

CONCEPTION OF SCIENCE AND ITS IMPLICATION IN TEACHING

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ABSTRACT

Science can be understood as a group of systematic knowledge of facts, origin and studied methods, observations and experiments (FERREIRA, 1993). There are many conceptions and explanations to Science, as well as ways to appropriate and to teach them. The present paper presents some ideas for teachers to reflect about teaching Sciences nowadays. Teaching Science requires an attention in the teaching learning process as the reconstruction of knowledge; to know that apprenticeship situations are not at random, that they begin when one have a student in front of a problem, a project or a task to be accomplished. A teacher of Sciences that mediates this process must develop strategies and teaching sequences that mobilize, stimulate and promote reconstruction of certain knowledge. This competence is close connected to the capacity of offering stimulus and challenges, to promote adjustments and interventions at the adequate moment as well as to promote discussions and reflections about ethical and environment features connected with Science measurements and current technology.

KEY WORDS: teaching; natural sciences; education

Any pedagogy, as any culture, consists in to discovering together with others, what we are in order to better discover, together with others, what remains to know to invent life”

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According to Ferreira (1993), Science can be understood as a group of systematized knowledge on the facts, principles and methods originated from studies, observations and experiments.

Many are the Sciences and their conceptions and explanations, the ways to appropriate them and for the educator to teach them.

Among the different branches of sciences it is proposed to proceed to a reflection on the present concepts on how to teach natural sciences.

The educator must first of all make clear some basic points such as the importance of a previous knowledge and its recovery through a curriculum that favors subjects related to the experiences of the students about any form of science and make use of it to make a diagnoses; to be willing to promote better communication among personal experiences, establishing relation among theory, practice and contextualization in order to allow students to organize themselves and, progressively, to allow them to understand and to make use of such knowledge, promoting moments of intense reflection on the nature of sciences and their relations with contemporary technology and society.

Do those that teach science perceive the student as a subject of learning?

There is no doubt that, for this purpose, the contents usually dealt with in course of Sciences should be rearticulated in a way to allow frequent revision and to link one to subject the next, prioritizing an approach to this concepts in the context of the students' experiences and a discussion and construction of the many meanings that are part of the explanation to natural phenomena. It is not the case to make use of inter-disciplinarity as dogma, but as an opportunity to promote an understanding of the differences and inter-relations of the components of the curriculum of natural sciences (DE CARO et al, 2004).

Therefore, it is necessary to opt for concepts of science, as a field of human knowledge and as a school discipline, that are coherent to the previous mentioned characteristics. As demonstrated in the National Parameters for Curriculum (1997), many tendencies have guided teaching of Natural Sciences not only in its basic aspects, such as the relation between science and society (UBEE, 2004), but also to other strictly pedagogic aspects, such as the approach and organization of the scientific contents in the school.

From the pedagogical point of view educators are compelled to foment in students the need for reflection of the ethic and cultural issues involved in the process of production, appropriation and use

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of sciences, in lieu of only to reduce teaching as simple description of theories and experiments presumed neutral or isolated from the social context.

In this regard, science is also a way of thinking, a way to arrive to coherent conclusions from premises, to question biases and hypothesis, to stimulate the construction of new ideas from those already established.

One should regard science as a human construction in which imagination, intuition and emotion take part, influenced by the social, economical and contextual in which it is inserted. To make science requires human options and responsibilities and, as such, it is in constant transformation; the scientific assertions are provisional and can never be taken as complete.

Therefore, teaching Sciences should be thought out as the creation of a investigative and dynamic environment in which the scientific definitions are not taken as an end in themselves, but represent the arrival point of a collective process of questioning, research, communication and debate of facts and ideas.

One search for the construction of a systematic an integrated knowledge on life, the world and its transformations, the interrelations among living beings and with the physical world, as well as the dynamic, dialectic and global integration of men organized in societies and producer of technologies with the natural environment.

In order to make significant the teaching-learning process it is important for teachers to make valid not only the theoretical fundamentals but also its pertinence (UBEE, 2004). Through contextualization it is possible to promote reflection, the formulation of knowledge based on the experience that will lead to a reorganization of the knowledge and to a renewed practice. It is from the practice that the student reflects on its action, analyzing and taking profit from the experiment.

Furthermore, one should consider the ethic, social, economical, cultural and political aspects of the production and appropriation of science by the contemporary society, in which the issues related to environment assume great relevance, which presently are pointing towards a worldly social and environmental crisis.

One should note that teaching Natural Sciences gives a decisive contribution in this regard, offering subsidy to the creation of attitudes of respect in relation to the environmental integrity, taking into consideration the long period to built the natural ambient, the complexity and the peculiar rhythm of the process of renovation and reconstitution of the components of nature (BRASIL, 1997).

To know how the natural ambient works and how life is sustained and renewed contributes to the formation of citizenship. The biological, physic and chemical knowledge can change our attitudes and our relations toward the way individuals and institutions use the natural and technological resources available in the society (DE CARO et al, 2004). The construction of a hydroelectric plant, for instance, tend to be regarded both as a “solution” facing the need for electric power, and as a “problem” in what regards the environmental impact of its construction.

Considering the previous example, it is possible to cite other aspects of the Sciences, more complex or polemic, such as the understanding of genetic mechanisms, certain basic aspects of the present technologies for vegetal and animal improvement or, even, the presence of genetic engineering in the production of drugs and clones. There is the key to that person that mediates the knowledge: an adequate moment to discussions and reflections on the ethical and environmental aspects related to these dimensions of the present science and technology.

Another opportune example is the wrong idea that microscopic beings are always connected to diseases. Here it is needed the intervention of the educator to favor discussions and to show the use of these microscopic beings in technologies, such as the control of plagues, in the production of vaccines and in the treatment of pollution residues and an array of other biotechnologies. Or, in an other instance, the fact that in the discussion of simple electric circuits one should stimulate the “source-user” model in terms of energy transference along a close circuit, without reference to the elements that constitute the electric current or the thread (electrons and atoms of the crystalline net). This macroscopic approach favor observable evidences: the heating of threads and resistors, the lightning of a bulb, the indication of the measurement equipments, the heating and weakness of a battery... Abstract models are, of course, inadequate and distant from the trainee context. Therefore, one should be guided based on real situations that promote dialogue with the theoretical elaborations.

It is necessary a round-trip ticket for the interdisciplinary road between the subjects dealt with in the discipline of Natural Sciences in such a way the biology, physics and chemic be complimentary to each other in order that teaching Sciences become attractive and efficient in the learning process.

In brief, teaching Sciences requires a focus in the teaching-learning process as a construction of knowledge; to know that learn-

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ing situations do not happen at random; they begin when one put the student to face a problem, a project or a task to be accomplished.

For that, the teacher, the mediator of such process, should develop strategies and didactic sequences that mobilize, stimulate and promote the reconstruction of a given knowledge. The competence of the teacher is closely linked to its capacity to offer stimuli and challenges, to promote adjustments and to make interventions in the adequate moment. The educator is the mediator of the interaction of the individual that knows with the object of knowledge. It is he that foments the discussion, question ideas, diagnoses previous ideas and creates conditions to the development of the trainee.

Therefore, the significant learning constitutes the basic objective of teaching and to the support of the student's reflection, having them face reality and to experience new conducts and to discover adequate solutions to each situation, transferring his/her experiences to daily day life.

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