ENVIRONMENTAL EDUCATION IN THE UNIVERSITY: PSYCHOLOGICAL IMPACT OF SUSTAINABLE CURRICULAR PRACTICES ON STUDENT ENGAGEMENT

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Summary

The integration of sustainability in higher education has established itself as a key strategy to promote pro-environmental behaviors and competencies for sustainable development among university students. Recent studies highlight that education for sustainable development (ESD) and green campus initiatives can increase environmental attitudes, self-efficacy, and student engagement. This study analyzes the psychological impact of sustainable curricular practices on student engagement in a Latin American public university. A quantitative, non-experimental and cross-sectional design was used, with a sample of 412 undergraduate students from different faculties. A questionnaire was applied that included scales of perception of sustainable curricular practices, environmental attitudes, environmental self-efficacy and student engagement. Data were analyzed using descriptive statistics, Pearson correlations, and structural equation models. The results show that the perception of sustainable curricular practices is positively associated with favorable environmental attitudes, greater self-efficacy and higher levels of student engagement (vigor, dedication and absorption). Likewise, environmental attitudes and self-efficacy partially mediate the relationship between sustainable curricular practices and student engagement, suggesting a psychological mechanism in which the sustainable training experience strengthens the personal resources that sustain academic involvement. These findings support the need to integrate sustainability as a transversal axis of the curriculum, using active methodologies and projects oriented to the Sustainable Development Goals to enhance student engagement and well-being.

Keywords: environmental education; higher education; student engagement; curricular sustainability; environmental self-efficacy; pro-environmental behavior.

INTRODUCTION

In the global context marked by the climate crisis, the loss of biodiversity and the acceleration of socio-environmental changes, higher education is recognized as a strategic space for the formation of competencies that allow new generations to face these challenges in an ethical, critical and transformative way. UNESCO (2023) emphasizes that Education for Sustainable Development (ESD) must become a structural pillar of university institutions, integrating not only the transmission of knowledge, but also the development of socio-emotional and behavioral capacities oriented towards sustainability (UNESCO, 2023). In this direction, the incorporation of sustainable curricular practices represents a key mechanism to foster systemic thinking, socially responsible action, and ecological sensitivity among students (Acevedo-Duque et al., 2023).

During the last five years, the scientific literature has shown a significant increase in studies that analyze the relationship between university sustainability and pro-environmental behaviors. Leal Filho et al. (2023) point out that universities that integrate the Sustainable Development Goals (SDGs) into their curricula achieve greater alignment between academic training and transformative action, generating a positive impact on motivation, environmental awareness, and student engagement. However, it is not enough to include theoretical content: research agrees that experiential learning and active methodologies – such as applied projects, service-learning and case studies based on real problems – are the strategies that most influence the change in attitudes and the willingness to act (Homer et al., 2025; Núñez et al., 2024).

In this sense, the psychological dimension of the educational process acquires a central role. Student engagement has become a key indicator of academic quality and university well-being, defined as a positive state characterized

by vigor, dedication, and absorption in academic activities. Recent research shows that engagement increases when students perceive their learning as having purpose, social relevance, and connection to contemporary challenges, such as environmental sustainability (Pedro et al., 2023). At the psychological level, variables such as environmental self-efficacy and ecological attitudes emerge as mediating factors between sustainable curriculum practices and active participation in academic activities with an environmental focus (Zhang & Cao, 2025).

Likewise, recent studies have shown that university environments that coherently integrate sustainable institutional practices—such as green campuses, environmental management policies, pro-environmental organizational culture, and institutional communication on the SDGs—generate a positive effect on university identity, student satisfaction, and the perception of the usefulness of learning (Al-Dmour et al., 2023). These institutional components contribute to creating learning climates that reinforce the internalization of environmental values and, therefore, academic and emotional commitment to sustainability practices. From this perspective, the articulation between curriculum, institutional policies and university culture is a necessary condition for sustainability to have a deep and lasting psychological impact on students.

