

***La enseñanza de la Biología con enfoque sociocultural. Una
mirada teórica y práctica***
***The teaching of Biology with a sociocultural approach. A
theoretical and practical look***

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Resumen

El vertiginoso desarrollo científico y aplicaciones prácticas de las ciencias biológicas exigen, en el contexto didáctico de la Biología, un enfoque didáctico que se corresponda con su desarrollo sociocultural; sin embargo, su actual concepción didáctica no plantea la utilidad social de la misma; de su enseñanza resulta una preocupación el tradicionalismo con que se enseña y se aprende la misma, básicamente bajo una postura instructiva de conocimientos supuestamente acabados y poco significativos para los estudiantes. En tal sentido este trabajo tiene como objetivo proponer ideas básicas para la conducción del proceso de enseñanza-aprendizaje de la Biología con un enfoque sociocultural. 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 aplicar y valorar el impacto social de los contenidos en la enseñanza de la Biología.

Palabras clave: Enfoque sociocultural; Proceso de enseñanza-aprendizaje; Ideas básicas, Enseñanza de la Biología.

Abstract

The vertiginous scientific development and practical applications of the biological sciences demand, in the didactic context of Biology, a didactic approach that corresponds to its sociocultural development; however, its current didactic conception does not raise its social utility; From his teaching, the traditionalism with which it is taught and learned is a concern, basically under an instructive position of supposedly finished knowledge and little significant for the students. In this sense, this work aims to propose basic ideas for conducting the teaching-learning process of Biology with a sociocultural approach. 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 pertinent to apply and assess the social impact of the contents in the teaching of Biology.

Keywords: Sociocultural approach; Teaching-learning process; Basic ideas, Teaching Biology

Introducción

The 21st century is characterized by a socio-cultural revolution, based on the vertiginous development of science and the social impact of its practical applications. In the educational context, it implies that the teaching content must not only be updated, consistent with new scientific discoveries, but also reveal its practical utility and social impact, contributing to logical and heuristic thinking, allowing the application of scientific knowledge in the solution of everyday life problems and promoting education for life.

The above is evidenced in the third stage of the Improvement of the National Education System, where new approaches and educational components are introduced, aimed at achieving comprehensive training and better preparation of students for life, based on a conception for teaching science that has applications in everyday life, overcoming traditionalism and decontextualization of teaching content.

For this reason, numerous investigations have been devoted to the study of different approaches to the teaching-learning of science as one of the most pertinent ways to provide the necessary answers in relation to the way science is taught and learned. In this regard, one of the contemporary approaches used is the sociocultural one, which corresponds to the need to imprint certain changes in didactics in correspondence with the current role of science development.

Researchers such as (Basulto, 2017; Fundora, 2007; Pedroso, 2008; Torres, 2008; Valdés, 1999; Vázquez, 2003; Vázquez, Zubero and Fernández, 2005); among others, have deepened the study of the sociocultural approach, motivating the multiplication of research on this topic at national and international level.

In spite of recognizing the contribution offered by these authors, in the research carried out by the authors, it has been found that this approach is not implicit in the programs and methodological orientations of Biology subjects in middle school, in spite of being a necessity given by the changes in the conceptions of Biology teaching in middle school within the framework of the III Improvement of the National Education System.

The proposals of the researches that have been carried out on the subject have been based on theoretical contributions, so there is a lack of practical proposals that allow transforming the teaching-learning process, this has an impact on the professional improvement where the proposed ways and methods directed to this purpose are insufficient; also the articulation of the professional improvement, the transformations in the study plans and the dissimilar types of training have occurred in a relatively short time, factors that have contributed to a permanence of the traditional approach. Another cause is the professional training programs where the theoretical contributions that have been made in science didactics in general and in biology didactics in particular are limited.

Development

An approach to the problems of teaching science

- Currently, the teaching of school science presents different problems. Regard this, different researches in the field of science education (Fernández et al., 2003), point out a large number of probable causes, among them the most significant are:
 - Curricular designs far removed from the social practice of science, that is, inadequacy of curricular designs with respect to the needs of education in the XXI century.
 - Evaluation systems centered on academics.
 - Outdated bibliography.
 - Use of traditional pedagogical strategies that do not promote understanding and appreciation of scientific topics and technological developments related to the development of science and their social impact.

- Lack of contextualization of content in teaching.
- Persistence of a transmission-reception teaching model.
- Pedagogical-disciplinary knowledge in teacher training and updating.
- Diffusion of some deformed visions of science and technology by some teachers.

