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2030 Agenda at UNACAR: student perception based on the academic context

Agenda 2030 en la UNACAR: percepción estudiantil a partir del contexto académico

Agenda 2030 na UNACAR: percepção dos alunos com base no contexto académico

Abstract

Introduction: sustainability within Higher Education Institutions plays a key role in preparing future leaders capable of addressing global challenges. Emphasis is placed on the need to incorporate sustainability into educational processes—from curricula to institutional management—in order to advance towards the achievement of the Sustainable Development Goals outlined in the 2030 Agenda. **Objective:** to evaluate the perception of students at Universidad Autónoma del Carmen regarding sustainability, considering the impact of academic factors such as faculty affiliation and current semester. **Method:** this was a quantitative study with a comparative-correlational approach, employing a non-experimental cross-sectional design without manipulation of variables, aimed at determining the relationships among them based on the academic indicators mentioned. **Results:** significant differences were found between the academic context and students' perceptions, underscoring the need to adjust the educational strategies implemented thus far. **Conclusion:** to foster a culture of sustainability within the university environment and, at the same time, enhance these initiatives, it is essential to implement strategies tailored to the specific characteristics of each academic level and group.

Keywords: sustainability, higher education, sustainable development

Resumen

Introducción: la sostenibilidad dentro de las Instituciones de Educación Superior tiene una importante función a la hora de crear futuros líderes, con capacidad para enfrentar desafíos globales. Se resalta la necesidad de incluir la sostenibilidad en los procesos educativos, desde planes de estudio hasta la gestión institucional, para seguir avanzando hacia el cumplimiento de los Objetivos de Desarrollo Sostenible de la Agenda 2030.

Objetivo: evaluar la percepción de los estudiantes de la Universidad Autónoma del Carmen hacia la sostenibilidad, considerando el impacto de factores académicos como la facultad de pertenencia y el semestre cursado. **Método:** el estudio fue de tipo cuantitativo con enfoque comparativo - correlacional, su diseño fue no experimental de corte transversal, sin manipulación de las variables, con el fin de determinar su relación entre sí a partir de indicadores académicos mencionados. **Resultados:** se encontraron diferencias significativas entre el contexto académico y la percepción de los estudiantes, lo que reflejaba la necesidad de ajustar las estrategias educativas implementadas hasta el momento. **Conclusión:** para fomentar una cultura de sostenibilidad dentro del entorno universitario y, al mismo tiempo, mejorar estas iniciativas, es fundamental aplicar estrategias que se adapten a las características específicas de cada nivel y grupo académico.

Palabras clave: sostenibilidad, educación superior, desarrollo sostenible

Resumo

Introdução: a sustentabilidade nas Instituições de Ensino Superior desempenha um papel fundamental na formação de futuros líderes capazes de enfrentar desafios globais. Destaca-se a necessidade de incluir a sustentabilidade nos processos educacionais — desde os currículos até a gestão institucional — para avançar no cumprimento dos Objetivos de Desenvolvimento Sustentável da Agenda 2030. **Objetivo:** avaliar a percepção dos estudantes da Universidad Autónoma del Carmen sobre a sustentabilidade, considerando o impacto de fatores acadêmicos como a faculdade de origem e o semestre cursado. **Método:** o estudo foi de natureza quantitativa com abordagem comparativa-correlacional, utilizando um desenho não experimental de corte transversal, sem manipulação das variáveis, visando determinar a relação entre elas a partir dos indicadores acadêmicos mencionados. **Resultados:** foram encontradas diferenças significativas entre o contexto acadêmico e a percepção dos estudantes, evidenciando a necessidade de ajustar as estratégias educacionais implementadas até o momento. **Conclusão:** para promover uma cultura de sustentabilidade no ambiente universitário e, ao mesmo tempo, aprimorar essas iniciativas, é fundamental adotar estratégias adaptadas às características específicas de cada nível e grupo acadêmico.

Palavras-chave: sustentabilidade, ensino superior, desenvolvimento sustentável

Introduction

Higher Education Institutions (HEIs) play a decisive role in the formation of socially responsible citizens committed to the environment. Experts such as Wiek & Redman (2022) and Brundiers et al. (2021) have emphasized the need to incorporate sustainability into university education. For them, this approach is not only important but fundamental for preparing students to face current global challenges, such as environmental protection, social justice, reducing inequalities, and promoting peace, which are considered key aspects for building a fairer and more sustainable future (Abowardah et al., 2024).

In this context, Žalėnienė & Pereira (2021), Cardeño Portela et al. (2023), López González et al. (2023) y Jiménez-Pitre et al. (2023) highlight that sustainability in Higher Education (HE) must be addressed comprehensively, considering not only the environmental aspect but also the social, economic, and cultural dimensions. Lim et al. (2022) argue that HEIs have the responsibility to transform their teaching, research, and community engagement processes by fully integrating the principles of Sustainable Development (SD).

The concept of SD has evolved as a result of the active role of universities in training leaders capable of addressing the challenges of our time. Thus, the 2030 Agenda and its 17 Sustainable Development Goals (SDGs), adopted by the UN in 2015, present an essential roadmap for guiding institutional efforts towards a more equitable and resilient future (Shava et al., 2023).

