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ARTICLE

Pedagogical Model for Environmental Education: Development and Validation in the Bachelor's Degree in Education (Pedagogy and Psychology)

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ABSTRACT

The Bachelor's degree in Education (Pedagogy and Psychology) trains a professional who, once graduated, will work as a school educational psychologist. Among their professional functions, they will provide educational guidance and counseling. Included in the content of these functions is environmental education; however, there are no subjects in the curriculum that address this content. Therefore, this study proposes a Pedagogical Model for environmental training in the Bachelor's degree in Education (Pedagogy and Psychology). The methodology used is a systematization organized in cycles. Theoretical-level methods include: historical-logical analysis, analytical-synthetic, inductive-deductive, systemic-structural, from abstract to concrete, modeling, and systematization. At the empirical level, the methods used were: document analysis, surveys, observation, researcher's diary, in-depth sessions, photography, source triangulation, and expert criteria. The proposal takes into account characteristics and principles, and is organized into the diagnostic subsystems, components of the pedagogical process, organizational components of the training process, and evaluation. Contents are proposed for the environmental education of students. It is concluded that the model is a theoretical construction that simplifies the most general elements that distinguish environmental education by considering the object of the profession and modes of action as basic cores. It has a systemic character given by the interrelation

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between the different subsystems and the components that comprise it, which determines that environmental education is the result of the system as a whole. It constitutes a tool for the work of the program that guides actions to develop knowledge, skills, and values.

Keywords: Pedagogical Model; Environmental Training; Environmental Education; Bachelor's Degree in Education (Pedagogy and Psychology)

1. Introduction

The school is a training institution at each of the educational levels. It is primarily responsible for directing the environmental education of new generations, through the formation of feelings, attitudes, and moral values aimed at the care and protection of the environment. In universities in particular, students must assume a responsible, ethical, and committed professional conduct in their ways of acting.

Therefore, Environmental Education for Sustainable Development is defined by the Ministry of Education, 2013 [1] as: An educational process that gradually and integrally incorporates the economic, socio-political, and ecological dimensions of sustainable development into the education of students and teachers of the National Education System and is expressed in ways of thinking, feeling, and acting responsibly toward the environment. This concept specifies the necessary elements to achieve environmental education in new generations, from education in its broad sense.

However, to form an individual with a complete environmental education, it is necessary that this process also integrates the content related to the professional field they will develop, which is specific to each one. It is for this reason that environmental education is approached from the perspective of Ávila Cutiño, Espinosa Cruz, and Andaya Rodríguez [2], who consider it a specialized environmental education in the training of professionals.

In this regard, there have been numerous studies that have addressed this topic. Such is the case of Esteban Ibáñez, Musitu Ferrer, Amador Muñoz et al. [3], who emphasize the importance of environmental education work in universities as a necessary element in the comprehensive training of new generations. These investigations are aimed at the development of knowledge. Based on this, Bilavych, Borys, and Dovgij et al. [4] propose educational recommendations for their acquisition by future specialists, based on the analysis of the educational state of ecology in the theory and practice of education. For their part, Li and Krasny [5] consider that: through facilitating workshops and ongoing networks for the exchange of ideas, professional development programs may foster innovation or practice change among environmental educators. This research highlights the importance of environmental education in universities so that future graduates incorporate it into their professional roles.

In this sense, according to Ma [6], it is considered necessary to carry out effective environmental education for students in the normal colleges and universities in China, with the aim of increasing awareness and practical skills in environmental education among future teachers, and for this purpose, it describes the philosophy, methods, and challenges of environmental education within its context.

Likewise, Su, Chen, Tsai, and Su [7] adopt a critical position on the need for universities work together with local communities to create a green, sustainable future. From this same position, Angelaki, Bersimis, Karvounidis, et al. [8] emphasize the challenges of introducing education for sustainability in higher education institutions, analyze how these challenges could be addressed, and record the essential principles that can guide its incorporation in higher education.

From the perspective of environmental training understood as environmental education specialized in the training of professionals, some authors propose the environmentalization of the curriculum. In this line of thought, authors such as Eliyawati, Widodo, Kaniawati, and Fujii [9] suggest in the results of their research that the sustainability context (environmental, economic, and sociocultural dimensions) should be integrated into the training of environmental education teachers.

In this direction, Linhares and Reis [10] conducted a

study aimed at evaluating the implementation of an intervention program that combines nature-based solutions with a pedagogical approach to environmental citizenship for future teachers. The research questions focus on the educational potentials and challenges of this intervention. From this same line of thought, Kimaryo [11] conducted research on primary school teachers' perceptions of environmental education, its integration into primary education, and the teaching practices of teachers in Tanzania.

In the world, other studies stand out, among which are: Vukelić, Lončarić, and Rončević [12], who aim to understand the relationship between the factors that predict future teachers' intention to implement education for sustainable development and values education as a tool to advance society towards sustainable development.

For its part, Bulut and Oksuzoglu [13] conducted a study to examine the deficiencies of teachers regarding education for sustainable development and to identify their causes and reveal their suggestions for improvement. These suggestions are directed to policymakers, the Turkish Higher Education Council, the Ministry of National Education, and their colleagues. A commendable effort to involve governments in this process.

From these same positions, Wahl and Rudinger [14] consider that education for sustainability is a transdisciplinary field that must consider the interrelations between environmental and social systems, including educational systems. Sustainability education in higher education must be holistic and experiential to engage learners in different paradigms of sustainability learning.

In this sense, the research conducted by de Moura, Martins, de Moura, et al. [15] reaffirms that specialists in psychopedagogy contribute to education by expanding the possibilities for exploration and reflection on the learning process. It also reinforces the importance of the intervention and prevention work of this professional and their role in the school environment. Related to the above, it has been established that despite the numerous investigations on the subject, none are aimed at the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology), which takes into account the particularities of their modes of action. This degree trains a professional who, once graduated, will generally work as a school psychopedagogue. From their professional roles, they must develop educational counseling and guidance. Among the content of these functions is environmental education; however, there are no subjects in the curriculum that cover this content.