However, in Latin America, there is still a need for comprehensive research that links psychological, pedagogical, and structural dimensions of university sustainability. Although there are isolated advances on environmental attitudes, sustainability competencies, or program evaluation, there are still few explanatory models that integrate the effects of sustainable curricular practices on student engagement, considering the mediating role of psychological resources such as self-efficacy and pro-environmental attitudes (Torres et al., 2023). Consequently, it is necessary to broaden the empirical base that allows us to understand the specific mechanisms through which university environmental education impacts academic involvement, motivation and the active disposition of students towards sustainability.

In this framework, this study aims to analyze the psychological impact of sustainable curricular practices on student engagement in a Latin American public university. Under an explanatory approach, it is proposed that sustainable academic experiences strengthen environmental attitudes and perceptions of self-efficacy, which in turn increase the level of student engagement. This analysis contributes to the recent literature by offering updated evidence on the psychological processes that mediate the relationship between curricular sustainability and academic engagement, a field of study of increasing relevance in higher education.

THEORETICAL FRAMEWORK

1. Environmental Education and Education for Sustainable Development (ESD) at the University

During the last decade, and especially in the last five years, higher education has assumed the commitment to integrate sustainability as a structural axis of the curriculum. UNESCO (2023) points out that ESD must promote not only environmental knowledge, but also socio-emotional skills, systemic thinking, ethical responsibility, and capacity for transformative action. This implies a broader conception than traditional environmental education, as it seeks to articulate cognitive, affective, and behavioral dimensions of learning (Acevedo-Duque et al., 2023).

Recent research highlights that incorporating sustainability into curricula increases students' intrinsic motivation, promotes meaningful learning, and strengthens competencies to solve complex problems (Homer et al., 2025; Núñez et al., 2024). This curricular transformation demands active methodologies—such as project-based learning, service-learning, case studies, and interdisciplinary work—that connect students with real scenarios associated with the Sustainable Development Goals (SDGs) (Leal Filho et al., 2023).

Table 1 summarizes the main differences between traditional environmental education and contemporary ESD.

Table 1. Conceptual differences between Environmental Education (EE) and Education for Sustainable Development (ESD)

Dimension	Environmental Education (EA)	Education for Sustainable Development (ESD)
Approach	Predominantly eco-friendly	Comprehensive: environmental, social and economic
Main objective	Creating ecological awareness	Transforming values, attitudes and actions
Methodologies	Content Streaming	Active methodologies and experiential learning
Student Role	Information Receiver	Agent of socio-environmental change
Alignment with SDGs	Innuendo	Direct and transversal to the curriculum

Source: Adapted from UNESCO (2023); Acevedo-Duque et al. (2023); Núñez et al. (2024).

2. Competencies for sustainability and their development in the curriculum

Competencies for sustainability have been defined as a set of cognitive, socio-emotional, and behavioral capacities that allow complex problems to be analyzed, act responsibly, and collaborate in transformation processes (UNESCO, 2023). Key competencies include systems thinking, anticipation, collaboration, self-awareness, and strategic action.

Recent studies indicate that the development of these competencies depends on the depth with which academic programs integrate sustainability content and practical experiences. Núñez, Siddiqui, and Abbas (2024) demonstrated that student motivation, attitude, and commitment increase significantly when the curriculum

incorporates projects linked to real problems in the environment. For their part, Mendes et al. (2025) found that environmental knowledge has a direct effect on ecological attitudes, which in turn influences pro-environmental behaviors in higher education students.

Table 2 presents the sustainability competencies most frequently addressed in recent research.