In Mexico, several universities have begun to align their curricula, management processes, and research with the SDGs, promoting interdisciplinary approaches and applied research as pathways to address emerging challenges (González-Campo et al., 2022). In particular, SDG 4, which advocates for inclusive and quality education, is considered both a goal in itself and a catalyst for achieving the other SDGs (Vindigni, 2024).

This underscores the importance of critically analyzing the role that HEIs play in achieving the 2030 Agenda (Caputo et al., 2021; Pacheco-Peralta et al., 2022; Fuchs et al., 2023; Jabeen, 2024). Quality HE should not only provide technical skills and knowledge but also foster values such as social responsibility, empathy, and the ability to act in the face of complex problems, which is fundamental for developing a sustainable culture (Lim et al., 2022).

Despite the growing interest among Latin American HEIs in incorporating education for sustainable development (ESD) into their curricula (Filho et al., 2021; González-Campo et al., 2022; López-Leyva, 2024), progress has not been uniform, as many institutions face significant internal and external challenges, such as a lack of sustainable infrastructure, the promotion of social inclusion, and the fight for gender equity. Additionally, there is a lack of resources and limited training on sustainability issues, complicating the implementation of comprehensive strategies (Abdul Karim et al., 2021).

Furthermore, according to the Economic Commission for Latin America and the Caribbean (ECLAC), there have been achievements in education in Mexico; however, significant inequalities and obstacles persist in the effective

implementation of policies that promote sustainability in the education sector (ECLAC, 2021). Although SDG 4 aims to ensure inclusive, equitable, and quality education, discrepancies in graduation rates in HE are significant, especially for students from vulnerable socioeconomic backgrounds.

In various HEIs, sustainability initiatives often depend on isolated efforts by certain academics or are disconnected from core academic activities, due to a lack of financial and human resources. As a result, the capacity of these universities to adopt a holistic approach to sustainability is limited (Žalėnienė & Pereira, 2021), even though this approach is fundamental for effectively meeting the SDGs (González-Campo et al., 2022). According to Lim et al. (2022), it is crucial that university management promotes an organizational culture that favors the integration of sustainability across all its functions.

Within this framework, HE plays a fundamental role in training leaders to address the challenges of SD, with students constituting the essential group due to their potential to contribute to SD in their professional lives and their capacity to become agents of change in their communities (Tomasella et al., 2022). Accordingly, it is important to examine the level of knowledge, awareness, and perception of students regarding sustainability and its practical implementation if it is aspired to have an informed and committed generation capable of efficiently addressing global challenges related to sustainability (Abowardah et al., 2024; Ribeiro et al., 2021; Zwolińska et al., 2022). Furthermore, the importance of promoting innovative pedagogical methodologies, such as problem-based learning and service-learning, is emphasized as they facilitate active and reflective understanding of sustainability for students (Silva-Munar et al., 2021).

In this context, assessing the perceptions of students in HEIs regarding sustainability is fundamental for strengthening education in this area and adjusting institutional strategies according to the needs and values of the student community. Analyzing these perceptions allows for the identification of areas for improvement in sustainability initiatives, ensuring their effectiveness and relevance; at the same time, it helps in developing educational programs that encourage action and active commitment. Additionally, evaluating the impact of these initiatives contributes to generating success indicators that facilitate decision-making to optimize the inclusion of sustainability across all areas of the university (Figueroa-García, 2023).

Moreover, it fosters students' commitment to engage and actively participate in sustainability issues. This commitment is crucial for achieving the SDGs and training professionals who truly care about SD.

This becomes even more significant when considering that the literature has shown that student perception varies based on factors such as the semester enrolled, the affiliated faculty, and prior exposure to content related to SD (Lim et al., 2022). This highlights the need to constantly evaluate how students view and value sustainability initiatives at their universities.

Furthermore, various studies have addressed student behavior and attitudes towards the SDGs, identifying the influence of sociodemographic, motivational, and contextual variables (Callejón et al., 2022; Ramírez-Franco & Antolín, 2022; Silva-

Munar et al., 2021). In this regard, Silva-Munar et al. (2021) examined the future behavioral intentions of Chilean university students regarding the SDGs, employing the theory of planned behavior. Through a structured questionnaire designed to assess intention, attitude, subjective norm, and perceived behavioral control (PBC), they found that students' intentions are partially influenced by their beliefs and personal motivations.

According to the findings of these authors, attitude and PBC positively influence students' willingness to engage in actions aligned with the SDGs. Likewise, the study suggests that implementing formal education programs is not essential to promote these intentions.

Ramírez-Franco & Antolín (2022) analyzed how business students' attitudes towards the SDGs changed before and after the COVID-19 pandemic. They used a questionnaire directed at international students in Spain, asking them to rank 18 items, including the SDGs and an additional objective related to profit maximization. This allowed them to objectively evaluate the relevance of the SDGs among future professionals. The findings revealed that, in the long term, students attribute greater importance to goals linked to environmental and social sustainability.

Although the perception of university students regarding the SDGs has been the subject of extensive studies globally (Jones et al., 2023; Michalos et al., 2009; Novieastari et al., 2022), this topic has been less explored in Mexico. Additionally, there is a lack of specific instruments designed to quantify this perception in the context of Mexican HEIs.

