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Articles

Body dynamics as an educational strategy to enhance environmental socioemotional skills

Dinámicas corporales como estrategia educativa para potenciar habilidades socioemocionales ambientales

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Abstract

The contemporary environmental crisis calls for rethinking higher education in order to incorporate environmental socio-emotional skills. Embodied learning integrates emotional education, sustainability, and bodily experience to foster responsible environmental attitudes and behaviors. The objective of this study was to evaluate the effect of a bodily dynamics program—based on conscious movement, motor cooperation, and experiential reflection—on the development of environmental socio-emotional competencies, including emotional self-regulation, ecological empathy, environmental awareness, and disposition toward pro-environmental behaviors. A quantitative quasi-experimental pretest–posttest design was applied with 48 university students from Quito. The intervention group participated in an eight-session bodily dynamics program, using validated instruments to assess socio-emotional competencies, emotion regulation, and connectedness to nature. Statistically significant improvements were observed in socio-emotional competencies, adaptive emotion regulation strategies, and connectedness to nature in the intervention group, with moderate effect sizes, while the comparison group showed no relevant changes. The study supports bodily dynamics as a relevant educational strategy in higher education, strengthening environmental education through an integrated emotional, embodied, and experiential learning perspective.

Keywords: Bodily dynamics, socio-emotional skills, environmental education, higher education.

Resumen

La crisis ambiental contemporánea exige replantear la educación superior para incorporar habilidades socioemocionales ambientales. El aprendizaje corporeizado integra educación emocional, sostenibilidad y experiencia corporal para favorecer actitudes y conductas ambientales responsables. El objetivo de este estudio fue evaluar el efecto de un programa de dinámicas corporales, basado en movimiento consciente, cooperación motriz y reflexión experiencial, sobre el desarrollo de competencias socioemocionales ambientales, incluyendo la autorregulación emocional, la empatía ecológica, la conciencia ambiental y la disposición hacia conductas proambientales. Se aplicó un diseño cuasiexperimental cuantitativo pretest–posttest con 48 estudiantes universitarios de Quito. El grupo de intervención participó en un programa de dinámicas corporales de ocho sesiones, utilizando instrumentos validados para evaluar competencias socioemocionales, regulación emocional y conexión con la naturaleza. Se evidenciaron mejoras estadísticamente significativas en las competencias socioemocionales, en el uso de estrategias adaptativas de regulación emocional y en la conexión con la naturaleza en el grupo de intervención, con tamaños de efecto moderados, mientras que el grupo de comparación no presentó cambios relevantes. El estudio respalda las dinámicas corporales como una estrategia educativa pertinente en la educación superior, al fortalecer la educación ambiental desde una perspectiva integral que articula aprendizaje emocional, corporal y experiencial.

Palabras clave: Dinámicas corporales, habilidades socioemocionales, educación ambiental, educación superior.

Introduction

The environmental crisis has highlighted the need to rethink traditional educational models, particularly in higher education, where the training of professionals with social and environmental responsibility has become an ethical and pedagogical imperative. The challenges associated with climate change, biodiversity loss, and ecosystem degradation require not only technical and scientific knowledge but also the development of environmental socio-emotional skills that enable students to understand, feel, and act responsibly in response to these issues. Environmental education has thus evolved toward comprehensive approaches that incorporate emotional, social, and value-based dimensions as essential components for transforming pro-environmental behaviors and attitudes (González-Salamanca et al., 2020; UNESCO, 2020).

Environmental socio-emotional skills can be defined as a set of emotional, social, and ethical capacities that facilitate a conscious, empathic, and responsible relationship with the natural and social environment. These skills include emotional self-regulation in the face of environmental uncertainty, ecological empathy, awareness of interdependence, and the willingness to engage in collective actions oriented toward sustainability. Numerous studies have shown that such skills are associated with higher levels of environmental commitment, responsible decision-making, and psychological well-being, particularly among young and university populations, reinforcing the need to address them explicitly within educational processes (Mayer & Frantz, 2004).

