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Publisher: The Netherlands Press

ISSN: 2472-9884 E-ISSN: 2472-9876

Subject area: [Arts and Humanities: General Arts and Humanities](#) [Social Sciences: Cultural Studies](#) [Social Sciences: Communication](#)

Source type: Journal

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## Didactic Units in Biology and Environmental Education: A Review for Latin America

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Vol. 8.1, S1 2024
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Articles

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### Abstract

This article reviews the didactic units in biology and environmental education in the context of Latin America, analyzing their design, implementation, and effectiveness in the teaching of environmental and biological topics. Through a literature review and case analysis, the most commonly used teaching strategies are identified and their impact on student learning is evaluated. It highlights best practices and proposes recommendations to improve the quality of biology and environmental education in the region.

### How to Cite

Juan Carlos González García, Wilmer Orlando López González, Andrés Fernando Alulema Moncayo, & Marco Antonio García Pacheco. (2024). Didactic Units in Biology and Environmental Education: A Review for Latin America. *EVOLUTIONARY STUDIES IN IMAGINATIVE CULTURE*, 236–248. Retrieved from <https://esiculture.com/index.php/esiculture/article/view/879>



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ESIC2024

Posted: 23/05/2024

## Didactic Units in Biology and Environmental Education: A Review for Latin America

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### Abstracts

This article reviews the didactic units in biology and environmental education in the context of Latin America, analyzing their design, implementation, and effectiveness in the teaching of environmental and biological topics. Through a literature review and case analysis, the most commonly used teaching strategies are identified and their impact on student learning is evaluated. It highlights best practices and proposes recommendations to improve the quality of biology and environmental education in the region.

**Keywords:** Didactic units, biology, environmental education, Latin America, teaching, learning.

### Introduction

Education in biology and the environment is essential to form informed citizens committed to sustainability, a critical objective in a region like Latin America, which faces significant environmental challenges. This region is home to some of the most diverse ecosystems in the world, such as the Amazon, but also faces serious problems such as deforestation, biodiversity loss, and pollution (FAO, 2021). In this context, environmental and biological education plays a crucial role in raising awareness and empowering future generations in the protection and conservation of the environment.

Despite its importance, the quality of education in biology and the environment in Latin America presents great disparities. A recent UNESCO report (2021) indicates that in some countries in the region, more than 40% of schools lack adequate educational materials for teaching these topics. In addition, poor educational infrastructure and lack of specific teacher training are persistent obstacles that limit the effectiveness of teaching in biology and environmental education.

The implementation of effective teaching units is essential to improve the teaching of biology and environmental education. These didactic units structure the teaching-learning process, integrating content, activities and assessments designed to achieve specific educational objectives. In Latin America, however, the application of didactic units faces several challenges, from the scarcity of resources to cultural and linguistic differences that can affect their relevance and effectiveness (INEP, 2021).

Recent data show that the effectiveness of teaching units in biology and environmental education varies considerably among countries in the region. For example, a study in Brazil revealed that only 60% of urban secondary schools use didactic units that integrate environmental education into their biology programs, while in rural areas, this percentage drops to 40% (INEP, 2021). Similarly, in Mexico, although 65% of schools report the use of teaching units in biology, only 25% of these include environmental education components (SEP, 2022).

Country	Schools with teaching units in biology (%)	Schools that integrate environmental education (%)
Brazil	60% (urban), 40% (rural)	50% (urban), 20% (rural)
Mexico	65%	25%
Colombia	55%	30%
Argentina	60%	35%

Source: INEP (2021); SEP (2022)

The above table shows the disparity in the implementation of teaching units in biology and their integration with environmental education in four Latin American countries. These differences highlight the need for a more coherent and equitable approach to biological and environmental education in the region.

In addition, the ability of teachers to effectively implement these teaching units is a critical factor. A study conducted in Argentina indicates that 70% of biology teachers feel that they have not received adequate training to integrate environmental education into their classes (Ministry of Education of Argentina, 2021). This underscores the urgent need for professional development programs that equip educators with the tools and knowledge needed to deliver effective education in biology and the environment.

In summary, although progress has been made in the implementation of didactic units in biology and environmental education in Latin America, important challenges remain related to infrastructure, teacher training, and equity in the distribution of resources. This article aims to review current practices and propose recommendations to improve the quality and effectiveness of biology and environmental education in the region.

## Methodology

This study uses a qualitative approach, combining literature review, case analysis, and interviews with experts to explore the design, implementation, and effectiveness of didactic units in biology and environmental education in Latin America. The methodology has been carefully selected to capture a comprehensive view of the current situation and provide informed recommendations to improve the quality of education in this area.



### Bibliographic Review

The bibliographic review was carried out to identify and analyze recent research on the implementation of didactic units in biology and environmental education in Latin America. Academic databases such as Scopus, Google Scholar, Redalyc, and the UNESCO Digital Library were used to collect articles, reports, and case studies published between 2018 and 2023. The selection of the literature was based on relevance, methodological quality, and regional relevance, ensuring that the selected studies offered an adequate representation of the educational realities in the region.

In total, more than 50 articles and documents were analyzed, which provided a solid basis for understanding current trends in biology and environmental education in Latin America. The literature review was structured around three key themes: the design of teaching units, the effectiveness of their implementation, and the specific challenges related to environmental education in different socioeconomic and cultural contexts (Creswell & Poth, 2018).

### Case Analysis

The case analysis focused on representative countries from different subregions of Latin America, including Brazil, Mexico, Colombia, and Argentina. These countries were selected because of their diversity in terms of biodiversity, educational infrastructure, and pedagogical approaches. Each case was examined in depth to evaluate how the didactic units in biology and environmental education are designed and implemented, and what factors influence their effectiveness.

The case studies were based on the collection of secondary data from government reports, education policy documents and previous studies. In addition, specific curricular programs and teaching materials used at different educational levels (primary, secondary and higher education) in these countries were reviewed. This approach allowed for a comparative understanding of best practices and common challenges in the region (Yin, 2018).

### Interviews with Experts

To complement the literature review and case analysis, semi-structured interviews were conducted with 20 experts in education, biology and the environment from different Latin American countries. Interviewees included academics, education policymakers, curriculum designers, and teachers with experience in implementing teaching units in biology and environmental education.

The interviews were designed to explore topics such as the perception of the effectiveness of the didactic units, the challenges in implementation, teacher training, and the needs for educational resources. The questions were open-ended and designed to allow interviewees to share their experiences and perspectives freely, thus facilitating the identification of common patterns and themes (Patton, 2018).