In this regard, García-Martínez et al. (2022) argue that self-concept significantly influences the academic performance of university students and is an essential component when evaluating their perception of the SDGs. This influence can affect how students engage with topics such as sustainability and SD. It is emphasized that the cognitive, emotional, and relational skills that constitute the concept of emotional intelligence can foster the development of transformative competencies, which are fundamental for promoting sustainable transformations in individuals and communities (Munir et al., 2023).

Nizar et al. (2019) examined how postgraduate students understand, experience, and act in relation to ESD. To achieve this, they implemented a questionnaire based on the research of Michalos et al. (2009) directed at 38 students from various faculties. The results showed that, although students possess good knowledge and favorable attitudes towards ESD, their actions reflect only a moderate commitment. The study also highlights the need to better integrate ESD into university life to strengthen students' commitment to SD.

On the other hand, Callejón et al. (2022) analyzed the sustainable behavior of finance students in Spain by adapting the questionnaire from Nizar et al. (2019), highlighting the influence of sociodemographic factors such as gender, and evaluating knowledge, attitude, and environmental behavior. The results demonstrated positive attitudes towards sustainability, although with moderate knowledge and behavior. They concluded that improving awareness and attitude could promote sustainable behaviors, underscoring the importance of integrating sustainability into education.

The work by Abdul Karim et al. (2021) explored the critical success factors in knowledge about sustainability among students at the Institutes of Teacher Education (ITE) in Malaysia. In a similar vein, Diaz et al. (2023) highlighted that the environmental behavior of university students depends not only on their level of knowledge about sustainability but also on how they integrate sustainable strategies into their daily lives and their perceptions of environmental issues. The results showed that students have a high level of knowledge about sustainability, indicating that the sustainability program of the ITE has been effective in fostering positive attitudes and behaviors towards environmental care.

As previously indicated, there have been few studies conducted on this topic in Mexico. Among the most notable is that of Figueroa-García (2023), which examines sustainable consumption behavior (SCB) within the university community as an essential component of Mexican HEIs' contributions to sustainability.

In the research conducted at 14 HEIs in Querétaro, students, professors, and administrative staff were surveyed using a questionnaire that evaluated factors such as institutional action, ESD, social influence, and community actions. The findings highlighted that only social influence and interventions directed towards the adjacent community are significant determining factors of SCB. Additionally, the intricate interaction between institutional action, ESD, and physical factors is recognized.

Based on this review, it can be concluded that there are various global studies related to measuring student behavior and perception in the context of ESD and the SDGs. However, this is not the case in the Mexican context, where there is also a lack of specific instruments designed to capture this perception in Mexican HEIs.

At the Universidad Autónoma del Carmen (UNACAR), located in the state of Campeche, Mexico, several strategies and policies are implemented to promote sustainability in both its academic life and institutional management. However, to ensure the effectiveness of these initiatives, it is essential to understand how students perceive sustainability and what academic factors, such as their faculty affiliation and semester enrolled, influence this perception. The present article aims to evaluate this perception to identify significant differences and areas for improvement in educational strategies and institutional sustainability.

Within this contextual framework, this research is particularly important as it allows for an accurate assessment of how students from UNACAR perceive the SDGs. This not only enriches academic knowledge in the field of ESD but also provides a foundation for designing educational and curricular policies for similar institutions that promote informed and engaged global citizenship. The following section details the methodology employed for this study.

Methods and materials

Design

The research was conducted using a quantitative approach with a comparative-correlational scope. The objective is to evaluate the student perception at UNACAR towards sustainability, considering the impact of academic factors such as faculty affiliation and semester enrolled, in order to identify significant differences and areas for improvement in educational and institutional sustainability strategies. The design was non-experimental and cross-sectional, allowing data collection at a single point in time without manipulating variables, thus identifying patterns of association between them (Creswell and Creswell, 2022; Hernández-Sampieri and Mendoza-Torres, 2023).

Participants

The population consisted of undergraduate students from four faculties at UNACAR: Faculty of Chemistry (FC), Faculty of Information Sciences (FIS), Faculty of Health Sciences (FHS), and Faculty of Educational Sciences (FES). According to records from the institution's Office of Academic Records, during the January-June 2024 cycle, the total number of active students in these faculties was 3,226.

In this context, the sample selection was carried out using a non-probabilistic intentional or judgment sampling method, adhering to inclusion criteria such as being enrolled and active in various higher education programs from the mentioned faculties, being in one of the considered semesters (second, fourth, sixth, and eighth), and those who voluntarily accepted to participate.

Graduate students, those with temporary leave, and individuals who did not completely answer the questionnaire were excluded. This type of sampling is relevant in research requiring direct access to specific subgroups within a population (Adeoye, 2023). Table 1 presents the distribution of the student population and the sample size by faculty, facilitating better analysis.

Table 1

Distribution of the student population and sample size by faculty

School or Faculty	N	n
Faculty of Information Sciences	535	288
Faculty of Health Sciences	1634	423
Faculty of Educational Sciences	539	209
Faculty of Chemistry	518	332
Total Students	**3226**	**1252**

Source: Authors' own elaboration.

