

# MENDIVE

REVISTA DE EDUCACIÓN

Translated from the original in Spanish

## A methodology to strengthen the environmental education

### Una metodología para fortalecer la educación ambiental

### Uma metodologia para reforçar a educação ambiental

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#### ABSTRACT

The environmental education is a very important topic in this moment, its development constitutes a necessity in the professors in initial formation, given in the fundamental thing by the contribution that it has in the protection of the environment. The present work

has as objective to propose a methodology for the environmental education, from the discipline General Zoology so it contributes to their best preparation. Starting from this problem and the potentialities that offers the discipline General Zoology, different theoretical methods are applied as the analysis and synthesis, historical logical and the system focus and empiric methods like the study of documents: programs, methodological orientations and books of texts, observation to classes and pedagogic test; those that allowed to verify the initial state of this process. The search of information on the topic threw that this thematic has been little tried from the theoretical and the methodological point of view, besides the professors' insufficient preparation in the direction of the process that are reflected in the learning of the professors in initial formation, for that reason a methodology to develop the environmental education was elaborated. The reached results evidence transformation levels that demonstrate that the proposal contributes to the completed preparation in the professors in initial formation.

**Keywords:** environmental education; methodology; professors in initial formation; General zoology.

#### RESUMEN

La educación ambiental es un tema de gran actualidad. Su desarrollo constituye una necesidad en los profesores en formación inicial, dado en lo fundamental por la contribución que esta tiene en la protección del Medio Ambiente. El presente trabajo tiene como objetivo proponer una metodología para la educación ambiental desde la disciplina Zoología General, de modo que contribuya a la mejor preparación del profesor en formación. A partir de esta problemática y las potencialidades que ofrece la disciplina Zoología General se aplicaron diferentes métodos de nivel teórico como el análisis-síntesis, histórico-lógico y el enfoque de sistema y de métodos empíricos como el estudio

documental de programas, orientaciones metodológicas y libros de textos, la observación a clases y la prueba pedagógica, los que permitieron constatar el estado inicial de dicho proceso. La búsqueda de información sobre el tema arrojó que esta temática ha sido poco tratada desde lo teórico y lo metodológico; además de insuficiencias de los profesores en la dirección del proceso que se reflejan en el aprendizaje de los profesores en formación inicial, por lo que se elaboró una metodología para desarrollar la educación ambiental. Los resultados alcanzados evidencian niveles de transformación que demuestran que la propuesta contribuye a la preparación más acabada de los profesores en formación inicial.

**Palabras claves:** educación ambiental; metodología; profesores en formación inicial; Zoología General.

#### RESUMO

A educação ambiental é um assunto muito atual, seu desenvolvimento é uma necessidade para os professores em treinamento inicial, principalmente devido à contribuição que dá para a proteção do meio ambiente. O presente trabalho visa propor uma metodologia de educação ambiental da disciplina de Zoologia Geral, de modo a contribuir para uma melhor preparação do professor em treinamento. A partir desta problemática e das potencialidades oferecidas pela disciplina Zoologia Geral, diferentes métodos de nível teórico são aplicados, tais como análise e síntese, abordagem histórico-lógica e sistêmica e métodos empíricos como o estudo documental de programas, diretrizes metodológicas e manuais escolares, observação em sala de aula e teste pedagógico, o que permitiu verificar o estado inicial deste processo. A busca de informações sobre o assunto mostrou que este assunto tem sido pouco tratado do ponto de vista teórico e metodológico; além das insuficiências dos professores na direção do processo que se refletem no aprendizado dos professores em

treinamento inicial, por isso foi elaborada uma metodologia para desenvolver a educação ambiental. Os resultados obtidos mostram níveis de transformação que demonstram que a proposta contribui para uma preparação mais completa dos professores no treinamento inicial.