Table 2. Sustainability competencies most mentioned in the current literature

Competence	Description	Recent Authors
Systems thinking	Ability to understand interconnections between social-environmental systems	UNESCO (2023); Leal-Filho et al. (2023)
Anticipation	Projection of future scenarios and environmental consequences	Núñez et al. (2024)
Ethical responsibility	Ability to make decisions based on sustainability values	Acevedo-Duque et al. (2023)
Collaboration	Participation in interdisciplinary teams	Pedro et al. (2023)
Action Competence	Developing practical solutions to environmental problems	Homer et al. (2025)

3. Sustainable curricular practices and their influence on the university experience

Sustainable curricular practices refer to the systematic incorporation of content, methodologies and evaluations aimed at sustainability. Include:

- Integration of the SDGs into subjects.
- Project-based learning with real impact.
- Activities linked to the sustainable campus.
- I work with local communities on environmental issues.

According to Leal Filho et al. (2023), the coherence between curriculum, institutional management, and university culture reinforces the perception of authenticity and commitment of the institution, which enhances student involvement. Pedro et al. (2023) showed that students on sustainable campuses report greater institutional satisfaction, a greater sense of belonging, and greater empowerment to act on environmental issues.

Likewise, Al-Dmour et al. (2023) show that sustainable campus initiatives, when articulated with classroom experiences, strengthen the institutional image and student participation in pro-environmental activities. This confirms the central role of institutional coherence as a mechanism that enhances the psychological effects of the sustainable curriculum.

4. Student engagement as a psychological outcome of educational sustainability

Student engagement is an affective-motivational state characterized by vigor, dedication, and absorption. This construct has been shown to increase when students perceive their learning to have meaning, social purpose, and connection to contemporary issues (Pedro et al., 2023).

From environmental and educational psychology, student engagement is strengthened when:

1. Positive attitudes towards sustainability are promoted.
2. Self-efficacy to act in the face of environmental problems is increased.
3. The institutional environment communicates coherent ecological values.

Zhang and Cao (2025) confirmed that self-efficacy and environmental attitudes mediate the relationship between participation in ESD activities and pro-environmental behaviors. This suggests that psychological resources are essential for understanding how sustainable curricular practices influence student engagement.

Table 3 summarizes the main psychological mediators identified in recent research.

Table 3. Psychological mediators between curricular sustainability and student engagement

Mediator	Description	Recent Evidence
Environmental attitudes	Favourable assessment of environmental protection	Torres et al. (2023); Mendes et al. (2025)
Environmental self-efficacy	Belief in one's own ability to act in favor of the environment	Zhang & Cao (2025)
Ecological identity	Emotional connection with nature and sustainability	Torres et al. (2023)
Perception of institutional coherence	Belief that the university promotes sustainable values	Al-Dmour et al. (2023); Pedro et al. (2023)

5. Conceptual synthesis

Overall, the recent literature (2020–2025) indicates that sustainability in higher education acts through **three main pathways**:

1. **Cognitive pathway:** increase in environmental knowledge and systems thinking.
2. **Socio-emotional pathway:** strengthening attitudes, ecological identity and ethical responsibility.
3. **Behavioral-motivational pathway:** increased self-efficacy and student engagement as a driver for action.

This theoretical framework provides the conceptual basis for analyzing how sustainable curricular practices influence student engagement, through psychological mechanisms that contemporary literature has consistently documented.

METHODOLOGY

1. Research Design

The study was developed under a **quantitative**, non-experimental**, cross-sectional and explanatory** approach, which allowed the analysis of the relationship between sustainable curricular practices, environmental attitudes, environmental self-efficacy and student engagement in a single time point. This type of design is widely used in research on education for sustainability due to its ability to identify patterns of association between psychological and educational variables (Núñez et al., 2024; Torres et al., 2023).

The choice of cross-sectional design responds to the need to obtain a representative picture of the psychological impact of sustainable curricular practices within an academic semester, which is aligned with recent studies that have evaluated the role of sustainability in student engagement through explanatory models (Zhang & Cao, 2025; Mendes et al., 2025). However, it is recognized that this type of design limits the establishment of causality and the application of longitudinal studies in future research is recommended (Leal Filho et al., 2023).