Note. N = population, n = sample.

Instrument

For data collection, a self-administered questionnaire was used, applied in person, consisting of two sections. The first section included 13 sociodemographic

questions, both closed and open-ended. The second section comprised 60 items grouped into four dimensions: knowledge, attitude, behavior, and perception regarding institutional strategies towards sustainability.

Validated scales were used to measure different constructs of the study. First, the original scale by Michalos et al. (2009) was employed, which was later adapted by Nizar et al. (2019) and Callejón et al. (2022) to assess dimensions related to students' knowledge, attitude, and behavior towards sustainability. Additionally, the scale developed by Figueroa-García (2023) was used specifically to measure student perception regarding institutional strategies aimed at sustainability.

Each scale was selected for its theoretical relevance and underwent a content validation process through expert judgment, as well as an analysis of internal reliability within the context of this study. The items were rated using a seven-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (7). These scales addressed different dimensions of the phenomenon under study from complementary approaches, allowing for a comprehensive evaluation of student perceptions regarding institutional factors that affect their academic experience.

Instrument validity

To ensure content validity, the expert judgment method was used, and the Aiken's V coefficient was calculated, which quantifies the relevance and representativeness of each item concerning the theoretical domains of the construct (Maldonado-Suárez and Santoyo-Telles, 2024). Acceptable values of the coefficient ($V > 0.75$) were obtained for each item, indicating that the scale meets the criteria for relevance and coverage.

Reliability

Reliability was assessed using McDonald’s Omega coefficient, which is considered more robust than Cronbach's Alpha in contexts with multidimensional scales and ordinal items (Orçan, 2023). In this regard, Table 2 presents the results of this analysis, showing scores ranging from 0.86 to 0.93. These values indicate adequate reliability of the instrument, as they fall within the acceptable range for measurements in social and educational research.

Table 2

Reliability analysis by dimension

Dimension	No. of items	McDonald's Omega Coefficient
Knowledge about sustainability	15	.90
Attitude towards sustainability	15	.86
Behavior towards sustainability	16	.90
Institutional strategies for sustainability	14	.93

Source: Authors' own elaboration.

Data analysis

The data were analyzed using IBM SPSS Statistics (version 25). Descriptive analyses were conducted to characterize students' general perceptions, as well as inferential analyses to compare scores by faculty and semester. Prior to applying statistical tests, the assumptions of normality (Kolmogorov-Smirnov) and homogeneity of variances (Levene) were evaluated, which were not met ($p < .05$). Consequently, non-parametric techniques were employed, specifically the Kruskal-Wallis test for group comparisons and the Games-Howell test for post hoc multiple comparisons.

Based on the research objectives and the theoretical review conducted, the following hypotheses were formulated to guide the inferential analysis: student perception of sustainability dimensions varies significantly according to the school or faculty they belong to, and student perception of sustainability dimensions varies significantly according to the semester enrolled.

Results and discussion

Participant characteristics

According to the results, the average age of participants was 20.53 years, with a standard deviation of 2.05 years. In terms of gender, 52.66% (659) of participants identified as female, 45.93% (575) as male, and 1.41% (18) as other. Regarding marital status, 87.14% (1091) of students reported being single, 6.80% (85) indicated being in a common-law relationship, 5.59% (70) identified as married, and a minimal proportion of 0.47% (6) did not specify their marital status.

Regarding employment status, 68.89% (863) of students indicated that, at the time of completing the survey, they were unemployed, while 28.35% (355) reported having a part-time job, and only 2.76% (35) stated they were employed full-time. Additionally, 39.80% (498) of students mentioned that both parents were the main family support, 27.47% (344) indicated it was solely the father, and 22.29% (279) stated it was only the mother.

General description of student perception towards sustainability

As shown in Table 3, the results indicate that students' perceptions towards sustainability are generally positive. Specifically, the dimensions of knowledge and attitude towards sustainability showed higher scores, indicating that students possess an adequate level of knowledge and a favorable attitude toward sustainability. On the other hand, the dimensions of behavior towards sustainability and institutional strategies received slightly lower scores; however, these scores remain positive, reflecting a favorable perception in these areas as well.

Table 3

Descriptive statistics of perception dimensions towards sustainability

Dimensions	Minimum	Maximum	Mean (Std. Dev.)
Knowledge about sustainability	1	7	5.28 (1.01)
Attitude towards sustainability	1	7	4.99 (0.97)
Behavior towards sustainability	1	7	4.52 (1.18)
Institutional strategies for sustainability	1	7	4.49 (1.26)

Source: Authors' own elaboration.

Note. Std. Dev. = Standard deviation.

Comparisons by faculty

Furthermore, Table 4 presents the results of the comparative analysis of student perception towards sustainability by faculty. The results indicate that students from the FIS have a positive and consistent perception across all evaluated dimensions, particularly regarding attitudes and behaviors towards sustainability. In contrast, while students from the FC demonstrate a high level of knowledge, they show lower scores in terms of behavior and institutional strategies.

