

***Un acercamiento a las tareas docentes en el tratamiento a los
contenidos biológicos en preuniversitario***
***An approach to teaching tasks in the treatment of biological
contents in preuniversity***

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Resumen

En la formación integral de los estudiantes de la enseñanza preuniversitaria constituye un problema la concepción y aplicación de tareas docentes que tributan al aprendizaje memorístico, reproductivo, sin una plena comprensión y aplicación de lo aprendido a situaciones de la vida cotidiana. De ahí que el objetivo del presente artículo es la elaboración de un procedimiento para la concepción de las tareas docentes, que contribuya a la orientación, control y evaluación de las mismas, y potenciar de esta manera, la calidad de las clases de Biología. Se emplearon métodos del nivel teórico, empírico y estadístico matemático. Los resultados se evaluaron mediante la aplicación del pre experimento, cuyos resultados mostraron su validez y permitieron concluir que la propuesta es pertinente para contribuir al aprendizaje desarrollador en la práctica escolar.

Palabras clave: Proceso de enseñanza-aprendizaje; Tratamiento a los contenidos biológicos; Tareas docentes; Procedimiento.

Abstract

In the integral formation of students of pre-university education, the conception and application of teaching tasks that contribute to rote, reproductive learning, without a full understanding and

Yendris Oliva, Rocio A. Rodríguez, Giolvys Basulto: Un acercamiento a las tareas docentes en el tratamiento application of what has been learned to situations of daily life, constitutes a problem. Hence, the objective of this article is the elaboration of a procedure for the conception of teaching tasks, which contribute to their orientation, control and evaluation, and thus enhance the quality of Biology classes. Methods of the theoretical, empirical and mathematical statistical level were used. The results were evaluated through the application of the pre-experiment, whose results showed its validity and allowed us to conclude that the proposal is relevant to contribute to developing learning in school practice.

Keywords: Teaching-learning process; Treatment of biological contents; Teaching tasks; Procedure

Introduction

The 21st century is characterized by a socio-cultural revolution, based on the rapid development of science and the social impact of its practical applications. In the educational context, based on the requirements of the 2030 Agenda, related to quality education and the contribution to sustainable development, it implies that the teaching content has applications in everyday life, overcoming traditionalism and decontextualization, revealing its social impact and practical utility by solving everyday problems in a responsible manner and thus promoting an education for life.

The above is evident in the third stage of the Continuous Improvement of the National Education System, focusing on reducing the volume of information by concentrating on the essential, adapting the contents to the peculiarities of assimilation and cognitive possibilities of students; where new approaches and educational components are introduced to achieve comprehensive training and better preparation of students for life.

Hence, a greater didactic and methodological preparation of teachers is needed to integrate "knowing and being" in "knowing how to do" and "knowing how to value" within their different spheres of action in order to face the new educational challenges.

An important aspect to materialize these aspirations is the attention to the teaching-learning process, as it constitutes an ideal way to contribute to the formation of that ideal of man to which society aspires.

Regarding the teaching-learning process and its incidence in the integral formation of the student, the criteria of (Addine, 2004; Meneses, 2007; Collazo, 2018; Echemendía et al. 2018; Martinez, L.E. et al., 2021); among others; were systematized.

For Martínez, L.E. et al., (2021); "the teaching-learning process requires a harmonious combination between didactic procedures, knowledge system, particularities of the students as subjects of learning,

Yendris Oliva, Rocio A. Rodríguez, Giolvys Basulto: Un acercamiento a las tareas docentes en el tratamiento which enables them to develop the logical operations of thinking, through the observation of biological phenomena" (p.32).

Taking into account the above, the authors are of the opinion that an important element in the teaching-learning process are the organizational forms of teaching, since they make possible an efficient management of the teaching-learning process, evidencing the interrelation of all the components of the process and where the conception of the forms of collective activity constitutes a mediating element, through which collaborative learning is promoted.

However, in the context of the teaching-learning process of Biology 4 tenth grade, the treatment of its contents continues to be a concern, with the predominance of a behaviorist posture, a memoristic conception characteristic of the model of transmission-reception of knowledge, generally decontextualized from reality; basically limited to describe biotic processes and phenomena at molecular and cellular levels, which must be assimilated by students in an uncritical and unreflective way, which limits the social scope of the same.

