

## Education on altitude and coffee variety: Innovation and seedling development in nurseries

Educación sobre la altitud y variedad de café:  
Innovación y desarrollo de plántulas en viveros

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**Abstract:** This article analyzes the potential of integrating the high-altitude coffee (*Coffea arabica*) value chain as a pedagogical axis within the educational process of the Management and Entrepreneurship subject at the high school level in rural schools in the Mira River Basin, Ecuador. Using a qualitative and participatory methodology based on the systematization of experiences, this study identifies the opportunities and challenges of incorporating the coffee-growing approach into public high school entrepreneurship curricula. The results show that contextualizing school content with coffee production—from plant propagation in nurseries to the processing and marketing of high-altitude coffee with specialty varieties—strengthens young people's connection to their land, promotes meaningful learning, and enhances territorial identity. The study also highlights the importance of inter-institutional coordination and international cooperation within the educational process. The proposed contextualized curriculum includes tools such as the coffee value chain diagram and project-based learning activities relevant to the region. These are aimed at fostering viable agro-industrial ventures and strengthening the local economy. It is concluded that education based on the coffee value chain represents a transformative strategy that helps reduce youth migration and contributes to building sustainable and resilient rural communities.

**Keywords:** High-altitude coffee, contextualized curriculum, sustainable development, rural education, youth entrepreneurship, agricultural management.

**Resumen:** El presente artículo analiza la perspectiva de integrar la cadena de valor del café de altura (*Coffea arabica*), como eje pedagógico en el proceso educativo de la disciplina de Gestión y emprendimiento a nivel de bachillerato, en las instituciones educativas del sector rural de la Cuenca del Río Mira, Ecuador. A través de una metodología cualitativa y participativa basada en la sistematización de experiencias, se identificaron las oportunidades y desafíos de incorporar el enfoque cafetalero en las asignaturas de emprendimiento del bachillerato fiscal. Los resultados evidencian que contextualizar los contenidos escolares con la producción cafetalera, a lo largo del proceso agrícola desde la propagación de plantas a nivel de vivero hasta el procesamiento y luego la comercialización del café de altura con variedades especiales, fortalece el arraigo juvenil, promueve aprendizajes significativos y potencia la identidad territorial. Asimismo, se destaca la relevancia de la articulación interinstitucional y la cooperación internacional en el proceso educativo. La propuesta de currículo contextualizado incluye el uso de herramientas como la gráfica de la cadena de valor del café y actividades de aprendizaje por proyectos pertinentes con la región, orientadas a la creación de emprendimientos agroindustriales viables y al fortalecimiento de la economía local. Se concluye que la educación basada en la cadena del café constituye una estrategia transformadora que contribuye a mitigar la migración juvenil y a construir comunidades rurales sostenibles y resilientes.

**Palabras clave:** Café de altura, currículo contextualizado, desarrollo sostenible, educación rural, emprendimiento juvenil, manejo agrícola

## Introduction

The Mira River Basin, located in northern Ecuador and extending mainly through the provinces of Carchi and northern Imbabura, is a territory with significant biocultural and agroecological wealth. It is characterized by its ethnic diversity, with indigenous, Afro-descendant, and mestizo communities, and its scattered rural configuration, where subsistence agriculture and local marketing predominate. One of the crops with the longest history and greatest economic importance in the area is coffee, especially the *Coffea arabica* species, grown at altitudes between 1,200 and 1,800 meters above sea level, under ideal climatic conditions and using techniques handed down from previous generations (PROECUADOR, 2019; INEC, 2021). Despite its potential, the coffee value chain still faces limitations in processing and marketing. However, in recent years, associative initiatives, cooperation projects, and institutional efforts have sought to strengthen coffee production as an engine of local development, while recognizing the value of this crop as a formative and cultural element within the territorial identity of the Mira River Basin (SENESCYT, 2020; COSPE & FIEDS, 2022).

Although Ecuador's rural areas have vast agroecological and cultural wealth, the national education system still has limitations in terms of effectively articulating with local productive environments. This disconnect is especially evident at the high school level, where the curriculum content, particularly in entrepreneurship, management, and project management courses, tends to be abstract or based on urban examples, making it difficult for students to acquire knowledge that is relevant to life and work in the region (Ecuadorian Ministry of Education, 2016; Paredes & Ramos, 2019). As a result, many rural youth fail to see agricultural production as an educational opportunity or a viable path to economic development, which affects their motivation, weakens their sense of belonging, and reduces their chances of remaining in the community.

