



The emergence of a Geoethics' Syllabus for Teaching in Higher Education and Citizen Awareness

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The world is far from achieving sustainable development, thus the life on Earth depends on the balance of Earth Systems. Mankind's growing influence on the environment was recognized as long ago as 1873, when the Italian geologist Antonio Stoppani referred to the "anthropozoic era" (Crutzen, 2002). Although it is clear that the anthropic action has provoked many damages to our planet, the set of challenges of Sustainable Development Agenda 2030 is big and hard to accomplish. The universal goals of the Agenda require the buy-in and action of all parts of the world, rich and poor (Sachs, 2015) and emphasizes the more attention that must be given to the educational context. Part of this learning process is about recognizing that geoscientific understanding influences the economic growth and development of each country and thereby its cultural framework (Vasconcelos et al., 2016). According to Stewart (2016), it is clear that geoscientists need to collaborate with allied Earth science disciplines such as biology, zoology, ecology, agronomy and environmental science. The author also mentioned that to fully appreciate the complexity of contemporary human – environment relations, we must also draw from the social sciences. After all, many of the societal issues relating to the planet are not concerned with the scientific understanding but rather. In this sense, Geoethics spans a continuum of concerns, from establishing clear and transparent professional codes of practice to global legal frameworks and governance around environmental destruction, or 'ecocide' (Higgins, 2012).

Recognizing this breadth of concerns, the international partnership Erasmus Plus GOAL project(2017-1-PTO1-KA203-035790) explores expertise in overlapping interdisciplinary areas to develop a Geoethics syllabus and to offer suggestions of educational resources that can be used in Higher Education to enhance the quality and relevance of students' knowledge, skills and competencies as well as citizens' awareness.

However, learning is an idiosyncratic process and moreover, learning is a natural process - it is an instinct (Orion, 2017), in the drive to achieve the GOAL project aims, a Social Constructivist learning view was pointed as to underpin the development of the Geoethics syllabus and complementary educational resources. Social Constructivist learning methods are characterized by using realistic problems, emphasizing multiple perspectives, and scaffolding learners through their zone of proximal development (Moreno, 2017). Other Social Constructivist learning methods mainly involved cooperative learning, tutoring, reciprocal teaching, communities of learners, problem and case-based learning, and structured classroom discussions. The syllabus subject content integrates Geoethics in georisks, in geoheritage, in water management and in georesources exploitation and exploration. To develop the educational and complementary resources dilemmas were taken from real life and laid in the form of cases. Field trips and videos were developed to support the case-based approach and to align the dilemmas with specific Earth System contexts. The visit to particular sites provided the work-base for the reflection about interactions between human activity and the Earth systems, and enable the GOAL team to recognize diverse Geoethics perspective.

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