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SABERERES TRANSDISCIPLINARY SOCIO-ECOLOGICAL MODEL: TOWARDS EDUCATION FOR SUSTAINABILITY

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ABSTRACT

The SaberERES model emerges as an ecology of knowledge oriented towards educational sustainability, the result of a transdisciplinary research process developed at the Guachacay experimental farm, a living space where social, ecological, pedagogical, and productive dynamics intertwine. Based on the paradigm of complexity, this research recognizes the farm as an autopoietic socio-ecological system, where education manifests itself as a relational, reflective, and transformative practice. Using a complex methodology that integrated in-depth interviews, participant observation, social cartography, reflective logs, and focus groups, a theoretical-practical model was designed that articulates agroecological production, community participation, and citizen training around the principle of sustainability. SaberERES is configured as an open, self-organized, and dynamic proposal that links local, scientific, and ethical knowledge in an educational framework aimed at building a culture of cooperation and respect for life.

KEYWORDS: Complexity; Transdisciplinarity; Education for Sustainability; Socioecological System.

1. INTRODUCCIÓN

In Colombia and various other Latin American countries, pressure on natural resources and socioeconomic transformations in the region have intensified problems associated with environmental degradation, social inequality, and the fragility of rural production systems (Estenssoro, 2018). This scenario poses significant challenges for education systems, particularly in training new generations capable of understanding and addressing contemporary socio-environmental complexities. In this context, education plays a strategic role in building responsible citizenship and promoting sustainability-oriented practices, although various studies indicate that structural obstacles still exist that limit the active participation of multiple social actors, including teachers, in these educational processes (Quiroz-Martínez & Rushton, 2025).

From this perspective, pedagogy cannot be understood solely as a discipline within the field of knowledge, but rather as an integrative social knowledge that articulates cultural, historical, and territorial dimensions in the configuration of educational processes. As a reflective practice, pedagogy enables the reconstruction of learning experiences through didactic and curricular devices that link knowledge to the contexts of students' lives. In this sense, educational training involves not only the transmission of content, but also the construction of attitudes, values, and skills oriented toward the comprehensive development of individuals (Díaz Alvarado, 2008).

Within this framework, experimental farms emerge as pedagogical spaces with significant potential for articulating educational, productive, and environmental processes from interdisciplinary and transdisciplinary approaches. These environments allow for the exploration of the interrelationship between rurality, society, the environment, and education, while facilitating situated learning based on agricultural practices that integrate scientific knowledge, local knowledge, and community dynamics. In this way, the educational experience in rural contexts can contribute not only to the strengthening of technical skills, but also to the development of meaningful links between the new generations and the territories where their life projects are built.

In a historical context characterized by the fragmentation of knowledge and the intensification of the global eco-social crisis, educational institutions face the challenge of training individuals capable of understanding reality from systemic and relational perspectives. In this scenario, the Guachacay experimental farm was set up as a living learning laboratory, a space where productive practices, educational processes, and community dynamics converge, allowing for the observation of the interaction between nature, society, and knowledge in everyday experience.

The doctoral research that gave rise to the SaberERES model sought to answer the following question: How does the experimental farm as an interdisciplinary training model influence the construction of a transdisciplinary education for sustainability? Addressing this question involved transcending traditional dichotomies present in the production of educational knowledge, such as theory and practice, subject and object, or science and culture. From this perspective, the farm is no longer conceived as a simple setting for technical practices but is understood as a living socio-ecological system in which processes of educational autopoiesis and collective construction of meaning emerge (Maturana & Varela, 1987).

The emergence of the SaberERES model is part of an epistemological horizon that dialogues with complex thinking (Morin, 1990), social systems theory (Luhmann, 1996), and Southern epistemologies (de Sousa Santos, 2018). From this perspective, sustainability is not conceived as a technical objective based exclusively on efficiency or control of systems, but rather as a dynamic process that involves recognizing ecological and social interdependencies, embracing uncertainty, and promoting recursive learning processes in living systems.

In this sense, this article presents the process of constructing the SaberERES model as the result of a transdisciplinary research exercise that articulates pedagogical, ecological, social, and ethical dimensions in the context of the Guachacay experimental farm. Rather than proposing a normative or prescriptive framework, the model is presented as a relational and emergent framework that allows for the interpretation of formative dynamics in complex socio-ecological systems and guides educational practices committed to sustainability.

