



## Environmental Education Indicators Associated with Sport Professionals

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### Abstract

Environmental education is a highly demanded transversal training process of the international education system, particularly in Cuban education. A number of dimensions and indicators of sports and fitness activity have been established to measure the impact of this process. However, despite the relevance of this topic, no proposal of indicators that can be homogenized into a standard assessing pattern to evaluate these actions have been submitted. The purpose of this paper was to suggest a group of indicators to assess the environmental education of the the students from the Bachelor Degree in Physical Culture, based on a set of more integrated indicators. Accordingly, bibliographic review, observation, and a survey were conducted to determine the indicators, which, it turn, revealed shortcomings in the environmental education of students, and provided a way for progressive solution.



**Keywords:** indicators, environmental education, sports

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## Introduction

Among the challenges of mankind in the twenty-first century, the most critical one is the environment. Constantly, the design of several new strategies, celebration of national and international conferences, and cooperation agreements, aim to find consensus in terms of natural resources management. The attitude assumed by humans toward the environment, either in favor or against has been criticized and adjusted, leading to new laws and theories. Some scholars have warned about the fate of the earth if humans continue to prey on nature and its ecosystem. Other in favor of negationists have reduced the extent of the peril, underestimating the impact of wars, irrational felling for commercial purposes, overexploitation of minerals, the extinction of biodiversity, and the emission of greenhouse gases. In this battle for environmental education, several approaches, strategies, and programs have been suggested in almost all sectors, as a fundamental tool to set this vital difference. However, despite the number of growing propositions, there is no deep, diverse, and customized system of indicators that provide an evaluation of this educational process in most social sectors.

Several approaches have aimed to design parameters or indicators that evaluate environmental education in various contexts and processes. Earlier, Boyarchuk; Boyarchuk, (1997) evaluated the impact of the environmental crisis following the collapse of the socialist camp in relation to the already developed components of environmental education in Russia. In turn, Rickinson (2021) made a comprehensive critical review about the evidence showing indicators that measured the effects of environmental education on learning.

Marouli, 2002, was able to link some indicators of this educational process to Multiculturalism in Canada. D'Amato, and Krasny (2011), associated the parameters of environmental education with physical activity, particularly adventure sports. Ghaemi, *et al* (2017) consolidated these parameters by presenting a conceptual model that served as



strategic referents for further research in this area, rather than as punctual elements. Suwondo; Darmadi; Haryanto, (2018) were the first to establish indicators to evaluate environmental education in universities, different from Verma *et al*, (2020), who dedicated more time and efforts to validate parameters that gave a higher priority to the social side within the ecology of sustainable cities. More recently, with the gradual spread of Covid-19, there is no question that the environmental scenario should be taken into consideration for environmental education, as reported by Bashir *et al* (2020) (A) in a study conducted in California, and Bashir *et al* (2020) (B); in New York.

In order to design a group of dimensions and indicators that have contributed to the promotion of physical culture and sports, first, it was necessary to explore the origin and methodologies used internationally. Consequently, this research produced synthetic information about the appearance of these indicators in the study of Muñoz-Montilla, A.N, & Páramo Bernal, P (2018). According to that study, it was first stated in the Declaration of Stockholm, in 1972, which was ratified in Agenda 21, in the Rio Summit (1992), and later establishment of the Commission for Sustainable Development, in 1996. This historical integration created the first measurable indicators and their methodology to evaluate sustainable development somehow in the way it was intended within that context. Gradually, other elements that improved such indicators were included, such as the ecological footprint, the Living Planet Index, the environmental sustainability index, while the theory of environmental education under construction matured.

A review of Mayer, M ( 2003) revealed that the environmental education in Spain showed positive results in the 1980s, from the transversality of disciplines, exporting the experience to Latin America and the Caribbean. It stemmed from the breakdown of three dimensions: an institutional, a curricular, and a conceptual. Possibly, a comparison of the results observed in these new territories might be interesting and favorable. However, the literature shows a vague idea of how these dimensions turned into indicators, and how the latter adapted to the sports sector, the scope of this study.

Regarding the indicators of environmental education in higher education, it appeared as a reference in the study done by Eschenhagen, M.L, (2011). The author suggested five different angles from which it was possible to measure and observe the efforts made by universities to tackle environmental topics. These angles were, 1. From environmental



subject perspective, 2. From postgraduate course perspective, 3 From the reproduction of knowledge in student (thesis) perspective 4. From research groups in universities perspective, and 5. From environmental management perspective at the university as an institution.