In response to the situation described above, an initiative has emerged that recognizes the social need to go beyond the usual transmission of scientific knowledge in science education. This requires a transformation of the didactic approach that relates the contents of sciences, such as biology, with their social impact and practical applications, a fundamental component for the creation of knowledge societies, with the processes of appropriation of knowledge.

This has to do with the fact that many teachers do not relate the sociocultural aspects of science, which is why they lack meaning for students and, as a consequence, hinder their learning.

Therefore, today we are faced with the challenge of articulating the teaching of science from a new approach: the sociocultural.

An approach to the sociocultural approach to science

For Torres, (2008) the sociocultural approach "focuses attention on the social and cultural impacts of science" (p. 48). In the context of Biology it means revealing, in the teaching-learning process, the social nature of biological contents, explaining their practical usefulness.

Hence, from this approach, the teaching-learning process becomes a socio-cultural activity of vital importance that contributes to the formation of students, capable of adopting responsible attitudes, making informed decisions and solving everyday problems related to science, technology, innovation, and their practical applications.

Likewise, the knowledge of science as a subject is built in close relation to the social context, based on the needs imposed by society, scientific and technological development, culture, among others. That is why, in the teaching-learning process it is necessary to use the sociocultural approach in order to enhance in all its magnitude science as a subject, as a cultural vehicle that contributes to the integral formation of our students in today's knowledge society.

This is evidence that science is part of society, which makes it necessary to define the objectives and contents in the teaching-learning process, taking into account the experience in the creative activity and

attitudes, as well as knowledge, habits, particular skills, which is the aspect to which most attention is devoted. Otherwise, the scientific training of citizens would be incomplete.

All the general content of science is clearly revealed through research activity, so if we want to prepare the new generations to live the present and future of science and technology, there is no choice but to reflect in the teaching-learning process, with special interest, the main characteristics of contemporary creative activity.

The above is evidenced by research in the field of pedagogy in general and didactics in particular, which has made it possible to improve the teaching-learning process of teaching disciplines in different contexts, taking into account traditions, culture and advanced experiences (meanings), in an effort to acquire knowledge, values and attitudes that prepare man for life.

In this regard, it is essential that these meanings be integrated into the students' teaching activity. This is based on transforming the socially significant into personal meanings, in such a way that in the students' activity these social meanings are integrated with the personal ones, that the social historical experience is connected with the personal one.

From the methodological point of view, giving a cultural orientation to science education means that teachers should organize the teaching-learning process and act in it taking into account the relationship between culture, education and science. It also means reaching the teaching practice towards the formation of educated men, capable of orienting themselves in the historical and social context in which they live. Hence the need for a coherent didactic conception, adequated to the current socio-cultural context that allows the effective scientific training of the new generations.

The school has the social task of developing individuals capable of preparing themselves for life, in a self-taught way, to solve the problems of time, supported by a solid basic training; it is not possible to fulfill this task without a profound transformation of the methodology of the teaching-learning process, where a deficient methodological work that does not imprint quality to this process can be appreciated.

To the extent that we manage to teach the student to use scientific knowledge, so that he/she can autodidactically create new situations in order to solve the problems of daily life, he/she will feel more motivated because he/she has been useful to society and has acted in accordance with the demands of the context in which he/she lives.

In this regard, it is important to emphasize that "when we teach students or schoolchildren, the fundamental necessary condition is the individual's desire to learn (...) in order to learn the new, it is condition number one to feel that it is "advantageous, useful (...)" (Kapitsa, 1985, pp. 209-210).

In teaching practice, unfortunately, science teaching is traditionally conceived as the simple transmission of already elaborated knowledge and the formation of specific habits and skills.

Essential aspects of the research experience, such as the delimitation of problem situations, the formulation of hypotheses and the development of strategies to test them, are not often taken into account or, on the other hand, insufficient attention is paid to the development of the values of the scientist, such as a critical attitude towards the work he/she does, the social orientation of thought and the willingness to learn in a self-taught manner.

That is why, in contrast to the traditional approaches used in the teaching-learning process of school science, the sociocultural approach corresponds to the need to make certain changes in didactics, constitutes an alternative for the teaching-learning of school science, as it distances itself from encyclopedic teaching, with little relevance and social impact, and places the student at the center, allowing the contextualization of the teaching content of school science, while providing the necessary tools for the appropriation of knowledge in relation to the existing ones.

In relation to the sociocultural approach, Torres' definition states that:

It is understood as the direction of the teaching-learning process of these that considers not only what is known and what is done, but that gives special weight to knowing how to value and the fact that science is a cultural vehicle which develops in students a reflective attitude that empowers them in the understanding of their environment (...) for the achievement of sustainable development. (...) (2008, p. 17)

The above definition constitutes an important background to define, from the perspectives of this work, what is understood by teaching Biology with a sociocultural approach.