**Palavras-chave:** Educação ambiental, metodologia, professores em treinamento inicial, zoologia geral.

#### INTRODUCTION

In the history of the Earth, the Environment has been changing very slowly, although in certain periods the changes have been more noticeable and important than in others. But it is not only natural forces that has affected, the development of human beings and the increase in their number as well. Due to it, the protection of the Environment (MA) has become a priority, to ensure economic and social development and, above all, health and survival is human species on the planet (González, 2016).

The understanding of sustainable development from a holistic conception of the Environment is the most appropriate strategy for modern man, in order to raise the quality of life of the current human generation, without endangering the possibilities of future generations to satisfy their own. Undoubtedly, this process is complex and they are the pedagogy and didactics key to renewing the values and perception, to develop an awareness and an engagement that enable change during the process of education and training happening in the school areas and not in school ( Santos *et al.* , 2016).

At present there is a very interesting epistemological controversy around the construction of knowledge about environmental education. Some authors give it the rank of a pedagogy,

others that of a didactics and not a few that of a methodology.

The didactics of environmental education and training should guide the principles for the direction of the teaching - learning process to understand the complexity of environmental problems of the contemporary era and the search for its solution in sustainable development, determining the dynamics of all its components and the relationship with the main contexts of action (Santos *et al.*, 2016).

Chávez (2017), referring also to what we can do from education, states:

The most that can be done, at the moment, is to offer educators a series of guidelines for instructing society about the most important questions facing the modern world and, of course, <sup>TM</sup>the man himself. Said guidelines will be related to each of the components of the educational activity: objectives, contents, teaching methods, means, work organization and evaluation. No matter how guiding and re conceptualized pedagogy and didactics are to face environmental education, it is the teacher who puts them into play, with his pedagogical tact (p. 2).

As a characteristic of learning in relation to environmental issues, the nature of the object it deals with and its general objectives, work methods are selected that should ensure a reflective, critical and developmental activity, promoting problem solving, referring to specific situations that affect the quality of the environment. This implies that people and students participate in decision-making. Working with problems

can be a way of involving students in the exercise of their autonomy, of their moral principles, of their solidarity attitudes, of the affective bond with the natural and human heritage, at the same time that they achieve the elaboration and debate of proposals for action and intervention that modify behaviors and attitudes.

In Cuba there is a policy on the Environment defined, not only in Party documents, but also in the Constitution of the Republic and, correspondingly, in the documents that govern the activities that are organized in this sense in state agencies and Cuban institutions.

In a look at the last decade of education for sustainable development (2015-2020), a long process in favor of environmental education, started in Stockholm in 1972, is renewed and updated, which expresses the need to train new mentalities and skills to internalize an environmental dimension and a new knowledge within rationality, attitudes, behaviors and decision-making (Contreras s, Pérez & Hernández, 2018, p. 406).

The Pedagogical Faculties are responsible, through the development of curricular and extracurricular activities, for developing in the initial training of teachers of the Biology career procedures that allow their active participation in the knowledge, assessment, prevention and correction of the environmental problems, and radiate them in the schools and communities where they carry out their future work.

In university education, due to the level of systematization and deepening of their curricula, its contents offer great potential to work in this regard.

The new study plan E, in essence, is characterized by achieving the training of a teacher who, in the Biology career, responds to the demands of the end of education and the objectives of the Cuban school, in relation to the integral formation of the new generations in the conditions of the construction of socialism and the contemporary Scientific-Technical Revolution (National Career Commission, 2016).

The General Zoology Discipline stands out for the potential it offers to promote the formation of a responsible attitude that guarantees its contribution to the protection of the Environment; however, the modes of action of Professors in Initial Formation (PFI) do not correspond with the desired training objectives (Banasco, Armiñana, Garcés & Guerra, 2016).

In addition, in the exploratory study carried out, the scarce integration of the contents of General Zoology with those of environmental education is evidenced, so that the PFIs do not appropriate enough knowledge, values, habits and skills.

Taking into account the results of the study carried out, the objective of this article is presented: to propose a methodology for environmental education, from the General Zoology Discipline, so that it contributes to the better preparation of the teacher in training.