Associated with the above, it has been found that despite numerous studies on the topic, none of them are aimed at the environmental education of students in the Bachelor's degree in Education (Pedagogy and Psychology), taking into account the particularities of their modes of practice. This program in Cuba trains professionals with dual training in Pedagogy and Psychology who, once graduated, will generally work as school educational psychologists.

The school educational psychologist is a professional specializing in educational psychology or psychopedagogy, focused on supporting learning difficulties. As part of their professional duties, they must provide guidance to other education professionals and educational counseling to students and families. Environmental education is among the content of these functions; however, within their curriculum, there are no courses that address these topics.

From this same perspective, Álvarez-García, Sureda-Negre, and Comas-Forgas [16] conducted a document study using a reliable search strategy, based on clear and precise criteria and dimensions. As a result of this study, they assume that there is a lack of environmental competencies among pre-service teacher education students and gaps in teacher training curricula regarding Environmental Education. In the studies conducted, the fundamental emphasis has been on aspects that distinguish the modes of action of professionals with a degree in Education. From these, content for environmental training is expressed; however, there are professional modes of action specific to Pedagogy-Psychology that are not expressed, such as psychopedagogical advice and educational guidance.

Also, within the framework of the addressed topic, the proposed objectives are fundamentally directed towards managing the pedagogical process and incorporating it as part of the content of the subjects in the curriculum of different educational levels, and this is not the activity generally carried out by graduates located in schools as school psychopedagogues, who perform functions directed at advising, educational guidance, and research.

In particular, the model of the professional aims to

develop the environmental training of students from their general objectives. It specifies that they must be able to contribute to the improvement of education from an environmental perspective, acquire knowledge, and develop attitudes and skills for life regarding the environment, as well as direct educational strategies that promote an increase in quality and healthy lifestyles.

However, in the Plans of the Teaching Process, there are no subjects for the theoretical preparation of students on these topics. In the current Study Plan E, environmental education is positioned as a curricular strategy from the methodological guidelines, and the term environmental training is used, but it is not specified how to do this based on the particularities of the object of the profession and the modes of action of the professionals in the career.

Related to the above, at the beginning of the research, it is noted that, in exchanges made with faculty members, cognitive deficiencies are linked to how to work on environmental education from the object of the profession and the modes of action with their own particularities.

Similarly, the professional experience of the researcher, as well as the review of documents prepared by professors of the course and the visit to the work component, reveal deficiencies regarding the work of environmental education that is carried out. These deficiencies manifest in students as: a lack of motivation for environmental issues, cognitive and attitudinal deficiencies in the care and protection of the environment, and insufficient information on how to educate the environment from their functions as future specialists in Pedagogy-Psychology.

The reality described above leads to defining a problem given the need for environmental training of students and the real conditions to achieve it from the current curriculum. Therefore, this presentation aims to propose a Pedagogical Model for environmental education in the Bachelor's degree in Education (Pedagogy Psychology).

2. Materials and Methods

The methodology employed is based on materialist dialectics as a general method of interpretation of the sciences, which studies the most general laws of movement and development of nature, society, and thought. It allowed for a theoretical generalization of the most important achievements in environmental education in the world and in Cuba.

Its categories reflected properties and connections between the elements that make up environmental education from the perspectives of nature, society, and thought. This research constitutes a synthesis of the work developed by the author over eight years in environmental education for students in the Bachelor of Education (Pedagogy-Psychology). It has a qualitative approach that allows for a deep understanding of experiences. In each of the cycles through which the research progresses, an analysis of the regularities is carried out regarding the cognitive, affective, and behavioral categories, which are being included as content for environmental education.

As a procedure, organized systematization in cycles is used based on the criteria of Jara [17]. For this purpose, the analysis, structuring, and organization of the information collected from documents, photographs, in-depth sessions, participant observation, and the researcher's journal, among other materials, was carried out. Three cycles were determined in the initiation process. In each of them, an analysis of the regularities regarding cognitive, affective, and behavioral categories is conducted. The experience gained in them gradually generates indicators and content that are included in environmental education.

This systematic qualitative procedure generates a theory consistent with the type of grounded theory design [18], which allows for the conceptual explanation of the contents that should be included in environmental training, as well as the approach to solving the posed problem through the construction of a Pedagogical Model, via inductive reasoning.

During the research, methods from both empirical and theoretical levels of knowledge were employed, allowing for the collection, classification, and qualitative analysis of information. The theoretical level methods served a gnoseological function in the research, analysis, and interpretation of the information, the foundation of the proposal, and the development of content.

Among them are highlighted: Historical-logical analysis, Analytical-synthetic, Inductive-deductive, Systemic-structural, ascending from the abstract to the concrete, Modeling, and Systematization.

The empirical level methods allowed for the collec-

tion of information about the environmental education status of students when entering and exiting the program, and the specialists' assessment of the relevance of the proposed Pedagogical Model. The following were used: Document analysis, Survey, Observation, Researcher diary, In-depth sessions, Photography, Triangulation of sources, and the Criteria of specialists.

Document analysis: to verify the gaps and potential regarding environmental education in Study Plans C, D, and E of the Bachelor's degree in Education (Pedagogy and Psychology), the following are analyzed: the Teaching Process Plan, the Professional Model, and the Methodological and Organizational Guidelines or Instructions: Ministry of Education.

Additionally, documents prepared by the program professors are examined, such as semester reports and program validation reports, years and disciplines, and the institutional self-assessment for accreditation, regarding the environmental education of students in the Bachelor's degree in Education (Pedagogy and Psychology).

Survey: administered to students of the Bachelor's degree in Education (Pedagogy and Psychology) upon entering the university to determine their prior level of knowledge on the researched topic, and at the end of the first cycle, to characterize the level of knowledge acquired in environmental education.

Observation: This is used to gather relevant data about the process, allowing for informed decision-making and conclusions to be drawn about each activity.

Researcher's Journal: This is used to compile qualitative information collected during the process. It includes details about the research methodology, notes, reflections, viewpoints, and conclusions. The processed information is useful for systematizing experiences to determine the strengths and weaknesses of the cycles and activities, with the aim of evaluating the work's results and identifying content for environmental education.

