



## A contribution from Physical Education to climate action, one of the goals for sustainable development

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**Received:** 09/30/2021.

**Accepted:** 11/20/2021

**DOI:** <https://doi.org/10.34982/2223.1773.2022.V7.No2.003>

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### ABSTRACT

**Introduction:** Under the pandemic conditions, virtual education was implemented to help develop activities from home.

**Aim:** To design a strategy for student mitigation of the causes and effects of climate change, through Physical Education, considering the Goals for Sustainable Development, particularly, environmental protection and its targets.

**Materials and methods:** The quantitative methodology of the study relied on a phenomenological-hermeneutical approach, by documentary review of micro-planning, and interviews of eight educators.

**Results:** The results permitted the establishment of a set of strategies proposed to mitigate climatic change associated with the curriculum.





**Conclusions:** Physical Education enhances the possibilities of establishing different strategies to contribute to nature.

**Keywords:** pandemic, physical education, sustainable development, climatic change

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## INTRODUCTION

In 2015, Ecuador and other 192 countries signed the 2030 Agenda, which compelled them to develop the 17 Goals for Sustainable Development [GSD] (Resolution FCCC/CP/2015/L.9, 2015). Among the most important aspects determined are the protection of the environment, with four GSDs (clean water and sanitation, climate action, underwater life, and the life of ground ecosystems).

During the COVID-19 pandemic, nations were unable to continue to meet these commitments as a result of the global crisis in the areas of health, labor, and economy, though the environment underwent a remarkable recovery during the year and a half of pandemic (Aliaga Rodríguez, 2020). In this sense, García (2020) noted that during the pandemic, lifestyles changed to a more confined setting (homes), reducing the negative impact on nature, with a drop in the use of transportation means, temporary close down of companies and factories, low sales levels, and a reduction of other human activities.

People's awareness to contribute to the preservation and conservation of the environment is fundamental. It is included in Goal No. 13, named Climatic Change. González and Meira (2020) coincided that this awareness must take place in educational facilities ultimately, having the students and teachers as key actors, reaching to all families to produce a change in the society.

A review of the National Ecuadorian Curriculum revealed its flexibility, it allows educators to set different curricular contents, and complexity levels depending on the context. Accordingly, Posso and Bertheau (2020) said that the Physical Education Curriculum is flexible in such a way that the contents are determined by teachers, depending on the needs and requirements of students and the context. If learning is based on developing sports activities, flexibility will permit the approach of any sports discipline in keeping with age and the learning requested.

It could help include topics related to the environment in the Ecuadorian curriculum, such as preventing the pollution of drinking water, the ocean, air, soils, along with greater sensitization toward climatic change, and respect for sea and ground flora and fauna (Moreno, 2020). Among the subjects that could contribute more to the GSD is Physical Education, since its practical nature permits the





implementation of different actions, namely, physical, cognitive, social, and affective.

These elements would entail a constructivist curricular direction in which students build their learning based on their experiences and the understanding of what surrounds them (Posso, 2018b). In this sense, new equipment and materials could be developed by recycling, to deal with several issues; individual or collective actions could also help reduce the harmful effects of man on the environment (Canaza, 2019).

This awareness associated with the support of the environment must be stated under the three curricular approaches of Physical Education in a ludic setting, which permits more pleasant lessons, and be oriented not only to the physical participation, but also in the construction of pillars that withstand new challenges, depending on its strengths and weaknesses (Posso, Barba, Marcillo, Acuña, and Hernández, 2020).

Undoubtedly, this flexibility linked to the curricular approaches and active methodological teaching, such as the inverse lesson and cooperative learning, will foster the creation of new topics associated with the environment sequentially and adjustably to the reality experienced by the students living in community, in addition to the fact that the students will meet the graduation profile of Ecuadorian high schools, being fair, supportive, and innovative (Posso, Barba, Marcillo, and Beltrán, 2021), with activities from the homes and into the society that contribute to the preservation of a green planet.

During the pandemic, Physical Education could approach nature importantly. While confined, students were unable to perform physical activities in green spaces. As a result, people in general longed for open spaces, in contact with the same nature that was not valued as much before the pandemic. The return to normal life may have helped acquire this value, a good opportunity to create awareness on the protection of the environment as a whole.

The work using curricular blocks (groups of topics that according to the type of learning, must be transversalized across topics related to the defense and protection of nature. For instance, the Ludic Practice Block (LPB) must generate a space for games and recreation within natural settings, or settings that suggest the association with nature at times and in spaces outside the curriculum. (Posso, Otáñez, Córdor, Córdor, and Lara, 2021).

The Gymnastic Practice Block (GPB) will require that the fitness and coordinative activities not only take place in regular gymnasiums, but in facilities built in natural settings, using recycled or alternative materials (Córdor, Córdor, and Posso,





2021), including safety elements like mattresses that will be used to ensure student wellbeing.

In the Body Language Practice Block (BLPB), body language classes could be associated with dance, choreography, theater plays, circus practices, etc. (Córdor, Chimba, Córdor, Romero, and Posso, 2021), topics related to the care and protection of the environment, going through the Ecuadorian mix of cultures and cosmovision, with movement harmony and synchrony that offer clear messages to society.

