

Analysis of the Ecological Attitude and Sustainable Behavior of Students: A Green Campus Model, the Case of the University of Medellín, Colombia

Yuri Lorene Hernández Fernández
<https://orcid.org/0000-0002-4738-4182>

Sandra Milena Palacio López
<https://orcid.org/0000-0003-3293-5233>

Dora Luz Delgado Gómez
<https://orcid.org/0000-0001-5259-7118>

Javier A. Sánchez-Torres
<https://orcid.org/0000-0002-8217-2177>
University of Medellín, Medellín, Colombia

Abstract

Environmental education has an important role in higher education institutions as it leads to understanding the importance of sustainability, thus creating a positive impact on students. This impact extends beyond the classroom, inspiring them to actively engage in environmentally responsible behaviors and become conscientious stewards of our planet. The aim of the research was to analyze the environmental perception and ecological attitude of university students at the University of Medellín, that is, this study consisted of examining whether environmental education programs positively influenced the perception of the green campus and the ecological attitude. A structural model was proposed to empirically contrast this phenomenon at a university accredited as a green campus. The results explored that the universities that carry out environmental programs and that offer educational activities on this topic generate a responsible attitude towards sustainability and ecology in their students. This has short, medium and long-term impacts for the university.

Keywords: Ecological perception, ecological attitude, environmental education, green campus, University of Medellín.

Introduction

Today, environmental problems are global and have generated challenges associated with health, loss of biodiversity, food shortages and climatic variations, threatening the survival of life on the planet. Although these problems can affect everyone, and most governments have not been able to counteract them (Arce et al.,

2015). One way to deal with these problems is to involve local community groups and organizations to work with the government to protect and conserve the environment.

Therefore, it is necessary to create public awareness and educate the younger generations for a sustainable solution to these problems (Gómez et al., 2018), which leads to recognizing the importance and role of education in raising environmental awareness and developing human capital to support local communities in this exercise (Wright, 2016).

One of the objectives of education is to provide effective teaching strategies, where students realize the relevance and applications of the subject under study in their lives. A good environmental education program focuses on conceptual understanding, as well as on the development of the mental awareness and concern (Gu et al., 2019). Environmental education deals with a pedagogical approach that is based on the premise that students learn to connect environmental concepts with the real world, thus creating significant experiential learning (Jung & Kim, 2018).

Under this scenario, the initiative of a green campus has attracted a lot of attention although the phenomenon of the green university is more and more frequent, it is very important that being green is not just a statement, since promoting green campuses is necessary (Agustina et al., 2022; Dagiliūtė et al., 2018).

It is important that universities generate a significant impact and play a relevant role in the provision of sustainable development, that is, to commit and lead the way to establish sustainable practices at institutions and also to contemplate, as a final objective, the formation of a central value by integrating the concept of sustainable development in tertiary education, to make the contribution of the university to the sustainable development of society (Gulwadi et al., 2019). This includes the promotion of environmental problems to society, executing sustainable outreach and partnership strategies, involving construction, energy, waste, food, water and landscaping, waste management and transportation (Fachrudin & Fachrudin, 2021), and not least, encouraging debate and solutions to the environment and social problems of the communities where they are found (Veidemann, 2022).

Consequently, the research aims to analyze to what extent sustainable environmental education programs implemented by universities affect the perception of green campus and whether sustainable environmental education programs implemented by universities actually influence the ecological attitude of their students.

To achieve the aim of the research, a quantitative study is applied to a specific case, a university that develops sustainable environmental education programs. To conduct the research, first, the case of the University of Medellín located in Colombia will be described, then the hypotheses and the model will be presented, followed by the development of the applied methodology, the analysis of the data and results, and, finally, conclusions will be made.

Case of the Living Campus of the University of Medellín

In 1994, the Environmental Engineering undergraduate program was created at the University of Medellín. the program aims to train professionals who develop innovative solutions to environmental problems that arise from the society-nature interaction.

The consolidation of a sustainable territory in the living campus was carried out through projects in education and research for sustainability, food sovereignty, comprehensive management of solid waste, conservation of socio-ecosystems, sustainable mobility, renewable energies, among others. Each of these projects has a high level of interrelation with culture and education. 'Campus Vivo' has been gaining legitimacy and recognition through some networks such as the Latin American Forum Network of Environmental Sciences – FLACAM, the Colombian Network in Environmental Training RCFA, the Interinstitutional Committee of Environmental Education for the Department of Antioquia and the Interinstitutional Committee of Environmental Education Municipal-CIDEAM, among others.