2. METHODOLOGY

The methodological approach of this research is based on the perspective of complex systems, understood as dynamic configurations composed of multiple interrelated components whose interactions generate emergent and nonlinear behaviors (García, 2006; Polanco-Echeverry, Álvarez-Salas & Ríos-

Osorio, 2015). From this perspective, educational phenomena are not interpreted as isolated processes, but as open systems where social, ecological, cultural, and productive dimensions interact.

Within this framework, the Guachacay experimental farm was analyzed as a socio-ecological learning system, in which educational, productive, and community processes converge. More than a space exclusively dedicated to agricultural production, the farm is conceived as a living laboratory where scientific knowledge, traditional knowledge, and practical experiences interact. This interaction enables the construction of contextualized knowledge and promotes understanding of the relationships between education, territory, and sustainability.

From this perspective, agricultural systems transcend their productive function to become complex pedagogical devices, in which multiple dimensions of learning are articulated: ecological, social, cultural, economic, and ethical. This convergence favors experiential learning processes, through which participants not only develop technical skills associated with agricultural work, but also reflective and critical abilities that allow them to interpret complex issues such as sustainability, food security, and natural resource management.

The complexity approach also makes it possible to overcome the traditional dichotomy between theory and practice, promoting constant dialogue between different disciplines and levels of knowledge. By considering the experimental farm as a dynamic system, the interdependence of its components and the way in which the decisions and actions of the actors influence the functioning of the whole are recognized. This approach is linked to the principles of transdisciplinarity, which seek to integrate different forms of knowledge in order to address socio-environmental issues in a holistic manner.

From an epistemological point of view, this approach recognizes that knowledge is constructed through collective processes of interpretation and dialogue between different disciplinary perspectives. Consequently, the analysis of the educational processes developed on the experimental farm was aimed at identifying the interdependencies between productive practices, social dynamics, and training processes, understanding that these relationships constitute a situated learning system.

The conceptual framework of complexity allows us to understand that agroecological systems are organized into hierarchical levels of integration, where physical and biological levels are linked to broader social and cultural dimensions (Morin, 1989). In this sense, sustainability issues cannot be analyzed exclusively from the natural sciences, but require the incorporation of social, cultural, and institutional factors that influence the management of ecological systems (Salas et al., 2012).

The methodological procedure adopted is inspired by the complex systems analysis method proposed by García (2006), later adapted by Polanco-Echeverry, Álvarez-Salas, and Ríos-Osorio (2015) for the study of socio-ecological systems. This approach proposes an analytical route aimed at understanding the relationships between the components of the system and constructing conceptual models that allow for the interpretation of unsustainability problems in territorial contexts.

Based on these references, the research was structured using a methodological approach consisting of four interrelated phases, which were developed in a flexible and recursive manner. This design allowed the analytical procedures to be adjusted as new understandings of the phenomenon under study emerged. As Maxwell (2012) points out, in qualitative research, the components of the methodological design may require progressive adjustments based on the findings obtained during the research process.

The phases of the research are presented below, detailing how they were carried out.

Figure 1: Research phases.

Note: The figure shows the research phases on the impact of interdisciplinary work in educational processes managed by the Guachacay experimental farm through transdisciplinary education for sustainability. Own elaboration.

3. RESULTS

A conceptual model is an analytical tool that allows us to organize and represent the central components of a complex phenomenon in a relational way, as well as the interactions that link them together. Its value does not lie in reducing reality to simplified schemes, but in making visible the logics that structure a system, facilitating the understanding of links, flows, and tensions that emerge from the interaction between multiple dimensions. In socio-ecological and educational research, conceptual models play an integrative role, connecting theoretical frameworks with empirical evidence and offering an interpretive structure that guides the analysis and communication of results (Maxwell, 2012; Ostrom, 2009).

From this perspective, the conceptual model presented below is conceived as a construction derived from the dialogue between the theoretical approaches addressed and the empirical findings obtained on the farm. Its purpose is to coherently articulate the ecological, productive, educational, and organizational elements analyzed throughout the study, showing how these are interdependently configured within a complex socio-ecological system. Thus, the model does not operate as a prescriptive framework, but rather as a device for synthesis and reflection that allows us to visualize the key relationships in the research process and serves as an interpretive bridge for understanding the analysis that was developed.