This situation is exacerbated by limited access to applied agro-industrial knowledge, poor coordination between educational institutions, farming families, and universities, and the absence of pedagogical models that link practice with context. As a result, a phenomenon of youth uprooting is reproduced in which, after completing their secondary education, young people migrate to urban centers in search of higher education or employment, and in many cases do not return to

their territories of origin, contributing to the economic stagnation of rural communities (Tapia, 2018; SENESCYT, 2020). This reality poses an urgent challenge for the education system: to reconfigure its objectives and methodologies to promote education that is relevant to the territory, values local productive knowledge, strengthens relevance, and fosters the construction of viable life projects in the local environment.

Therefore, the purpose of this research project was to highlight the logical relationship that allows the coffee value chain to be integrated as a pedagogical axis in high school entrepreneurship courses, with the aim of strengthening the appropriation of agro-industrial knowledge and territorial relevance in rural communities in the Mira River Basin. To this end, the intervention experience between 2020 and 2024 was analyzed within the framework of the project to strengthen the coffee production chain in the Mira River Basin, as a basis for building meaningful territorial learning and presenting inputs for a curriculum proposal applicable to rural public high schools, based on project-based learning and supported by the production and marketing chain and the demand for new models and techniques of entrepreneurial training.

#### Contextualized education and territorial relevance

Rural education has historically been approached from standardized perspectives that do not take into account the productive, cultural, or ecological wealth of the territories. In response to this limitation, contextualized education proposes that curriculum content, methodologies, and educational goals should be developed from and for the territory, favoring the development of skills relevant to community and productive life (UNESCO, 2020).

According to Tenti Fanfani (2010), territorial relevance in education implies that schools respond to the needs of their environment, strengthening local identity and providing tools for rooting and sustainable development. In rural contexts such as the Mira River Basin, where high-altitude coffee growing is a historical, economic, and cultural activity, incorporating this topic into the school curriculum allows for a reinterpretation of learning and projects young people as agents of change in their community.

Freire (1997) contributes from the perspective of critical pedagogy, arguing that education must start from the reality of the learner in order to be transformative. In this sense, addressing the coffee value chain in the classroom not only teaches about a product, but also about a way of life, a culture, and a shared productive history. One of the main

challenges in rural areas of Latin America is structural youth migration, largely motivated by the lack of relevant educational and employment opportunities in their territories of origin (ECLAC, 2019).

This migration has profound consequences, such as population aging, loss of local knowledge, and weakening of community ties. Authors such as Tapia (2018) and Rengifo (2021) point out that building roots among rural youth requires comprehensive policies that integrate education, entrepreneurship, and territorial identity.

In this context, schools become strategic spaces for cultivating ties to the “homeland” through content, practices, and projects that promote staying, entrepreneurship, and transformation.

#### Project-based learning and real-life experiences

Project-based learning (PBL) and experiential learning are methodological approaches that place students at the center of the educational process, promoting the resolution of real-life problems in their environment and the creation of concrete products as evidence of learning (Thomas, 2000; Kolb, 1984).

In the context of this study, working with the coffee value chain allowed young people to develop entrepreneurial projects in different links (production, processing, marketing, services), integrating technical, business, social, and environmental knowledge. Situated learning is particularly valuable in rural communities, as it promotes direct transfer between school and community life, enabling young people to acquire skills that are useful for their local future, and not only for urban or external contexts.

In the context of the current challenges of entrepreneurship education, especially in rural areas, it is essential to incorporate contemporary tools and methodologies that promote a flexible, collaborative, and innovative mindset. Techniques such as the agile mindset, the Canvas model, and the Lean Startup methodology allow students to develop projects in an iterative, user-centered, and practical way. These methodologies encourage adaptation to change, learning from mistakes, and early validation of ideas, which are key principles for developing resilient entrepreneurs who are committed to their environment. Their integration into an updated curriculum not only brings dynamism and relevance to the teaching-learning process, but also connects students with the real logic of the market and the needs of their community, which is essential in territories where innovation must emerge from the

local level and with limited resources (Ries, 2011; Osterwalder & Pigneur, 2010; Denning, 2018).

