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The teaching task. Treatment of biological contents in junior high school

La tarea docente. Tratamiento de los contenidos biológicos en secundaria básica

A tarefa de ensino. Tratamento de conteúdos biológicos no ensino secundário básico

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ABSTRACT
The educational task in the treatment of the biological contents in high school constitutes a topic to deal with the integral formation of the students to guarantee that adolescents respond to the objectives from this educational level according to the current necessities of the society. To give answer to the above-mentioned, it was pointed out as objective to propose actions to develop for the design of educational tasks in the treatment of the biological contents in high school. In the proposal the relationship among the components of the learning process of teaching, the ecological, evolutionary concepts, bioethics and Its contextualization was shown, being the most interesting the use of the Technologies of the Information and of the Communication. It was implemented in the practice starting from the design of educational tasks that propitiated the relationship among professor - student, student-student and student-group. Methods of the mathematical theoretical, empiric and statistical level were used. The results were evaluated by means of the application of the pre experiment whose results showed their validity. The design of educational tasks starting from the proposed actions propitiated the use of the knowledge and abilities for its context to the ecosystem, evolutionary and bioethics approach.

Key words: biological contents; educational task; teaching-learning process.

RESUMEN
La tarea docente en el tratamiento de los contenidos biológicos en secundaria básica constituye un tema a tratar en la formación integral de los alumnos para garantizar adolescentes que respondan a los objetivos de este nivel educativo acorde a las necesidades actuales de la sociedad. Para dar respuesta a lo anterior, se planteó como objetivo proponer acciones a desarrollar para el diseño de tareas docentes en el tratamiento de los contenidos biológicos en secundaria básica. En la propuesta se mostró la relación entre los componentes del proceso de enseñanza-aprendizaje, los conceptos ecológicos, evolutivos,

bioéticos y su contextualización, siendo lo interesante el uso de las Tecnologías de la Información y las Comunicaciones. Se implementó en la práctica a partir del diseño de tareas docentes que propiciaron la relación entre profesor-alumno, alumno-alumno y alumno-grupo. Se emplearon métodos del nivel teórico, empírico y estadístico matemático. Los resultados se evaluaron mediante la aplicación del preexperimento, cuyos resultados mostraron su validez. El diseño de tareas docentes a partir de las acciones propuestas propició el aprovechamiento de los conocimientos y habilidades para su contextualización al enfoque ecosistémico, evolutivo y bioético.

Palabras clave: contenidos biológicos; proceso de enseñanza-aprendizaje; tarea docente.

RESUMO
A tarefa de ensinar conteúdos biológicos no ensino secundário básico é um assunto a ser tratado na formação integral dos estudantes, a fim de garantir aos adolescentes que respondam aos objetivos deste nível de educação de acordo com as necessidades atuais da sociedade. Para responder ao acima exposto, o objetivo era propor ações a serem desenvolvidas para a concepção de tarefas de ensino no tratamento de conteúdos biológicos no ensino secundário básico. A proposta mostrou a relação entre as componentes do processo ensino-aprendizagem, os conceitos ecológicos, evolutivos e bioéticos e a sua contextualização, sendo a utilização das Tecnologias de Informação e Comunicação a mais interessante. Foi implementado na prática a partir da concepção de tarefas de ensino que favoreceram a relação entre professor-estudante, estudante-estudante e grupo de estudantes. Foram utilizados métodos matemáticos teóricos, empíricos e estatísticos. Os resultados foram avaliados através da aplicação do pré-experimento, cujos resultados demonstraram a sua validade. A concepção de tarefas de ensino a partir das ações propostas favoreceu a utilização de conhecimentos e competências para a sua contextualização a uma abordagem ao ecossistema, evolutiva e bioética.

Palavras-chave: conteúdo biológico; processo de ensino-aprendizagem; tarefa de ensino.

INTRODUCTION

In today's world, science has achieved a rapid development, producing changes in different spheres of society. Because of this development, the school has to guarantee the preparation of the students, achieving a comprehensive training that corresponds to the new advances.