Conduct of the teaching-learning process of Biology that allows the student to contextualize, apply and value the social impact of the biological contents taught in high school, so that it is meaningful and thus raise learning levels.

In summary, the authors consider it necessary to give a sociocultural approach to the teaching-learning of Biology, starting from contextualizing the essence of the biological content, which allows providing students with the necessary tools for the appropriation of the knowledge of this discipline in relation to

the existing ones, which reveals the social nature of the same and the science-technology-society educational orientation as opposed to the traditional form of its approach in education in a way that guarantees a greater pedagogical scope for learning and teaching it.

Materials and methods

The research was carried out in the IPU "Ramón Infante García", belonging to the municipality of Guantánamo, and the tenth grade was chosen for the study. The structuring of the biological contents system favors 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 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, relations and development tendencies. Likewise, 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 making of inferences about the teaching-learning process, in the processing and interpretation of the results, which allow reaching conclusions in relation to the sociocultural approach in the teaching of Biology.

The historical-logical method allowed the study of the evolution of the teaching-learning process, oriented to the sociocultural approach.

- Documentary analysis was used with the objective of knowing the treatment of the subject under investigation in the normative documents of the educational level 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 ascertained:

Teachers' limited didactic preparation, which does not favor student protagonism in the development of teaching activities.

The integral formation of students is limited by the predominance of a traditionalist approach in the treatment of biological content.

Students tend to know only the facts, concepts and principles that characterize science.

The students' skills development is insufficient, this limits the link of the contents with daily life.

Results

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 basic secondary education.

In the documentary analysis of the program and methodological guidelines, it could be appreciated that there is still limited guidance on how to elaborate teaching tasks that contribute to the fulfillment of the purpose and objectives of the level to relate such contents to life.

It should be noted that, the biological contents in tenth grade prioritize the aspects related to the cellular level, but it does not address sufficiently to the application of the knowledge system to its 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 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 sociocultural approach is limited.

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

In this way, basic ideas are presented that make it possible for the teacher to conduct the teaching-learning process of Biology with a sociocultural approach.

1. At the beginning of each class and depending on the potential of the content and the diagnosis of the group, a problematic situation will be presented, preferably open, elaborated from the social, productive, economic and environmental context.
2. To carry out an analysis of the objectives and contents of the Biology subject programs.
3. To link the learning content with social practice and to stimulate the student's appreciation of it at the educational level.
4. The achievement of this purpose requires that the student is able to identify the qualities that confer value to the object of study and that he/she makes his/her evaluation, that is to say, that he/she finds the social value it possesses, thus the positive effect that is produced in the student, regarding the learning of a content, the fact that he/she finds the social utility it has and the individual utility that the knowledge with which he/she is interacting can bring him/her is unquestionable.

On the other hand, the interaction between students during the activity in the classroom will provide different moments in which important educational influences can be exerted, based on the evaluation and self-evaluation of their behavior and the result of the activity.

5. Use methods, procedures and forms of organization that facilitate the interpretation, comprehension, explanation, evaluation and argumentation of proposals by the student,
6. Elaborate learning tasks in a way that allow the search and the analytical revelation of knowledge.

In developing learning tasks, the teacher should keep the following suggestions in mind:

- They must contain those contents that reveal a social significance or practical utility and an active and reflective search of the knowledge object of teaching-learning.
- They must stimulate the operations of logical thinking, research and creativity of the student.
- They should promote the increase of cognitive, intellectual and formative demands towards higher levels of cognitive performance, through the performance of increasingly complex tasks, of interdisciplinary character, and the progressive transition from dependence to independence and creativity.
- They should lead to the resolution of typical science problems and others related to the context, transferring learning to new situations of daily life.

- They should motivate to systematize what has been learned and create the need for the search of new knowledge, since the student:

Elaborate propositions, look for ways, procedures to explain the fact, phenomenon or process, reflect, analyze the meaning of the same, establish their mutual relations, their social nature and social and technological repercussions; as well as the evaluation of which resolution methods are adequate and the search for the best ones, giving possibilities for the students to elaborate and explain their own procedures.

Establish levels of integration with the contents of other subjects or with the contents received in previous years.

- Solve problems related to the context, transferring learning to new situations of daily life, to the creative application of new knowledge and skills acquired.
- Assume judgments and critical positions make assessments around the content object of study and its practical and social implications, allowing them to appropriate knowledge, contribute to the development of their thinking and the formation of values.