## MATERIALS AND METHODS

The population and sample coincide and is made up of an enrollment of 32 PFI of the second year of the Biology career of the Department of Natural Sciences and 10 Biology professors of the Department of Natural Sciences.

The methodological conception used in this research is the comprehensive investigative approach, which is based on the dialectical-materialist method, which made possible an analysis of the environmental education process from the Zoology Discipline in the initial training of teachers, knowing their relationships with other objects and the determination of the human being in the transformation of the problem identified about said object.

This general method was accompanied by the application of methods of the theoretical level, among which are: a historical-logical analysis, used to know the object of study in the historical course, taking into account the background, trends and theoretical methodological conceptions in the environmental education process; analysis-synthesis, which allowed the study and evaluation of different concepts that served as reference framework to environmental education for work with the protection and conservation of wildlife, as well as the determining of the structure of the methodology and teaching tasks and the system focus, which allowed the analysis of structural components characterizing environmental education, particularly regarding the design of the methodology, based on the discipline Zoology mobilize the potential of their content based on obtaining knowledge, skills and behaviors that promote actions compatible with the environment. Other methods used were those of the empirical level, such as: documentary study to do the analysis of regulatory documents of General Zoology discipline for second year of biology career PFI, in order to determine the possibilities offered by the contents of the discipline as a condition for structuring the methodology aimed at strengthening their environmental education; classes observation, for the characterization of the process of teaching - learning of the General Zoology discipline and the realization of

the environmental education work being done and the pedagogical work to check the knowledge possessed by PFI on environmental education.

## RESULTS

The application of the research methods allowed verifying the following results on the process under study:

- It is found that the objectives of the program undertake environmental dimension of Zoology discipline, existing links between them and the possibility of studying environmental issues, with emphasis on the protection of animal biodiversity of Cuba; so it can be stated that, explicitly or implicitly, the proposals made to the Zoology discipline condition the process of environmental education of teachers in initial training.
- Considering the topics that the discipline program addresses and the different aspects for its study, it is obvious to consider that it has sufficient potentialities that allow approaching the work with environmental education through its system of knowledge and skills and, based on them, specify integrative teaching tasks that by means of the different forms of educational organization, it is possible to strengthen environmental education in teachers in initial training of the Biology career.
- The review of methodological guidance allows us to suggest that, although the work of environmental education generally is entered, no roads are set for it, so that the suggestions made are insufficient for the professors, through its creativity and scientific and methodological training, to

integrate the contents of the program of Zoology discipline with environmental education.

In the observations to classes it was found that 45% of the teachers show difficulties to integrate the contents of Zoology with environmental education. 95% do not take actions that promote the use of resources provided by the general discipline with environmental education.

In the responses to the Pedagogical Test, it is evident that 94.5% of the PFI have insufficient command in indicators of both dimensions, such as: level of knowledge for the identification of endemic threatened and endangered species, level of knowledge to identify global and local environmental problems.

Considering the results achieved and the criteria assumed previously developed a methodology for developing environmental education in the PFI from the General Zoology discipline that allows the integration of this with environmental education.

Then, methodology, its objectives, actions and methodological guidelines for implementation are proposed.

### General aspects of the methodology

The methodology presented is about the problem of the environmental education from the results of the diagnosis applied to the selected sample, which brings actions of interest to confirm the importance of the program Zoology discipline of the career of Biology from the University of Pinar del Río "Hermanos Saíz Montes de Oca".

For the elaboration of the methodology, the criteria related to this form of presentation of the scientific results that have been elaborated by the Center for Studies of Pedagogical Sciences of Villa Clara are assumed. The definition of

methodology is used from the particular point of view addressed by R. Bermúdez and M. Rodríguez and completed by Dr. N. de Armas as it is considered as one that includes a set of methods, procedures, techniques and means that respond to each science in relation to its characteristics and object of study (De Armas & Valle, 2011).

This methodology has its meaning in terms of environmental education, because it establishes guidelines for the treatment of the concepts of the program of Zoology discipline promoting expression of wildlife protection through the teaching - learning process.