In the teaching-learning process of Biology 4 tenth grade, it is unavoidable that students individually and collectively appropriate the contents of the molecular and cellular levels through the activity that is generated with the realization of teaching tasks, so as to contribute to logical thinking, to the integral formation of the personality of the pre-university student and thus respond to the demands of Agenda 2030, related to quality education and the contribution to sustainable development.

The teaching task favors the orientation of activities that involve self-management and the acquisition of knowledge, which leads to the development of skills, feelings and the formation of values.

In order to respond to this aspiration, the following proposal is developed, which aims to elaborate a procedure for the design of teaching tasks in the treatment of biological contents in pre-university education.

Development

Teaching tasks. A theoretical approach

Teaching tasks play an active role in learning by concretizing students' activities both internally and externally through different links in the process.

Teaching tasks have been treated in a wide and dispersed way by different pedagogues, from different latitudes and from different learning points of view, so they have been called teaching tasks, cognitive

Yendris Oliva, Rocio A. Rodríguez, Giolvys Basulto: Un acercamiento a las tareas docentes en el tratamiento tasks, didactic tasks, typical tasks, intellectual tasks and learning tasks, among others, according to the interests of each researcher and the specific context where they are developed.

Many are the pedagogues who have devoted themselves to the study of its characteristics, peculiarities in the teaching-learning process highlighting its value, among them: (Alvarez de Zayas, 1999; Rico, Silvestre, 2002; Rodriguez, 2012; et al., Martinez 2016); among others.

Rico and Silvestre (2002) are assumed, who express that teaching tasks are "(...) those activities that are oriented to be performed by the student in class or outside the classroom, involving the search for and acquisition of knowledge, the development of skills and the integral formation of his personality" (p. 78). These authors consider that this represents the purpose of its design and implies the development of skills for the search for knowledge, which makes its execution and evaluation possible, facilitating the fulfillment of the objectives of the educational level.

An exploratory study was carried out, in which empirical methods were applied, including: analysis of documents, observations of teaching activities, interviews with students and teachers. The main weaknesses assessed are:

In the oriented teaching tasks, the conscious assimilation of knowledge, skills, feelings and values, and their contextualization with sustainable development is limited.

- The teaching tasks that are elaborated do not take into account, in their totality, an educational proposal for students to appropriate from the system of knowledge and skills of the biotic phenomena and processes of the molecular and cellular levels.
- The use of the potential of the biological content to respond to the needs, motivations and interests of students in relation to the linkage and application of the content of the molecular and cellular levels to daily life is limited.

The aforementioned weaknesses show the need for a new dynamic in the design of teaching tasks in the treatment of biological contents in pre-university education, so that students appropriate a conception of life with a sociocultural and bioethical approach. For this purpose, it is important to update the phenomena, biotic processes at the molecular and cellular levels and their link with everyday life situations, and the solution of teaching tasks, which favor assimilation.

Sample and methodology

The research was carried out at the IPU "Flor Crombet", belonging to the municipality of Guantánamo; the tenth grade was chosen for the study. The structuring of the biological contents system favors the

Yendris Oliva, Rocio A. Rodríguez, Giolvys Basulto: Un acercamiento a las tareas docentes en el tratamiento formation of knowledge, skills, feelings and values that constitute the basis for the study of these contents in the tenth grade of this educational level. We worked with a sample of 37 students and 2 teachers who teach biological contents in the subject Biology 4 tenth grade.

The methodological conception of the research was based on the dialectical-materialist method as a scientific-methodological basis, which allowed analyzing the object of study, its causes, relationships and development trends. Similarly, theoretical methods (historical and logical, analysis and synthesis, induction and deduction, systemic-structural, modeling) and empirical methods (observation and pedagogical test) were used.

The induction-deduction method allowed the work with the theoretical-methodological referents and the drawing of inferences about the teaching-learning process, in the processing and interpretation of the results, which allow conclusions to be drawn in relation to 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.

Documentary analysis was used with the objective of knowing the treatment of the subject under investigation in the normative documents of the educational level, of the tenth grade and class plans of the subject Biology 4 tenth grade.

Observation made it possible to verify the current state of the problem by exploring the reality of the teaching-learning process through the observation of teaching activities.

For the processing of the information, 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 purpose, the following ideas were determined:

- Limited didactic preparation of teachers in relation to the conception of problematizing teaching tasks.
- The traditionalist approach is manifested in the treatment of biological contents, limiting the creativity and integral formation of students.
- Limited development of skills in students for linking the contents with life.