Authors of topics related to the teaching-learning process, Addine (2004) and Meneses (2007) refer to the need for planning this process, which enables the mastery of the content and the integral development of the personality of the students.

Later, Basulto *et al.* (2017) express also to be taught and learn biological content with sense to life, apply the basic concepts to solve everyday problems in a responsible way. Echemendía *et al.* (2018) and Collazo (2018) consider the need for logical thinking, the experiences related to the activity for individual and collective appropriation of new knowledge for the integral formation of the personality of the student, contributing to the love, care and protection of the environment.

In line with the above, the teaching-learning process requires a harmonious combination between didactic procedures, knowledge system, particularities of students as subjects of learning, which enables them to develop logical operations of thought,

through the observation of biological phenomena.

In the teaching-learning process of biological content, it is necessary to follow the deductive logic, which encourages the students to develop sensitivity to the appropriation of the content with an integrative, ecosystem, evolutionary and bioethical explanatory approach for sustainable development.

The idea of Robaina and Banasco (2017) is assumed; they define it as "a successive series of teaching tasks in which the class, the topic and the subject are structures in more complex systems (…)" p.3.

An important element in the teaching-learning process are the organizational forms of teaching, since they constitute the essential factor to achieve an efficient direction of the teaching-learning process, evidencing the interrelation of all the components of the process, taking into account the individual and pedagogical group diagnosis for the development of the learning object.

As part of the organization of the teaching-learning process, a place is occupied by the conception of collective forms of activity, which play an important role as a mediating element for individual development. In this form of activity, students exchange points of view, criteria, and opinions, which allows the student to express what he thinks and reflect on the elements that other students and the teacher can offer him.

In the teaching-learning process, it is important that students individually and collectively appropriate the content through the activity that is generated by performing the teaching tasks.

Authors who have dealt with the subject of the teaching task such as Álvarez de Zayas (1999) emphasizes its importance in the context of the training of students, since it encourages them to search for knowledge and the development of skills for their comprehensive training. Martinez *et al.* (2016) ensure that the student perfects his mode of action and rises, meanwhile, individually and in groups, specifying the actions and operations to be carried out by the student and the guiding and controlling role of the teacher.

In relation to the above, Silvestre and Zilberstein (2000) are assumed, who state that teaching tasks are "(…) those activities that are oriented so that the student performs them in class or outside of it, imply the search and acquisition of knowledge, the development of skills and the integral formation of their personality". These authors consider that this represents the end of their design and implies the development of skills for the search for knowledge, which enables its implementation and evaluation, facilitating the fulfillment of the objectives of the educational level.

The purpose of the article is to present the proposal of actions to be developed for the design of teaching tasks in the treatment of biological contents in secondary school.

An exploratory study to ascertain the degree of development of students were done, in which empirical methods were applied among which are: analysis of documents, teaching activities observation, students and teachers Interviews The main weaknesses assessed are:

- In the aimed teaching tasks, the assimilation and solid knowledge, skills, values and its contextualization with sustainable development was not treated with intentionality.
- In the teaching tasks, an educational proposal is not taken into account so that the

students can appropriate the biotic phenomena from the knowledge and skills system.

- It is limited to use of the potential offered by the biological content to respond to the motivations and interests of students in the appropriation of a conception of nature that includes recognition of social interactions.

The aforementioned weaknesses show the need for a new dynamic in the design of teaching tasks in the treatment of biological contents in high school, so that future generations appropriate a conception of life and nature based on biodiversity, with an evolutionary and ecosystem approach. For this, it is important an update of biological processes and their relationship to the environment, and solving teaching tasks, which fosters assimilation.

The teaching task fosters the orientation of activities that imply the search and acquisition of knowledge and that leads to the development of skills and the formation of values.

To respond to this problem, the following proposal is prepared, which aims to propose actions to be developed for the design of teaching tasks in the treatment of biological contents in high school.