### **General Methodology Objective**

Strengthen environmental education in PFI, by developing the teaching-learning Zoology discipline in Biology career at the University of Pinar de Rio "Hermanos Saiz Montes de Oca" as a process of instruction and education of the same.

### **Methodology Structure**

#### **Categorial body**

A necessary condition for developing the methodology to strengthen EA of teachers in initial training of Biology career by teaching assignments in each of the forms of Organization of Teaching (FOD), is identifying the traits and characteristics that set it apart. For this, it is necessary to define the concepts and categories that intervene in this process and that make up the categorial body of the methodology, establish the relationships of significance between them.

In this sense, due to their significance in the context of the proposed methodology, the concepts: environmental education, Environment, fauna, management and conservation of fauna diversity, form of teaching organization and initial teacher training, constitute the main categories that

distinguish it, based on the relationships established between them and with other necessary conceptualizations that contribute enriching elements to its functioning.

It cannot omit, for example, concepts such as biodiversity, endemic species, environmental species, local problems, global environmental issues, endangered species and ecosystems, given the connotation acquired within the methodology.

Inside of the transformations occurring in universities today, one of the challenges we must take is to strengthen environmental education of teachers in initial training. To achieve this, the formal route is, without doubt, an enabling space for teachers in initial training to appropriate knowledge, ideals beliefs and values, strengthening modes of citizen action to allow them, prevent or mitigate environmental problems of the environment, ensuring the protection of the Environment and the quality of human life of current and future generations for sustainable development.

As part of the EA formally it enables the teacher in initial training can identify in their environment, the environmental local problems, conceived as qualitative deterioration of the environment caused by urbanization, irrational exploitation of resources, etc., which affects the worsening of global environmental problems, considered planetary in scope due to their causes and manifestations and which can only be solved or alleviated by the joint action of nations.

Undoubtedly the Zoology discipline has an extensive knowledge system, significant, interesting and necessary for the teacher in initial training of biology career to identify ecosystems considered: community of biotic and abiotic elements closely related with the environment and that occupies a certain terrestrial and aquatic space, so that in this way they can study

biodiversity, considered as diversity in the number of living species and from here know the endemic species conceived as typical of a certain region and the species Threatened conceived as a category to design living species whose number and reproduction conditions are critical and reversibly; that is to say, strengthening in the teacher in initial training environmental knowledge, beliefs and values reversed in modes of citizen action that contribute to the protection of the environment.

### **Legal body (principles and laws)**

The principles in which the methodology is based are those set in the IGC Tbilisi (cited by Lugo, 2013):

1. The unit of the natural and social environment

EA cannot be conceived in a unilateral way, highlighting only one of the elements that constitute the Environment, therefore the actions must promote the treatment of all its components.

2. The Systematicity

EA, characterized in the process of learning to be, to do, to foresee and to have, maintains continuity throughout the entire educational process to which the individual is subjected.

3. The unity of the affective, the cognitive and the behavioral

EA should be conceived as the process where there is a close union of the instructive and the formative, in order to promote the development of personalized values and convictions, with a special sense of an individuality that acquires a dynamic role in their daily and socializing behavior.

4. Participation and transformation of attitudes

The individual becomes the center of the process of shaping a consistent attitude in their actions about, through and for the Environment (MA), essential aspects to promote dialogue, trust and active participation in solving problems.

5. The interdisciplinary approach and character

It is important to establish relationships between all disciplines and articulate all the knowledge to solve a problem, as well as guarantee the participation of each one of them with a general and particular approach, in coherence and integrity.

6. The unity between the global, national, regional and local

The problems and their causes must be studied and analyzed from the local to the global with a progression of connected continuity: micro, macro or vice versa, and this must be one of the essential principles of EA. Starting from the solution of problems closer to the life of the center or community.