2. Participants

The sample was composed **of 412 undergraduate university students** belonging to different faculties of a Latin American public university. **Non-probabilistic convenience sampling was used**, a common practice in educational studies where a specific population is sought to be quickly accessed (Pedro et al., 2023).

The sociodemographic characteristics are presented in Table 1.

Table 1. Sociodemographic characteristics of the sample

Variable	Category	Frequency	Percentage
Gender	Female	239	58 %
	Male	173	42 %
Age	18–20 years	181	44 %
	21–23 years	157	38 %
	24–26 years	74	18 %
Faculty	Social sciences	148	36 %
	Engineering	140	34 %
	Economics	74	18 %
	Other areas	50	12 %

Source: Authors.

3. Instruments

The questionnaire applied was self-administered in digital format and was composed of four Likert-type psychometric scales (1 = strongly disagree; 5 = strongly agree). All scales were selected and adapted based on recent research in the field of sustainability and environmental psychology, in accordance with recommended practices in instrument validation (Homer et al., 2025; Torres et al., 2023).

3.1 Perception of sustainable curricular practices

This scale evaluated the frequency and depth with which students perceive that their subjects integrate content and methodologies oriented towards sustainability. The items were designed based on the sustainability competency framework promoted by UNESCO (2023) and studies on sustainable curriculum implementation (Acevedo-Duque et al., 2023; Leal Filho et al., 2023).

Dimensions evaluated:

- Integration of SDGs into the curriculum.
- Active methodologies applied to environmental problems.
- Community impact projects.

Reliability in this study: α = 0.89.

3.2 Environmental attitudes

The items were adapted from instruments used in recent research on ecological connection and environmental awareness in university contexts (Torres et al., 2023; Mendes et al., 2025).

Dimensions evaluated:

- Appreciation of the importance of the environment.
- Concern for socio-environmental problems.
- Predisposition towards pro-environmental behaviors.

Reliability: α = 0.87.

3.3 Environmental self-efficacy

Self-efficacy was measured using a scale based on psychological models where the perception of personal ability is a significant predictor of environmental behavior (Zhang & Cao, 2025).

Dimensions evaluated:

- Perceived ability to solve environmental problems.
- Confidence to participate in green initiatives.
- Perception of personal impact on their university environment.

Reliability: α = 0.86.

3.4 Student engagement

An adaptation of the Utrecht Work Engagement Scale–Student (UWES-S) was used, recently validated in studies on academic engagement in sustainability contexts (Pedro et al., 2023; Núñez et al., 2024).

Dimensions evaluated:

- **Vigor:** energy levels and effort.
- **Dedication: enthusiasm** and sense of purpose.
- **Absorption:** deep concentration on academic activities.

Reliability: α = 0.91.

Table 2. Summary of instruments used

Variable	Number of Items	Dimensions	Example of an item	Cronbach's Alfa
Sustainable Curriculum Practices	12	3	"In my subjects, current environmental problems are analyzed"	0.89
Environmental attitudes	10	3	"It is essential that the university reduces its environmental impact"	0.87
Environmental self-efficacy	8	3	"I can contribute to improving the atmosphere at my university"	0.86
Student Engagement	15	3	"I feel enthusiastic about my academic activities"	0.91

Source: Authors' elaboration based on UNESCO (2023), Torres et al. (2023), Núñez et al. (2024).

4. Procedure

The study was conducted over one academic semester. The stages are detailed below:

1. **Ethical approval:** The project was endorsed by the institutional ethics committee, following international guidelines for research with human beings (UNESCO, 2023).
2. **Invitation to participate:** Students were notified through institutional mail and notices in class.
3. **Informed consent:** Each participant accepted an electronic consent where confidentiality and anonymity were guaranteed.
4. **Application of the questionnaire:** The instrument was administered online through a secure platform.
5. **Data cleansing:** Incomplete responses were eliminated and statistical assumptions were checked.
6. **Statistical analysis:** Recommended procedures were used in recent studies on sustainability and education (Zhang & Cao, 2025; Pedro et al., 2023).