Results

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The Cuban educational system has made important achievements in the treatment of biological contents; however, weaknesses have been identified that limit the integral formation of students in pre-university education.

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

In the bibliography, the application of the knowledge system to situations of the social, productive, environmental and daily life context is not always explicitly recognized.

In the documentary analysis of the program and methodological guidelines, it was possible to appreciate the tendency to treat the content, the use of different forms of teaching organization, but the guidelines on how to elaborate teaching tasks that contribute to the fulfillment of the level's purpose and objectives in order to relate such contents to daily life are limited.

It should be noted that the biological contents in tenth grade prioritize the aspects related to the levels of organization of matter, the cell as a unit of structure and function, 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 classes sampled, the objectives lack a formative approach, so they respond essentially to the instructive, not taking advantage of the potential of the content for its linkage to the problems of the student's daily life and society.

In 83% of the classes observed, the conception of teaching tasks that require the student to contextualize the contents in the solution of problems with a bioethical approach is limited.

48.7% of the students' answers only refer to the contents and not to their contextualization in the link with daily life.

Environmental (bioethical) elements are not always addressed as main concepts for the protection of the environment.

Based on the previous results, a procedure is proposed, containing actions that make possible the design of teaching tasks in the treatment of biological contents in pre-university education, in order to achieve the students' integral formation.

The procedure offers the teacher who teaches biological contents, to design teaching tasks based on the purpose and objectives of the level, the characterization of the students and the use of the different forms of teaching, favoring the interrelation between the different components of didactics.

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The proposal is considered in this case as a functional variant that facilitates the work with the teaching tasks, guiding the teacher through the logical steps to operate with it.

In this regard, the proposals made by Martínez et al. (2021), but contextualized to the purposes of this work, constitute important antecedents.

In general, the procedure consists of the following actions

- 1. Identify the formative objectives of the educational level, grade level and subject.
- 2. Updating the characterization of students in the mastery of biological content and the contextualization of the same.
- 3. Design teaching tasks based on the potentialities provided by the knowledge system for the comprehensive training of students, taking into account the following invariants:
 - Relationship of the contents with other subjects.
 - Structure-function relationship.
 - Contextualization of contents to daily life.
- 4. Uso de las Tecnologías de la Información y las Comunicación (TICs)
- 5. Determine the organizational forms of teaching and learning assessment.

Based on these general actions, the proposal to design teaching tasks is developed:

Step 1. At the time of diagnosis

- Updating the characterization of the students and teaching group in terms of specifying the tendencies and needs in the order of potentialities and deficiencies, both as a group and individually in relation to the mastery of the biological contents and their contextualization.
- It means to carry out the exploration in a first moment that allows us to know the current state of the student; this reveals the mastery of the biological knowledge and skills.
- It enables the teacher to know the degree of development of his students and the group in the cognitive, that is, in the instructional, educational and the application of the knowledge system to daily life and its sustainability.
- Establish the relationship of the formative objectives of the educational level, grade and subject.
- Concepts dealt with in previous grades, new concepts, concepts that will be studied in depth later, skills, feelings and values that favor the students' learning and their contextualization are specified. These must be productive and formative in nature.

Step 2. At the time of planning

- Determine the form of organization of the student-student relationship; teacher-student; student-group; teacher-group to develop the task: individual, by teams and in plenary or groups.
- It is determined when the teaching task is oriented, the means, the teaching methods to be used, what will be evaluated individually and collectively.
- Design teaching tasks based on the potentialities offered by the knowledge system for the integral formation of students.
- It is determined the what, as well as the potentialities of the contents of the molecular and cellular levels to feed back the formative objectives to which it contributes and its contextualization to the sociocultural and bioethical approach, establishing the structure-function-functioning relationship.
- Plan the use of Information and Communication Technologies (ICTs).
- They constitute support tools for the search of information on the Internet to solve the teaching task, means of acquiring knowledge and communicating its result.
- Determine the form of learning assessment.

Determine how to control the process and the result of the work with the teaching task in order to evaluate to what extent the actual study approached the ideal through the fulfillment of the objective.

In this sense the evaluation system that is planned must respond to the proposed objectives. This step makes it possible to receive, classify and order the information on the transformations that the students have undergone.