In-depth Sessions: These are held with departmental, year-level, and discipline-specific groups to assess professors' opinions on the environmental education activities developed within the program, their experiences implementing the curriculum strategy, and for developing content.

Photography: This is used to record relevant visual incidents in the research at different stages of the systematization process, allowing for the collection of evidence during the investigation.

Triangulation of sources: This is used to compare the results obtained from different sources of information and draw conclusions about the process.

Expert opinion: This allows for the collection of expert opinions on the research topic regarding the relevance of the proposed Pedagogical Model and its potential to contribute to solving the scientific problem, as well as opinions related to the subsystems that make up the model and the relationships between them; the proposed content for environmental education and the categories and units of analysis; and the suitability of the proposed strategy for implementing the Pedagogical Model.

The Expert Criteria method was used, based on the considerations of Iriste and Katane [19], who consider it a method for gathering qualitative opinions from specialists in the research topic. The specialists were selected by compiling a list of candidates deemed qualified to offer assessments and recommendations on the aspects they would be consulted about. The following criteria were considered: teaching and scientific rank, experience in training education professionals, and experience in environmental education and training; all of which are supported by their curriculum vitae and professional performance.

These specialists were sent a survey to confirm their willingness and availability to participate. After receiving their responses, those most closely related to the research topic and most willing to collaborate were selected. They were then sent the proposed model and its rationale, along with a survey to evaluate its relevance. Subsequently, the criteria are collected, tabulated, and a qualitative analysis is performed to refine the proposal and assess its relevance.

The selected specialists numbered 10. They are all university professors with the academic rank of Doctor of Pedagogical Sciences and other higher teaching positions; 30% are assistant professors and 70% are full professors. They have an average of 32.5 years of teaching experience and an average of 22.2 years of experience in environmental education.

The criteria used for their selection are as follows: they believe that the model achieves its proposed objective, which requires preparation and commitment from

the faculty leading the pedagogical process; they consider the proposal innovative, as it prioritizes the environmental training of future specialists in Pedagogy-Psychology; and it prepares them to put this training into practice in their professional work, from the perspective of their profession.

The sample is determined during the initial immersion phase and adjusted in each cycle of the systematization process because it allows for data collection and analysis; its selection is non-probabilistic. The sampling technique is used with a defined purpose and in accordance with the evolution of events and the characteristics of the qualitative research. It is a diverse sample, representing the complexity of the phenomenon studied, and also documenting the diversity to identify differences, similarities, patterns, and particularities of the unit of study.

First cycle: comprised of the 8 students who entered in the 2008–2009 academic year and the 21 from 2009–2010.

Second cycle: comprised of the 12 students who entered in the 2010–2011 academic year, 29 from 2011–2012, 29 from 2012–2013, 21 from 2013–2014, and 20 from 2014–2015.

Third cycle: the 17 students entering in the 2015–2016 school year and 20 in the 2016–2017 school year.

3. Results

The results obtained from the survey, the pedagogical test, participant observation, and the researcher's journal were compared through triangulation of sources, revealing patterns in the students' cognitive, affective, and behavioral needs.

Among the cognitive findings, the following stand out: students identify environmental problems, but only natural ones; they do not recognize economic and social problems. Their knowledge of environmental education is insufficient: they consider the school's role to be solely focused on teaching about the environment and how to protect it, but they do not demonstrate how to do so within their own functions. They also show deficiencies in their knowledge of regulatory documents for environmental education. In defining the concept of environmental education, they refer to isolated elements addressed in school. They recognize behaviors that constitute harm to the environment, especially the natural environment, but not to the social and economic environment. They do not recognize the importance of the environment for personality development.

From an emotional standpoint, they demonstrate a lack of motivation regarding environmental issues, and behaviorally, a lack of responsibility towards environmental care. They exhibit negative social attitudes such as littering, playing loud music, and using inappropriate voices.

In summary, the curricula used in the Bachelor of Education Pedagogy program in Cuba have shown potential for environmental education in their general objectives, but this potential is not reflected in the content, which fails to consider the profession's purpose or its practical applications. Students enter the program with both strengths and weaknesses in environmental education, highlighting the need for the curriculum to incorporate the profession's purpose and its practical applications.

The different cycles of the systematization process are the result of an analytical process that allowed for the structuring and organization of the information collected from documents, photographs, in-depth sessions, participant observation, and the researcher's journal. A systematic qualitative procedure is used to generate a theory, being consistent with the type of grounded theory design, which allows for explaining at a conceptual level the content to be included in environmental education.

First, an open coding process took place, where the researcher reviewed the materials to analyze and generate—through constant comparison—initial meaningful content. Among these contents that emerge openly, environmental education is selected as the central content of the process under exploration, and establishes the relationship with other emerging contents. Subsequently, an axial coding process occurs, in which the data identified and separated in the open coding are grouped to create connections between themes. During this process, a schema of the studied phenomenon is constructed, which includes: the conditions under which it occurs, the actions that are carried out, the elements considered, the emerging contents, and the results.

In the systematization process carried out, taking into account the categories of analysis in each of the cycles, the following patterns were observed:

- **1st cycle:**
  - **Strengths**: the students recognize ecological problems as environmental problems and more than 50% recognize economic and social problems; they identify environmental problems of global and local nature, referring to natural, social, and economic issues. They provide examples of a larger number of international meetings where environmental topics and environmental education have been addressed, considering that the role of specialists in Pedagogy and Psychology is to educate about environmental care and protection, and they acknowledge the possibilities of doing so through guidance and prevention. They define the concept of environmental education and the environment, referring to the essential elements of both concepts. Increased student motivation regarding the topic. Work begins as a research line for students of the program, as they propose solutions to environmental problems through their educational practice.
  - **Shortages:** There are cognitive deficiencies regarding how to develop environmental education and the documents that regulate it at the national level and within the Ministry of Education. Environmental education is not addressed in all subjects of the curriculum due to a lack of guidance on how to work from the actions of the educational psychologist. The emotional engagement of students with environmental education is insufficient.

From a behavioral perspective, only 50% of students enroll in the elective course: "Environmental Education from the functions of the pedagogue-psychologist." The activities to be developed from a work-research and outreach perspective are insufficient.