In this context, the integrated analysis of interviews, focus groups, field observations, and technical-productive records allowed us to recognize the emergence of a model that is configured at the intersection between practices, actors, and learning environments on the farm. This model expresses a particular mode of knowledge production in which knowledge ceases to operate as isolated domains and is transformed into relational networks that are continuously reconfigured based on shared experience. Practical training in the different production modules promotes the convergence of technical, ecological, social, and pedagogical perspectives, creating a space for exchange in which students, operators, teachers, and technical staff constantly reinterpret concepts and procedures. The collaborative problematization of issues such as water efficiency, waste management, soil fertility, and animal health encourages participants to transcend one-dimensional views, while the joint design of solutions integrates knowledge from agronomy, animal husbandry, environmental education, rural economics, and the experience accumulated in daily work. This consolidated dynamic of interdisciplinary interaction strengthens informed decision-making, allowing for a clearer understanding of the interdependencies that characterize agroecological production and sustainable land management.

As these practices are sustained over time, a shift towards transdisciplinary ways of thinking can be observed, visible when actors recognize that the ecological, economic, and educational challenges of the 21st century require systemic interpretive frameworks capable of integrating multiple dimensions of analysis. The explicit incorporation of the ecological, social, and economic effects of each productive decision allows us to understand the farm as a network of relationships, while the processes of co-creation of knowledge articulate scientific, technical, pedagogical, and local knowledge to generate explanations and solutions that no single discipline can produce in isolation (Morin, 2008; Klein, 2010). In this movement, the SaberERES model is consolidated as an emerging epistemological framework that guides the reading of complex problems, promotes educational practices consistent with contemporary demands, and strengthens the capacity of actors to act in scenarios marked by uncertainty.

Practice is revealed as the core element linking these transformations. More than an operational component, it is the means through which interdisciplinarity and transdisciplinarity are integrated. Direct exposure to the complexity of the environment prevents the fragmentation of knowledge; immediate feedback between action and reflection strengthens critical judgment; and the validation of local and experiential knowledge broadens the sources of legitimacy of academic knowledge. The farm thus becomes a living laboratory where learning is continuously negotiated and reconstructed, and where decisions made in real time become opportunities to understand the systemic effects of each action.

This understanding is decisive for the construction of the SaberERES model, as it reveals the complexity of the territory, forces us to interpret sustainability from the perspective of everyday practices, and places training within a process of territorial transformation in which learning involves understanding, intervening, and anticipating the evolution of the system. In this sense, SaberERES is configured as a conceptual and operational architecture that enables a complex reading of the environment, promotes training practices relevant to contemporary demands, and enhances the capacity of actors to respond to emerging challenges in highly uncertain scenarios.