From the field of Social and Emotional Learning (SEL), the literature has consistently demonstrated that the systematic development of emotional and social competencies produces positive effects on social coexistence, well-being, and academic performance. Seminal meta-analyses have shown that SEL programs significantly contribute to strengthening social skills, prosocial attitudes, and responsible behaviors, supporting their integration across educational levels. However, much of this evidence has focused on primary and secondary education, leaving a gap in higher education, particularly regarding its articulation with environmental education and sustainability (Durlak et al., 2011; Taylor et al., 2017).

Emotional education has emphasized the importance of deliberate and experiential practice for the development of deep and lasting socio-emotional competencies. As noted by Lapuente (2020) “programs of deliberate practice in emotional education allow for the improvement of the capacity to think, reason, speak, and listen, and develop a set of socio-emotional knowledge competencies that foster significant personal maturation and greater emotional balance” (p. 168). This perspective is particularly relevant for university environmental education, as emotional balance and reflective capacity constitute necessary conditions for addressing the complexity and uncertainty inherent in contemporary socio-environmental problems (Xiao et al., 2025).

Within the framework of Education for Sustainable Development (ESD), international organizations have emphasized that sustainability requires not only cognitive competencies but also socio-emotional skills that enable individuals to confront complexity, uncertainty, and ethical dilemmas associated with environmental problems. Highlights that competencies such as empathy, self-reflection, and emotional regulation are fundamental to fostering active and engaged environmental citizenship. Consequently, universities are called upon to design pedagogical strategies that integrate these dimensions in a transversal, experiential, and contextualized manner (Guerra-Macías & Tobón, 2025).

In parallel, the embodied learning approach has gained relevance in contemporary educational research by proposing that the body plays a central role in the construction of knowledge, emotions, and social relationships. From this perspective, cognition is not limited to abstract mental processes but emerges from the dynamic interaction between body, emotion, and environment. Recent studies have shown that methodologies based on movement and bodily experience generate positive effects on learning, motivation, and psychological well-being, making them a relevant pedagogical alternative for the development of environmental socio-emotional skills (Liu et al., 2025)

Bodily dynamics, understood as structured educational activities that integrate conscious movement, motor cooperation, and bodily expression, align with a conception of the human being as a complex, systemic, and self-regulated organism. The body not only performs actions but also actively participates in meaning-making and purposeful emotional experience. As Lapuente (2020) states, “we must move toward the updating of the person as a complex, systemic, and reflective organism in a continuous process of balance and self-regulation [...]; we are experience, and we need to give meaning to what happens to us” (p. 182). This conception reinforces the pedagogical value of bodily dynamics as mediators of socio-emotional and environmental learning (Koch et al., 2019)

In the university context, interventions based on bodily awareness, educational dance, and cooperative physical activities have shown significant improvements in emotional well-being, stress reduction, and the strengthening of self-awareness. These findings suggest that the body can function as an effective pedagogical mediator for the internalization of environmental values and attitudes when linked to intentional and reflective processes. The embodied experience of emotion, combined with its conscious regulation, fosters a meaningful connection between personal experience and collective responsibility toward the environment (Rodríguez-Jiménez et al., 2022).

Environmental psychology has provided solid evidence regarding the importance of emotional connection to nature as a predictor of pro-environmental behaviors. Instruments such as the Connectedness to Nature Scale have demonstrated that individuals who experience a stronger affective connection with the natural environment tend to exhibit higher levels of environmental concern and a greater willingness to act in favor of sustainability. Bodily experiences that promote sensory perception, mindfulness, and direct interaction with the environment can strengthen this

connection, acting as a bridge between socio-emotional learning and responsible environmental action (Tam, 2013).

In urban Latin American contexts, such as the city of Quito, university students face complex socio-environmental challenges, including urban expansion, pollution, and natural resource management. These realities demand educational approaches that not only inform but also transform the ways in which students relate emotionally and ethically to their environment. However, empirical evidence on pedagogical strategies that integrate bodily dynamics and environmental socio-emotional skills in higher education within the region remains limited, justifying the need for research that explores innovative and context-sensitive approaches (UNESCO, 2020).