Table 4

Comparison of perception dimensions towards sustainability by faculty

Dimensions	Faculty			
	FIS Mean (Std. Dev.)	FHS Mean (Std. Dev.)	FES Mean (Std. Dev.)	FC Mean (Std. Dev.)
Knowledge about sustainability	5.22 (0.02)	5.05 (0.05)	5.35 (0.08)	5.57 (0.07)
Attitude towards sustainability	5.46 (0.02)	4.68 (0.05)	4.88 (0.06)	5.03 (0.06)
Behavior towards sustainability	5.44 (0.02)	4.54 (0.05)	4.70 (0.06)	3.59 (0.07)
Institutional strategies for sustainability	5.61 (0.02)	4.20 (0.06)	4.50 (0.08)	3.88 (0.07)

Source: Authors' own elaboration.

Note. FIS = Faculty of Information Sciences, FHS = Faculty of Health Sciences, FES = Faculty of Educational Sciences, FC = Faculty of Chemistry, Std. Dev. = Standard deviation.

Comparisons by semester

The results presented in Table 5 show a comparison of student perception towards sustainability across different academic semesters. It was found that

perceptions of sustainability, in terms of knowledge, attitude, behavior, and institutional strategies, vary by academic semester.

In this context, it is observed that students in more advanced semesters tend to have greater knowledge and are more likely to adopt sustainable behaviors. However, their perceptions regarding institutional strategies are less favorable, which could reflect a lack of interest from students or a lack of continuous reinforcement in institutional activities and commitment to sustainability.

Table 5

Comparison of perception dimensions towards sustainability by semester

Dimensions	Semester			
	2nd	4th	6th	8th
	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)	Mean (Std. Dev.)
Knowledge about sustainability	5.30 (0.05)	5.20 (0.04)	5.25 (0.06)	5.49 (0.09)
Attitude towards sustainability	5.14 (0.04)	4.82 (0.05)	4.98 (0.06)	5.14 (0.09)
Behavior towards sustainability	4.86 (0.05)	4.55 (0.05)	4.35 (0.07)	5.14 (0.09)
Institutional strategies for sustainability	4.91 (0.06)	4.40 (0.06)	4.30 (0.08)	4.25 (0.10)

Source: Authors' own elaboration.

Note. Std. Dev. = Standard deviation.

Inferential Analysis

Since the assumptions of normality and homoscedasticity were not met, the comparison between groups by semester and faculty was conducted using the Kruskal-Wallis test. Table 6 presents the corresponding results. From these, it can be determined that there are significant differences in sustainability perception among the faculties for all evaluated dimensions ($p < .001$), which may be associated with specific contextual or academic factors of each academic unit.

Additionally, the analysis of multiple comparisons conducted using the Games-Howell test provided evidence that students from the FIS have a positive and consistent perception, while those from the FC exhibit a lower and more variable level of perception, particularly in the dimensions of behavior and institutional strategies. These results highlight the importance of adapting educational and sustainability strategies according to the specific characteristics and needs of each faculty to improve student perception comprehensively and effectively.

Table 6

Kruskal-Wallis test for comparison of student perception towards sustainability among faculties

Dimension	Faculty				H	p
	FIS Mdn (range)	FHS Mdn (range)	FES Mdn (range)	FC Mdn (range)		
Knowledge	5.20 (2.33)	5.20 (6.00)	5.53 (5.80)	6.00 (6.00)	108.7 7	<.00 1
Attitude	5.45 (1.73)	4.67 (5.87)	5.13 (5.13)	5.20 (6.00)	143.4 0	<.00 1
Behavior	5.44 (2.13)	4.50 (5.69)	4.88 (5.31)	3.72 (6.00)	399.3 3	<.00 1
Institutional strategies	5.64 (1.57)	4.07 (5.79)	4.79 (5.79)	3.93 (6.00)	375.7 8	<.00 1

Source: Authors' own elaboration.

Note. FIS = Faculty of Information Sciences, FHS = Faculty of Health Sciences, FES = Faculty of Educational Sciences, FC = Faculty of Chemistry, Mdn = median.

Regarding the comparison of student perception toward sustainability according to the academic semester completed, significant differences were similarly found across all dimensions, as shown in Table 7. Moreover, according to the Games-Howell test for multiple comparisons, it can be noted that, in general, eighth-semester students show a higher degree of knowledge and slightly more positive attitudes; however, they report the lowest levels in behavior and perception regarding institutional strategies for sustainability. In contrast, second-semester students have more favorable perceptions concerning strategies and sustainable behaviors.

Table 7

Kruskal-Wallis test for comparison of student perception towards sustainability based on semester enrolled

Dimensions	Semester				H	p
	2nd Mdn (range)	4th Mdn (range)	6th Mdn (range)	8th Mdn (range)		
Knowledge	5.33 (6.00)	5.27 (5.53)	5.33 (5.73)	5.67 (6.00)	20.4 4	<.00 1
Attitude	5.27 (5.87)	4.93 (5.87)	5.20 (5.47)	5.33 (6.00)	32.3 5	<.00 1
Behavior	5.13 (5.25)	4.63 (5.69)	4.69 (5.44)	4.38 (6.00)	43.2 6	<.00 1
Institutional strategies	5.29 (5.79)	4.43 (6.00)	4.50 (5.64)	4.29 (5.79)	56.7 8	<.00 1

Source: Authors' own elaboration.