MATERIALS AND METHODS

The research was carried out in junior high school, in the seventh grade. The structuring of the biological content system encourages the formation of knowledge, skills and values that constitute the basis for the study of these contents in the different grades of the educational level. We worked with a sample integrated by 37 students and five teachers who taught the biological content in Natural Sciences subjects in that grade and biology in the other grades.

The methodological conception of the research was based on the dialectical - materialistic method as a scientific - methodological basis, which allowed the analysis of the object of study, its causes, relationships and development trends. In the same way, we worked with theoretical methods (historical and logical, analysis and synthesis and induction and deduction, systemic-structural, modeling) and empirical methods (observation and pedagogical test).

The induction-deduction method allowed the work with the theoretical-methodological references and the making of inferences about the teaching-learning process, in the processing and interpretation of the results, which allow reaching conclusions regarding the teaching task.

The historical-logical method allowed the study of the evolution of the teaching-learning process, with emphasis on the use of teaching tasks for the contextualization of the knowledge system.

The documentary analysis was used with the objective of knowing the treatment of the subject under investigation in the normative documents of the educational level, the seventh grade and class plans of the Natural Sciences subject.

With the observation, the current state of the problem could be verified from the exploration of the reality of the teaching-learning process, from the observation of teaching activities.

For information processing, descriptive statistics and percentage analysis were used.

The pedagogical test was applied to diagnose the students and verify the pedagogical problem.

The use of these methods made it possible to identify the weaknesses related to the object of study. For this, it was found:

- Limited didactic preparation of teachers, which does not encourage their leadership.
- It manifests traditionalist approach in the treating of biological content, limiting the integral formation of students.
- In students, there is a tendency to know only the facts, concepts and principles that characterize science.
- Little development of skills in students to link content with life.
- The student is not the center of the process, so there is no emotion and creation of meaning in them.

RESULTS

The Cuban educational system has made important achievements in the treatment of biological contents; however, weaknesses that limit the integral formation of students in junior high school have been identified.

The historical study carried out revealed the need to improve, in the direction of the process, the contextualization of the knowledge system for the comprehensive training of students.

The bibliography, not always explicitly, recognizes the application of the knowledge system in favor of the comprehensive preparation and performance of students in life.

In the documentary analysis of the program and methodological guidelines, it was observed a tendency to treat the content, use of different forms of organization of teaching, but not directed how to develop teaching tasks taxing to the fulfillment of the purpose and objectives of the level to relate such content with life.

It should be noted that the biological contents in the seventh grade prioritize aspects related to the unity and diversity of organisms, the kingdoms that group in the living beings, not sufficiently addressing the application of the knowledge system to their contexts of action to promote a better understanding of them.

In 77.7 % of the sampled classes, the objectives lack a formative approach, so they respond essentially to the instructive; the potentialities of the content are not used to link them to the problems of society.

In 83 % of the classes observed, the conception of teaching tasks that require the student to contextualize the contents in solving problems with an ecosystem, evolutionary and bioethical approach is limited.

48.7 % of the student's responses only refer to the content and not to its contextualization in connection with life.

Environmental elements (ecological and bioethical) are not always addressed as the main concepts for environmental protection.

From the above results, proposed actions enable the design of teaching tasks in the treatment of biological contents in secondary school so that it achieves the integral formation of students.

The proposed actions will offer to the teacher who teaches biological contents to design teaching tasks starting from the end and objectives of the level, the characterization of students and the use of different ways of teaching promoting the interrelation between different components of teaching.

The actions to be developed are:

1. Identify the educational objectives of the educational level-those of the degree-subject.

2. Updating of the characterization of the students in the domain of biological contents and their contextualization.

3. Design teaching tasks based on the potentialities provided by the knowledge system for the comprehensive training of students, attending to the following invariants:

- Relation of the contents with other subjects.
- Structure-function relationship.
- Organism-environment relationship.
- Contextualization of the contents to daily life.