7. The need for a holistic perspective

The environmental education work from the general objectives of the curriculum, those required for second and third year of biology career and particularly for the General Zoology discipline, knowing the principles established and especially dominating the scope it has. Mastering the comprehensive scope of environmental education is something transcendental, because with this we will work in order to meet the objectives that are set today for the new generations: patriotic, labor, citizen, revolutionary and scientific training.

These principles, according to the author, are those most suited to the characteristics of the Cuban educational system and can be specified for particular content on the Environment incorporated into the various components of the

General Zoology discipline, but in their daily work it can use other principles derived from their activity and scientific inquiry.

### **Laws**

Law 81/97 of the Environment establishes the principles that govern environmental policy and the basic standards to regulate the environmental management of the State and the actions of citizens and society in general, in order to protect the Environment and contribute to achieving the country's sustainable development goals.

The National Environmental Education Strategy (CITMA-CIGEA, 2019) constitutes an essential tool for advocacy work, education and development of an environmental culture, from the management and treatment of educational processes in various scenarios and conditions. Each organization, institution or territory will make the pertinent adjustments for its implementation.

### **Instrumental methodological Apparatus**

De Armas & Valle (2011) state that "The instrumental apparatus is made up of theoretical and empirical methods, techniques, procedures and actions that are used to achieve the objectives for which the methodology is developed" (p.49).

According to the methods, this component provides the direction of the process and answered questions from the How to develop the process? How to teach? How to learn? The method then is the way that represents the set of actions of teachers and students and allows teaching and learning, as well as determining the organizational patterns of cognition and if regulators of activity between teachers and students, aimed at achieving the objectives.

The selection of the methods for the implementation of the methodology to strengthen environmental education in teachers in initial training of the Biology-Geography career respond to the category of developer methods, which is why in this case problematic methods, of independent and problem-solving methods are selected.

The problematic methods, according to Majmutov (quoted by Salcedo, Hernandez, the Llano, McFerson & Daudinot, 2002) are: problematic exhibition, partial search, heuristics conversation and research method.

### **Independent working method**

It is understood as any activity carried out by the student individually or collectively, both by assigned tasks and by personal desire, without the direct intervention of the teacher, aimed at consolidating and deepening the knowledge, skills and habits acquired (teaching or independent work). In this regard it is assumed in the stated methodology for environmental education method freelancing since that efficient application helps to ensure the assimilation of knowledge, develop the creative ability, develop correct skills and habits, and stimulate the investigative spirit, develop the leadership of their own learning and the development of an integral personality.

### **Problem solving methods**

The search for more practical alternatives led to learning from problems. With this method, PFIs are not expected to discover scientific knowledge themselves. Rather the selection and sequence of problems must guide to learn, from various sources, contents that are considered relevant (Bell & Moya, 1999).



Capote (2003), in his doctoral thesis, refers to the fact that the word problem comes from the Greek and means: task, exercise or theoretical or practical question that requires a solution. However, this word has multiple meanings, depending on the sphere of knowledge in question and the theoretical and ideological position assumed.

The author shares the criteria of authors such as Campistrous & Rizo (1996), from which the problem can be characterized as a dialectical category that reflects in the subject the existence of contradictions in the object to be known, which determines the research activity of search of new knowledge, which makes those who solve it arise certain needs and motives that drive them to undertake the solution; It is any situation in which there is something hidden from the subject and the solution of the problem intensely compromises his cognitive activity.

The foregoing confirms that problem solving can perfectly lead to directed investigative activity.

Regarding implementing the investigative activity of the PFI through problem solving as a method or for professional training, a position coinciding with that of Rodríguez (2002) is assumed when determining that school research must guarantee that the PFI performs the following actions: of motivation and development of the field of interests, of detection of the specific problem to be investigated, of expression of prior knowledge concerning the problem, of planning for the solution of the problem, of execution of the planned, of expression of the results and of assessment of the results.

In the sciences, the solution and approach problems by PFI should take to create contradictions between what they know and the unknown, arouse their interest in finding the solution, hypothesize, get to

perform experiments that allow testing them, everything which can motivate them to seek information, deeping into the precise elements to answer their questions, and that learning deviates from "memory acquisition" and encourages the development of thought (Campistrous & Rizo, 1996).