A systematization of the indicators found in the bibliographic review showed that all were designed heterogeneously, based on the needs of the context of place and moment in which the research reality is developed. Most indicators consulted carry a dose of naturalistic origin, for this has been the prevailing dimension throughout the years.

At the same time, there has been some distancing between environmental institutions and the local universities, though this phenomenon has been solved in various areas of the world, resulting from the scientific-technical breakthroughs made for the community at universities, closing the previously existing gaps. Besides, derived from the inclusion of interdisciplinary branches, such as psychology and pedagogy, which have enabled more humanistic and ethical-social dimensions of environmental education.

Upon the analysis of these indicators to evaluate environmental education in higher education, this study designed a group of dimensions and parameters to measure the impact of this educational process on teaching in the area of physical culture. Hence, the purpose of this paper was to suggest a group of indicators to evaluate the environmental education of the students of the Bachelor Degree in Physical Culture, based on the dimensions of this process from a more contemporary and integrated conception.

## **Materials and Methods**

In this research, two classes from the regular 2019-2020 course (CRD, in Spanish) in the Bachelor Degree of Physical Culture, at the Hermanos Saiz Montes de Oca University of Pinar del Rio were included. The number of students in each group was 14 students, totaling 28 individuals, averaging 20 years of age; the students were high school graduates from Pinar del Rio. A sample of 14 students, accounting for 50% of the second-year population, was used.



Documentary review: concepts and definitions from outstanding bibliographic sources associated with indicators for environmental education in physical culture were used as a reference to formulate the indicators. (Valladares Fuente *et al.*, 2017; Fernández-Hernández *et al.*, 2018; Valladares Fuente, 2019; Millán-Sánchez, & Castillo-Martínez, 2020; Reynoso and Fuente, 2020)

Observation: two Physical Education lessons were observed, along with the observation of 5 sports activities with students in the facilities of the faculty to gather information about aspects related to the environmental attitudes of students.

Survey: a total of 14 students were taken from the two groups at random and were surveyed to know the current situation in terms of comprehensive environmental education. Several dimensions, such as naturalist, ethical-social, and constructed environment in the work of Valladares Fuente *et al.*, 2017; Reynoso and Fuente, 2020) were included in the survey. Studies of environmental education were considered to classify within the Dimension-Indicator relation, then the following arrangement was made:

Dimension 1. [MAN]: Natural Environment

Indicator 1.1. [MAN -AEN]: Attitude toward the natural ecosystem

Sub-indicators:

1.1.1. [AEN-PAV]: Protection of green spaces

1.1.2. [AEN-CAR]: Contribution to reforestation

1.1.3. [AEN-CRM]: Contribution to recycling and re-utilization of materials

1.1.4. [AEN-VDA]: Waste dumping in appropriate places

1.1.5. [AEN-FVP]: Favorable contribution to life on the planet

1.1.6. [AEN-PCA]: Protection of water quality

1.1.7. [AEN-CTV]: Favorable contribution to the actions of Task Life

Indicator 1.2. [AHS]: Attitude toward hygiene and health

Sub-indicators:

1.2.1. [AHS-CHA]: Preservation of personal hygiene in every activity

1.2.2. [AHS-HPD]: Periodical hydration while practicing sports

1.2.3. [AHS-EES]: Prevention of exposure to sun radiations

1.2.4. [AHS-EPD]: Prevention of drug addiction, smoking, and alcoholism

1.2.5. [AHS-ECH]: Prevention of hostile, violent, isolated, and unpleasant behaviors



Dimension 2. [MAC]: Constructed Environment

Indicator 2.1 [MAC-ARD]: Attitude toward sports resources

Sub-indicators:

2.1.1. [ARD-PED]: Protection of sports equipment and gear

2.1.2. [ARD-PID]: Protection of sports facilities

2.1.3. [ARD-RID]: Repair of sports equipment with eco-friendly materials

Indicator 2.2 [MAC-ARE]: Attitude toward school resources

Sub-indicators:

2.2.1. [ARE-PBM]: Protection of school materials

2.2.2. [ARE-COE]: Positive contribution to school beauty

2.2.3. [ARE-CME]: Positive contribution to the protection of school furniture

Dimension 3. [MES]: Ethical-Social Environment

Indicator 3.1 [MES-APE]: Attitude toward the Ethical profile

Sub-indicators:

