PROBLEM BASED LEARNING AT THE SERVICE OF NEW KNOWLEDGE PRODUCTION

A. Almeida[1], C. Vasconcelos[2], J. Faria[3], C. Pereira[4]

[1]Lisbon School of Education / Center of Geology of Oporto University (PORTUGAL)
[2]Oporto University, Faculty of Sciences, Center of Geology (PORTUGAL)
[3]University of Minho, School of Sciences (PORTUGAL)
[4]Lisbon School of Education / Interdisciplinary Center of Educational Studies (PORTUGAL)

Science Education has sought methods that can promote connections to real situations and also improve significant learning experiences. Problem Based Learning (PBL) has proved to be an effective methodology to this purpose. Initially implemented in Medicine in 1969, it has been extended to other scientific fields during the last decades.

The reasons for the success of this methodology are the following:
a) to present a problem that is relevant in a real context;
b) to frame it using a real or fictional scenario that can motivate students for it;
c) to give data sources to help its resolution;
d) to promote collaborative work;
e) to help students dealing with the data sources proposed through a tutorial process;
f) to demand a final product (a presentation or a poster, for instance) in which the answer to the problem is included;
g) to assess all the learning process, presenting new situations that need the knowledge acquired.

As it is possible to recognize, all these steps reflect a social constructivism approach, based on the sociocultural theory of Vygotsky, where interactions with teachers and pairs are the basis of the process. This methodology aims to develop the autonomy of students, helping them to learn in a more active way, knowing that the knowledge gained it is “new” for the students but, normally, it is not new for the scientific field associated to the initially proposed problem.

Within the scope of the curricular unit of Didactics of Geology, 20 master students of the Course for Teacher Training in Biology and Geology worked the very recent field of Geoethics that arises as a result of a paradigm shift in the earth sciences. This new field tries to emphasize the role of Geology in a more sustainable society, instead of its traditional contribution to the exploitation of the earth resources and mutilation of the planet, as quarries are the best examples.

Starting with the challenge of Matteucci et al. (2012) “A Hippocratic Oath for geologists?”, the students read about the code of ethics of physicians and also about the new challenges that

geologists face since the present environmental crisis has started. After the text, several questions were included: Which deontological principles can we identify to regulate the work of geologists? How can geologists influence political decisions, concerning situations associated with geological knowledge? How can geologists conciliate their contribution to the economic development with the preservation of the planet? What can be the role of geologists in the need for rethinking technological progress?

After these questions were given, the challenge suggested to the students was to build the professional code of geologists, covering the main principles that it should include. To this task, several internet addresses were given, some linked to the code of health professionals (given as a mere example) and also the address of The International Association for Promoting Geoethics. The task was previously made in four groups of five students and the result of each group was discussed to design the final code that met the consensus of the class.

This experience, which we considered relevant to present, highlights the potential of PBL not merely as a provider for access to knowledge that is available but also as a producer of new knowledge, strengthening its interest in Science Education, especially when associated with higher education.

keywords: problem based learning (pbl), geoethics, production of knowledge, higher education.