Lastly, the Sports Practice Block (SPB), which is intended to design sports implements using recycled material, creating a game-ground-water interrelation setting. New tasks could be added in favor of the preservation of nature, with the inclusion of other transversal blocks like Construction of Body Identity and Relations of Body Practices and Health, which can be the solution and explanation of practices in favor of nature.

The above provides the rationale for the aim of this research, which is to design a strategy of student mitigation about the causes and effects of climatic change through Physical Education, considering the Goals of Sustainable Development, as part of the environmental protection and its targets.

## **MATERIALS AND METHODS**

The methodology used was qualitative, through a hermeneutic-phenomenological approach. Two techniques were applied: a documentary review of elementary education learning suggested in the micro-planning in the first month of Physical Education classes made by the four physical Education teachers who participated in the survey from different educational facilities, who contributed to the GSD included in the environmental protection target.

The other technique used was the interview which helped gather the educational experiences during the pandemic, from eight educators, four of them in the area of Physical Education, and the others from the Bachelor Degree of Pedagogy in Physical Activity and Sports. The sample was considered non-probabilistic, since information was collected in September, using Zoom.

The study tackled two main questions: What strategies should be managed within educational institutions to mitigate the causes and effects of climatic change? What strategies should be considered to mitigate the causes and effects of climatic change from home?





## RESULTS AND DISCUSSION

Upon the documentary review of micro-planning, several were considered to adjust to the GSD, particularly those associated to environmental protection. Each learning highlighted in tables 1, 2, and 3 can be contextualized to fulfill these objectives; they generate different activities aligned to the creation of awareness, diffusion, collaboration, and contribution to coping with the negative effects of climatic change and an opening to the care of nature (Table 1), (Table 2), (Table 3).

**Table 1.** Results of the documentary review in the Elementary Education

LPB	GBP	BLPB
To identify the attributes, objectives, and roles of participants in different types of games (chasing, cooperation, relieves, using elements, popular, ancestral, perceptive, etc.), as necessary components to improve their motor performance.	To develop combinations of basic motor skills and abilities (for instance moving and role play, or combine roles with jumping, and linking the skills to different movements or turns), that allow them to improve their performance in gymnastics.	To recognize and participate in different expressive-communicational body practices associated with the local traditions.

Note: Taken from the Ministry of Education (2017).

**Table 2.** - Results of the documentary review of the Intermediate Education

LPB	GBP	BLPB	BCPD
To identify and contrast the attributes, origin, and objectives of different types of games (relay, using elements, cooperative, aquatic, popular, natural, using songs, etc.) to participate and recognized them as part of the production of culture.	To perceive and record the use of space. Planes and axes: sagittal, transversal, longitudinal, in-depth), and time (speeds, simultaneity, alternation, etc.), while showing skills, acrobatics, and individual and group gymnastic sequences.	To experience, recognize, value, and respect the local and foreign expressive-communicational manifestations, associating them with meanings of origin (music, clothing, language, etc.) to understand the contributions made to the cultural heritage.	To recognize the offensive tactical intentions (for example, distancing, the search for free space, returning the cell phone), as resources to solve the participation in adapted games favorably.

Note: Taken from the Ministry of Education (2017).

**Table 3.** - Results from the documentary review of Higher Education

LPB	GBP	BLPB	BCPD
To participate on different game categories (traditional, popular, adjusted, massive, expressive, using elements, in the natural setting, etc.), recognizing the cultural contribution of their origins, objectives, and rationale, to the national identity.	To achieve group building (with or without elements: handkerchiefs, ropes, bands, balls, sticks and clubs), gymnastic compositions and choreographies, identifying the attributes, using gymnastic movements as links, and establishing patterns of collective work to find safe, effective, and pleasant ways of conducting them.	To link popular expressive-communicational body practices (parties, ancient rituals, street dances, carnivals, and others) to the meanings of origin, providing new meanings, and recreating them, recognizing the contribution made to the cultural identity of a community.	To practice different types of sports (individual and team sports, closed and open, indoor and outdoor, invasive, in nature, etc.), identifying similarities and differences, and recognizing ways of participating depending on the sports setting (recreational, federative, high performance, etc.), to consider the necessary requisites that permit continuous practice.

Note: Taken from the Ministry of Education (2017).





The information gathered helped design strategies to mitigate climate change from a Physical Education Class standpoint, and at home. Tables 1 and 2 show the results established in dimensions and sub-dimensions, following an analysis of coincidences of opinions, with a practical approach (Table 4) and (Table 5).