In this regard, Vygotsky, quoted by Bermúdez and Pérez, stated that: "any function in the child's cultural development appears on the scene twice, on two planes: first as something social, then as something psychological; first among people, as an interpsychic category, then within the child, as an intrapsychic category" (2004, pp. 49-50). It is precisely in communication that the acquisition of the referred external forms takes place. Thus, learning, intellectual development and the formation of feelings, qualities and values require interaction between people and consequent individual activity.

The group interaction favors that the student appropriates the teaching content being the protagonist of his own learning, without ignoring that each student must act independently and the determining role of the "adequate direction" of the teacher in each type of activity.

The exchange of information, the group reflections, the interaction among its members, favors the thinking of each student, allows him to confront ideas, to complete them, to vary them and even to arrive at new approaches. In other words, group work contributes to the development of each of its members.

8. To provide students with the tools so that they perceive that the knowledge acquired in the classroom has its concreteness in educational practice and does not remain as abstract concepts that cannot be applied in daily life. To this end, it is suggested:

- Teach science content based on the environment that surrounds the student, the activities he/she performs daily at home, in the community, among others.
- Make the environment a specialized classroom for science. Changing the confined space of the classroom to turn the environment into a classroom and even more, into a laboratory to do and learn science for life.

The above ideas are intended to deepen the scientific significance of the teaching content, why and what it is taught for, reflecting its future projection, level of impact in practice, potentialities, new ideas and points of view for its teaching, the contributions of science and technology to its development, so that it transcends the merely informative and includes the development of didactic tools for the integration of science and technology to the teaching-learning process of school science, a process that is known as a social appropriation of knowledge.

Finally, we would like to illustrate through an example, the idea that we defend in this work:

Analyze the following situation

Carbohydrates are necessary for the proper functioning of cell membranes; however, an excess of carbohydrates in the diet has a negative impact on the body and can lead to nutritional and metabolic disorders such as obesity and diabetes mellitus, cardiovascular diseases, arterial hypertension, among others.

Why do people think that eating is a pleasure when it is the first premise to preserve health and life?

a) From the answer in the previous paragraph, translate the following words of Hippocrates, one of the most outstanding figures in the history of medicine:

"It lets that the food your medicine and the medicine your food". Argue the sentence.

b) Among the complex carbohydrates, we find cellulose. One of its sources is sugarcane bagasse, the result of the process of obtaining cane sugar. It was researched through the internet or in an information center, the applications of this product in Cuba and how sugar production has behaved in the territory, as well as its derivative products in the period (2018-202).

c) Because of its sweet taste, the simple sugar called glucose is used in confectionery for the preparation of candies and sweets; when the remains of these sweets accumulate between the teeth, they ferment under the action of certain microorganisms, and create the favorable environment for the development of cavities, a common disease of the digestive system. Why is it important to go to the doctor when suffering from the so-called "toothache" and not authenticate yourself?

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 the sociocultural approach in the teaching of Biology for the integral formation of students in pre-university education.

92.6 % of the teachers express the importance of the sociocultural approach in the direction of the teaching-learning process of Biology 4, 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 and their experiences in their relations with everyday life.

With the implementation of the sociocultural approach in educational practice, transformations are achieved that show its impact on the integral formation of students. This demonstrates its effectiveness and relevance in the teaching-learning process of Biology, which leads to the idea of its possible generalization to other subjects in the area of Natural Sciences at this educational level.

Most significant results achieved with the application of the basic ideas.

The development achieved in biological knowledge, skills and values to link the contents with everyday life situations is appreciated.

They achieve the updating of the biological content from the self-management of knowledge.

Improvements are observed in the planning of teaching activities led by students, according to teachers' opinions. In this same order, they are able to establish an evaluation strategy to verify the progress achieved in the students, taking into account not only the elements of knowledge, but also the development of qualities and values that characterize the student's ways of acting at this educational level.

Conclusions

Assuming the sociocultural approach in the teaching-learning process of Biology means a change of position before the problems of knowledge and pedagogical reality, and the substitution of an atomized vision for an assertive, reflexive, transforming and contextualized vision of the teacher's professional knowledge. The basic ideas proposed to solve the problem lead to conceive new didactic strategies, to elaborate new ways and procedures to address the contents in the teaching of Biology, to link them with everyday life situations and thus, to promote new attitudes in students and teachers. In this context, the teacher should not only act as a transmitter of knowledge, and the student should leave aside his passive role and take on a positive and active attitude in the development of scientific thinking in order to become a creative professional.

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