#### Entrepreneurship education with a territorial focus

Entrepreneurship education has been incorporated into Ecuadorian high schools through subjects such as Entrepreneurship and Management. However, in many cases, it has focused on generic business models that are decontextualized or unviable in rural areas (Ecuadorian Ministry of Education, 2016).

Authors such as Herrera and de la Cruz (2017) propose a territorial entrepreneurship approach, which promotes the creation of productive initiatives based on local resources, ancestral knowledge, community networks, and existing value chains. This type of approach is aligned with the principles of the popular and solidarity economy and with endogenous development models. The experience of the “Café Entre Montañas” project shows that students can actively participate in collective branding, fair trade, barista training, rural tourism, and product development if they are provided with technical support, adequate pedagogical training, and opportunities for integration with territorial actors.

#### Entrepreneurship in Ecuadorian public high schools

In the Ecuadorian educational context, entrepreneurship is formally incorporated into the high school curriculum through specific subjects such as Entrepreneurship and Management, Project Management, Life Project, and Integrative Projects, in accordance with the guidelines of the Ministry of Education. This incorporation responds to the objective of training students with life and work skills, capable of identifying opportunities, generating viable ideas, managing resources, and making decisions based on ethical and sustainability principles. The General Framework for the High School Curriculum establishes that entrepreneurship should be understood as a process that articulates creativity, innovation, leadership, and social commitment, oriented toward personal and community well-being (Ecuadorian Ministry of Education, 2016).

However, despite its presence in regulations, multiple studies and field observations show that school entrepreneurship is often developed in isolation from the local environment, with examples and projects that are far removed from the reality of students, especially in rural contexts (Paredes & Ramos, 2019). This creates a gap between what is taught and what young people need to build a life project in their territory. Hence the importance of territorializing the entrepreneurial approach,

incorporating into the aforementioned subjects production models specific to the area, such as the coffee value chain in the Mira River Basin. This approach not only allows for the development of the skills outlined in the curriculum, but also enhances the relevance of rural education, strengthens community ties, and stimulates community transformation from the school (Herrera & de la Cruz, 2017).

## Methodology

This study is part of a qualitative, proactive approach based on the systematization of experiences, which responds to the need to understand and transform educational realities, particularly in rural contexts where traditional, productive, and community knowledge play a central role.

From the qualitative paradigm, it is assumed that social reality is constructed by the actors who live it and that knowledge is generated from the interpretation of meanings, values, and practices that emerge in a given context (Denzin & Lincoln, 2018). In this case, the research process focuses on recovering, analyzing, and interpreting an intervention carried out between 2020 and 2022 in the Mira River Basin, Ecuador, where the project “Strengthening the coffee production chain to promote commercial associations and guarantee fair prices for producers” was developed. This experience provided a set of relevant lessons on the link between rural youth, coffee production, and entrepreneurship education.

The research is also proactive in nature, as it does not merely describe or analyze a situation, but proposes a contextualized pedagogical intervention model: a curriculum strategy that integrates the agro-productive approach into the three entrepreneurship subjects of the Ecuadorian public high school system. This perspective is based on the contributions of Colomer (2009), who argues that educational research should be oriented toward social transformation through viable proposals that respond to the problems identified.

As a central methodological strategy, we opted for the systematization of experiences, understood as a scientific, reflective, and critical process of reconstructing a meaningful social practice. According to Jara (2012), systematization involves “organizing, ordering, and critically interpreting an experience, rescuing its lessons and

understanding its internal logic.” This methodology is particularly relevant in rural contexts, where educational innovation must emerge from the knowledge generated by local actors themselves, articulating technical, traditional, and academic knowledge.

The scientific method is expressed in this qualitative study through the rigorous application of the following elements: clear formulation of the problem, coherent methodological design, use of appropriate data collection techniques (interviews, workshops, document review), categorization and interpretation of data, and validation of the proposal through dialogue with relevant actors. As Flick (2015) points out, validity in qualitative research does not depend on statistical replicability, but on the interpretative rigor and comprehensive depth with which social phenomena are addressed.

This approach made it possible to identify curriculum gaps, youth perceptions, and opportunities for educational improvement, and led to a proposal that seeks to promote the territorial relevance of the curriculum in coffee-producing communities, strengthening the sense of belonging and youth roots.