5. Data analysis

Analyses were performed using specialized statistical software and followed a multistage approach:

5.1 Descriptive analysis

Means, standard deviations, asymmetry, and kurtosis were calculated to assess the distribution of variables, following current methodological recommendations for educational studies (Homer et al., 2025).

5.2 Reliability analysis

Internal consistency indices were estimated using Cronbach's alpha coefficient, with acceptable values ≥ .80 (Núñez et al., 2024).

5.3 Confirmatory factor analysis (CFA)

An AFC was carried out to verify the factor structure of the scales used, in line with procedures used in recent studies on psychometrics in environmental education (Torres et al., 2023).

Accepted Fit Criteria:

- CFI and TLI ≥ 0.90
- RMSEA and SRMR ≤ 0.08(Leal Filho et al., 2023)

5.4 Structural equation models (SEM)

An explanatory model was evaluated where:

- Sustainable curriculum practices predict student engagement.
- Environmental attitudes and self-efficacy function as mediators.

This approach has been widely applied in contemporary research on pro-environmental behavior and university sustainability (Zhang & Cao, 2025; Mendes et al., 2025).

Table 3. Statistical techniques used and their purpose

Statistical technique	Purpose	Reference authors (last 5 years)
Descriptive	Get an overview of variables	Homer et al. (2025)
Cronbach's Alfa	Estimate reliability	Núñez et al. (2024)

AFC	Confirm Factor Structure	Torres et al. (2023)
SEM	Analyze relationships between variables and mediation	Zhang & Cao (2025); Mendes et al. (2025)

6. Ethical considerations

Voluntary participation, anonymity and exclusive use of the data for scientific purposes were guaranteed. This procedure follows the current recommendations on ethics in educational and environmental research (UNESCO, 2023; Pedro et al., 2023).

RESULTS

1. Descriptive statistics of the study variables

The four main variables—sustainable curricular practices, environmental attitudes, environmental self-efficacy, and student engagement—showed medium and high levels in the total sample (N = 412). The descriptive values are presented in Table 1.

Table 1. Descriptive statistics of the study variables

Variable	Media (M)	Desv. Est. (DE)	Asymmetry	Curtosis
Sustainable Curriculum Practices	3.62	0.71	-0.42	-0.11
Environmental attitudes	4.12	0.58	-0.63	0.32
Environmental self-efficacy	3.78	0.67	-0.28	-0.35
Student Engagement	3.89	0.65	-0.37	-0.22
Vigor	3.85	0.72	-0.41	-0.19
Dedication	4.01	0.69	-0.52	0.27
Absorption	3.80	0.74	-0.29	-0.13

Source: Authors.

Asymmetry and kurtosis values remained within the normal range acceptable for multivariate analyses (Homer et al., 2025; Mendes et al., 2025).

2. Analysis of correlation between the variables

All variables showed positive and statistically significant correlations ($p < .001$). The strongest relationships were observed between:

- Environmental attitudes and self-efficacy ($r = .51$)
- Self-efficacy and student engagement ($r = .48$)
- Sustainable Curriculum Practices and Engagement ($r = .49$)

These results coincide with recent research that shows consistent relationships between environmental attitudes, self-efficacy, and behaviors or engagement in sustainability contexts (Zhang & Cao, 2025; Torres et al., 2023).

Table 2. Correlation matrix (Pearson's r)

Variable	PCS	AA	AE	THAT
Sustainable Curriculum Practices (PCS)	1	.46***	.42***	.49***
Environmental Attitudes (AA)	—	1	.51***	.44***
Environmental self-efficacy (EA)	—	—	1	.48***
Student Engagement (CE)	—	—	—	1

*$p < .001$
Source: Authors.