- **2nd cycle:**
  - **Strengths**: Greater orientation of teachers towards environmental education, which promotes its incorporation into the subjects of the curriculum. Students' level of knowledge on environmental issues increases. Students' motivation regarding environmental topics rises, which encourages a closer connection of research to the professional field. They appreciated natural values and expressed value judgments about them. They show greater interest in using natural elements from the environment in educational strategies. They value their ability to positively transform environmental reality through their roles as educational psychologists. Various activities for environmental education are included in the organizational components of the training process**.** Increases the participation of students and teachers in scientific events with work on environmental topics.
  - **Shortages:** Environmental education shows shortcomings in working from professional practice approaches. There are no teaching resources that make explicit how to work from professional practice approaches.

- **3rd cycle:**
  - **Strengths:** Students demonstrate, through their actions, greater responsibility for the environment, the need for its protection, and the role of the school. Solutions to environmental problems were addressed through scientific research. Students published articles, prepared informational documents, and participated in events where they shared their experiences in environmental education from their professional roles. Community guidance actions were carried out regarding the care and protection of the environment.
  - **Shortages:** Students do not show the same level of development in their environmental education and in their involvement in solving environmental problems through their actions.

The disciplines and subjects do not have specific guidelines for the program that indicate how to address environmental topics through their content.

This process led to the emergence of units of analysis for each of the categories.

Its implementation has allowed for the emergence

of categories and units of analysis that constitute essential elements in the evaluation process of the environmental training of students. In the cognitive category, the units of analysis that emerge are: identifying environmental problems in their context, knowledge about the didactics of environmental education, mastery of regulations on environmental education in the National Education System, recognizing behaviors that constitute violations of the environment, and acknowledging the importance of the environment for the development of personality.

In the affective category, the units of analysis that emerge are: interest in the use of natural elements of the environment in educational strategies, valuing their possibilities for positive transformation of environmental reality from their functions as Psychopedagogues, appreciating natural values and their influence on the development of personality, and showing motivation towards studying the environment and its influence on students' personalities.

And finally, in the behavioral category, the following units of analysis emerge: respecting, protecting, and being responsible for the environment, seeking solutions to environmental problems in their surroundings through scientific research, utilizing environmental potentialities in order to develop personality, guiding on the care and protection of the environment, and advising on environmental education.

As a result of the research process, a pedagogical model, in accordance with Goldberg's criteria [20], is developed for the environmental training of students in the Bachelor of Education (Pedagogy-Psychology). This model meets several requirements:

1. To consider environmental training as an element of the training process, characterized by the dynamic relationship between the components of the pedagogical process.
2. The diagnosis of potentialities and needs for environmental training as a starting point and criterion for evaluating the process, based on the proposed categories and units of analysis.
3. To consider the members of the organizational levels of the career as personological components of environmental training in the pedagogical process.
4. The specificities of the environmental training of the Bachelor's degree in Education. Pedagogy-Psychology is established based on the object of the profession and modes of action.
5. The appropriate relationship between students and professors who are part of the career collective, in order to achieve assertive communication and the proper organization of activities in a way that positively influences the development of personality.
6. Establish in the design of the curriculum at the meso and micro levels, the most general elements of environmental training and determine the pedagogical, didactic, and domain categories.

The components of the Pedagogical Model for the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology), such as foundations, characteristics, principles, and requirements, constitute the basis upon which the construction process is supported, based on identified potentials and deficiencies.

3.1. Model for the Environmental Training of Students in the Bachelor of Education (Pedagogy-Psychology)

3.1.1. Model Structure

General objective: To contribute to the environmental training of students in the Bachelor of Education (Pedagogy-Psychology), taking into account the object of the profession and the modes of action.

- **Specific objectives**:
  - Define content for the environmental training of students, based on the object of the profession and the modes of professional action.
  - Structure environmental training activities from the contents of the disciplines and subjects of the degree, and in each of the organizational components of the training process.
  - Design pathways for the environmental training of students in the degree that develop modes of action to contribute to the solution of professional problems from their functions as a psychopedagogue.

In **Figure 1**: Graphical representation of the Pedagogical Model for the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology), the graphical representation of the model ap-

pears. For its design, the model of the professional in the field was taken into account, where the objectives to be achieved in the training process of students of the Bachelor's degree in Education (Pedagogy and Psychology) are established, and the object of the profession and the modes of practice are defined.

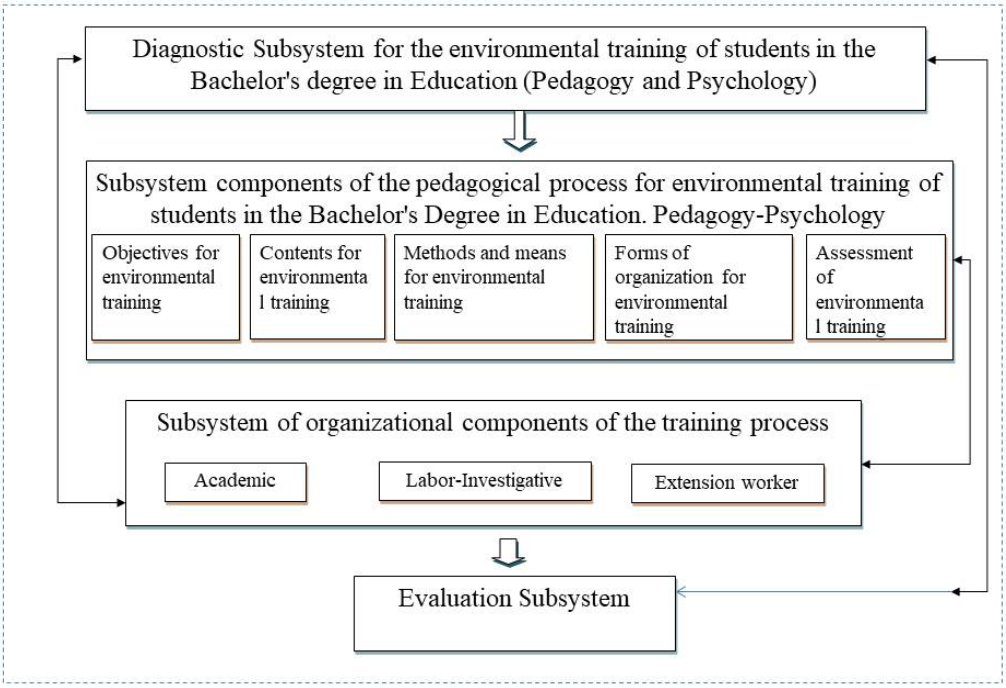

Figure 1. Graphical representation of the Pedagogical Model for the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology).