In 2015, some Environmental Engineering undergraduate students proposed a classroom project for the initiation of an 'Ecohuerta' in the 'La Ortega', a forest property located in the university campus. The 'Ecohuerta' is based on agroecological practices and has the area of 2,500 m², of which 550 m² are planted with more than 45 different plant species and vegetables. It was designed with different techniques of ancestral wisdom, among them a hydrological design was used. The latter allows for the collection of approximately 70,000 liters of rainwater, which is used to irrigate the crops during the driest periods. Thanks to the products that are grown there, educational processes have been advanced through the realization of Agroecological and Peasant Fairs.

In 2016, the Campus Vivo Sustainability Management University System was developed, whose main objective was to execute, articulate, integrate and disseminate the sustainability practices developed by the university, having local and global responsibility with care as pillars of ecosystems and humans. The idea for the Campus Vivo was born from a need for the university to strengthen its role as a cutting-edge educational institution that recognizes the importance of sustainability (social, economic and environmental) and considers it necessary to become an institution that contributes to the fulfilment of the Sustainable Development Goals (SDGs).

In 2017, the Campus Vivo held events and training strategies that contributed to strengthening a positive attitude of students towards ecology. Among them the most outstanding were: El Vivo Fest: a university event around sustainability, consumption responsibility and good living; participation in the Chair of Science and Freedom; and the access process aimed at students.

In 2018, the Campus Vivo also embarked on the management and consolidation of an action plan that would lead to the recognition of the institution's sustainability policy before the Colombian Ministry of the Environment and Sustainable Development.

Currently, the University of Medellín is actively participating in the program committees that develop the proposals for master documents to obtain the qualified registration of the Master programs in Sustainability Management, specialization in Renewable Energies and the virtual diploma in Sustainable Entrepreneurship. This will give rise to the first program proposal of the University of Medellín on the platform 'Mirada X', where an important participation has been achieved in the management of the University Pact for Education for Sustainable Development with the participation of 50 higher education institutions of the Aburrá Valley Metropolitan Area. Two articulated projects are also being managed to promote the participation of students and the university community: the 'Green Corridor' nature tourism innovation project for ecological restoration, with which it is hoped to achieve an educational place for nature tourism; and the 'Living Laboratory' project, created with the support of the Faculties of Engineering, Economic and Administrative Sciences that will integrate

teaching, research and extension and its development will contribute to the consolidation of the Regenerative Social, Economic and Ecological Innovation Model (SER model), through the articulation of its various components, as well as projects that will contribute to university life, resilience, climate change and food sovereignty through the SER Model.

Theoretical Foundation

To formulate the hypotheses and define the model to be tested, two central elements must be reviewed: first, the perception of students regarding a green campus and its sustainable environmental education programs and, second, the relationship between sustainable environmental education programs, the perception of green campus and the ecological attitude of university students.

The Perception of University Students About a 'Green Campus'

The purpose of environmental perception is to find various cultural aspects, which are related to the different ways in which individuals are involved with the environment. Therefore, it is important to define perception as the way in which people manage to see the environment in which they are, taking into account relevant elements, such as integration of the interaction with the ecosystem (Salas-Zapata & Cardona-Arias, 2020). In this way, the perception seeks to communicate to others a positive message from the environment, so that people can interpret this significantly and impart it to other individuals. This leads to a commitment to the habitat, where the spaces function in providing an experience according to the culture, to which one belongs.

In that same context, the incorporation of an entire university community in sustainable development activities is essential (Dagiliūtė et al., 2018). In this sense, for students, it is important to generate an understanding of the perceptions of sustainable development and provide an idea of whether or not and how they are likely to participate in sustainable practices, and also care about sustainable development (Heyl et al., 2014).

In previous studies on the position of students regarding the sustainable practices implemented by their universities, it was found that they were more concerned about the wasteful consumption of natural resources and the destruction/pollution of the environment (Abd-Razak et al., 2012; Fachrudin & Fachrudin, 2021).

Environmental education programs influence the perception of a green campus by raising awareness of environmental issues, promoting pro-environmental behaviors, and fostering a sense of environmental responsibility among students and staff. Therefore, it is relevant to focus efforts on educating students and developing related programs to have more positive effects on green campus projects (Gulwadi et al., 2019).