4. Use of Technologies of Information and the Communication (ICT)

5. Determine the organizational forms of teaching and learning assessment.

From these actions, the proposal is developed to design teaching tasks:

At the time of diagnosis

- Establish the relationship of the educational objectives of the educational level -those of the degree-subject. Concepts discussed in earlier grades, new concepts, concepts that were later deepened, skills and values that conciliate the students learning and their contextualization are needed.
- Updating of the characterization of the students in the domain of the contents and the contextualization of the same. It enables the teacher to know the degree of development of his students in the cognitive, that is, in the instructive, educational and the application of the knowledge system to life and the sustainability of it.

At the time of planning

- Design teaching tasks based on the potentialities provided by the knowledge system for the comprehensive training of students. It will be determined what, as well as the potential of the content to feed back the training objectives that taxed and its contextualization to the ecosystem, evolving and bioethical approach, establishing the structure-function-operation.
- Planning the use of Technologies of Information and the Communications (ICT). T hey constitute support tools for searching information on the internet to solve the teaching task, a means of acquiring knowledge and communicating its results.
- Determine the organizational forms of teaching and the evaluation of learning. It is determined when the teaching task is oriented, the means, teaching methods to be used, what will be evaluated individually and collectively.

In addition, for the elaboration of the proposed teaching tasks, the classification made by Silvestre and Zilberstein (2000) was taken into account:

a) Tasks that contribute to the perception and understanding of the teaching content

b) Tasks that require the application of knowledge and the development of reflective thinking

c) Tasks that require creation with greater cognitive independence

According to these authors, it is important to take into account the characteristics of teaching tasks, such as:

- Be varied, considering different levels of demand that lead to the application of knowledge in known and unknown situations, which promote the effort and intellectual work of the student, leading him to higher stages of development.
- Be sufficient, so that the dosed activity itself, includes the repetition of the same type of action, in different theoretical and practical situations; the actions to be repeated are those that promote the development of intellectual ability and the assimilation of content.
- Be differentiated, in such a way that they promote activities that respond to the individual needs of students, according to the different degrees of development and preparation achieved.

The teaching task, in the treatment of biological contents, requires planning, orientation and evaluation. They favor the assimilation of the system of contents by developing independent work and group discussion.

Two examples of teaching tasks to guide in the treatment of biological contents in seventh grade are presented.

Teaching Task 1

Content: Common characteristics in living beings

Objective: Identify the characteristics that provide unity and diversity to organisms

Form of organization: first class

Methodological suggestions: The procedure in this task is teaching aimed at guiding students to contribute to the assimilation of the content of the subject, especially the identification of key concepts from common characteristics of organisms.

The collective analysis of the teaching task will be directed towards the characteristics that show unity among the organisms. The use of teaching aids that facilitate the development of the activity is important. It will guide the use of internet to look for information, in addition to the textbook.

1. In organisms there is a correspondence between their structures and their functioning in a given environment, they react to changes in the environment and they interact with the rest of the biotic, abiotic and socioeconomic factors.

a) Identify in the previous approach the common characteristics of the organisms that are manifested.

b) How important is the presence of these characteristics in organisms?

c) Redact brief information about the structure-environment. Consult internet site: https://es.slideshare.net/bgca/adaptaciones

Teaching Task 2

Contents: nutrition

Objective: exemplify unity-diversity in organisms from the nutrition function

Form of organization: first class

Methodological suggestions: to analyze the nutrition function as a characteristic that provides unity to organisms; it is important to highlight the unity-diversity contradiction in the different forms of nutrition that are manifested in nature by organisms. Guide the use of internet to

search for information in addition to the textbook.

2- Identify the type of nutrition that the following organisms carry out: the rabbit, the almond tree, the trout and the stick ear mushroom.

a) Is there unity or diversity in the nutrition function? Exemplify your answer.

b) Summarize the characteristics of the different forms of nutrition studied; which is the importance of is this function for organisms?

c) Present the result of part b in PowerPoint
format. Consultation on internet site: https://www.significados.com/nutricion

DISCUSSION

The results obtained with the application of the applied methods and the search for theoretical references on the subject affirm the need to delve into it, due to the importance of biological contents in the comprehensive training of elementary school students.