In addition to the issues surrounding environmental education, as it is a subject of Pedagogy, a prioritized objective in the National Education System, it is also a task of universities, specifically in teaching programs, to train professionals who must carry out environmental education as part of their work.

Both elements are integrated and establish the need for environmental training of the students of the career by determining deficiencies based on the professional model, which does not clarify how to carry it out from the object's profession and modes of action.

To address this issue, a model for the environmental training of students in the degree program has been developed. This model is structured into four subsystems: diagnosis, organizational components of the training process, components of the pedagogical process, and the evaluation subsystem.

The different subsystems are interrelated; the diagnosis is a permanent analytical element and constitutes the basis upon which the rest of the subsystems are supported; the components of the pedagogical process determine the proposal for each one. These components are materialized in the subsystem of organizational forms, and in the evaluation subsystem, the model is evaluated. Its integration enables environmental training in the Bachelor's degree in Education (Pedagogy and Psychology).

- **Diagnostic subsystem**: it is assumed based on the criteria of Anvarovna [21], who considers it is necessary to ensure that the personality of young people is not harmed, to support their pedagogical independence, and to have a positive influence on them through values, customs, and traditions. It is carried out on incoming students and the training curricula. It is updated every school year. Instruments such as pedagogical tests, surveys, participant observation, and document analysis are used. It constitutes a permanent analytical element.

In academic years, the contents with potential for working on environmental education in the different sub-

jects of the Curriculum are evaluated. In the career group, the Educational Strategy of this organizational level is redesigned based on the fulfillment of the general objectives proposed by the model, based on the diagnosis. In the year groups, the activities of the educational project that contribute to environmental education are diagnosed. In addition to carrying it out individually and systematically for differentiated attention according to potentialities, deficiencies, and motivations. This subsystem constitutes the foundation upon which the rest is supported.

- **Subsystem components of the pedagogical process**: Subsystem components of the pedagogical process. The objectives are assumed as a fundamental component based on the criteria of Segedinac, Segedinac, Konjović et al. [22], who consider that these allow for the sequencing of educational experiences. Additionally, other components are assumed: content, methods, media, evaluation, and organizational forms. In accordance with these criteria, they are determined as components of the pedagogical process for environmental education: objective, content, method, medium, evaluation, and forms of organization. In accordance with these criteria, they are determined as components of the pedagogical process for environmental education:

Objectives for environmental education: they constitute the guiding component of the pedagogical process and express the transformations that are desired to be achieved in the environmental education of students. They are general and determine the rest of the components. They are planned taking into account Natalini's criteria [23], which hold that they should start from a holistic approach that integrates the relationship between economy, politics, society, and ecology as a useful tool to educate new generations, the objectives and requirements of the Ministry of Higher Education, in addition to those proposed by UNESCO [24]. They take into account the objectives of the subjects and the content proposed for environmental education. They serve an orienting and evaluative function by constituting the image that is intended to be achieved. The following general objectives for environmental education are proposed:

- Acquire knowledge and develop attitudes and skills for life regarding the environment and environmental education.
- Direct educational strategies that promote the increase of quality and healthy lifestyles that respond to environmental problems of practical education.
- Demonstrate in their performance knowledge of the normative documents of environmental policy.
- Direct the educational process and teaching-learning based on the environmental potential of the content.
- Guide individual and collective subjects to promote healthy environments for the development of students' personalities.
- Advise managers and teachers on the direction of environmental education.
- Research environmental problems in educational practice within the pedagogical process.

- **Content for environmental training**

The contents in this research cover the knowledge, skills, and values for the environmental education of students in the Bachelor's degree in Education (Pedagogy and Psychology). They integrate the object of the profession and the modes of professional practice with the contents of environmental education. Among them are: Regulations on environmental education, learning for coexistence with natural ecosystems and their protection and care, the environment in personality development, educational guidance to promote healthy environments and prevent disasters and protect mental health, educational strategies that take into account environmental components, environmental education as an object of educational research, advising school leaders and teachers on environmental education (**Figure 2**).

These contents determine knowledge, skills, and values that are concretized in the training process of students, from their preparation in the object of their profession and modes of action (**Figure 3**).

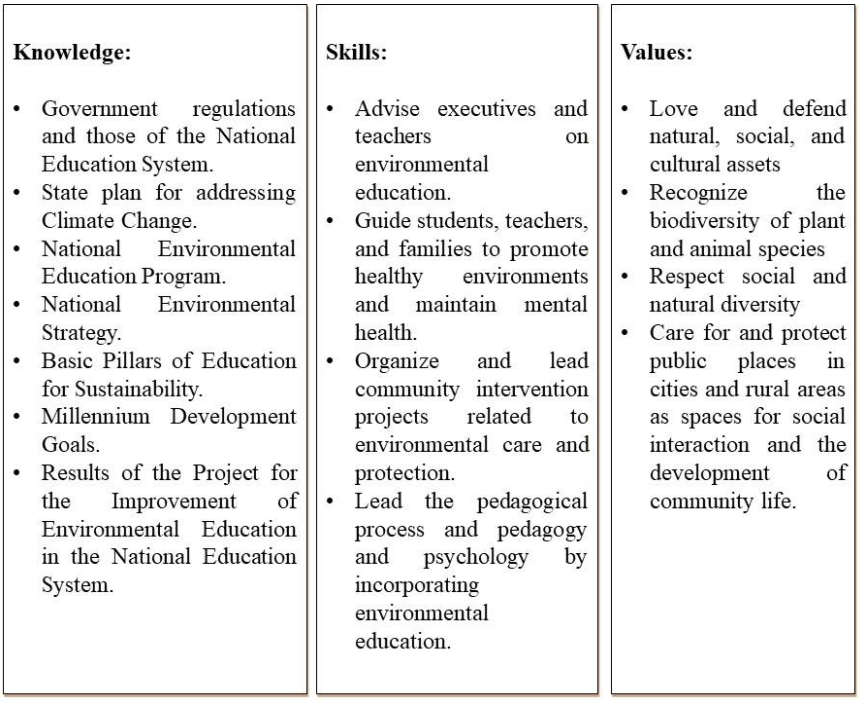

Figure 2. Relationship of the content for students' environmental training with the purpose of the profession.