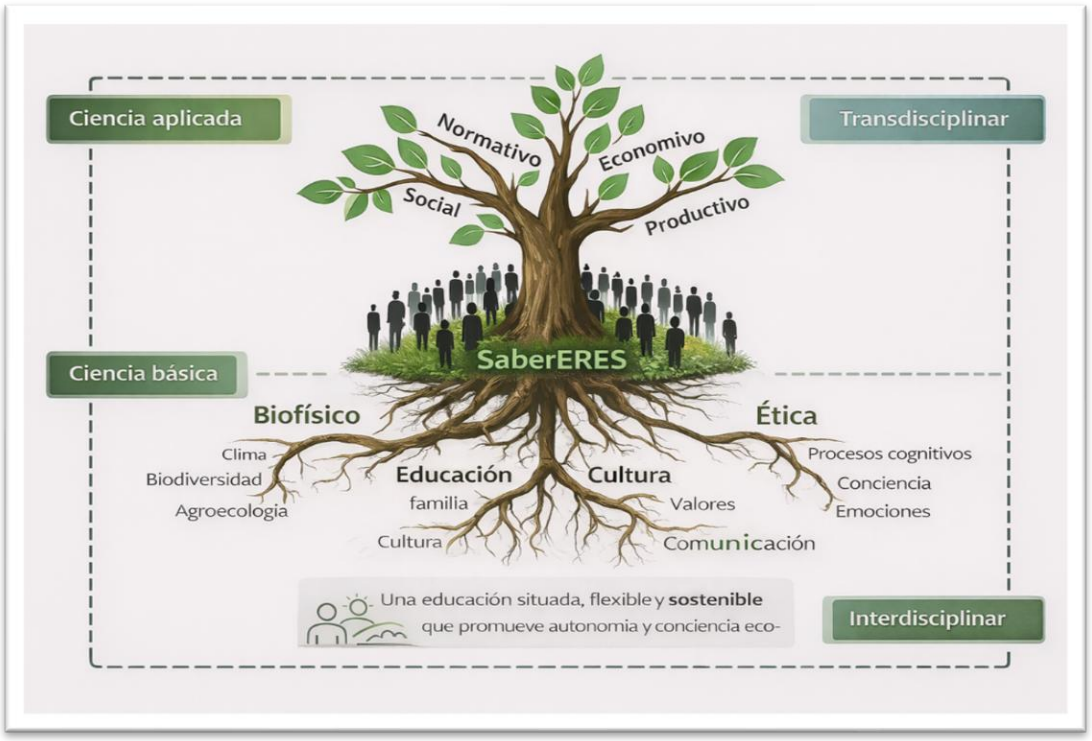

Figure 2: SaberERES transdisciplinary socio-ecological system model.

Figure 2 represents the SaberERES transdisciplinary socio-ecological system model as a tree symbolizing the comprehensive growth of knowledge, ethics, and culture in the context of transdisciplinary education. In the center, beneath the tree trunk, is the term SaberERES, which integrates knowledge with being, reflecting the idea of an education that articulates scientific knowledge, social action, and human development.

Each of the specific parts and how they are articulated is described below:

The roots of the tree branch out into three fundamental dimensions:

a. The first component, biophysical, refers to the natural and ecological systems that constitute the material basis of the territory and on which productive and formative processes are sustained. This component encompasses elements such as soil, water, energy, biodiversity, and climate, whose interaction defines both productive capacity and conditions for learning. From the perspective of socio-ecological systems, these elements do not operate in isolation, but as a network of interdependencies that conditions the possibilities for human action and the sustainability of agricultural systems (Ostrom, 2009; Folke et al., 2010). In this sense, the biophysical component constitutes the structure that underpins the idea of production, providing the ecological support on which trials, technical applications, and growth and productivity assessments are developed. Its analysis allows us to understand how agronomic decisions interact with the limits and potentialities of the environment, guiding productive practices that recognize the carrying capacity of the system and promote management processes consistent with the principles of agroecology (Altieri & Nicholls, 2017).

b. The second component, the cultural component, refers to human relationships, values, modes of communication, family, and education as processes through which communities construct meaning and produce knowledge in contexts. This component recognizes that learning is not a neutral or exclusively individual act, but rather a historically localized process, traversed by social and symbolic dimensions that influence the way in which subjects interpret the world and act upon it. From sociocultural and decolonial perspectives, culture is understood as a network of practices, memories, and knowledge that mediate the relationship between people and their environment and shape shared frameworks of meaning for collective action (Vygotsky, 1978; de Sousa Santos, 2010). In contrast, classical anthropological theory conceived of culture primarily as a relatively stable system of norms,

beliefs, and customs shared by a social group, capable of being described, classified, and compared. From this perspective, authors such as Tylor (1871) and Malinowski (1944) understood culture as a coherent set of practices and meanings that fulfilled specific functions in social organization, tending to privilege its structural and reproductive dimension. Learning and socialization were interpreted as processes of intergenerational transmission of preexisting cultural patterns, rather than as spaces of production.

c. The third component, ethics, articulates cognitive and emotional processes with awareness, responsibility, and judgment, recognizing that all educational and productive practices involve decisions with social and environmental consequences. This component expresses the need to educate individuals capable of acting with critical thinking, sensitivity, and commitment in the face of contemporary socio-environmental challenges, overcoming instrumental views of knowledge. From the ethics of care and critical education, ethical training is understood as a process that integrates reflection, experience, and action, aimed at building collective responsibility and informed decision-making in contexts of uncertainty (Noddings, 2013; Freire, 1970/2018).