This study is part of a proactive and participatory qualitative approach, based on the systematization of the empirical experience of the intervention project carried out between 2020 and 2024: “Strengthening the coffee production chain in the Mira River Basin to promote commercial associations and guarantee fair prices for producers.” Its methodological purpose is to design a contextualized educational proposal that incorporates coffee entrepreneurship into the Ecuadorian public high school curriculum, addressing the need for territorial relevance and youth empowerment in rural areas.

The target population is rural youth between the ages of 16 and 20 who are enrolled in high school in public educational institutions located in the Mira River Basin (provinces of Carchi and Imbabura). This region has historically been a producer of Arabica coffee and currently faces challenges related to youth migration, unemployment, and the underutilization of agricultural production chains with economic and cultural potential.

The program worked specifically with third-year high school students and teachers of the following subjects: a) citizenship education, b) entrepreneurship and management, c) life planning, and d) integrative projects.

These three subjects constitute the pedagogical core of the Entrepreneurship and Management block according to the Ecuadorian

Ministry of Education's curriculum and offer concrete opportunities to integrate productive, business, and social content with a local focus. The sample consisted of three rural public schools (two in the province of Carchi and one in Imbabura), 72 students (aged 16 to 20, intentionally selected for gender representation, grade level, and community participation), and six teachers of the three key subjects.

The study was developed under a methodological design specified in three phases:

#### Phase 1: Recovery of project experiences (2020-2024)

The lessons learned during the implementation of the project “Strengthening the coffee production chain in the Mira River Basin” were systematized, with an emphasis on: a) identifying viable production, associative, and commercial practices for young people; b) mapping local actors with potential for educational coordination (producers, associations, municipalities, universities); c) evidence of young people's lack of interest in coffee farming due to a lack of knowledge or educational connections.

Techniques used: this involved reviewing technical reports on the project and conducting in-depth interviews with eight leading producers and six local agro-industrial technicians.

#### Phase 2: Participatory diagnosis with young people and teachers

Participatory workshops were designed with high school students and semi-structured interviews were conducted with teachers of entrepreneurship-related subjects, exploring the following topics: a) young people's perception of coffee as a product that defines their identity and as a life choice, b) level of knowledge about coffee production, processing, and marketing, c) interest in developing school projects related to coffee, d) current limitations of the curriculum in addressing production-related content. The information gathering tools were an interview guide for teachers, a participatory questionnaire for students, and a class observation sheet.

#### Phase 3: Design of a contextualized curriculum proposal

Based on the findings from the previous phases, a modular educational proposal was designed that can be implemented across the three subjects in the entrepreneurship block. This design includes: thematic areas linked to the coffee production chain, learning outcomes aligned with the national curriculum, teaching strategies based on project-based

learning (PBL) and experiential education, and activities that promote co-creation among students, teachers, and community actors.

Among the criteria for validity and rigor, the following were reinforced in the methodological triangulation: integration of primary sources (interviews, workshops) and secondary sources (reports, national curriculum), contextual relevance: all activities were adapted to the socio-productive reality of the Mira River Basin; active participation: youth and teacher leadership was prioritized in the design of the proposal; and peer review: the first draft of the proposal was evaluated by three experts in rural education and local development.

## **Results**

Evidence of the educational potential of the coffee production chain highlights that during the systematization process, multiple pieces of evidence were identified demonstrating that the coffee production chain, approached pedagogically from the local context, has high potential to strengthen school learning, entrepreneurial skills, and territorial roots among young people in public high schools. This potential is evident in the articulation between community knowledge, the agroecological conditions of the environment, and the requirements of the national curriculum.

The agroclimatic potential of the territory, from the Mira River Basin, has ideal agroclimatic characteristics for the cultivation of high-altitude coffee (*Coffea arabica*), especially in areas between 900 and 1,800 meters above sea level, with average temperatures ranging between 18 and 23°C and adequate rainfall distribution throughout the year. These conditions allow the development of varieties of *Coffea arabica*, which require medium to high altitudes to produce quality beans with distinctive sensory profiles. The varieties that have been identified and that allow the quality indices described in this area to be achieved are: Caturra and Geisha as the main ones.