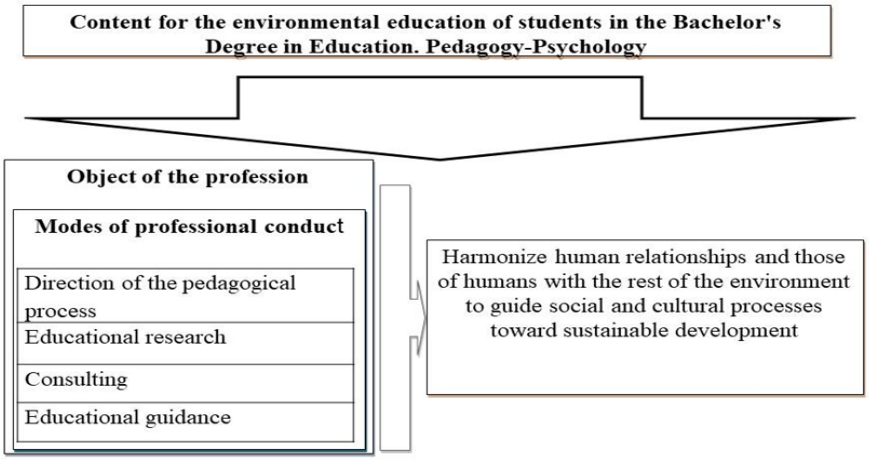

Figure 3. Diagram of the contents included in environmental training with respect to the purpose of the profession and professional modes of practice.

- **Methods and means for environmental training**

In the research, the definition of methods is conceived according to Coe, Waring, Hedges and Arthur [25], who consider them to be: systematic, intentional strategies employed by educators to enable meaningful learning. They involve the orchestration of teaching techniques, learning activities, and assessment practices in harmony with the learners' needs, the subject matter, and the educational objectives. For these authors, educational methods are designed to optimize both the acquisition of knowledge and the development of critical, creative, and reflective thinking skills.

The means consist of objects or their representations, bibliographic and audiovisual materials, or equipment that support the activity of the teacher and the students in order to fulfill the objectives. Proposed means include: audiovisual media, the environment itself, reflected in the school, family, and community contexts, which are investigated by the students in the link between theory and practice, by assessing the environmental conditions and the character-

istics of the school, family, and community. Also included are the social and educational institutions that carry out environmental education work, especially those with significant results.

- **Forms of organization for environmental education**

They constitute the basis on which the objectives, content, methods, means, and evaluation in the pedagogical process are structured. The concept defined by Shokirova is assumed: they are activities organized by teachers and students in a specially structured way and in a certain manner. The choice of forms of educational organization is determined by the educational tasks and depends on the content and methods of educational work [26].

Academically, the class serves as the fundamental form (lecture, seminar, practical class, workshop, among others). In addition to self-preparation, consultation, and tutoring, virtual classroom and multimedia resources are used to ensure the central role of students in the process.

In the work-research setting, it is conceived through practical work and Extracurricular, Course, and Diploma Projects. In outreach: teacher excursions, research projects, and visits to institutions.

- **Evaluation of environmental education**

It is a systematic process that assumes the criteria of the International Union for Conservation of Nature [27], which considers it as the process of systematically evaluating the effectiveness, relevance, and impact of environmental education programs in achieving conservation and sustainability goals. Due to its importance, it is considered a subsystem of the environmental training of students in the Bachelor of Education. Pedagogy-Psychology. To carry it out, four basic requirements proposed by Marimón are taken into account: decision on what to evaluate, planning how to do it, conducting the evaluation, and using the results. It is recommended to consider the categories and units of analysis established for the study of the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology).

- **Subsystem organizational components of the education process**

The organizational components of the training process act as mediators of the influence of teachers on students through concrete actions that respond to the achievement of the objectives of the professional model. These are classified according to the type of activity that the student develops into: academic, labor-research, and extension, according to Horruitiner Silva [28].

- **Evaluation subsystem**

The Pedagogical Model for environmental training of the students in the Bachelor's degree in Education (Pedagogy and Psychology) proposed is evaluated, taking into account the integrative conception and based on the students' performance, starting from the objectives of each academic year and the guidelines from the Ministry of Higher Education.

3.1.2. Implementation

The implementation of the model is carried out from each of the components that make up the student's education, taking this into account from the Academic component: Implementation of a subject in the curriculum, either in the core or as an elective: 'Environmental education from the functions of the school psychopedagogue, to systematize the contents covered in previous levels and begin to introduce those that students must receive based on their professional object and modes of action; as well as to explain the specificities at different educational levels.

Through the subjects of the curriculum, students come into contact with the contents of environmental training. They are worked on according to the potential of each, as a way to exemplify how to do it, from their modes of action. Below are suggestions for content with the potential to do this from the disciplines, and it is specified in proposals for the subjects: In the discipline of Pedagogical Foundations of Education, on the topics of health promotion, health education, sexuality, and quality of life in school, health education, lifestyle, and health culture.

From the contents: the most common diseases that occur among schoolchildren. Sexuality and personality. Prevention of sexually transmitted infections. The role of education. The strategic role of the school in the development of health culture. Guiding documents of the educational policy for the work of school health in the National Education System. Concept of a health-promoting school.

The school environment and factors related to the environment and school health. The importance of healthy environments in health prevention is emphasized.

Additionally, in the pedagogical process within the family and the community, the preventive nature of pedagogical intervention in response to natural disasters in schools, families, and communities is emphasized. Prevention of family, community, and school accidents.