On the other hand, the trunk represents the formative and practical mediation that articulates the biophysical, cultural, and ethical foundations (roots) with their social, productive, normative, and economic manifestations (branches). This level encompasses the pedagogical, organizational, and technical decisions that enable basic knowledge to be translated into concrete and contextualized actions, creating a space for praxis where reflection and action are integrated dialectically (Freire, 1970; Dewey, 1938). From a sociocultural perspective, the trunk functions as a mediation device, in which subjects articulate symbolic tools, experience, and context to produce collective knowledge (Vygotsky, 1978). In turn, understood as part of a complex system, this level enables the emergence of effects that cannot be explained in a linear fashion, but rather as the result of dynamic interactions between multiple dimensions (Morin, 2005). From this process emerge the branches, understood as the effects of the model, organized into key dimensions that guide decision-making and provide feedback to the system, in line with a transdisciplinary logic that integrates diverse knowledge without reducing its complexity (Nicolescu, 2002).

In this sense, the first branch corresponds to the social component, which refers to the relationships, forms of organization, dynamics of cooperation, and participatory processes that structure collective life in socio-ecological systems. This component highlights that production, learning, and land management are not individual acts, but rather social practices mediated by bonds of trust, shared agreements, and distributed responsibilities. From the perspective of socio-ecological systems, the social dimension is key to collective action and adaptive governance, insofar as it conditions the system's capacity to respond to change, resolve conflicts, and sustain long-term processes (Ostrom, 2009; Folke et al., 2010). In this sense, the social component of the model allows us to understand how interaction between different actors generates social capital, strengthens collaborative learning, and enables processes of knowledge co-production, which are fundamental elements for the sustainability and transformation of territorial systems.

The second corresponds to the normative component, which brings together the practices, agreements, rules, and guidelines that structure daily life on the farm and regulate interactions between different actors. This sphere is not limited to a formal regulatory framework, but rather expresses the system's capacity to produce norms, collectively constructed from shared experience and the need to coordinate actions in a dynamic and changing environment. From the perspective of common pool resource governance, these emerging norms strengthen collective action by generating legitimate and adaptive commitments based on trust and mutual recognition rather than external imposition (Ostrom, 1990; Cleaver, 2012). In this sense, the normative component of the model allows us to understand how regulation on the farm is configured as a living process, where rules are continuously adjusted based on collective learning and the socio-ecological conditions of the territory.

The third set corresponds to the economic component, in which the leaves symbolize the processes that link production with cost analysis, efficiency, rational use of resources, and the economic viability of the different modules of the farm. This component is not limited to reading financial indicators, but expresses the understanding that all productive practices are part of a network of decisions that generate simultaneous effects in the economic and environmental spheres. From the perspectives of ecological economics and agroecology, economic sustainability is understood as the ability to maintain productive processes without compromising the natural cycles or social

conditions that make them possible, integrating criteria of efficiency with socio-environmental responsibility (Martínez-Alier, 2002; Altieri & Nicholls, 2017).

In this sense, the economic component of the model allows us to analyze how productive decisions on the farm are oriented toward dynamic balances between profitability, environmental care, and long-term sustainability.

The productive component is manifested in the sheets that represent the tangible results of the work on the farm, such as crop cycles, animal management, input transformation, technical innovation, and the search for sustainable productivity. These visible expressions cannot be understood solely as material results, but rather as the materialization of the understanding and use of the biophysical component mediated by cultural and social dimensions, insofar as production decisions incorporate local knowledge, collective agreements, and lessons learned through practice. From learning and educational agroecology approaches, production is configured as a pedagogical space where each action—sowing, feeding, transforming, or evaluating—becomes a scenario for reflection, adjustment, and continuous feedback, articulating ecological knowledge, social experience, and technical action (Lave & Wenger, 1991; Francis et al., 2011).

In this sense, the productive component of the model allows us to understand how the interaction between the biophysical, cultural, and social spheres gives rise to productive practices that not only generate goods, but also contextualized knowledge and collective capacities oriented toward the sustainability of the system.

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The framework surrounding the tree delineates four epistemological and methodological axes that guide a comprehensive understanding of the model: the articulation between basic science and applied science, as an expression of the link between the production of theoretical knowledge and its implementation in real contexts; and the transition from interdisciplinarity to transdisciplinarity, understood as the shift from cooperation between disciplines to the integration of scientific, ethical, and cultural knowledge in collaborative learning processes. These axes reflect a conception of knowledge as a dynamic and relational process, in which complexity is not reduced, but rather assumed as a condition for understanding and acting in living systems (Jantsch, 1972; Nicolescu, 2010). In this sense, the SaberERES model is configured as a metaphor for living education, where science, ethics, and culture do not operate as separate domains, but as intertwined dimensions that enable the formation of conscious, critical, and co-responsible subjects, capable of acting in the face of sustainability challenges and contributing to the construction of forms of democratic coexistence in complex socio-ecological contexts.