The objective of this study was to evaluate the effect of a bodily dynamics program—based on conscious movement, motor cooperation, and experiential reflection—on the development of environmental socio-emotional competencies, including emotional self-regulation, ecological empathy, environmental awareness, and disposition toward pro-environmental behaviors.

Methodology

The study was conducted using a quantitative approach and a quasi-experimental pretest–posttest design with a comparison group. This design was selected because it allowed the assessment of changes in the study variables associated with an educational intervention implemented in a university context, without altering the regular academic organization.

The sample consisted of 48 university students from the city of Quito, selected through convenience sampling. Of the total participants, 24 students comprised the intervention group and 24 the comparison group. Students aged 18 years or older with active enrollment in undergraduate programs and availability to participate in all phases of the study were included. Students with health conditions that limited participation in light to moderate bodily activities were excluded, as were those simultaneously enrolled in other training programs focused on socio-emotional or environmental development. Participation was voluntary, and all students provided informed consent prior to the beginning of the data collection process.

The intervention consisted of a bodily dynamics program designed for this study, aimed at developing environmental socio-emotional skills through guided bodily experiences. The program was grounded in principles of embodied learning, emotional education, and education for sustainable development, and focused on the use of conscious movement, cooperative motor interaction, and experiential reflection as pedagogical strategies. The bodily dynamics included body awareness exercises, cooperative movement activities, and expressive proposals symbolically linked to situations related to the environment and emotional experience, with the purpose of fostering bodily experience and personal and group reflection.

The program was implemented over eight consecutive sessions, each lasting approximately 60 minutes. The sessions were conducted during a regular academic period, outside formal assessment spaces, as complementary formative activities. This modality allowed the participation of students from different fields of study, without requiring the identification of a specific degree program or institution, and without interfering with their regular academic activities.

Each session was organized into three phases. In the first phase, bodily activation activities were conducted, focusing on body awareness, breathing, and conscious movement. In the second phase, cooperative and expressive bodily dynamics were developed, centered on motor interaction and shared experience. A brief experiential reflection phase was included, in which participants recorded or discussed the experience and its relationship to emotions, attitudes, and situations connected to the environment and everyday life. The overall structure of the sessions remained consistent, with progressive variations in the types of dynamics applied.

Validated instruments were used for data collection. Socio-emotional competencies were assessed using the Social and Emotional Competencies Questionnaire (SEC-Q), an instrument designed to measure dimensions such as self-awareness, self-regulation, social awareness, and responsible decision-making in educational contexts (Zych et al., 2018). Emotional regulation was assessed using the Emotion Regulation Questionnaire (ERQ), which measures the use of cognitive reappraisal and expressive suppression strategies in emotionally demanding situations (Gross & John, 2003). The environmental socio-emotional dimension was assessed through the Connectedness to Nature Scale (CNS), which measures individuals' emotional and affective connection to the natural environment and has been used as an indicator of pro-environmental dispositions (Mayer & Frantz, 2004).

In the first stage, prior to the implementation of the program, participants in both groups completed the instruments corresponding to the pretest in order to obtain baseline measurements of the study variables. Subsequently, the bodily dynamics program was applied exclusively to the intervention group over the eight-week period, while the comparison group continued with their regular academic activities. At the end of the intervention period, the same instruments were re-administered to both groups to obtain posttest measurements.

Data analysis was conducted using statistical software. Descriptive statistics were calculated to characterize the variables, and comparisons were performed between pretest and posttest measurements, as well as between groups, taking initial values into account.

Results

The results are presented according to the study variables and the comparison between pretest and posttest measurements for the intervention and comparison groups. Descriptive and inferential statistics were used to examine changes associated with the bodily dynamics program.

Table 1 presents the descriptive statistics for environmental socio-emotional competencies measured through the Social and Emotional Competencies Questionnaire (SEC-Q) at pretest and posttest for both groups.