H1: Environmental education programs influence the student's perception of a green campus.

Relationship Between Sustainable Environmental Education Programs, the Perception of Green Campus and the Ecological Attitude of University Students

Attitude is defined as positive or negative individual evaluations in favor of an object or situation, determined by the positive or negative consequences that derive from it, and influenced by other factors such as: mood, emotions, personality, social pressure, potential, risk or time, among others (Ajzen, 2001).

An ecological attitude can be defined as an approach that aims to safeguard the natural environment and make concerted efforts to rectify the environmental degradation that has transpired. This attitude essentially shapes one's emotions and preferences in relation to the environment (Zheng et al., 2018).

Ecological attitude involves a strong commitment to preserving and revitalizing our natural environment. It entails a deep concern for the well-being of our planet, a recognition of the harm that human activities have caused, and a determination to take remedial actions. Those who adopt an ecological attitude often prioritize environmental conservation and sustainability in their decision-making processes and daily lives (Mutaliyeva et al., 2020).

In essence, an ecological attitude encompasses a set of values, beliefs, and behaviors that reflect a genuine dedication to protecting the Earth's ecosystems, mitigating ecological harm, and embracing a sustainable coexistence with nature. It embodies a mindset that acknowledges our interconnectedness with the environment and seeks to foster harmony between human activities and the natural world (Zheng et al., 2018).

According to various studies, ecological attitude is influenced by emotions, such as fear, anger and concern stimulated by knowledge of environmental problems, as well as other fundamental values, willingness to take action to solve environmental problems and ideas about the limits of personal response for the benefit of the environment (Dodds et al., 2019; Mutaliyeva et al., 2020; Zheng et al., 2018).

Having a positive ecological attitude means that the individual, in this case, the students, are interested in seeking and acquiring knowledge or information about ecological products and events, and certainly participating in activities that provide protection, where they can take preventive actions and protective attitudes toward protecting nature and addressing environmental issues, and integrating this behavior into their daily lives (Muflihaini et al., 2020).

According to the literature, it has been shown that certain variables reinforce a positive ecological attitude, as it is the case with environmental awareness and the perception of environmental risk, which are reinforced by the environmental programs practiced by educational institutions (Suleimenova & Ivanova, 2018). By involving students to participate in such programs, they are more friendly to the environment in terms of their feelings and ideas, their attitudes and behaviors regarding environmental protection (Sayan & Kaya, 2016).

The influence of environmental education on the attitude of students towards the environment has been proven through the learning process, which organizes and clarifies the concepts of value to develop the skills and attitudes necessary to raise awareness, knowledge and the attention of the students to take care of the environment, as well as their perception of themselves in relation to others (Thomsen et al., 2018). Similarly, it has been found that demographic variables such as gender, age, level of schooling, educational level of parents, level of household income, among others, have an effect on environmental awareness and, therefore, on the environmental attitude of students (Gustria & Fauzi, 2019).

Therefore, it is essential to ensure the continuity of environmental education in educational institutions, which will contribute to attracting the attention of the

stakeholders, such as public, civil and private sector, and, thereby, enhance students' environmental knowledge and awareness. As it is evident, improving environmental education is one of the strategies to ensure the sustainable future of the environment (Dias et al., 2022; Gurbuz & Ozkan, 2019).

Different universities have begun the implementation of 'green campus' programs, becoming the main channel through which universities have adopted the principles of sustainable development (Gavinolla et al., 2023; Martins et al., 2018). Thus, 'green campus' programs have become indirect indicators that classify higher education institutions as world leaders in sustainability (Zach et al., 2012).

A green campus implies infusing environmentally friendly initiatives, practices or interventions in all dimensions of the university, creating a sensitive academic environment and establishing a results-oriented culture of sustainable action (Fachrudin & Fachrudin, 2021).