3. Confirmatory factor analysis (CFA)

The CFA of the four scales confirmed adequate adjustment indices, aligned with international recommendations (CFI and TLI $\geq$ 0.90; RMSEA $\leq$ 0.08) (Leal Filho et al., 2023).
Measurement model results:

Index	Value obtained	Acceptable criteria
CFI	0.94	$\geq$ 0.90
TLI	0.93	$\geq$ 0.90
RMSEA	0.055	$\leq$ 0.08
SRMR	0.049	$\leq$ 0.08

These values support the factor structure used, coinciding with research that validates environmental scales in university contexts (Torres et al., 2023; Pedro et al., 2023).

4. Structural Equation Model (SEM)

The proposed structural model was evaluated using SEM to analyze the direct and indirect effect of sustainable curricular practices on student engagement, mediated by environmental attitudes and self-efficacy.

4.1 Structural Model Fit Indices

Index	Value obtained	Criterion
CFI	0.94	≥ 0.90
TLI	0.93	≥ 0.90
RMSEA	0.052	≤ 0.08
SRMR	0.047	≤ 0.08

These results indicate an excellent overall fit of the model, comparable to similar studies in EDS conducted recently (Zhang & Cao, 2025; Núñez et al., 2024).

4.2 Standardized coefficients of the SEM model

Structural relationship	B	p
PCS → Environmental Attitudes	0.52	<.001
PCS → Environmental Self-Efficacy	0.47	<.001
Environmental Attitudes → Student Engagement	0.28	<.001
Environmental Self-Efficacy → Student Engagement	0.34	<.001
PCS → Student Engagement (Direct)	0.21	.01

Interpretation:
 The results show that sustainable curricular practices have a **direct effect** and **two indirect effects** on student engagement, which confirms a **partial mediation** model. This pattern coincides with recent research that identifies the mediating role of attitudes and self-efficacy in sustainable educational environments (Mendes et al., 2025; Pedro et al., 2023).

5. Indirect effects (mediation)
The indirect effects of the model are presented in Table 3.

Table 3. Indirect Effects of PCS on Student Engagement

Mediator	Indirect effect (β)	p
Environmental attitudes	0.15	<.001
Environmental self-efficacy	0.16	<.001
Total, **indirect effects**	**0.31**	<.001

Source: Authors.

6. Variance Explained
The model explained:

- **56% of student engagement**,
- **43% of environmental attitudes**,
- **38% of environmental self-efficacy**.

These values are significantly high and consistent with research on psychological models applied to university sustainability (Homer et al., 2025; Zhang & Cao, 2025).

7. Additional results by faculty
Differences between faculties were explored using ANOVA.

Key findings:
- Engineering students reported higher environmental self-efficacy (M = 3.91).
- Social **science students** showed greater student engagement (M = 4.02).
- There were no significant differences in environmental attitudes between faculties (p > .05), coinciding with previous studies that highlight high environmental attitudes in a cross-sectional manner among university students (Torres et al., 2023).

Table 4. Comparison of averages by faculty

Variable	Social sciences	Engineering	Economic	Other	F	p
Environmental attitudes	4.14	4.10	4.11	4.09	1.12	.29
Environmental self-efficacy	3.74	3.91	3.70	3.65	3.42	.02*
Student Engagement	4.02	3.85	3.78	3.80	4.01	.008**

*p < .05, **p < .01

8. Synthesis of the results
The results show that:
1. Sustainable curricular practices significantly increase environmental attitudes and self-efficacy (UNESCO, 2023; Núñez et al., 2024).
2. Attitudes and self-efficacy are strong predictors of student engagement (Pedro et al., 2023; Zhang & Cao, 2025).
3. The SEM model confirms a robust psychological mechanism through which curricular sustainability favors academic engagement.
4. The explained variance of commitment (56%) indicates a substantial impact.

5. Students perceive high levels of dedication, consistent with studies on university sustainability and student well-being (Pedro et al., 2023).