These characteristics make the area a territory with a coffee-growing vocation that has not yet been fully exploited, representing an educational opportunity to train young people to value, understand, and improve the agro-industrial processes of their own community. In addition, successful cases of family farms that are beginning to transition to organic production and fair trade practices were observed, adding value to sustainability education.

Diversity of species and local production practices: in the rural areas visited during the systematization process, different varieties of coffee were identified, such as Typica, Bourbon, Caturra, Geisha, and Catuaí, which allows for the development of differentiated educational activities on plant genetics, climate adaptation, species selection, and good agricultural practices. This biodiversity is key to the design of educational content on topics such as agronomic innovation, bioeconomy, and quality improvement strategies.

During the development of the project within the framework of this inter-institutional cooperation, the Carchi State Polytechnic University identified and produced 90,000 plants of two varieties of high-altitude coffee with special characteristics for their production and development, namely Geisha and Caturra, which were delivered to family production units in the project's area of influence. Integrating these species into the curriculum opens up a range of practical activities, from seed germination and nursery management to selective harvesting techniques and post-harvest processing (wet and dry processing), facilitating integrated learning in natural sciences, mathematics, and business management.

The coffee chain as a living educational laboratory and from the follow-up carried out in the schools that participated in the pilot tests of the coffee approach, it was revealed that working with the coffee production chain allows the agricultural environment to be converted into a living laboratory, where students can observe, experience, and understand economic, ecological, and social phenomena from an integrated perspective. For example, in the “Entrepreneurship and Management” course, real projects were designed to calculate production costs and profit margins for cups of coffee sold at local fairs. In “Life Project,” debates were generated on the meaning of continuing in the community as rural entrepreneurs, and in “Integrative School Project,” learning paths were planned that included everything from participatory diagnosis of the family farm to the design of business models.

These activities not only strengthened motivation but also the development of cross-cutting skills such as leadership, collaborative work, critical thinking, and sustainability. Disconnection between the school curriculum and the productive vocation of the territory: one of the main findings was the lack of connection between the content of entrepreneurship subjects in public high schools and the productive

reality of rural communities. Although the subjects of Entrepreneurship and Management, School Projects, and Life Project address key concepts such as ideation, planning, business models, and environmental analysis, their application in the classroom tends to be abstract, with examples far removed from the coffee-growing environment, which is one of the region's historical and central economic activities.

Teachers reported that they lack contextualized teaching materials and training processes that would enable them to focus their classes on specific agro-industrial enterprises. This creates a perception among young people that education is irrelevant, fueling migration, school disengagement, and disconnection from their productive culture.

Despite the disconnect between the curriculum and the reality of rural life, the workshops revealed a high level of interest, creativity, and desire among young people to remain in the area, provided they are offered training and productive opportunities that are consistent with their environment. The participatory workshops revealed that students have practical, empirical knowledge about coffee cultivation and harvesting, inherited from their families, but lack technical training in processing, marketing, and presentation of value-added products (such as ready-to-drink coffee beverages). Likewise, many young people expressed interest in entrepreneurship activities that link coffee growing with community tourism, digital marketing, and cultural identity, demonstrating a creative potential that is not being exploited by formal education.

Valuing coffee-growing experience as a core element of the curriculum

Another key result was the identification of coffee as a core element for a situated pedagogical approach that can be integrated across the three subjects in the entrepreneurship block. The project experience showed that when young people participate in real coffee processing and marketing processes, they develop technical, organizational, and communication skills with high educational value. The processing of coffee into ready-to-drink beverages, the design of local brands, participation in fairs, and links with producer associations generated significant and motivating learning experiences, allowing young people to recognize the value of their territories and project themselves as agents of change.

In the absence of contextualized teaching materials, both students and teachers stated that the texts and guides available in the Entrepreneurship and Management, Integrative School Project, and

Life Project courses present generic examples focused on urban, commercial, or technological ventures and do not consider the agricultural reality or value chains present in rural areas. This has created a cognitive and emotional barrier, as students do not feel reflected in the content and, therefore, are unable to construct meaningful learning from their environment.

This disconnect between the curriculum and reality directly affects school motivation and retention, as pointed out by Freire (1997), who argues that education must start from the context of the learner in order to be transformative. The lack of materials that explain, for example, how to process coffee, calculate sales prices, design packaging, or analyze the viability of a coffee venture prevents the teaching-learning process from having local relevance and cultural relevance.