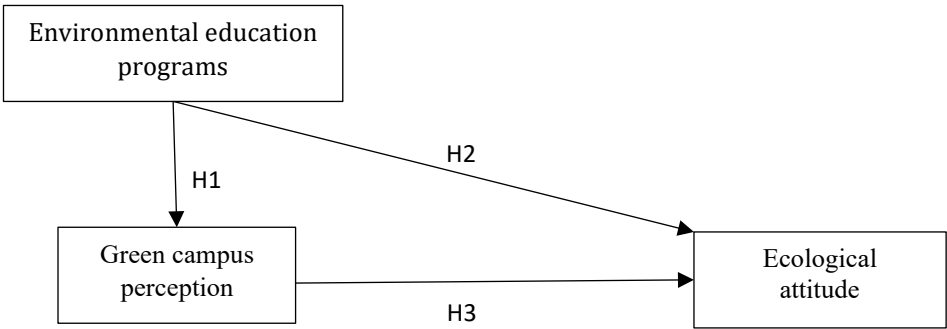
These interventions range from the incorporation of these objectives in the curricular design, promoting respectful practices with the environment in all dimensions of university operations and infrastructure, and reinforcement of the values of critical thinking, collaborative decision-making and responsibility for the environment in the university community, thus promoting education for sustainable development (Fachrudin & Fachrudin, 2021).

This education model oriented towards sustainability campuses implies changing the conscience among students and encouraging teachers to apply new pedagogical methods where organizational forms of academic and social participation are agreed. The programs of learning should expand from the classroom and university services to a real environment to generate in the student an active role and positively influence environmental attitudes (Martínez Roget et al., 2013; Veidemane, 2022).

H2: Environmental education programs reinforce the ecological attitude of students.

H3: A positive perception of the green campus by students reinforces their ecological attitude.

Figure 1
Theoretical Model



Methodology

The nature of the model was exploratory and the sampling requirements for the model analysis used the Partial Least Square (PLS). The PLS was selected for several reasons. The primary aim was to predict and clarify the dependent variables of the model rather than to confirm the model overall validity. The focus was on explaining the dependent variables and increasing their explained variance, as well as understanding the direction, size, and significance of the path coefficients (Sarstedt et al., 2022).

Measurement Instrument

The questionnaire, adapted from prior research, was structured as follows: the first section collected basic demographic information from the participants (Table 2). The second section included five variables taken from the literature. The variables of environmental attitude and environmental education programs were adapted from Gurbuz & Ozkan (2019), and the green campus variable from Dagiliūtė et al. (2018) (Table 1).

Table 1
Measurement Tool

Variable/adopted from	Measurement items
Ecological attitude (Gurbuz & Ozkan, 2019)	AE1. I think I can take an active part in protecting the environment. AE2. I think I try to use resources such as electricity, water, etc., in the most efficient way possible. AE3. I consider that the environment is the responsibility of all of us.
Environmental education programs (Gurbuz & Ozkan, 2019)	ERU1. I consider that the university contributes with environmental education, ecology and activities for its care. ERU2. I believe that the university encourages its students to conduct applied research in the environment. ERU3. I believe that the university contributes to caring for the environment in its study programs.
Green campus perception (Dagiliūtė et al., 2018)	CG1. I believe that the university has an environmental program. CG2. I think that the university promotes recycling and it is feasible. CG3. I consider that the university promotes pollution reduction activities.

To avoid language comprehension problems, a pilot-test was carried out with 10 students, without finding any semantic problems. The university students of all courses, regardless of the number of years of study, participated in the survey. They were asked to indicate the extent to which they agreed with the statements in the questionnaire according to a five-point Likert-type scale (1 = Strongly Disagree; 2 = Disagree; 3 = No Opinion; 4 = Agree; 5 = Strongly Agree). A non-probabilistic sample based on the convenience method was developed through surveys administered to students at the

University of Medellín, Colombia. The total number of surveys collected was 697. A greater number of responses were received from females (n = 456) compared to males (n = 241), which did not affect the results of the study (the statistical tests were performed by gender and to moderate the effect without finding significant differences). Similarly, no significant differences were found between the two participant age ranges (Table 2).

Table 2

Sample

Variables	Demographic traits	%
Gender	Male	34.6
	Female	65.4
Age of respondents	Between 16 and 20 years of age	51.9
	Between 21 and 30 years of age	48.1

Data Analysis and Results

The data were analyzed using the Smart PLS 3.2.8 program following the recommendations of Hair et al. (2020) to examine poorly tested relationships or poorly developed theories. First, the measurement tool was validated; then, we evaluated the validity of the model by testing the proposed hypotheses.

Validity of the Measuring Instrument

First, the discriminant validity test was applied, which verified that the items measured only their corresponding variable and not the other variables; the results showed that all the values of the items of the discriminant loads were greater than 0.505. Consequently, they are acceptable (Table 3) (Hair et al., 2017).