Note. Mdn = median.

The findings of this study indicate that the academic context significantly influences student perception towards sustainability. In particular, the semester enrolled emerges as a determining factor in how students value the principles of sustainable development.

This result aligns with the observations made by Michalos et al. (2009) and Callejón et al. (2022), who identify that, in addition to gender, the semester completed has a significant impact on students' perception and valuation of sustainability. Furthermore, it is consistent with the findings of Nizar et al. (2019), indicating that as students progress in their academic journey, their level of knowledge about sustainability increases, but their practical commitment and confidence in institutional strategies decrease. This could reflect changes in exposure to sustainability-related content or experiences throughout their academic trajectory.

This pattern can be partially explained by the discontinuous exposure to sustainability-related content over the academic path. While the early stages of education may provide a motivating introduction to the SDGs, later semesters might dilute this theme or treat it in isolation, limiting meaningful appropriation. Tomasella et al. (2022) and Silva-Munar et al. (2021) point out that this lack of integration in training programs weakens the link between acquired knowledge and the transformative action expected from university students.

Moreover, the results reflect significant differences according to the faculty affiliation, reinforcing the idea that the immediate environment—including the curriculum, teaching methodologies, and organizational culture—directly influences how students perceive sustainability. In this regard, students from faculties with a greater integration of socio-environmental content or more visible institutional practices in this field exhibited attitudes and behaviors more consistent with a sustainable culture. This concurs with the documentation by Lim et al. (2022) and Abowardah et al. (2024), who state that meaningful educational experiences aligned with sustainable development principles generate greater involvement and a sense of belonging among students.

The study also reaffirms the importance of strengthening the connection between academic training and institutional sustainability actions. As warned by Figueroa-García (2023) and Jabeen (2024), a gap between institutional discourse and the daily experiences of students can generate distrust and disengagement. Therefore, it is essential to design university policies that integrate sustainability as a transversal and cultural axis—not only as a curricular content but as a guiding principle of management, research, and community engagement.

Consequently, it can be concluded that the academic context, defined by the faculty and semester enrolled, significantly influences students' perceptions towards sustainability. These academic factors can shape how students understand and value sustainable practices, suggesting the need for differentiated educational strategies that consider the particularities of each faculty and the level of academic progress. Adapting sustainability educational initiatives to these specific contexts

could strengthen students' awareness and commitment to sustainability throughout their university education.

Finally, academic factors, specifically faculty affiliation and semester enrolled, not only condition the level of knowledge or attitude towards sustainability but also shape the interpretive framework from which students engage with the concept of sustainable development. Considering these variables in the design and implementation of educational strategies can contribute to forming a more critical, informed, and engaged university citizenry regarding current global challenges.

Conclusions

This study addresses the integration of sustainability in HE and highlights that the academic context, determined by faculty and semester enrolled, significantly influences student perception. This understanding allows for identifying that, to achieve better results in the adoption of these practices, it is important to consider the specific characteristics of each faculty and the level of academic progress.

Among the limitations of the study is the use of non-probabilistic judgment sampling, which may limit the generalization of results to the entire student population of the university. Additionally, the cross-sectional design prevents establishing causal relationships between the studied variables and perceptions of sustainability.

One of the strengths of the study lies in the inclusion of a large sample of students from various faculties and academic levels, allowing for a detailed comparative analysis of the perception toward sustainability. However, a potential area for improvement would be the incorporation of a longitudinal approach to assess the evolution of perception over time and under the influence of different educational strategies.

This study contributes to the literature on education for sustainability by demonstrating the need to adapt educational strategies according to specific academic contexts. In this sense, future studies could explore more deeply how additional factors, such as gender or participation in extracurricular activities related to sustainability, influence student perception.

To continue this line of research, the implementation of a longitudinal design is proposed to assess the impact of educational strategies on students' perception and sustainable behavior throughout their academic journey. Additionally, it would be useful to expand the analysis to other universities to compare results and explore whether the observed differences are consistent across various academic contexts.

This research reinforces the importance of an adaptable and specific educational approach to foster a culture of sustainability in the university environment, highlighting the need for personalized strategies that address the needs and particular characteristics of each academic group.

References

Abdul Karim, A., Abdullah, S., Mohd Ayub, A. y Sharaai, A. (2021). Critical Success Factors of Knowledge on Sustainability in Malaysian Higher Education. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(5), 74-83. http://dx.doi.org/10.17762/turcomat.v12i5.732

Abowardah, E., Labib, W., Aboelnagah, H. y Nurunnabi, M. (2024). Students' Perception of Sustainable Development in Higher Education in Saudi Arabia. *Sustainability*, 16(4). https://doi.org/10.3390/su16041483

Adeoye, M. (2023). Review of Sampling Techniques for Education. *ASEAN Journal for Science Education*, 2(2), 87-94. https://ejournal.bumipublikasinusantara.id/index.php/ajsed/article/view/230/214

Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., Dripps, W., Habron, G., Harré, N., Jarchow, M., Losch, K., Michel, J., Mochizuki, Y., Rieckmann, M., Parnell, R., Walker, P. y Zint, M. (2021). Key competencies in sustainability in higher education toward an agreed-upon reference framework. *Sustainability Science*, 16, 13-29. https://doi.org/10.1007/s11625-020-00838-2