3.1.1. [APE-PHC]: General practice of courtesy habits

3.1.2. [APE-MAA]: Maintenance of appropriate look

3.1.3. [APE-MCA]: Maintenance of proper ethical conduct

Indicator 3.2 [MES-APS]: Attitude toward the Ethical profile

Sub-indicators:

3.2.1. [APS-MFC]: Maintenance of favorable relations with partners

3.2.2. [APS-MFP]: Maintenance of favorable relations with teachers

3.2.3. [APS-CTE]: Contribution to teamwork in favor of the environmental strategy

Measurement criterion: 1: The action is taken optimally

2: The action is taken sometimes/irregularly

3: No action is taken/the action is insufficient

These dimensions and indicators were analyzed and included in the diagnostic. Accordingly, pre and posttests were designed and applied during the teaching processes observed and surveyed.

## Results and Discussion



On the search for referents of indicators to evaluate the impact of environmental education on physical culture, the findings of Valladares Fuente *et al.* (2017) suggested a group of indicators that responded to the following dimensions: 1. Cognitive, 2. Practical, and 3. Assessing-affective, which stem from the most contemporary definition of environmental education. However, the analysis of how each action made by students specifically contributes to every component of the environment was difficult, considering this perspective. Hence, the process was evaluated from different visions.

According to Fernández-Hernández *et al.* (2018), the indicators were conceived within the scope of the previous authors, since the indicators were seen as macro elements, and the dimensions as output aspects of these indicators.

In this case, the indicators included: 1. Mastery of contents acquired about the environment through a system of activities suggested, and 2. The capacity to contribute to the solution to environmental problems that affect health and life quality. Naturally, the authors of this paper focused more on assessing how knowledge about environmental education can help with changes to address environmental issues in the Bachelor Degree in Physical Culture. The idea was very pertinent, but did not match the objective of using indicators that evaluate every part of the environment, which was generally integrated.

In his research, Valladares (2019) went deeper into the ethical-social dimension of environmental education in Physical Culture students, within the context of the English subject. This analysis referred to its conduct component. The author stressed that the process should not be limited to the academy, but regarded as a school-community combination using communication and the teaching of foreign languages to develop a culture toward the development of environmental attitudes.

A year later, Millán-Sánchez, R, & Castillo-Martínez, G. (2020) presented a well-structured methodology for permanent environmental education of physical education teachers, whose implementation and functionality were even validated by expert opinion. Nevertheless, a specific exploration of the indicators used for this evaluation shows, on page 271, that category-based environmental education is directed to environmental professionalization. These categories were knowledge, skills, and attitudes related to permanent environmental education. In this study, the authors assumed the dimensions





contained in the definition of environmental education to evaluate their impact, but did not explain the indicators used to perform this assessment.

Moreover, Reynoso and Fuente, 2020, assumed the indicators suggested by Valladares Fuente *et al.* (2017), and implemented the dimensions and indicators to encourage respect and responsibility to environmental elements related to the sport of athletics. The samples in this study were coaches and athletes from *La Guajira* Athletics League, in Colombia.

The indicators used were the following:

“-Knowledge about environmental education (naturalist, ethical-social, and constructed environment).

-Knowledge about actions athletes must take to keep a sustainable and balanced environment (the three sides mentioned previously).

-Knowledge about environmental vulnerable elements that make up the setting where they reside.

-Knowledge about the environmental problems of the world and the location where they reside.” (Reynoso and Fuente, 2020, p 283)

This referent was used as a starting point for the design of indicators in the survey applied in this research. Other indicators were added from different reviews, not only seen from the Knowledge-Skills-Attitudes triad, but from the perspective of naturalist, ethical-social environmental education, toward a constructed environment. The following tables show an analysis of the results achieved by observing students’ activities, including scientific observation, and survey. During the observation, the indicators associated with attitudes and skills were monitored, whereas the survey measured the indicators related to knowledge.