92.6% of teachers manifest the importance in the direction of the process the interaction between the components of teaching, being the pupil center teaching. It corroborates that 87, 5 % of students expressed in their responses the application of the knowledge system and their experiences in their relations with nature.

Without contradicting the foregoing, and in this regard Echemendía *et al.* (2018) state that: The dynamic that takes place in the teaching and learning of biological contents should encourage students love, the need for care and protection of the environment, stimulate the ability to perceive and understand the beauty of nature, social life and the formation of a scientific conception of the world.

This process is based on the activity for the acquisition of knowledge in the school environment that comes from the object-subject relationship, which contributes to the integral formation of the student, which coincides with the authors consulted when considering that the teaching task in the treatment of biological contents has to be planned, with the use of educational means for its contextualization to the need to protect nature.

This study confirms the vision of Robaina and Banasco (2017), who affirmed that the teaching task implies the search and acquisition of knowledge, becoming problems for the student, establishing the contradiction between the known and the unknown.

The authors' criterion does not contradict Collazo (2018), when expressing that the integration of the cognitive and the affective implies promoting new knowledge from learning situations and sharing experiences and experiences related to the activity.

From the foregoing, the authors of this paper agree on the design of teaching assignments in the treatment of biological content, it has to be planned, establishing the relationship student teacher and contextualized in relation to achieving its goal.

The teaching task in the treatment of biological contents requires a harmonious combination between didactic procedures, knowledge system, peculiarities of students as subjects of learning, which enables them to develop logical operations of thought, through the observation of biological objects and phenomena.

Another aspect to take into account is that, when guiding teaching tasks, the student understands that there are questions for which they have no answer. Hence the need for motivation and guidance to find the solution during its execution. This generates interests in the student, which promotes responsibility and commitment in the search for the solution.

The treatment of the biological material has its essence in the task teacher, contributing to the development of skills, so it will become motivation for finding the unknown in the student , being an end , the assimilation of the system of scientific knowledge contributing thus, to the integral formation of the student to assume the demands of society. The authors agree with Basulto *et al.* (2017), by proposing that teaching and learning be taught by developing logical thinking, contributing to the formation of ethical citizens.

In the proposal, the relationship between the components of the teaching - learning, ecological concepts, evolutionary, bioethicists and contextualization are manifested, being so interesting the use of Technologies of Information and Communications (ICT) to the solution of the teaching task; in agreement with Hernandez (2017), which states that these technologies foster a social and collaborative learning and with Hernandez and Avilés (2019) , which enhance the development of skills that are taxed to the development the student: understanding and finding information and communication.

The authors consider that the use of ICT motivates the student to search for information, which is presented by them in an organized way according to reality, making it possible to fulfill the objectives.

After the analysis carried out, the authors consider that the teaching task plays a primary role in the treatment of biological contents. In the search for its solution, the student develops actions that lead him to understand the unknown and its contextualization.

Systematization performed ascertains that the teaching task has been discussed to different approaches primarily aimed at the search for knowledge and skills development promoting the integral formation of the student.

The actions proposed for the design of teaching tasks in the treatment of biological contents, make it possible their contextualization, helping to solve problems that society faces.

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Conflict of interest:

Authors declare not to have any conflicts of interest.

Authors´ Contribution:

Luis Enrique Martínez Zamora: Conception of the idea, general advice on the topic addressed, coordinator of authorship, literature search and review, preparation of instruments, compilation of information resulting from the applied instruments, writing of the original (first version), review and final version of the article, correction of the article.

Leticia Echeverría Palomino: Literature search and review, translation of terms or information obtained, application of instruments, compilation of information resulting from the applied instruments, statistical analysis, preparation of tables, graphs and images, correction of the article.

Liulka Hernández Páez: Application of instruments, compilation of information resulting from the applied instruments, preparation of the database, review of the applied bibliographic standard, review and final version of the article, correction of the article.