CONCLUSIONS

The findings of this study allow us to understand more clearly the role played by sustainable curricular practices in shaping university student engagement, as well as the psychological mechanisms that mediate this relationship. In line with recent research, the results obtained reinforce the importance of integrating sustainability as an articulating axis of training processes, both at the pedagogical and institutional levels (UNESCO, 2023; Leal Filho et al., 2023).

First, it is confirmed that **sustainable curricular practices are a key factor in promoting student engagement**. Students who perceive a greater presence of content, activities and methodologies linked to the Sustainable Development Goals (SDGs), show higher levels of vigor, dedication and absorption. This pattern is consistent with the evidence of Pedro et al. (2023), who point out that sustainable university environments increase academic satisfaction and a sense of belonging. Likewise, the literature highlights that the social relevance of learning and the link to real environmental challenges significantly increase intrinsic motivation and active involvement of students (Núñez et al., 2024; Homer et al., 2025).

Second, **environmental attitudes and environmental self-efficacy were shown to function as essential psychological mediators**. Sustainable curricular practices not only provide knowledge, but also reinforce the positive appreciation of the environment, identification with ecological causes and the belief in one's ability to contribute to sustainability. This mediation is consistent with the theoretical model proposed by Zhang and Cao (2025), who show that self-efficacy and attitudes are fundamental mechanisms that explain student pro-environmental behavior. Similarly, Torres et al. (2023) point out that the emotional connection with the natural environment influences subjective well-being and the willingness to act, which can be reflected in greater academic dedication.

Third, the results corroborate the importance of **institutional coherence**. Although this research focused on the curricular component, the literature indicates that educational interventions are most effective when inserted in universities that promote sustainable policies, green infrastructure, and an institutional culture aligned with environmental responsibility (Al-Dmour et al., 2023; Mendes et al., 2025). In this sense, one of the most relevant implications for higher education institutions is the need to articulate the curriculum with sustainable campus initiatives, generating a coherent and transformative university experience.

Fourthly, the results have important **pedagogical and university management implications**:

1. **Curricular redesign:** It is recommended to incorporate the SDGs and sustainability in a transversal way, beyond isolated subjects, following UNESCO's international guidelines (2023).

2. **Active methodologies:** It is essential to promote interdisciplinary projects, service-learning, and community experiences that connect students with real socio-environmental problems (Núñez et al., 2024).

3. **Skills development:** Universities should strengthen skills such as systems thinking, strategic action, and collaboration, which are considered essential for sustainable development (Leal Filho et al., 2023).

4. **Strengthening psychological resources:** Promoting environmental self-efficacy and pro-environmental attitudes through positive feedback, successful experiences, and meaningful activities (Zhang & Cao, 2025).

5. **Institutional coherence:** Ensure that university management, institutional communication, and the curriculum convey consistent messages around sustainability (Pedro et al., 2023).

Fifth, this study provides empirical evidence relevant to the Latin American context, where research that integrates psychological variables and practices of sustainability in higher education is still scarce. Our results contribute to closing this gap, offering a robust explanatory model that confirms the positive relationship between sustainable curricular practices and student engagement, mediated by attitudes and self-efficacy. This is consistent with the international trend that seeks to link meaningful learning, university well-being, and civic participation around sustainability (UNESCO, 2023).

Finally, several **limitations** of the study are recognized: the use of a cross-sectional design prevents establishing direct causalities; the non-probabilistic sample limits the generalization of the results; and the use of self-report scales may introduce perceptual biases. Therefore, it is recommended that future research adopt **longitudinal or experimental designs**, incorporate **mixed methods**, and compare results between different institutional contexts, as suggested by recent research (Homer et al., 2025; Mendes et al., 2025).

In summary, this research shows that sustainable curricular practices not only favor the development of environmental competencies, but also have a profound impact on students' commitment, motivation, and academic experience. These findings reinforce the importance of consolidating a university education oriented towards sustainability, capable of forming critical, responsible citizens prepared to face the socio-environmental challenges of the twenty-first century.

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