It is an important moment that begins with the individual and group evaluation of the process of the results where the achievements and difficulties are exposed and then an individual and general qualification that can be quantitative or qualitative is argued.

In addition, the development of the proposed teaching tasks took into account the fulfillment of the following requirements as stated by Trimiño (2015, pp. 58-59):

- a) The correspondence between the diagnosis, the group strategy and the individual plan.
- b) Attention to diversity.
- c) That it is sufficiently motivating to create the need for its solution.
- d) Involve students concretely in the activity so that they generate their own procedures and methods of self-learning.
- e) Preventive work from the classroom.
- f) The correspondence between the treatment of the content and the individualized answers.

- g) The treatment of the content based on the interests and motivations of the group.
- h) It takes into account the criteria and doubts of particular students to give general explanations.
- i) The use of the existing resources that support the teaching-learning process.
- j) Demonstration of the usefulness of the class for its activity based on the needs of practical life.
- k) Simulation of teaching situations based on practice.
- l) The stimulation of communicative competence.
- m) The development of self-learning and self-evaluation actions.
- n) Guidance, execution and control of independent work.
- o) Controlling and evaluating the process and the result of the work in the teaching task to achieve the objective, specifying to what extent the real state is close to the desired one.

Based on the above procedure, the authors of this paper infer that:

1. A teaching task constitutes a plan for student performance.
2. Teaching tasks should be primarily focused on meaning. They include some kind of gap, be it information, opinion or reasoning, which students must fill in with their own resources. Therefore, the tasks simply create a scientific framework, within the limits of which the student can move freely.
3. A teaching task involves real processes of knowledge use and at the same time communication.
4. The teaching task may require the use of any of the developed skills, sometimes several at once.

The teaching task, in the treatment of biological contents, requires planning, orientation and evaluation. These tasks favor the assimilation of the content system through the development of independent work and group discussion.

An example of a teaching task to be oriented in the treatment of biological contents in tenth grade is presented.

Teaching task

Content: comparison between prokaryotic and eukaryotic cells.

Objective: to compare prokaryotic and eukaryotic cells.

Form of organization: the class

Methodological suggestions:

The procedure in this teaching task is aimed at guiding students to contribute to the assimilation of the content of the subject, especially the comparison between prokaryotic and eukaryotic cells based on their similarities and differences.

The collective analysis of the teaching task will be directed towards the characteristics that show similarities and differences between both cellular patterns. It is important to use teaching aids that facilitate the development of the activity. The use of the Internet will be oriented to search for information, in addition to the textbook.

Analyze each of the following situations

(A) Tuberculosis (TB) is one of the world's major public health problems. It is an infectious disease of bacterial origin caused by the bacterium *Mycobacterium tuberculosis* (or Koch's bacillus) and mainly affects the lungs; however, it can affect any other part of the body. It is estimated that one-third of the world's population is infected by the bacillus.

(B) The stem cell is a cell that has the capacity to either self-renew by mitotic divisions or to continue the differentiation pathway for which it is programmed and thereby produce cells of one or more mature, functional, fully differentiated tissues.

- Identify the cell pattern present in the underlined examples.
- Between the two cell patterns, similarities and differences are established between their structures and how they function in a given environment and react to changes in the environment. Discuss this approach.
- Investigate about the treatment and hygienic measures to be taken into account by patients suffering from tuberculosis and their relatives.
- Discuss the applications that have the treatments of diseases with stem cells in our country.
- Present in power point format the result of item d). Consult in Internet the site: <https://www.significados.com/aplicaciones stem cells>.

Discussion

The results obtained with the application of the applied methods and the search for theoretical references about the subject affirm the need to deepen in it, due to the importance of biological contents in the integral formation of pre-university education students.

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92.6 % of the teachers state the importance of the interaction between the components of didactics in the direction of the process, being the student the center of the teaching activity. It is corroborated that 87.5% of the students express in their answers the application of the knowledge system to daily life situations.

Considering these results, the authors of this article are of the opinion that the dynamics that takes place in the teaching-learning process of biological contents should stimulate in students creativity, cooperative work, self-management of learning, as well as 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 didactic means for its contextualization to situations of daily life.

This study confirms that the teaching task implies the self-management of knowledge, allows the integration of cognitive and affective aspects, involves promoting new knowledge from learning situations and sharing experiences related to the activity.

Likewise, the authors of this article agree that the design of teaching tasks in the treatment of biological contents must be planned, establishing the student-teacher interrelation and contextualized in relation to the achievement of its objective.