Table 3

Discriminant Validity Test

Indicators/variable	Loads	Statistics t (O/STDEV)	P Values
AE1 -> Ecological attitude	0.833	23.490	0.000
AE2 -> Ecological attitude	0.748	16.483	0.000
AE3 -> Ecological attitude	0.767	7.029	0.000
ERU1 -> Environmental education programs	0.931	164.557	0.000
ERU2 -> Environmental education programs	0.884	79.721	0.000
ERU3 -> Environmental education programs	0.920	134.685	0.000
CG1 -> Green campus perception	0.858	85.257	0.000
CG2 -> Green campus perception	0.870	70.991	0.000
CG3 -> Green campus perception	0.929	64.836	0.000

Notes: Significant at: *p<0.01, t-value > 2.576

The other reliability tests were also satisfactory, such as Cronbrach's alpha test (all values were > 0.70), mean variance extracted (all values were > 0.5), composite reliability (all values > 0.6) and Rho_A (all values > 0.70) verifying the convergent reliability of measurement for all variables (Table 4) (Gefen et al., 2000; Henseler et al., 2014).

Table 4

Reliability Test

Variable	Cronbach's alpha	Rho_A	Compound reliability	Average extracted variance (AVE)
Ecological attitude	0.751	0.705	0.864	0.725
Environmental education programs	0.863	0.871	0.916	0.786
Green campus perception	0.899	0.902	0.937	0.831

The divergent validity was verified by comparing the AVE value of the variables with the correlation of the constructions with respect to each variable squared, since these were less than the square root of the AVE, which showed that each variable was more strongly related with its own items (Table 5) (Fornell & Larcker, 1981). Finally, the Henseler–Ringle test also confirmed the divergent validity, as no values higher than 0.8 were found (Table 6) (Henseler et al., 2014).

Table 5

Discriminant Validity Test—Fornell and Larcker Criterion (AVE)

	Ecological attitude	Environmental education programs	Green campus perception
Ecological attitude	0.725		
Environmental education programs	0.247	0.886	
Green campus perception	0.276	0.814	0.912

Table 6

Discriminant Validity Test—Heterotrait-Monotrait Ratio (HTMT)

	Ecological attitude	Environmental education programs	Green campus perception
Ecological attitude			
Environmental education programs	0.339		
Green campus perception	0.378	0.719	

Validity of the Model

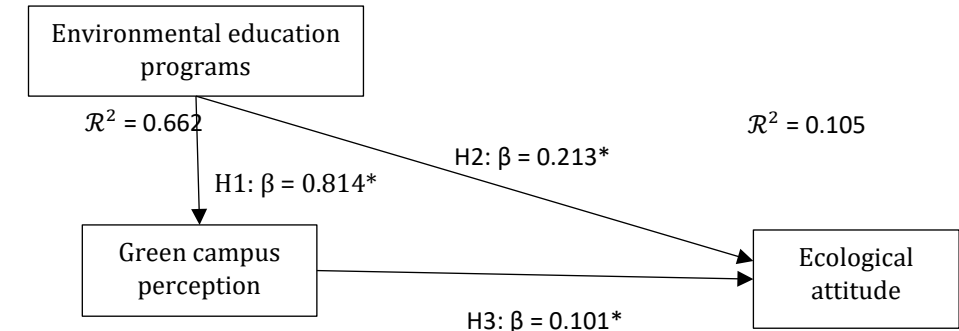
Regarding the verification of the model, a bootstrapping was carried out taking 5,000 subsamples (Sarstedt et al., 2020) (Table 7). The results confirmed, first of all, that the model presented an acceptable level of prediction of the dependent variables, having an R square for the variable ‘perception of a green campus’ equal to 0.662 and for the variable ‘ecological attitude’ of 0.105. Second, all the hypotheses were confirmed, with environmental education programs having a positive influence on the perception of a green campus (H1: $\beta = 0.814^*$) and, in the same way, on the ecological attitude (H2: $\beta = 0.213^*$). This finding shows that the modern trend of universities towards green campuses should not only focus on the sustainability and impact on nature of the campus facilities, but also on the actions carried out in environmental education that are interrelated with university teaching of their students (Mammadova, 2017; Ngare et al., 2022). Finally, this study supported (H3: $\beta = 0.101^*$) the perception that a green campus influences the ecological attitude of university students, i.e., ecological attitudes of university students are generated, thus fulfilling the university goal of training integral citizens (Agustina et al., 2022; Farooq et al., 2022; Ortiz-de-Urbina-Criado et al., 2022) (Figure 2).