Table 1. Current situation of Dimension 1. [MAN]

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PAV	1	2	3	2	2	2	2	2	3	2	2	2	2	3
CAR	3	3	3	3	3	3	3	3	3	3	3	3	3	3





CRM	2	2	2	2	2	2	2	2	2	2	2	2	2	2
VDA	2	2	3	2	3	2	2	3	2	2	3	2	3	2
FVP	2	3	2	3	3	2	2	2	3	3	2	2	3	2
PCA	3	2	2	3	2	2	3	2	3	2	3	2	2	2
CTV	3	2	2	3	2	2	3	2	3	2	3	2	3	2
CHA	2	2	2	3	2	2	3	2	2	3	2	3	2	2
HPD	3	3	3	3	3	3	3	3	3	3	3	3	3	3
EES	2	3	2	2	2	3	2	3	2	2	3	2	2	3
EPD	3	3	3	3	3	3	3	3	3	3	3	3	3	3
ECH	2	2	2	3	3	2	2	3	2	3	2	2	3	2

Table 1 shows that in this indicator-based dimension, two main aspects stood out:

1. The absence of optimum measurement criterion was predominant; that is, students did not respond systematically and successfully to none of the aspects.
2. The indicators in which all the students had the lowest qualifications were [CAR], [HPD] and [EPD]. This result showed that most students had never planted a tree around them; they do not hydrate while practicing sports, and frequently smoked or drank alcohol. These aspects are priorities on which to focus using the design of an environmental educational strategy.

Table 2. Current situation of Dimension 2. [MAC]

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PED	1	2	3	2	2	2	2	2	3	2	2	2	2	3



PID	3	3	3	3	3	3	3	3	3	3	3	3	3	3
RID	3	3	3	3	3	3	3	3	3	3	3	3	3	3
ARE	2	2	3	2	3	2	2	3	2	2	3	2	3	2
PBM	2	3	2	3	3	2	2	2	3	3	2	2	3	2
COE	3	2	2	3	2	2	3	2	3	2	3	2	2	2
CME	3	2	2	3	2	2	3	2	3	2	3	2	3	2

In Table 2, this indicator-based dimension showed two main aspects: 1. The absence of optimum measurement criterion was predominant. Somehow, these aspects have been affected as a result of factors like the lack of knowledge, neglect, lack of control and discipline. 2. The indicators in which all the students had the lowest qualifications are [PID] and [RID]. They revealed that students did not contribute to maintenance, embellishment, and cleaning of the sports facilities; neither they presented initiatives to make sports gear, at least, with rustic materials. Generally, these shortcomings were not only part of students, teachers and coaches also bore a quota of responsibility, who did not encourage the participation of the students in these activities. It is noteworthy that after the analysis of this diagnostic, the results were discussed in the group, and the weaknesses were dealt with. Cleaning the facilities, for instance was improved, whereas the other aspects are being attended.

Table 3. Current situation of Dimension 3. [MES]

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PHC	1	2	3	2	2	2	2	2	3	2	2	2	2	3
MAA	3	3	3	3	3	3	3	3	3	3	3	3	3	3
MCA	2	2	2	2	2	2	2	2	2	2	2	2	2	2



MFC	2	2	3	2	3	2	2	3	2	2	3	2	3	2
MFP	2	3	2	3	3	2	2	2	3	3	2	2	3	2
CTE	3	3	3	3	3	3	3	3	3	3	3	3	3	3

In table 3, the indicator-based dimension shows two main aspects: 1. The absence of optimum measurement criterion was predominant, which indicated that even in the aspects in which the students have the best results, additional optimization work must be done. The indicators in which all the students had the lowest qualifications are [MAA] and [CTE]. The diagnostic showed that the issue of fashion and sports trends seriously affected the dressing ways of these students at the university. Accordingly, this aspect was systematically treated during student meetings. Regarding Task Life, even when these activities have been part of the state policy, there are still some breaches to narrow, so these actions motivate and commit students more to their communities. Therefore, in the context of the degree, this work was reinforced so that teachers can ensure proper guidance, implementation, and control of this priority.



## Conclusions

The purpose of this paper was fulfilled through the proposition of a group of indicators to evaluate the environmental education delivered by the professionals of the sports sector, in an organized and contextualized manner, in the area of physical culture. A number of studies about the establishment of indicators to conduct a general evaluation of environmental education were presented. They were helpful to create environmental indicators for the area of physical culture. A diagnostic was conducted using the indicators that revealed the main flaws of environmental education dimensions, thus offering a more detailed analysis for further treatment and improvements. These indicators were included in the environmental strategy of the educational institution, and are part of the evaluation tool of Task Life in physical culture.



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### **Conflict of interests:**

The authors declare the absence of conflict of interests in relation to this manuscript.