In particular, in subjects: Special Pedagogy in the educational care of students with learning difficulties, psychopedagogical treatment for dyslexia, dyscalculia, and dysgraphia, motivational problems, attention deficits, sensory difficulties, socio-cultural challenges, strictly educational and intellectual issues; to exemplify through the use of environmental elements in educational strategies.

In Introduction to the Specialty, emphasize the contents related to living with natural ecosystems and their protection and care in the learning for life outcomes. In the subject of Pedagogy, when teaching: problem, objectives, contents, methods and means, the integrated evaluation and the forms of organization of educational work, the subjects involved, and the educational work of Fidel Castro Ruz will be addressed. Skills for environmental education in the school and the community will be developed, as well as convictions and values for their pedagogical and civic approach in the transformation of the environment.

In the Teaching Discipline and Curriculum, it is proposed to work on the subject of General Didactics by arguing how to develop environmental education from it. In Curriculum Theory and Practice, this is done by addressing the normative documents of environmental education and the specificities for each level. In Didactics of Pedagogy and Psychology, intervention strategies are modelled to solve environmental problems in professional practice and to guide the pedagogical process of Pedagogy and Psychology while incorporating this topic.

In the Discipline of Physiological and Psychological Foundations of Education, to encourage students to understand the influence of the environment on personality development, health status, and physical development as indicators of health, the environment is seen as part of the social development situation and the driving force behind it.

From the subject Psychopathology, relate the role of educational contexts in promoting mental health, as well as in the content of some alterations of cognitive, affective, conative psychic functions, and the motor phase or behavior.

In the Discipline Guidance in the Educational Context, when teaching the contents about the guiding action in the emotional development of personality, focused on the personalizing dimensions: stimulation of personal growth, healthy lifestyles, life project, personal self-realization, and social skills in conflict resolution. Values as explicit content of guidance. Techniques and methods for values guidance.

Furthermore, in the contents of educational direction counseling, ways to carry it out, and addressing the most common problems in personality development during childhood, adolescence, and youth in Cuba: hyperactivity, shyness, aggression, and other emotional development disorders that have an environmental cause; there will also be work on advising families in the face of natural disasters, for the integration of agencies and socializing agents, and in stimulating the educational potential of the community.

Similarly, in the characterization and educational guidance in the community. Ways, modalities, methods, and techniques of community guidance. Specificities in Cuba. Relationship between community guidance, community work, and prevention. Experiences of proposals for community guidance to achieve interrelation between school and community: programs, projects, and strategies for the interrelation of the school and the community. Role of the school and the graduate in Pedagogical Psychology in the community work group.

In addition, while providing psychopedagogical consultations and group reflection workshops, integrating socializing agents for the conduct of the educational process in different institutions from an environmental perspective.

Likewise, while teaching the contents of potentially generating factors for psychological disturbances, emphasizing natural disasters and using training and direct counseling programs for mental preparation, attention, self-motivation, self-control, and self-relaxation, through the use of elements from the environment, to provide psychological help to people affected by natural disasters.

In the subject of Educational Guidance, explain the concept of health and the influence of the environment on

it, the possibilities of acquiring diseases and suffering accidents in unfavorable environmental conditions. Explain the possibilities of guiding to foster healthy environments in relation to environmental conditions, and how to proceed in the face of natural disasters, and provide guidance to parents and other community agents regarding the health of students.

In the Discipline of Labor and Research Training, guide students to consult theses that address the topic to exemplify the phases of the research process. Conduct research on pedagogical and psychological subjects and on the modes of action of the psychopedagogue.

Labor-research component. Students appropriate the mode of action by interacting with the object of the profession; therefore, it is suggested that: They incorporate into educational institutions to appreciate the work of environmental education, value such activities, diagnose different contexts, develop intervention strategies that utilize the environmental potential of the community and the school to carry out their work as psychopedagogues, design activities such as contests, interest circles, and morning sessions on the topic, visualize videos about the experiences of institutions in environmental education.

Similarly, they should guide and advise teachers, families, and students to create healthy environments for development and to provide guidance before, during, and after possible natural disasters. In the development of skills in the use of methods and techniques of scientific-research activity for the solution of professional problems, evaluate the environmental influence on personality development and propose actions for its solution.

Extensionist component. It allows students to engage in work with socializing agencies and agents, as well as to develop skills to interact with and guide families, the community, and the school based on various environmental content, according to the diagnosis of institutions and the educational needs of students.

Based on this: direct environmental education activities, organize morning sessions, political and cultural events, commemorate environmental anniversaries, conduct visits to outstanding educational and social institutions such as schools associated with UNESCO and those located in watersheds, lead interest circles, scientific societies, and develop meetings with environmental education specialists.

Similarly, conduct visits to community projects with environmental themes, carry out diagnoses and design environmental education activities, visit institutions where psychopedagogical treatments are applied through elements of the environment, carry out social intervention activities in response to social environmental issues such as: alcoholism, smoking, inadequate hygiene conditions, provide advice on environmental education in schools and other institutions, guide the school, the family, and the community on actions to be taken before, during, and after environmental disasters, offer guidance to victims of natural disasters.

The integration between the organizational components of the process is realized in environmental training, which should result from fulfilling the objectives of the proposed model. To evaluate the results of the model and the training process of the students, a final subsystem is developed, that of evaluation, which allows for feedback on its implementation in environmental education.

It is developed as a process with a systemic character and considers the evaluation methods of each proposed activity of the strategy. The evaluation methods are: self-evaluation of the program, semester reports, and validation of subjects, disciplines, and academic years.

In the subjects, the contents for environmental training are evaluated, with the means to carry it out in higher education (systematic, partial, and final). For this, the instruments designed for each of them are used.

In the academic years, it is aimed at evaluating the achievement of the objectives for the level declared in the Pedagogical Model. Similarly, the individual evaluation of each student is carried out, which demonstrates the development achieved, based on the categories and units of analysis. Potentialities and deficiencies are determined for the work in the next course.