Table 7
Validity of Empirical Model

Hypothesis	Validation	Original sample (O)	Statistics t	P Values
H1: Environmental education programs -> Green campus	Supported	0.814*	54.232	0.000
H2: Environmental education programs -> Ecological attitude	Supported	0.213*	3.176	0.002
H3: Green campus perception -> Ecological attitude	Supported	1.010*	1.974	0.043

Notes: Significant at: * $p < 0.01$, t-value > 2.576

Figure 2
Empirical Model



Notes: Significant at: * $p < 0.01$, t-value $>$

Conclusion, Limitations and Future Areas of Research

The research aimed to analyze to what extent sustainable environmental education programs implemented by universities affect the perception of green campus and whether sustainable environmental education programs implemented by universities actually influence the ecological attitude of their students.

The results of the empirical study confirm that the environmental education program that is included within the institutional program Campus Vivo of the University of Medellín has generated a positive relationship between the variable of perception of a green campus and, therefore, the improvement of ecological attitude of students (Suleimenova & Ivanova, 2018). This research is one of the few studies that has supported the effectiveness of environmental education programs in the ecological awareness of university students.

This study suggests that universities build not only green campuses but also transversal programs in environmental education. The impact that this generates on their students and society is already a demand of society towards university graduates and professionals (Farooq et al., 2022). Therefore, university institutions must define and implement environmental education programs in alignment with environmental and cultural changes, considering the positive perception of the students. There is a need for new courses directly or transversally related to ecology, sustainability, environmental impact, (Dias et al., 2022) using various pedagogical tools, for example, blended learning, flipped classrooms, and hybrid learning, alongside student-centered models akin to open inquiry for integration into environmental education sessions (Rasis et al., 2023).

Similarly, it is of great importance that universities, and more importantly those that are considered green campuses, include courses and programs on sustainability, ecology, environmental and social impact, among others, in their training programs in a transversal or direct manner, given that the new international measurement rankings of universities include more and more indicators that measure their performance and, therefore, this will determine their level of quality and categorization (Mammadova, 2017; Veidemane, 2022).

The limitations of this study lie in the fact that it is necessary to contrast this type of analysis in different models of green campus, since the environmental education programs are unique for each university. Similarly, it is possible that there are biases related to the previous perception of students about the name of green campus of the examined university and their answers.

As future areas of the research, it is proposed to explore the impact of sustainable environmental education programs on other aspects of student life, such as academic performance, well-being, and career choices, as well as the actions of sustainable environmental care and development of graduates.

References

- Abd-Razak, M. Z., Utaberta, N., & Handryant, A. N. (2012). A study of students' perception on sustainability of campus design: A case study of four research universities campus in Malaysia. *Research Journal of Environmental and Earth Sciences*, 4(6), 646–657.
- Agustina, L., Meyliana, M., & Hanny, H. (2022). Constructing CSR student self-consciousness through university social responsibility implementation: evidence