Problems should be raised in all possible perspectives, giving more importance to the qualitative problems that quantitative, more open than closed, providing the opportunity to manipulate real objects, that are contextualized, that offers opportunity to consult support material that can expose and clarify its resolution strategy (Gil, 1994).

For a correct environmental education, the three methods must be combined so that teachers in initial training are able to identify environmental problems, substantiate them, propose solutions to them and defend them. To achieve a correct combination, problems should be properly raised, using language of everyday life that is clear, written in simple words, with a catchy title that can interpret and analyze both the aspect of the procedure as a result, to develop a final product, such as a report, a poster, an exhibition, an article, a conference, etc.

The problem solving, as well as being served today as a competition that depends on the domain of science where it develops and the knowledge personality of PFI, it is also assumed as a method, as presented in the environmental education methodology raised and requires:

1. The adaptation of the tasks to the possibilities and previous conditions of teachers in initial training, as well as a context.
2. Teachers in initial training do not know in advance the resources they should use.

3. That pre-service teachers be given scope to formulate questions and time to reflect.

4. That the reflection activity, conceptual understanding and the elaboration of own procedures be stimulated.

5. To reframe, generalize or develop new tasks from doubt.

6. To encourage communication of results in small or large groups.

7. To work with errors.

8. To foster individual and collective evaluation.

9. To make the analysis of methodological gain, considering knowledge and skills, methods and strategies that can be transferred to other similar topics.

The selection of the methods for its implementation is based on the following criteria:

- Need for a productive relationship between teacher-teacher in initial training, promoting instruction and education in their unit, responding to the purposes (objectives) formulated.
- The process of assimilation, learning product, was present and the discovery of knowledge.
- To provide opportunities for teachers in initial training to solve problems such theoretical and practical.
- Those teachers in initial training will be the protagonists of their own learning, providing answers and solutions as products of this protagonism, which implies the existence of motivation and motives that compel them to do so, through an adequate direction and orientation of the learning process by teachers.

## STAGES OF THE METHODOLOGY

**Preparatory stage:** planning and organizing the process

**Objective:** To plan activities to be performed from the results of the diagnosis of the preparation of the PFI, the potential offered by the program of discipline and themes for strengthening environmental education, with an emphasis on wildlife protection.

A. Diagnosis of needs, cognitive interests (knowledge, abilities, skills, habits) and formative (feelings, motives, values, attitudes) in teachers in initial training.

It is essential to start from the diagnosis because of the importance of knowing their potentialities and their possibilities of success when facing the resolution of environmental education problems, so that they can go through different stages of scientific - environmental research, from the collection of information or real data (based on maps, text, statistical data and in the process of work in the locality), the systematization of the collected data (through its description, the comparison of maps, classification tables, etc. ether) and the analysis, until the generalization and elaboration of the conclusions.

This diagnostic process should be carried out as part of the frequent evaluation system that teachers carry out.

It is also necessary to know the composition of the classroom, taking into account the different levels of development in which the students are, with a view to implementing the resolution of problems related to environmental education and emphasizing the protection of fauna.

## Diagnostic action procedure

Determination of cognitive referents, intellectual skills for their activation, different levels of development in which students are with a view to implementing the resolution of problems related to environmental education, emphasizing the protection of fauna, conceptions that students have on environmental education and proper management of wildlife resources and the analysis of the results and identification of the needs of the PFI.

B. Analysis of the requirements and potential of the program General Zoology discipline.

An analysis of the requirements of the program and its correspondence with the current model of teacher training of the Biology career should be carried out, making the necessary adjustments in correspondence with the results of the diagnosis of the group and the real conditions for its development, considering the possibility implementation of the proposal.