In the disciplines, the results achieved in each subject and in general will be evaluated based on the environmental training results obtained according to the contents of each one. In the labor-research component, the results obtained by students in student scientific work, participation in events, defenses of Extracurricular, Course, and Diploma Projects, publication of articles on these topics, among others, are taken into account. In the extension ac-

tivities, evaluation will be based on the results obtained in these, and participatory techniques will be used to promote self-assessment among students.

The way to implement the Model is through the Strategy for Environmental Education of students in the Bachelor's degree in Education (Pedagogy and Psychology), in which the organizational components of the process are integrated. This is developed by considering it a practical result that can transform the object of research, and the concept defined by Păun [29] is adopted, who considers it as: a group of two or more methods and devices integrated into an operational structure, carried on at the level of the teaching-learning-evaluation activity, for the realization of the general, specific and concrete pedagogical objectives, in high quality parameters.

It is structured with an introduction on the elements to consider in its implementation, a general objective, specific objectives, and organizational planning with actions, methods, and means to carry them out, participants, and forms of evaluation. The activities are planned to address each of the declared specific objectives.

It serves as a tool for the work of the degree program, guiding actions for its development from the perspective of the profession and modes of practice, so that students acquire knowledge, skills, and values.

General objective: Implement the Model for environmental education for students in the Bachelor's degree in Education (Pedagogy and Psychology) from the perspective of the profession and modes of practice.

Based on this, the following are determined as specific objectives:

1. Train the degree program professors in the content of environmental education.
2. Incorporate environmental education into the components of the process.
3. Solve professional problems regarding environmental education based on the actions of the pedagogue-psychologist.

Each school year is designed based on the assessment carried out with students and teachers.

4. Discussion

Currently, research was conducted around the world, such as that of Shabalala [30] in Africa, which synthesizes conceptual, pedagogical, and policy-based perspectives on the integration of indigenous knowledge systems; Sihombing, Anwar, Liu, et al. [31], in Indonesia, whose work suggests that incorporating traditional knowledge into scientific education promotes cultural preservation, environmental management, and sustainable development. Both studies highlight the importance of context in environmental education and educational practices, elements that are supported by the present research, emphasizing the need for a diagnosis as a component of the model that contextualizes the pedagogical process.

The Pedagogical Model for the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology) that is presented is flexible to be used and includes new contents for environmental training, which may arise in educational practice [32].

This model is being generalized to other Cuban universities where the program is studied. The model can be useful in the initial training of other programs in pedagogical and psychological education. In addition, it serves as a reference for including environmental education as part of the methodological guidelines of the program and for developing teaching materials that could be used by teachers and students in environmental training and education.

The result of applying the model conditioned the better preparation of students in this subject, motivation for environmental education work from their roles as school psychopedagogues, a holistic approach to the pedagogical problems they address, highlighting among them those of an environmental nature. And the proposals for categories and units of analysis that allow for evaluating the performance of future psychopedagogues from an environmental perspective.

Environmental education studies at universities around the world are conducted from different perspectives and approaches. This research calls on the academic community to work on environmental content from the training of professionals so that it can be used by future professionals. They will demonstrate responsible behavior toward the environment, not only through their personal attitudes but also through their ways of acting.

Today's university students are the future professionals who, in a short time, will have important decisions

regarding the environment in their hands. These decisions also include their professional choices. In particular, education professionals will train new generations and must prepare so that environmental education is one of the elements of their work.

5. Conclusions

The specificities of the environmental training of students in the Bachelor's degree in Education (Pedagogy and Psychology), must take into account the object of the profession and the modes of action in preparing them to harmonize the relationships between people and with the rest of the environment, and to orient social and cultural processes towards sustainable development and achieving a higher quality of life.

The proposed Pedagogical Model is a theoretical construction that simplifies the most general elements that distinguish environmental training by considering the object of the profession and modes of action as the basic cores. It has a synthetic, systemic, cyclical, dynamic, participatory, and protagonistic character for the students, given by the interrelation established among the different subsystems and components that make it up, which determines that environmental training is the result of the system as a whole. It is a tool for the work of the career that guides actions to develop knowledge, skills, and values.

The systematization of experiences for environmental education was carried out through three cycles in which the axes of systematization, the activities developed, and the strengths and weaknesses were analyzed. This enabled the process of analyzing and interpreting the information, enriching the categories and units of analysis, proposing content for environmental education based on the object of the profession and modes of action, and determining the subsystems that make up the Pedagogical Model and its system of interrelationships.

The study is limited to research conducted at the Central University of Las Villas; therefore, future research could: compare approaches to environmental education and environmental training that systematize the theoretical results of studies on the topic at universities in different countries, in similar programs that train professionals who develop psychopedagogy.

Author Contributions

D.d.l.C.H.A.: conceptualization, methodology, validation, formal analysis, investigation, writing—original draft preparation, supervision, project administration; M.M.F.: software, resources, data curation, writing—review and editing, visualization; M.A.L.H.: software, resources, data curation, writing—review and editing, visualization. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

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Hernández Abstengo, D.d.l.C., 2018. The Environmental Training of the Graduate in Special Education with a Specialization in Pedagogy-Psychology. Revista Varona. 65. Available from: http://revistas.ucpejv.edu.cu/index.php/rVar/article/view/63 (in Spanish)

Hernández Abstengo, D.d.l.C., 2018. Environmental Education Curriculum Strategy for Students in the Bachelor's Degree in Education (Pedagogy and Psychology).

Revista Luna Azul. 46, 369–386. (in Spanish)

Hernández Abstengo, D.d.l.C., Díaz Pacheco, M.d.l.A., Pérez Meneses, N., 2018. The Development of Skills for the Environmental Training of the Bachelor's Degree in Education (Pedagogy and Psychology). Revista Varela. 18(50), 202–212. Available from: https://revistavarela.uclv.edu.cu/index.php/rv/article/view/96 (in Spanish)

Hernández Abstengo, D.d.l.C., Martínez Ferrer, M., Escalona Leyva, M., 2024. Conception of Environmental Education in the Bachelor's Degree in Education (Pedagogy and Psychology), Cuban Perspective. Revista Atenas. 62, e11766. Available from: https://dialnet.unirioja.es/servlet/articulo?codigo=9930559 (in Spanish)

Conflicts of Interest

The authors declare no conflict of interest.

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