- in Indonesia. *Social Responsibility Journal*, 19 (5), 885–905. <https://doi.org/10.1108/srj-05-2020-0170>
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, 52(1), 27–58. <https://doi.org/10.1146/annurev.psych.52.1.27>
- Arce, M. E., Crespo, B., & Míguez-Álvarez, C. (2015). Higher education drop-out in Spain: particular case of universities in Galicia. *International Education Studies*, 8(5), 247–264. <https://doi.org/10.5539/ies.v8n5p247>
- Dagiliūtė, R., Liobikienė, G., & Minelgaitė, A. (2018). Sustainability at universities: Students' perceptions from Green and Non-Green universities. *Journal of Cleaner Production*, 181, 473–482. <https://doi.org/10.1016/j.jclepro.2018.01.213>
- Dias, B. G., da Silva Onevetch, R. T., dos Santos, J. A. R., & da Cunha Lopes, G. (2022). Competences for sustainable development goals: The challenge in business administration education. *Journal of Teacher Education for Sustainability*, 24(1), 73–86. <https://doi.org/10.2478/jtes-2022-0006>
- Dodds, R., Walsh, P. R., & Koç, B. (2019). Environmentally sustainable lifestyle indicators of travelers and expectations for green festivals: The case of Canada. *Event Management*, 23(4–5), 685–697. <https://doi.org/10.3727/152599519X15506259855661>
- Fachrudin, H. T., & Fachrudin, K. A. (2021). The relationship between green behavior and green campus principles: A literature review. *IOP Conference Series: Materials Science and Engineering*, 1122(1), 012028. <https://doi.org/10.1088/1757-899x/1122/1/012028>
- Farooq, K., Yusliza, M. Y., & Muhammad, Z. (2022). Make it their decisions, not your directives: Exploring required green competencies for employee ecological behavior. *Organizacija*, 55(2), 128–141. <https://doi.org/10.2478/orga-2022-0009>
- Fornell, C., & Larcker, D. F. (1981). Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *Journal of Marketing Research*, 18(3), 382–388. <https://doi.org/10.2307/3150980>
- Gavinolla, M. R., Suneeth, B. G., Kashya, S., Mishra, J. M., & Swain, S. K. (2023). Tracing the sustainability components in the Indian tourism curricula: An exploratory study. *Journal of Teacher Education for Sustainability*, 25(1), 116–132. <https://doi.org/10.2478/jtes-2023-0008>
- Gefen, D., Straub, D. W., & Boudreau, M. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, 4(4), 2–76. <https://doi.org/10.1.1.25.781>
- Gómez, M., Imhoff, B., Martín-Consuegra, D., Molina, A., & Santos-Vijande, M. L. (2018). Language tourism: The drivers that determine destination choice intention among U.S. students. *Tourism Management Perspectives*, 27, 125–135. <https://doi.org/10.1016/j.tmp.2018.06.001>
- Gu, Y., Wang, H., Xu, J., Wang, Y., Wang, X., Robinson, Z. P., Li, F., Wu, J., Tan, J., & Zhi, X. (2019). Quantification of interlinked environmental footprints on a sustainable university campus: A nexus analysis perspective. *Applied Energy*, 246, 65–76. <https://doi.org/10.1016/j.apenergy.2019.04.015>
- Gulwadi, G. B., Mishchenko, E. D., Hallowell, G., Alves, S., & Kennedy, M. (2019). The restorative potential of a university campus: Objective greenness and student perceptions in Turkey and the United States. *Landscape and Urban Planning*, 187, 36–46. <https://doi.org/10.1016/j.landurbplan.2019.03.003>

- Gurbuz, I. B., & Ozkan, G. (2019). What's going on at the universities? How much has the research revealed university students' attitudes towards the environment? A case study of Bursa, Turkey. *Applied Ecology and Environmental Research*, 17(2), 5109–5138. <https://doi.org/10.15666/aeer/1702>
- Gustria, A., & Fauzi, A. (2019). Analysis of high school students' environmental attitude. *Journal of Physics: Conference Series*, 1185(1), 1–6. <https://doi.org/10.1088/1742-6596/1185/1/012079>
- Hair, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, 109, 101–110. <https://doi.org/10.1016/j.jbusres.2019.11.069>
- Hair, J. F. Jr., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM). *Long Range Planning*, 46 (1–2). <https://doi.org/10.1016/j.lrp.2013.01.002>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Heyl, M., Díaz, E. M., & Cifuentes, L. (2014). Environmental attitudes and behaviors of college students: a case study conducted at a Chilean university. *Revista Latinoamericana de Psicología*, 45(3), 489–502. <https://doi.org/10.14349/rlp.v45i3.1489>
- Jung, J., & Kim, Y. (2018). Exploring regional and institutional factors of international students' dropout: The South Korea case. *Higher Education Quarterly*, 72(2), 141–159. <https://doi.org/10.1111/hequ.12148>
- Mammadova, A. (2017). Education towards urban sustainability: Lessons learned from the welfare business models of Kanazawa City, Japan. *Journal of Teacher Education for Sustainability*, 19(2), 154–164. <https://doi.org/10.1515/jtes-2017-0020>
- Martínez Roget, F., Pereira López, X., & Pawlowska, E. (2013). El Turismo Académico En Galicia: Otra Forma De Contribución De Las Universidades a Las Economías Locales [Academic tourism in Galicia: Another form of contribution of universities to local economies]. *Cuadernos de Turismo*, 32, 229–242.
- Martins, I., Monsalve, J. P. P., & Martinez, A. V. (2018). Self-confidence and fear of failure among university students and their relationship with entrepreneurial orientation: Evidence from Colombia. *Academia Revista Latinoamericana de Administracion*, 31(3), 471–485. <https://doi.org/10.1108/ARLA-01-2018-0018>
- Muflihaini, M. A., Ertando, A., & Suryadarma. (2020). How is the attitude of students' environmental literacy through the myth of beringin (Ficus sp.) in adiwiyata school? *Journal of Physics: Conference Series*, 1440(1), 1–10. <https://doi.org/10.1088/1742-6596/1440/1/012066>
- Mutaliyeva, L., Kurmanov, N., & Akisheva, A. (2020). Analysis of tourism potential and ecological tourism development in Kazakhstan. *E3S Web of Conferences*, 159, 04031. <https://doi.org/10.1051/e3sconf/202015904031>
- Ngare, I. O., Otieno, D. B., Ogutu, E. A., Ondieki, D., Atima, A., Otieno, E. O., Gikonyo, S. W., & Opiyo, L. O. (2022). Inclusion of green economy and sustainability programs in higher education institutions: Examining the case of Kenyatta University, Kenya. *Educational Research and Reviews*, 17, 168–175. <https://doi.org/10.5897/ERR2022.4241>
- Ortiz-de-Urbina-Criado, M., Mora-Valentín, E. M., & Nájera-Sánchez, J. J. (2022). Sustainability and entrepreneurship: emerging opportunities for business and