Callejón, A., Rosales, A., Torroba, M. y Lorente, E. (2022). Un análisis del comportamiento sostenible de los estudiantes universitarios de finanzas y contabilidad. *En IX Jornada Internacional AECA sobre Valoración, Financiación y Gestión de Riesgos: Actas IX Jornada Internacional-Cuenca 2022 (p. 31). Asociación Española de Contabilidad y Administración de Empresas, AECA*. https://dialnet.unirioja.es/servlet/articulo?codigo=8481770&orden=0&info=link

Caputo, F., Ligorio, L., y Pizzi, S. (2021). The Contribution of Higher Education Institutions to the SDGs An Evaluation of Sustainability Reporting Practices. Administrative Sciences, 11(3), 97. https://doi.org/10.3390/admsci11030097

Cardeño Portela, N., Cardeño Portela, E. J., & Bonilla Blanchar, E. (2023). TIC y transformación académica en las universidades. *Región Científica*, 2(2), 202370. https://doi.org/10.58763/rc202370

Comisión Económica para América Latina y el Caribe (CEPAL). (2021*). Educación y sostenibilidad en América Latina y el Caribe: Desafíos y oportunidades para una transformación inclusiva*. CEPAL. https://repositorio.cepal.org/bitstreams/ea5665bd-468c-4864-ba3c-0c890651f617/download

Creswell, J. W., y Creswell, J. D. (2022). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (6th ed.). SAGE.

Diaz, M., Bajo-Sanjuan, A., Gil, Á., Rosales-Pérez, A., y Marfil, L. (2023). Environmental behavior of university students. *International Journal of Sustainability in Higher Education*, 24(7), 1489-1506. https://doi.org/10.1108/ijshe-07-2022-0226

Figueroa-García, E. (2023). Factores que determinan el comportamiento sustentable en las instituciones de educación superior. Un modelo para Querétaro, México. *Revista iberoamericana de educación superior*, 14(39), 55-76. https://doi.org/10.22201/iisue.20072872e.2023.39.1529

Filho, W., Amaro, N., Ávila, L., Brandli, L., Damke, L., Vasconcelos, C., Hernandez-Diaz, P., Frankenberger, F., Fritzen, B., Velazquez, L., y Sálvia, A. (2021). Mapping sustainability initiatives in higher education institutions in Latin America. *Journal of Cleaner Production*, 315, 128093. https://doi.org/10.1016/J.JCLEPRO.2021.128093

Fuchs, P., Finatto, C., Birch, R., De Aguiar Dutra, A., y De Andrade Guerra, J. (2023). Sustainable Development Goals (SDGs) in Latin-American Universities. *Sustainability*, 15, 8556. https://doi.org/10.3390/su15118556

García-Martínez, I., Augusto-Landa, J., Quijano-López, R., y León, S. (2022). Self-Concept as a Mediator of the Relation Between University Students' Resilience and Academic Achievement. *Frontiers in Psychology*, 12, 747168. https://doi.org/10.3389/fpsyg.2021.747168

González-Campo, C., Ico-Brath, D. y Murillo-Vargas, G (2022). Integración de los objetivos de desarrollo sostenible (ODS) para el cumplimiento de la agenda 2030 en las universidades públicas colombianas. *Formación Universitaria*, 15(2), 53-60. http://dx.doi.org/10.4067/S0718-50062022000200053

Hernández-Sampieri, R., y Mendoza-Torres, C. P. (2023). *Metodología de la Investigación. Las rutas cuantitativa, cualitativa y mixta*. (2.ª ed.). McGraw-Hill Interamericana.

Jabeen, F. (2024). The Alignment of Universities With Sustainable Development Goals: How Do Academics Perceive the Progress (Not) Made? *IEEE Transactions on Engineering Management*, 71, 13545-13557. https://doi.org/10.1109/TEM.2022.3183016

Jiménez-Pitre, I., Molina-Bolívar, G., & Gámez Pitre, R. (2023). Visión sistémica del contexto educativo tecnológico en Latinoamérica. *Región Científica*, 2(1), 202358. https://doi.org/10.58763/rc202358

Jones, T., Mack, L., y Gómez, O. (2023). Students' perspectives of sustainable development goals in a Japanese higher education institute. International *Journal of Sustainability in Higher Education*, 25(1), 182-201. https://doi.org/10.1108/ijshe-12-2022-0380

Lim, C., Haufiku, M., Tan, K., Ahmed, M., y Ng, T. (2022). Systematic Review of Education Sustainable Development in Higher Education Institutions. *Sustainability*. https://doi.org/10.3390/su142013241

López González, Y. Y. (2023). Aptitud digital del profesorado frente a las

competencias TIC en el siglo XXI: una evaluación de su desarrollo. *Región Científica*, 2(2), 2023119. https://doi.org/10.58763/rc2023119

López-Leyva, S. (2024). La educación de América Latina percibida desde el objetivo 4 de los objetivos del desarrollo sostenible (ODS). *Información Tecnológica*, 35(2), 23-36. http://dx.doi.org/10.4067/S0718-07642024000200023

