and concept memorization. This reality supports the criticisms raised by Acuña Ortigoza (2021) who questions traditional educational models, arguing that they limit

active student participation and reduce opportunities to foster critical reflection on reality. From this perspective, education should be viewed as a transformative practice capable of linking learning to the social and environmental issues that are part of students' daily lives.

Similarly, the results demonstrate that educational experiences conducted outside the classroom generated higher levels of interest, participation, and understanding among students. Activities involving interpretive tours, observation of flora and fauna, environmental monitoring, and conservation projects contributed significantly to reinforcing learning regarding environmental content. These findings align with Ortiz et al. (2023), who maintain that learning acquires greater significance when it arises from the student's direct interaction with their environment. For this author, education should be grounded in real-life experiences that foster the active construction of knowledge.

The results obtained are also supported by the experiential learning approach described by Méndez Puenayán (2024) and Centurión (2023). According to these authors, learning unfolds through a continuous process that integrates concrete experience, reflective observation, abstract conceptualization, and active experimentation. The study found that students gained a deeper understanding of environmental content when directly participating in activities within the natural setting of Cajas National Park, highlighting the importance of incorporating experiential methodologies into educational processes in rural contexts.

Another relevant aspect identified during the research was the limited availability of specialized teaching resources for environmental education. Participating teachers reported difficulties stemming from a lack of contextualized materials and the absence of ongoing environmental training programs. These findings align with the views of Arguello et al. (2023) who emphasize that the quality of educational processes depends largely on the availability

of adequate resources and the institutional capacity to implement innovative teaching strategies.

Furthermore, the research demonstrated that the participation of community stakeholders, park rangers, and families is a fundamental component in strengthening environmental education processes. Collaboration among these diverse social actors fosters the collective construction of knowledge and enables the integration of academic content with the community's actual experiences and needs. This finding coincides with Palomino et al. (2022), who argue that learning is a social process constructed through the interaction between individuals and their cultural context.

From a territorial perspective, the results show that Cajas National Park serves as an ideal setting for developing innovative educational initiatives focused on environmental conservation. The protected area's ecological richness offers numerous opportunities to implement strategies involving experiential learning, school-based research, environmental interpretation, and community participation. In this regard, contextualized environmental education can become a strategic tool for strengthening territorial identity and fostering a greater appreciation of natural resources among future generations.

Finally, the findings indicate that the implementation of innovative educational approaches contributes significantly to strengthening environmental competencies among students from rural communities near Cajas National Park. The evidence demonstrates that methodologies such as project-based learning, experiential learning, community education, and environmental interpretation foster the development of knowledge, skills, and attitudes geared toward the conservation of the natural environment. These results align with the recommendations made by Alonso (2021), who promotes the incorporation of active and

participatory methodologies as a fundamental strategy for advancing education oriented toward sustainable development.

Conclusions

The results demonstrate that students from rural communities associated with Cajas National Park possess basic environmental knowledge, although limitations persist regarding the understanding of aspects related to biodiversity, ecosystem services, and water resource conservation.

Furthermore, it was found that educational experiences involving direct contact with the natural environment foster greater student participation, motivation, and comprehension of environmental subject matter.

Finally, the study concludes that incorporating innovative pedagogical strategies offers a relevant approach to strengthening environmental competencies, promoting ecological awareness, and contributing to the conservation of ecosystems within the area of influence of Cajas National Park.

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