Insufficient teacher training with a territorial focus, on the other hand, showed that teachers responsible for entrepreneurship subjects have not received specific training in agro-industrial entrepreneurship or active learning methodologies linked to rural productive projects. Many of them come from urban areas or have no experience in associative processes or productive chains such as coffee.

This creates a pedagogical barrier that limits teachers' ability to guide relevant and contextualized projects. As Kolb (1984) points out, experiential learning requires facilitators who are able to connect theory and practice in real situations. However, without tools or previous experience, many teachers opt for expository strategies or abstract exercises that fail to engage the interest or abilities of rural students. Furthermore, the current model of continuing teacher training does not include specialized modules on local economics, territorial development, or agricultural entrepreneurship, which perpetuates this gap between the curriculum and the productive vocation of the environment.

Coffee as a symbol of pride and a possibility for the future

Young people in the Mira River Basin said that their neighboring territories had managed to position themselves as sustainable tourist destinations based on their agricultural production, and that they could do the same with coffee. In this sense, coffee was no longer seen as a family burden or subsistence activity, but came to be understood as a cultural and economic resource capable of driving innovation, territorial differentiation, and youth entrepreneurship.

Many students said that “what they did in Guanábana Republic can be done here, but with coffee,” referring to the tourism development of a neighboring sector based on the development of a brand around the cultivation of soursop (*Annona muricata*) in the area surrounding the study, demonstrating a reinterpretation of the product not only as a source of income, but also as an element of identity and pride. This change in perception coincides with the postulates of Freire (1997), who defends the need for education to be anchored in the knowledge and dreams of the learner, in order to generate critical awareness and commitment to their context.

Greater motivation and ownership of learning, both in classroom activities and practical exercises, teachers noticed a significant increase in student motivation and participation when coffee was proposed as a cross-cutting theme in the subjects of Entrepreneurship and Management, Life Project, and Integrative School Project.

Unlike generic topics, the coffee focus allowed young people to visualize a possible and achievable life project, connecting technical learning with their family and community realities. Exercises that included coffee harvesting, production cost calculations, brand design for local coffee shops, and sales simulations at school fairs sparked an interest in learning by doing. This appropriation is in line with the proposals of Kolb (1984) and Thomas (2000), who emphasize that meaningful learning is strengthened when students actively participate in real projects with purpose.

Education for roots, not for migration, one of the expressions most repeated by young people during the focus groups was: “with coffee, we can stay and do something good here.” This phrase sums up one of the most important transformations in pedagogical terms: the coffee approach not only promotes entrepreneurial skills, but also stimulates processes of territorial rootedness, which are fundamental in rural contexts where early migration is an entrenched social pattern.

Teachers valued this transformation as key to revaluing rural public schools as spaces for innovation and local development, overcoming the view of education as mere preparation for leaving the territory. Consequently, the educational proposal based on the coffee chain is not only pedagogically relevant but also socially strategic for strengthening sustainable communities.

Positive institutional intervention and structural conditions for the educational coffee approach

UPEC's contribution to training, technical assistance, and outreach

The participation of UPEC teachers, researchers, and students helped strengthen both the technical-productive component and the focus on sustainability and entrepreneurship in the coffee-growing communities of the basin. The agricultural program promoted good agricultural practices, productive reconversion processes, ecological phytosanitary management, and agroclimatic characterization of areas suitable for coffee. At the same time, the Business Administration program provided training in associative models, commercial strategies, cost analysis, and business plans focused on coffee as a value-added product. This collaborative work generated a process of knowledge transfer between the university and the community, but also allowed for the development of educational prototypes that are now proposed for inclusion in public secondary education as part of a territorialized curriculum.

International cooperation support: COSPE and FIEDS. The project was implemented with funding from the Italian-Ecuadorian Fund for Sustainable Development (FIEDS) through the Italian organization COSPE, which ensured standards for planning, monitoring, and impact evaluation. This cooperation made it possible to coordinate a network of local actors (parish governments, producer associations, educational centers, and universities) under an approach based on a solidarity economy, fair trade, and territorial relevance. Within this framework, the inclusion of an educational component was not an isolated element, but rather a cross-cutting strategy, in which youth capacity building was understood as an investment in long-term sustainability.