Maldonado-Suárez, N., y Santoyo-Telles, F. (2024). Validez de contenido por juicio de expertos: Integración cuantitativa y cualitativa en la construcción de instrumentos de medición. *REIRE Revista d'Innovació I Recerca En Educació*, 17(2), 1–19. https://doi.org/10.1344/reire.46238

Michalos, A., Creech, H., McDonald, C. y Kahlke, M. (2009). *Measuring Knowledge, Attitudes and Behaviours towards Sustainable Development: Two Exploratory Studies*. International Institute for Sustainable Development. https://www.iisd.org/system/files/publications/measuring_knowledge_sd.pd f

Munir, S., Shakeel, M., y Waheed, K. (2023). The Importance of Emotional Intelligence for Transformational Leaders: A Critical Analysis. *Pakistan Journal of Humanities and Social Sciences*, 11(1), 332-339. https://doi.org/10.52131/pjhss.2023.1101.0353

Nizar, N. M., Ab Mutalib, N. H., y Taha, H. (2019). The status of knowledge, attitude, and behaviour of postgraduate students towards Education for Sustainable Development (ESD). *Jurnal Pendidikan Sains Dan Matematik Malaysia*, 9(2), 35-41. https://doi.org/10.37134/jpsmm.vol9.2.5.2019

Novieastari, E., Pujasari, H., Rahman, L., Ganefianty, A., y Rerung, M. (2022). Knowledge, perception, and awareness about Sustainable Development Goals (SDGs) among students of a public university in Indonesia. *International Journal of Health Promotion and Education*, 60(4), 195-203. https://doi.org/10.1080/14635240.2022.2066557

Orçan, F. (2023). Comparison of Cronbach's Alpha and McDonald's Omega for ordinal data: Are they different? *International Journal of Assessment Tools in Education*, 10(4), 709-722. https://doi.org/10.21449/ijate.1271693

Pacheco-Peralta, N., Viteri-Chiriboga, E., Fuenzalida-Moreno, U., y Marchan-Rodríguez, F. (2022). El Modelo de Gestión y Responsabilidad Social Universitaria en cumplimiento de los Objetivos de Desarrollo Sostenible 2030. *Polo del Conocimiento*, 7(6), 1989-2001. https://doi.org/10.23857/pc.v7i6.4176

Ramírez-Franco, J. y Antolín, R. (2022). Evolución de las actitudes de los estudiantes de empresariales hacia los Objetivos de Desarrollo Sostenible: Un análisis pre y post pandemia. *Revista Educativa HEKADEMOS*, (33), 32-39. https://www.hekademos.com/index.php/hekademos/article/view/70

Ribeiro, J., Hoeckesfeld, L., Magro, C., Favretto, J., Barichello, R., Lenzi, F., Secchi, L., De Lima, C., y De Andrade Guerra, J. (2021). Green Campus Initiatives as sustainable development dissemination at higher education institutions: Students' perceptions. *Journal of Cleaner Production*, 312, 127671.

https://doi.org/10.1016/J.JCLEPRO.2021.127671

Shava, G., Mkwelie, N., Ndlovu, M., y Zulu, E. (2023). Higher Education Institutions' Sustainable Development towards Agenda 2030: A Global Goals in Policy and Curriculum. *International Journal of Research and Innovation in Social Science*, 74(4), 1320-1336. https://doi.org/10.47772/ijriss.2023.7510

Silva-Munar, J., Galleguillos-Cortés, C., Hurtado-Cailly, R. y Saavedra-Godoy, A. (2021). Intención del comportamiento de estudiantes relacionada a los objetivos de desarrollo sostenible, basado en la teoría del comportamiento planificado. *Estudios pedagógicos (Valdivia)*, 47(1), 157-173. https://dx.doi.org/10.4067/S0718-07052021000100157

Tomasella, B., Wylie, A., y Gill, D. (2022). The role of higher education institutions (HEIs) in educating future leaders with social impact contributing to the sustainable development goals. *Social Enterprise Journal*, 19(4), 329-346. https://doi.org/10.1108/sej-03-2022-0027

Vindigni, G. (2024). Overcoming Barriers to Inclusive and Equitable Education: A Systematic Review Towards Achieving Sustainable Development Goal 4 (SDG 4). *European Journal of Arts, Humanities and Social Sciences*, 1(15), 3-47. https://doi.org/10.59324/ejahss.2024.1(5).01

Wiek, A. y Redman, A. (2022). *What Do Key Competencies in Sustainability Offer and How to Use Them*. In: Vare, P., Lausselet, N., Rieckmann, M. (eds) Competences in Education for Sustainable Development. Sustainable Development Goals Series. Springer, Cham. https://doi.org/10.1007/978-3-030-91055-6_4

Žalėnienė, I., y Pereira, P. (2021). Higher Education for Sustainability: A Global Perspective. *Geography and Sustainability*, 2(2), 99-106. https://doi.org/10.1016/J.GEOSUS.2021.05.001

Zwolińska, K., Lorenc, S., y Pomykała, R. (2022). Sustainable Development in Education from Students' Perspective—Implementation of Sustainable Development in Curricula. *Sustainability*, 14(4), 3398. https://doi.org/10.3390/su14063398

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