In general, the preparatory stage is a phase that is distinguished by the conception, planning and forecast of all the elements required for the successful execution of the environmental education methodological proposal, and it can be established that the most essential thing lies in the concretion of the executions, determining curricular and extracurricular activities, for example, environment concept is addressed in the content of the program General Zoology discipline for teachers in initial training, this concept is distinguished by its essential features, namely: abiotic factors, biotic, social.

C. Analysis of the potentialities of the topic or methodological analysis according to the planning model of didactic units.

Comprehensive analysis of the normative documents of education; It should conduct a study of the program General Zoology discipline and its contribution to the objectives of the professional model for initial training teachers of biology career colleges.

Analysis of the gradual derivation of objectives, so as to achieve the content and skills that potentially offer opportunities to address the work of environmental education.

Content analysis (selection and structuring of knowledge, procedures and attitudes).

Specify the conceptual system of the topic, represent it and identify its relationships and hierarchy in correspondence with the diagnosis and the potentialities of the topic, for the process of environmental education through problem solving.

Specify the skills and procedures that will be used to achieve them.

Initial diagnosis (previous knowledge, level of development of intellectual abilities).

Selection of teaching strategies (methodological approaches, teaching sequence, teaching activities, learning materials).

Analysis of the real conditions for its implementation.

Establishment of the objective and subjective conditions for the development of the teaching process.

Determination and location of available bibliographic sources.

They will carry out in the next stage, in correspondence with the diagnosis and the potentialities of the topic:

- Design of teaching tasks with an integrative and interdisciplinary nature, which make it possible to pass through different levels of independence.
- Class planning, where actions to be taken into account for proper management of fauna diversity are explained.
- Selection of evaluation strategies (knowledge of the PFI and development of the unit).

### **Second stage:** execution

**Objective:** develop planned activities to strengthen environmental education, with an emphasis on wildlife protection.

A. Development of a system of activities to promote interest in environmental education, highlighting the protection of fauna.

Class teaching task regarding the Environment (example)

#### 1. Lecture teaching task:

On an excursion to the field practice polygon we find several ecosystems, in which there is a great diversity of animals: why, if they are so different, are they included within the same domain and kingdom? Argue.

How important are these animals in nature and in human life?

#### 2. Teaching task of Practical class:

The most direct and fastest way to know the biological diversity that exists in a site is through an inventory; for this purpose, the realization of a rational collection in the surroundings of the university is oriented, and after developing the work, return it to its habitat (Cruz, Martínez, Fontenla & Mancina, 2017).

Use dichotomous keys to identify: domain, kingdom, subkingdom, grade, sub grade, *phylum*, class, order, genus and species of each specimen collected.

Which of these species bring benefits to man and which damages? Argue.

Will it be correct to apply harmful chemicals to eliminate harmful species? Argue.

List possible actions to maintain biodiversity in this locality.

**Third step:** control and evaluation of the results

It will take into account:

**Objective:** check the effectiveness of the activities undertaken to strengthen environmental education, with an emphasis on wildlife protection.

Assessment of the work carried out, in the search for the solution of environmental problems, emphasizing the protection of fauna.

Analysis of the development of each teacher in initial training in the identification of problems related to environmental education, emphasizing the protection of fauna, and trying to bring it to the model of lesson plans.

Readjustment of the strategy, according to the results obtained by the teachers in initial training.

It will be done through:

#### 1. Frequent evaluation:

- Oral participation in debates.
- Preparation of content sheets from the oriented bibliography.
- Written questions about the content studied

## 2. Partial evaluation:

- The modeling of classes.
- The modeling of methodological activities.
- System of tasks in a content and subject.
- Foundation of a problematic situation, of social or personal connotation.

## 3. Final evaluation:

- Reflection workshops.
- Student Scientific Session: those works whose results have connotation for the contributions of the authors, their creativity, and compliance with the basic requirements of the methodology of scientific research will be presented.
- Evaluation of the actions that make up the methodology and redesign of actions in order to improve it.

the study of environmental problems, which impregnates the knowledge with greater objectivity, it is the way to analyze problems in a integrated, holistic, systemic that allows the understanding of the same phenomenon as a whole (Fragoso, AJ, Santos, I., Aguiar E., 2017, p. 7).