- management education. *Journal of Entrepreneurship in Emerging Economies*, 15(5), 1071–1088. <https://doi.org/10.1108/JEEE-12-2021-0471>
- Rasis, R., Paidi, Suhartini, Kuswanto, H., & Hartanti, R. D. (2023). The effect of environmental education open inquiry learning kits on the environmental literacy of pre-service biology teachers. *Journal of Teacher Education for Sustainability*, 25(1), 40–63. <https://doi.org/10.2478/jtes-2023-0004>
- Salas-Zapata, W., & Cardona-Arias, J. A. (2020). Knowledge, attitudes and practices of sustainability in two university populations, Colombia. *Journal of Applied Research in Higher Education*, 13(3), 914–924. <https://doi.org/10.1108/JARHE-05-2020-0119>
- Sarstedt, M., Hair, J. F., Nitzl, C., Ringle, C. M., & Howard, M. C. (2020). Beyond a tandem analysis of SEM and PROCESS: Use of PLS-SEM for mediation analyses! *International Journal of Market Research*, 62(3), 288–299. <https://doi.org/10.1177/1470785320915686>
- Sayan, B., & Kaya, H. (2016). Assessment of the environmental risk perceptions and environmental attitudes of nursing students. *Contemporary Nurse*, 52(6), 771–781. <https://doi.org/10.1080/10376178.2016.1254051>
- Suleimenova, A., & Ivanova, O. (2018). Emotional competence and individual style of action of future teachers of higher education in the system of education for sustainable development. *Journal of Teacher Education for Sustainability*, 20(2) 44–63). <https://doi.org/10.2478/jtes-2018-0014>
- Thomsen, B., Muurlink, O., & Best, T. (2018). The political ecology of university-based social entrepreneurship ecosystems. *Journal of Enterprising Communities*, 12(2), 199–219. <https://doi.org/10.1108/JEC-08-2017-0068>
- Veidemane, A. (2022). Education for sustainable development in higher education rankings: Challenges and opportunities for developing internationally comparable indicators. *Sustainability*, 14(9), 1–20. <https://doi.org/10.3390/su14095102>
- Wright, S. (2016). Universities in a knowledge economy or ecology? Policy, contestation and abjection. *Critical Policy Studies*, 10(1), 59–78. <https://doi.org/10.1080/19460171.2016.1142457>
- Zach, S., Bar-Eli, M., Morris, T., & Moore, M. (2012). Measuring motivation for physical activity: An exploratory study of PALMS-The Physical Activity and Leisure Motivation Scale. *Athletic Insight: The Online Journal of Sport Psychology*, 4(2), 141–154.
- Zheng, Q. J., Xu, A. X., Kong, D. Y., Deng, H. P., & Lin, Q. Q. (2018). Correlation between the environmental knowledge, environmental attitude, and behavioral intention of tourists for ecotourism in China. *Applied Ecology and Environmental Research*, 16(1), 51–62. https://doi.org/10.15666/aeer/1601_051062

Correspondence concerning this paper should be addressed to Dr. Javier A. Sánchez-Torres, Facultad de Ciencias Económicas y Administrativas, Universidad de Medellín, Colombia. Email: jasanchez@udemedellin.edu.co