4. DISCUSSION

The emergence of the SaberERES model allows us to rethink education for sustainability from a perspective that goes beyond conventional disciplinary frameworks and places learning in the dynamic interaction between knowledge, territory, and experience. In line with the paradigm of complexity, education can be understood as an open, dynamic, and recursive system in which the relationships between actors, practices, and contexts generate emerging learning processes (Morin, 1990, 2001). From this perspective, sustainability is not reduced to a set of curricular contents, but is configured as a lived experience that is constructed in the daily interaction between subjects and ecosystems.

In this sense, the Guachacay experimental farm operates as a socio-ecological learning system, where agricultural production, community life, and educational processes are articulated within the same formative dynamic. This configuration allows us to understand learning from the perspective of the biology of knowledge proposed by Maturana and Varela (1987), according to which knowledge emerges from autopoietic processes generated in the interaction between organisms and their environment. From this perspective, the actors involved in the farm—teachers, students, technicians, and researchers—are not passive recipients of information, but agents who co-construct meanings and practices within a living system of relationships.

The complexity of the system is also evident in the way the educational experience responds to unforeseen situations. Phenomena such as the appearance of pests, climate variability, or organizational conflicts act as catalysts for learning, forcing the reorganization of practices and decisions. In line with complex thinking, these processes show

that educational sustainability is not based on stability, but on the system's adaptive capacity to reorganize itself in the face of uncertainty (Morin, 1990). In this context, the farm is configured as a pedagogical space where knowledge is constructed from experience, reflection, and collective decision-making.

Another central element in the configuration of the SaberERES model is the dialogue of knowledge, understood as the interaction between scientific knowledge, local knowledge, and practical experience. This process is related to the Epistemologies of the South proposed by de Sousa Santos (2018), which raise the need to recognize epistemological plurality and the legitimacy of diverse forms of knowledge in understanding reality. In the context of the experimental farm, this interaction favors the construction of an ecology of knowledge, where technical, empirical, and cultural knowledge are articulated to interpret and manage agroecological systems.

This epistemological dialogue takes on particular relevance in contemporary rural contexts, characterized by a growing diversity of productive, social, and cultural activities. The literature on rurality emphasizes that rural areas can no longer be understood exclusively in terms of agricultural production, but rather as multifunctional spaces where economic, ecological, and sociocultural processes converge (Pérez, 2004; Rodríguez-Pose, 2001). Within this framework, the territorial approach to rural development has highlighted the importance of strengthening local capacities and promoting participatory processes that improve living conditions in these territories (Schejtman & Berdegué, 2004).

The incorporation of the farm as an educational space fits precisely into this territorial perspective, as it allows educational processes to be linked to the productive and socio-environmental realities of the surrounding area. Various studies have shown that farm schools and agroecological training experiences promote the development of practical skills, collaborative work, and environmental awareness among participants (Rodríguez, 2017; Téllez Quintana, 2018; Quintana Martínez et al., 2013). These experiences confirm the potential of productive spaces as educational settings capable of integrating scientific learning, agroecological practices, and community engagement.

From this perspective, the farm is configured as a situated pedagogical environment, where learning is constructed through direct interaction with the natural and social processes of the territory. Recent literature highlights that these types of educational experiences promote the development of skills associated with sustainability by fostering an understanding of the interdependencies between ecological systems and social dynamics (Quiroz-Martínez & Rushton, 2025; Jensvoll, Bergan & Killengreen, 2025). In this way, learning on the farm not only strengthens technical knowledge about agricultural production, but also contributes to the formation of an ecological citizenry aware of its relationship with the environment.

Sustainability thus emerges as a cross-cutting theme that links the different dimensions of the educational process. Rather than an end goal, it is a guiding principle that shapes the teaching and production practices developed on the farm. In this sense, environmental education plays a strategic role in promoting ethical values and scientific knowledge geared toward the responsible management of natural resources (Pasek de Pinto, 2004). Recent studies agree that education for sustainability must integrate social, economic, and ecological dimensions, promoting educational processes that drive changes in practices and ways of relating to the environment (Aggarwal & Agarwala, 2025; da Rocha Pinto et al., 2025).