As can be inferred, education as a process and the school as an institution, play an essential role in this battle, because it must involve all members of society in the search for solutions to solve the problems of the environment, providing knowledge, the skills and motivations necessary for an adequate interpretation of the world and a social action consistent with their needs and demands.

In Cuba, the State and its government policy have prioritized the implementation of actions aimed at the conservation and protection of the Environment, which is based on article 75 of the 2019 Constitution of the Republic; in the contents emanating from the 2010-2015 strategic cycle of the National Environmental Education Strategy, now integrated into the new 2016-2020 strategic cycle of the National Environmental Strategy, as well as in the National Environmental Education Program for Sustainable Development that includes the key elements worked and projections, in tune with the new educational currents of the Region and that responds to international commitments such as the Sustainable Development Goals, the World Plan of Action on Education for Sustainable Development, promoted by UNESCO, the Paris Agreement of COP 21 in 2015 on Climate Change and Decision 3 Environmental Education for Sustainable Development approved at the XX Meeting of the Forum of Ministers of the Environment of Latin America and the

## DISCUSSION

The results obtained with the application of the exposed methods and the bibliographic search on the subject show the need to deepen it, due to the contribution to the strengthening of environmental education in teachers in initial training of the Biology career, which will be reversed in the new generations.

The authors acknowledge the importance of environmental education awareness about these problems; this is how it is stated:

The orientation of environmental education for sustainable development from the ecosystem approach is considered one of the current ways of assuming

Caribbean in March 2016 (National Assembly of the Popular power Republic of Cuba, 2019).

At the same way, it underlines the vast potential science in education as cultural heritage identity of Cuban pedagogy, which contains the conceptual and methodological basis of environmental education in Cuba, which is based on international practice experience and a long tradition for implementation and development of environmental educational processes in the national territory, highlighting the responsibility and obligation of the universities.

Among the latter, the pedagogical faculties for which constitutes a major challenge to achieve the quality of the graduates that the country needs, able to understand and handle the problems of the environment stand out, which is achieved with effective treatment and effective use of environmental dimension in the training process integrally that includes the important role, if not fundamental and strategic, of knowledge in relation to environmental problems, and therefore, with environmental education (Lugo, Álvarez & Rodríguez 2017).

The proposed methodology to implement the assumed theoretical conception was defined through a specific strategic action, aimed at strengthening the environmental education of teachers in initial training from the General Zoology Discipline. Coinciding with raising Armiñada (2017), this allows the development of more active learning strategies so that they can select, structure, sequence and integrate the content according to the objectives and interests at all times.

The results achieved showed levels of transformation in the teachers in initial training of the Biology career, which show that the proposed methodology contributed to the strengthening of environmental education in the initial training teachers of the Biology career.

Taking into account the current and future impact of climate change for the Cuban island, ratified by the scientific-technological results obtained and the guidelines issued by the General of the Army from 2006 to date, the Ministry of Science, Technology and Environment presents an updated proposal to confront climate change, inspired by the thought of the historical leader of the Cuban Revolution, Fidel Castro Ruz, when at the Earth Summit in Rio de Janeiro, on June 12, 1992, he stated: "... An important biological species is at risk of disappearing due to the rapid and progressive liquidation of its natural conditions of life: man..." (CITMA, 2017).

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#### **Conflict of interest:**

Authors declare not to have any conflicts of interest.

#### **Authors' Contributions:**

*Angel Caridad Lugo Blanco*: Conception of the idea, general advice on the topic addressed, authorship coordinator, literature search and review, drafting of the original (first version), revision and final version of the article, correction of the article, revision of the applied bibliographic norm.

*Concepción Alvarez Yong*: literature search and review, revision and final version of the article, revision of the applied bibliographic norm.

*Caridad Estrada Rodríguez*: literature search and review, revision and final version of the article, revision of the applied bibliographic norm.



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