Table 1

Descriptive statistics for socio-emotional competencies

Group	Measurement	Mean	SD
Intervention (n = 24)	Pretest	3.21	0.42
Intervention (n = 24)	Posttest	3.68	0.39
Comparison (n = 24)	Pretest	3.19	0.44
Comparison (n = 24)	Posttest	3.23	0.41

As shown in Table 1, the intervention group exhibited an increase in mean scores between pretest and posttest, whereas the comparison group showed minimal variation across measurements.

To examine changes in emotion regulation strategies, Table 2 presents descriptive statistics for the Emotion Regulation Questionnaire (ERQ), including cognitive reappraisal and expressive suppression.

Table 2

Descriptive statistics for emotion regulation strategies

Dimension	Group	Measurement	Mean	SD
Cognitive reappraisal	Intervention	Pretest	3.45	0.51
Cognitive reappraisal	Intervention	Posttest	3.92	0.48
Cognitive reappraisal	Comparison	Pretest	3.47	0.49
Cognitive reappraisal	Comparison	Posttest	3.50	0.46
Expressive suppression	Intervention	Pretest	3.12	0.57
Expressive suppression	Intervention	Posttest	2.78	0.55
Expressive suppression	Comparison	Pretest	3.09	0.54
Expressive suppression	Comparison	Posttest	3.05	0.52

The descriptive results indicate changes across measurement points in the intervention group for both emotion regulation dimensions, while the comparison group remained relatively stable.

Table 3 presents the descriptive statistics for the Connectedness to Nature Scale (CNS), reflecting the environmental socio-emotional dimension.

Table 3

Descriptive statistics for connectedness to nature (CNS)

Group	Measurement	Mean	SD
Intervention (n = 24)	Pretest	3.34	0.46
Intervention (n = 24)	Posttest	3.81	0.43
Comparison (n = 24)	Pretest	3.36	0.44
Comparison (n = 24)	Posttest	3.39	0.45

To analyze within-group differences, paired-sample t-tests were conducted. Table 4 summarizes the results for the intervention group.

Table 4
Paired-sample t-test results for the intervention group

Variable	t	df	p
Socio-emotional competencies (SEC-Q)	4.87	23	< .001
Cognitive reappraisal (ERQ)	3.94	23	.001
Expressive suppression (ERQ)	-3.21	23	.004
Connectedness to nature (CNS)	4.52	23	< .001

For the comparison group, paired-sample t-tests did not indicate statistically significant differences between pretest and posttest measurements ($p > .05$ for all variables).

To examine differences between groups while controlling for baseline scores, an analysis of covariance (ANCOVA) was conducted for each dependent variable. Table 5 presents the ANCOVA results.

Table 5
ANCOVA results controlling for pretest scores

Variable	F	df	p	Partial η^2
Socio-emotional competencies (SEC-Q)	11.36	1, 45	.001	.20
Cognitive reappraisal (ERQ)	8.92	1, 45	.004	.17
Expressive suppression (ERQ)	6.74	1, 45	.013	.13
Connectedness to nature (CNS)	10.58	1, 45	.002	.19

The results indicate statistically significant differences between groups at posttest when controlling for baseline scores, with moderate effect sizes observed across variables.

Discussion

The findings of this study indicate that a bodily dynamics program can contribute to the development of environmental socio-emotional competencies in higher education students. The observed changes across socio-emotional skills, emotion regulation strategies, and connectedness to nature suggest that pedagogical approaches grounded in bodily experience may facilitate forms of learning that integrate emotional, relational, and environmental dimensions, which are often insufficiently addressed in conventional university instruction (Immordino-Yang, 2016).

The increase in socio-emotional competencies identified in the intervention group is consistent with educational research emphasizing the role of embodied and experiential learning in promoting self-awareness, social sensitivity, and responsible decision-making. Recent studies have highlighted that learning environments which actively involve the body can enhance emotional engagement and support deeper internalization of values and attitudes, particularly in complex domains such as sustainability education (Burch et al., 2019). From this perspective,

bodily dynamics appear to function as a mediating mechanism that links emotional experience with reflective processes relevant to environmental responsibility.