Likewise, the incorporation of agroecological approaches reinforces the transdisciplinary nature of the SaberERES model. Agroecology has been recognized as a field that integrates ecological, agronomic, and social knowledge to understand the complexity of agricultural systems and promote sustainable practices (Altieri & Yurjevic, 1992; Guzmán-Casado et al., 2000). Within this framework, the experimental farm becomes a space where agroecological principles can be collectively experienced and reflected upon, allowing theory to be linked to practice in an educational context.

In epistemological terms, the results of this research suggest that the educational experience on the farm is structured around a noological matrix, understood as the network of knowledge, beliefs, and values that guide the interpretation of the world and educational practices. This matrix is constructed through the interaction between scientific knowledge, traditional knowledge, and everyday experiences, shaping a transdisciplinary and contextualized educational process. As López (2018) and Castillo and Mendoza (2020) point out, the integration of these dimensions promotes the development of critical awareness of the relationship between society, nature, and knowledge.

Taken together, these findings confirm that the experimental farm is a strategic educational space for

sustainability training, as it integrates ecological, social, and educational dimensions into a single learning system. The experience analyzed shows that education in rural contexts can contribute significantly to training individuals who are capable of understanding the complexity of socio-ecological systems and actively participating in the development of sustainable practices.

Finally, the SaberERES model provides a conceptual perspective that allows for the articulation of complexity, transdisciplinarity, and education for sustainability within a situated pedagogical framework. Rather than a closed methodological scheme, the model is configured as a relational and dynamic framework that guides educational processes in dialogue with ecosystems and communities. In this sense, its main contribution lies in showing how rural productive spaces can be transformed into socio-ecological learning laboratories, capable of generating relevant knowledge to address contemporary sustainability challenges.

5. CONCLUSIONS

The development of the SaberERES model allows us to understand education for sustainability from a socio-ecological perspective that integrates knowledge, experience, and territory into a single educational process. Rather than constituting a closed methodological framework, the model is configured as a relational and dynamic framework that emerges from the interaction between actors, practices, and ecosystems. In this sense, SaberERES does not represent the end of the research process, but rather the opening of new possibilities for interpreting and guiding educational practices aimed at sustainability.

One of the main contributions of the study is to highlight the potential of the experimental farm as a socio-ecological learning system, where productive, educational, and community processes are articulated in an integrated training dynamic. The experience developed at the Guachacay experimental farm shows that when actors recognize themselves as part of the ecosystem they inhabit, educational processes transcend the transmission of technical knowledge and become practices of care, co-responsibility, and critical reflection on the relationship between society and nature.

From this perspective, agricultural practices cease to be solely productive activities and become pedagogical and ethical mediations, capable of generating meaningful learning linked to sustainability. Daily interaction with the living systems of the territory favors experiential learning processes that strengthen understanding of the interdependencies between ecological, social, and cultural systems. In this way, sustainability is configured not as an objective external to the educational process, but as a way of inhabiting and understanding the world from a perspective of collective responsibility.

The SaberERES model also proposes that its potential for application in other educational contexts does not depend on the mechanical reproduction of its components, but on the transfer of guiding principles that can be reinterpreted according to the ecological, cultural, and institutional characteristics of each territory. This perspective recognizes that educational processes are deeply conditioned by the contexts in which they take place, so their pedagogical value lies in their capacity for critical and situated adaptation rather than in the standardization of models.

Likewise, the results of the study highlight the importance of strengthening educational strategies that connect new generations with agroecological systems and the territorial dynamics of the rural world. In a context marked by social, economic, and environmental transformations, training in productive and community spaces takes on strategic relevance for promoting critical skills, sustainable practices, and new ways of relating to the environment.

Finally, the research suggests that experimental farms and farm schools can be consolidated as relevant pedagogical settings for the development of transdisciplinary educational proposals aimed at sustainability. However, there is also a clear need to expand research on their educational and territorial impact in order to further explore their potential as devices for pedagogical innovation in rural contexts. In this sense, the SaberERES model provides a conceptual framework that contributes to rethinking education from the perspective of the complexity of socio-ecological systems and the collective construction of knowledge aimed at the sustainable transformation of territories.

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