Infrastructure installed: The Carchi Provincial Government's coffee roasting plant

Another structural element that reinforces the viability of the coffee chain-based educational approach is the existence of a coffee roasting plant installed in 2018 in the canton of Espejo with support from the Provincial Government of Carchi. This plant is equipped for roasting, grinding, and packaging coffee, allowing the agroindustrial cycle to be closed in the same production area. The existence of this infrastructure creates a unique opportunity for educational and productive coordination, as it allows high school students to visit the plant, understand industrial processes, analyze product traceability, and design local and international marketing strategies. It also opens the door to partnerships between educational institutions and processing

centers, which can become a replicable pedagogical practice in other rural areas of Ecuador.

The coffee value chain as a teaching tool: one of the most significant findings of the educational intervention of the project “Strengthening the coffee production chain in the Mira River basin” is the functionality of the coffee value chain graph as an integrative teaching resource in the Management and Entrepreneurship subjects that are part of the Ecuadorian public high school curriculum.

The graph divides the coffee value chain into four main phases: 1) Primary production (coffee-producing market): starts with the seed, goes through the production and harvesting stages, until the coffee is obtained in parchment form. 2) Processing: includes the roasting process, followed by grinding, where added value is generated. 3) Marketing (coffee beverage market): shows the passage of ground coffee to its distribution at retail outlets and commercial establishments, where it is transformed into a beverage. 4) Consumption and complementary services: reflects the importance of equipment, machinery, and specialized services for the preparation of the final beverage.

This visualization provides a sequential, clear, and applicable understanding of the links in the process, facilitating its use in teaching activities focused on project-based learning, business simulations, entrepreneurship plans, and technical agricultural education.

From the perspective of the participating teachers, the graph allowed them to establish curricular links with the competencies of each of the subjects in the area, such as:

- Identification of business opportunities,
- Design of management models,
- Proposal of local value-added production chains,
- Management of marketing processes in short circuits.

On the part of the students, the inclusion of this tool sparked interest by showing the real integration of technical knowledge with the nearby rural environment, strengthening their sense of belonging. They clearly recognized how an agricultural product such as coffee can become a beverage, a brand, a consumer experience, and even a tourist attraction, as is already the case in geographically nearby areas that have migrated from traditional crops to sustainable tourism ventures.

This result demonstrates that incorporating this graphic into educational processes not only improves understanding of the coffee economic cycle but also fosters entrepreneurial vision among rural youth, aligned with the potential of their territory. Building brand identity with community participation: As part of the intervention process carried out between 2020 and 2024, one of the most significant results was the collaborative creation of the name and visual identity of a collective brand for coffee produced in the Mira River basin. This process was carried out in November 2020 through six workshops led by teachers from the Business Administration program at the Polytechnic State University of Carchi (UPEC), with the active participation of coffee consumers, restaurant and café owners, university students, and young people from the community.

These workshops were designed as theoretical and practical collaborative learning exercises, combining content from subjects such as Brand Management, Services Marketing, and Territorial Entrepreneurship. The methodology used was based on market research tools, brainstorming, semiotic analysis, and brand prototyping. As a result, the name "Café de Carchi. Café de Altura," but this was not approved by the National Intellectual Property Service (SENADI).

In view of this refusal, the Carchi Coffee Growers' Economic Integration Network (REDCAFC) proposed a new name: "Café Entre Montañas," which was approved by SENADI and officially registered as a collective trademark under the SENADI-2022-17513 procedure, with protection for coffee-based beverages and coffee in the International Class. This process not only consolidated a community-based collective trademark with intergenerational participation, but also demonstrated the educational potential of the coffee approach as a focus for entrepreneurial training that is relevant to the region for young people in the sector. The experience has become a replicable educational practice in Ecuador's technical high schools, especially in management and entrepreneurship courses.

There is a clear need and opportunity to reconfigure the pedagogical approach of Ecuadorian public high schools toward models of contextualized, productive, and territorially relevant education. First, the findings confirm what authors such as Freire (1997) and Vygotsky (1978) have argued from a critical and sociocultural pedagogical perspective: learning becomes meaningful when it is linked to the real lives of learners, their prior knowledge, their culture, and their material

conditions. In this study, by linking the teaching-learning process to the coffee value chain, processes of identification, motivation, and a sense of belonging were activated among young people between the ages of 16 and 20, who saw their reality and future potential reflected in school activities.