With regard to emotion regulation, the observed pattern characterized by increased use of adaptive strategies and reduced reliance on maladaptive ones aligns with contemporary models that conceptualize emotional regulation as a situated and context-dependent process. Research in educational psychology has shown that embodied and movement-based interventions can support emotional awareness and flexibility by fostering attentional control and experiential reflection (Shusterman, 2012). In environmental contexts, such capacities are particularly relevant, as they may enable students to engage with uncertainty, ambiguity, and ethical tensions without resorting to avoidance or emotional disengagement.

The significant increase in connectedness to nature observed in the intervention group reinforces recent evidence suggesting that affective and sensory engagement plays a central role in shaping human–nature relationships. Scholars have argued that environmental learning experiences that incorporate bodily presence, sensory perception, and symbolic interaction can strengthen emotional bonds with the natural world, thereby supporting pro-environmental orientations (Kals et al., 1999). In this sense, bodily dynamics may contribute to moving environmental education beyond abstract knowledge transmission toward more relational and experiential forms of engagement.

The moderate effect sizes observed across the analyzed variables further suggest that the educational relevance of the intervention extends beyond statistical significance. Educational research increasingly emphasizes the importance of considering practical and contextual significance when evaluating pedagogical innovations, particularly in higher education settings characterized by curricular rigidity and limited space for experiential learning (Gleason Rodríguez & Rubio, 2020). The present findings indicate that relatively short, structured interventions grounded in bodily dynamics can yield meaningful changes in socio-emotional and environmental dimensions.

In urban Latin American contexts, where students are frequently exposed to socio-environmental stressors such as pollution, urban expansion, and social inequality, the integration of bodily and socio-emotional approaches may offer a culturally and contextually responsive educational strategy. Recent regional studies have highlighted the need for pedagogical models that address not only cognitive competencies but also emotional resilience and ethical engagement in sustainability-related education (Bielski, 2010). The present study contributes to this emerging body of evidence by providing empirical support for an embodied approach adapted to higher education contexts in the region.

Despite these contributions, several limitations must be acknowledged. The use of a convenience sample and the relatively short duration of the intervention restrict the generalizability of the findings and preclude conclusions regarding long-term effects. Future research should

consider longitudinal designs, larger and more diverse samples, and the incorporation of qualitative methods to explore students' subjective experiences and meaning-making processes associated with bodily dynamics and environmental learning.

Overall, the findings support the integration of bodily dynamics as a pedagogical strategy in higher education aimed at fostering environmental socio-emotional competencies. By situating learning within embodied experience, this approach aligns with emerging educational paradigms that emphasize holistic, relational, and transformative learning processes capable of responding to the complexity of contemporary environmental challenges.

Conclusions

The study contributes to the understanding of how bodily-based educational strategies can be meaningfully integrated into higher education to address environmental challenges from a socio-emotional perspective. By situating learning within guided bodily experience, the research advances an approach that expands environmental education beyond cognitive instruction, highlighting the relevance of emotional awareness, embodied reflection, and relational engagement as integral components of university-level sustainability training.

This research also provides methodological evidence that structured bodily dynamics can be implemented in diverse university contexts without dependence on specific disciplinary fields or institutional frameworks. The design and application of the program demonstrate the feasibility of incorporating experiential, body-centered interventions as complementary educational practices within regular academic periods, offering a transferable model for future educational initiatives aimed at strengthening environmental responsibility.

The study opens new avenues for interdisciplinary inquiry by bridging embodied learning, emotional education, and environmental pedagogy. It lays a foundation for further research exploring long-term impacts, contextual adaptations, and mixed-methods approaches, thereby supporting the continued development of holistic educational models capable of responding to the complexity of contemporary socio-environmental issues.

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Author Contributions

The authors contributed to the development of the manuscript.