**Table 4.** - Results of interviews about the mitigation strategies for climate change in the Educational Institution

Sub-dimensions	Strategies
<b>Utilization of recycled material</b>	Transversalization of curricular contents of Physical Education with the environmental protection contents. Collection of recycling material depending on the monthly planned activities. Creation of elements using recycled material for motor, cognitive, and social activities and exercises in Physical Education classes. Utilization of elements made in several planned activities and exercises.
<b>Creation of awareness associated with the protection of natural spaces</b>	Collection of information about actions, rules, and laws on the protection of nature. Peer interactions to transmit information collected. To generate reflection spaces on local environmental topics.
<b>To plant green gardens, shrubs, and trees</b>	Acquisition of seeds and seedbeds "Eaten fruit, sown seed" Location of spaces in and outside the educational facilities to foster gardens, plant shrubs, and trees. Creation of a schedule for plant watering and care.
<b>Consumption of season and organic foods</b>	Design of a nutritional plan based on the students' needs by age Diffusion of the importance of the nutritional plan for the educational community Adjustment of the Code of Institutional Life, which establishes the guidelines referring to student drinks and other items for sale at the school canteen.
<b>Paper consumption</b>	Design of rules in the Code of Institutional Life associated with the reduction in paper use. Promotion and diffusion of less paper use practices in academic processes.

**Table 5.** - Results of interviews about the mitigation strategies for climate change from home

Sub-dimensions	Strategies
<b>Garbage recycling</b>	Purchase of construction of recycling containers by type of material Separation of garbage in plastic, cardboard, metal, glass, and organic. Delivery of material collected at the community to recycling companies. Reuse as many times as possible before throwing away.
<b>Employment of reusable and biodegradable products</b>	Utilization of reusable containers like glasses, straws, food containers, cloth-made cases, etc. Utilization of biodegradable soap, shampoo, conditioner, sunscreen. Reduce the utilization of plastic.
<b>Food purchase</b>	Consumption of season foods Consumption of organic foods Reduction of meat consumption





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**Mobilization**

To walk and run to move to nearby places.

To use bicycles as transport.

To use public transportation.

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The results of the documentary review revealed that the skills related to performance or learning in different curricular blocks planned in the first month for the Physical Education classes support the strategies suggested in the interviews of the eight educators, to mitigate the causes and effects of climate change on educational facilities, and to mitigate the causes and effects of climate change from home.

Micro-planning should consider the inclusion of a diagnostic and strengthening process looking to determine weaknesses in the contents related to the protection of nature, and stronger solutions, Then, depending on the attributes and needs of students, to state a restructuring of curricular micro-planning, which may be by didactic unit, monthly, by project, weekly, by lesson, by type of skill, etc.

The advantages of these strategies are that they can be implemented not only the first month, but also throughout the school year. These strategies can be planned by integrating different progressive topics depending on the educational level and sub-level of students; they must be stated through a pedagogic model to the authorities of the institution seeking authorization. It should also include the importance of being direct actors who contribute from education to the GSD, especially the target protection of the environment.

Upon this authorization, the yearly curricular planning must be prepared collectively, by every Physical Education teacher. In it, the environmental topics could be added to the year's learning requirements, so there is a connection and space in the curriculum that ensure the fulfillment of the strategies suggested in this research as part of the objectives.

The active methodology of teaching should be the guiding type, which suggests this learning connection. Project-based learning, inverse lesson, and cooperative learning should be part of it, considering the learning and multiple intelligence theories, as well as neurolinguistic programming, an essential part for the implementation of these strategies. Consequently, the positive interactions and the development of the particular curricular approaches of Physical Education should be taken into account.

The assessing process should be established, suggesting shared assessment as an element that generates confidence and knowledge feedback. Formative assessment will be determinant throughout the purpose of assessment, including the characteristics of the academic reinforcement that supports the products from projects or construction of activities suggested, depending on the teaching methodology and topics dealt with.







Authentic sports, recreational, ludic, and artistic festivals can be suggested, which show the effects of learning, and the actions taken by educational institutions using an integrated vision in which the community, and organizations and businesses surrounding the institution can reach, then use these proposals in their area of influence, increasing the influence of the environmental pillar of GSD exponentially. These strategies pursue climate literacy, as suggested by Caballero, Baigorri, and Pardo (2021), being the educational institutions the first to deal with these issues, and the ones that create awareness in the educational community in terms of environment protection and care. These actions are for the short term, though permanent, which can be assumed by a society that developed a green planet for the future generations.

## CONCLUSIONS

The documentary review of curricular planning showed several performance-related skills that can be developed in activities and exercises to contribute to the protection of the environment, as part of GSD, thus increasing the range of possibilities for strategies to be implemented, depending on the contextualization and type of learning to be carried out.

These strategies are a direct contribution from the educational community; they pave the way for further research that can tackle the 181 performance skills of the Physical Education curriculum. Certainly, this subject is fundamental to generate a change of culture in favor of the environment.

The responsibility assigned to implement these strategies is given to the Physical Education teachers, though interdisciplinary work must be done from all areas of knowledge, which can ensure the introduction of nature protection topics in the curricular axes. It could guarantee the implementation of these strategies, and increase the number of strategies, ensuring the climate literacy of the society as a whole.

Physical Education and the different areas of knowledge within the Ecuadorian National Curriculum are a means to meet the sustainable development goals, due to its flexibility, the constructivist pedagogic model, and the curricular approaches, with the inclusion of others who pursue the same objective through the Ecuadorian Bachelor output profiles.







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**Conflict of interest:**

The authors declare the existence of no conflict of interest.

**Authorship statement:**

The authors have participated in the redaction of the manuscript and document analysis.