This approach breaks with the traditional logic of rural education that is disconnected from the territory, which often prepares students to leave their communities rather than transform them. As Tenti Fanfani (2010) points out, school should be a place where young people learn to stay with dignity and build a future in their context, not just a stepping stone to migration or urban underemployment. One of the most complex challenges identified in the Mira River Basin is precisely the phenomenon of youth migration for educational reasons, especially to cities such as Ibarra, Quito, and Tulcán. Upon completing high school, many young people leave their communities in search of higher education, and in most cases they do not return to their native territory, either due to a lack of job opportunities, the absence of decent conditions for entrepreneurship, or an emotional break with their place of origin.

This situation leads to a progressive generational drain, leaving rural communities as aging spaces with little productive innovation and scarce social renewal. In this context, the proposed coffee approach not only fulfills an educational role, but also a strategic one: it strengthens the emotional, cultural, and economic ties of young people to their homeland, allowing them to imagine a possible life in their own community. The incorporation of tools such as the coffee value chain chart in the classroom demonstrated that it is possible to work on integrated learning in economics, agribusiness, management, and marketing in an experiential and collaborative manner. This experience is consistent with the approaches of project-based learning (Thomas, 2000) and experiential learning (Kolb, 1984), which promote the resolution of real problems and the development of skills that can be transferred to work and community life.

In addition, the participation of the Carchi State Polytechnic University, through its Agricultural and Business Administration programs, constitutes a good practice of inter-institutional linkage between higher education, secondary school, and the productive community, contributing to closing gaps between academic knowledge and practical knowledge. This is consistent with the territorialized technical education frameworks proposed by ECLAC and UNESCO, which advocate for the articulation of education systems with local productive

systems. The experience of participatory construction of the collective brand “Café Entre Montañas” (Coffee Between Mountains), with university and community youth, also confirms the educational value of real entrepreneurship processes, where concepts of marketing, associativity, intellectual property, and solidarity economy are applied. This type of situated learning fosters not only technical skills in young people, but also critical awareness, empowerment, and economic citizenship.

On the other hand, the identification of structural barriers—such as the absence of contextualized teaching materials and limited teacher training on productive issues—points to the urgent need to review and update teacher training, as well as the available pedagogical resources, so that they respond to the productive realities of rural Ecuador. If these gaps are not addressed, the implementation of approaches such as the coffee one could be restricted to specific initiatives, without becoming a systemic educational policy.

Finally, the study invites us to consider the coffee value chain not only as an economic opportunity, but also as a hub for interdisciplinary learning and identity building for young people. Its potential to bring together agricultural, technical, business, and social knowledge makes it a strategic pedagogical tool for advancing toward a more equitable, relevant, and transformative secondary education.

## Conclusions

The systematization of the educational experience linked to the project “Strengthening the coffee production chain in the Mira River Basin” has demonstrated the high pedagogical potential of the coffee value chain as a core component of the entrepreneurship curriculum in Ecuador's public high schools. The incorporation of content, visual tools, and practical activities related to coffee made it possible to generate meaningful learning, develop entrepreneurial skills, and strengthen rural youth's sense of belonging to their territory. One of the most relevant findings was the recognition of coffee not only as a traditional crop, but also as a symbol of territorial identity and an opportunity for sustainable economic development. The focus on coffee, as part of the subjects of Productive Enterprise Management, Organization Management, and Entrepreneurship and Management, promotes the integration of technical, business, and social knowledge.

Likewise, it was found that the use of the coffee value chain graph as a visual teaching tool facilitates the understanding of complex processes, allowing students to design realistic and contextualized ventures. This experience, reinforced by theoretical and practical exercises and the active participation of community, university, and productive actors, consolidated situated, democratic, and intergenerational learning. Another critical aspect addressed in this study was youth migration for educational reasons, a phenomenon that has led to the aging of rural communities and the loss of economic dynamism. In this context, it was concluded that rural schools must be transformed into spaces for imagining and building viable futures in their own territories, avoiding generational breakdown. The coffee approach is a concrete strategy for promoting youth rootedness through education.

Finally, the participation of institutions such as UPEC, the support of the Provincial Government of Carchi, and the backing of cooperation agencies such as COSPE and FIEDS demonstrate that inter-institutional coordination is key to promoting educational processes with a territorial impact.

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