The teaching task in the treatment of biological contents requires a harmonious combination of didactic procedures, knowledge system, particularities of the students as subjects of learning, which enables them to develop the 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 he/she has no answer. Hence the need for motivating and guiding students to the search of solutions during the execution of the task. This generates interest in the student, which promotes responsibility and commitment in the search for the solution.

The treatment of biological contents has its essence in the teaching task, contributing to the development of skills, so it will become a motivation for the search of the unknown in the student, being its end, the assimilation of the scientific knowledge system thus contributing to the integral formation of the student to assume the demands of society.

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The proposal shows the relationship between the components of the teaching-learning process, the bioethical concepts and their contextualization, being lawful the use of Information and Communication Technologies (ICTs) for the solution of the teaching task.

In this regard, the authors consider that the use of ICTs motivates the student to self-manage information, promotes social and collaborative learning, and enhances the development of skills that contribute to student development: understanding and search for information and communication.

After the analyses carried out, the authors consider that the teaching task plays a fundamental 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.

Conclusions

The systematization carried out showed that the teaching task has been discussed from different approaches, mainly aimed at the search for knowledge and the development of skills favoring the student's integral formation. The proposed procedure containing actions for the design of teaching tasks in the treatment of biological contents, makes possible their contextualization, contributing to solve problems faced by society. teaching tasks can be applied in the current conditions of middle school; they are valid for frontal work with students and for the realization of individual and team tasks. The use that the teacher makes of them depends on the way he/she combines them to structure the teaching-learning situations. It constitutes a way to promote meaningful learning in the teaching-learning process of Biology, an alternative to improve academic results and for students to learn how to learn.

Referencias bibliográficas

Addine, F. (Comp. (2004). *Didáctica: teoría y práctica*. Pueblo y Educación.

Álvarez de Zayas, C. M (1999). *Didáctica la escuela en la vida*. Pueblo y Educación.

Collazo, M.M. (2018). Tarea docente para el proceso enseñanza aprendizaje del procesamiento avanzado

de documentos digitales. *Varona*, 66. <http://scielo.sld.cu/scielo.php?pid=S1992823820180001002>.

Echemendía, B.Y. et al. (2018). La enseñanza de la Biología como ciencia experimental. *Educación y Sociedad*, 16(1), 48-60. <http://revistas.unica.cu/index.php/edusoc/article/view/991/html>.

Yendris Oliva, Rocio A. Rodríguez, Giolvys Basulto: Un acercamiento a las tareas docentes en el tratamiento
Martínez, L.E. et al. (2016). La tarea docente en la formación del profesor de Biología-Química.
Mendive,

14 (3), 283-291. <http://mendive.upr.edu.cu/index.php/MendiveUPR/article/view/901/pdf>.

Martínez, L.E. et al. (2021). La tarea docente. Tratamiento de los contenidos biológicos en secundaria
básica. *Mendive*, 19 (1), 30-40. <http://mendive.upr.edu.cu/index.php/MendiveUPR/article/view/211>

Meneses, G. (2007). El proceso de enseñanza- aprendizaje: el acto didáctico. *UNIVERSITAT ROVIRA I
VIRGILI*. <https://www.tdx.cat/bitstream/handle/10803/8929/Elprocesodeensenanza.pdf>.

Robaina, M. y Banasco, J. (2017). La tarea docente desde la red social Elgg en el proceso de
asimilación del contenido de Biología Celular y Molecular I. *Varona*, 64 ,110.

<http://www.redalyc.org/articulo.oa?id=360657467009>.

Rodríguez, L. E y otros. (2012). *Metodología para la solución de problemas en el proceso de
enseñanza-*

aprendizaje de las ciencias en la escuela. En Temas seleccionados de la didáctica de la Física.
Pueblo
y Educación.

Rico, P. y Silvestre, M. (2002). *Proceso de enseñanza-aprendizaje. Breve referencia al estado actual
del*

problema. En: G. García (Comp). Compendio de Pedagogía (pp.68-79). Pueblo y Educación.

Silvestre, M. y Zilberstein, J. (2000). *Enseñanza y aprendizaje desarrollador*. CEIDE.

Trimiño B. (2015). *Contradicciones y Tendencias de la Educación Escolar Contemporánea*. Horson
Ediciones Escolares, S.A de C. V.