

EDUCATING FOR GEOETHICS: RAISING STUDENTS' AWARENESS AND PUBLIC ENGAGEMENT

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Abstract

Several authors argue that Western thought and modern science look at nature as an offering to Man; accordingly, throughout the ages, human beings made use of natural resources without worrying about the impacts of their actions on Earth system. Conversely, Eastern thought asserts that people are one with nature; people are perceived as an integral part of nature, harmoniously interacting with it and respecting bio and geodiversity. In both cases, though for different reasons, the emergence of Geoethics proves to be imperative. According to the International Association for Promoting Geoethics, the discipline of Geoethics studies and reflects upon the values that underpin appropriate human practices, whenever human activities interact with the Earth systems. In view of this, the GOAL Erasmus+ project explores the emerging territory of Geoethics attempting to inter-relate formal knowledge with good and sustainable field practices. Members of different partner countries bring expertise in overlapping interdisciplinary areas, thus contributing to develop a relevant Geoethics syllabus for Higher Education and to offer suggestions of educational resources that promote students' awareness and public engagement. The ultimate purpose of GOAL implies fostering improved science education for all citizens, in such a way that it ambitions to have a huge impact in citizen science. It is expected (or at least hoped) that in the medium and long-term, at least some of the activities may integrate the daily routine of some civil institutions. Moreover, the on-going process of public awareness will guarantee that the impact of project lasts far beyond the funding period.

Keywords: *Educational project, geoethics, global science literacy, public awareness, teaching.*

1. Introduction

Given the importance of citizens' awareness in achieving the targets of the United Nations Agenda for Sustainable Development, more attention must be given to the educational context of its goals. In particular, the key challenge of connecting the scientific comprehension and familiarity of the goals with the educational learning process took specific relevance in the research scenery. 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, Torres, Vasconcelos, & Moutinho, 2016). As such, the emergence of Geoethics proves to be imperative. According to the International Association for Promoting Geoethics (<http://www.geoethics.org>), "*Geoethics consists of research and reflection on the values which underpin appropriate behaviors and practices, wherever human activities interact with the Earth system. Geoethics deals with the ethical, social and cultural implications of geoscience education, research and practice, and with the social role and responsibility of geoscientists in conducting their activities*". Geoethics may help to re-evaluate behaviors, to increase awareness for alternative human activities or even to redirect economic models of growth and development (Peppoloni & Di Capua, 2016). Equally, human activities increasingly interact with and irrevocably modify the Earth system. Such activities are underpinned world views, belief systems and values that are culturally defined, and which set the limits of geoscientific behaviors and practices. To respect the Earth is an ethical responsibility in as much as a necessity, if sustainable life is to endure. Commonly, there are different ways of looking at *Man* and *Nature*. Several authors argue that Western thought and modern science look at nature as an offering to human beings (Sterling, 2010). Conversely, the classic Eastern thought asserts that although human beings rely on Earth systems to sustain themselves, people are perceived as an integral part of nature respecting bio and geodiversity. In both cases, though for different reasons, the emergence of Geoethics proves to be imperative. An outstanding part of the research in Earth Science Education was conducted along the last four decades has been reviewed and summarized by Orion and Ault (2007) and Orion and Libarkin (2014) and it can be stated that at the end of the second decade of the 21st century, the quality of Earth Science Education in schools has established solid theoretical foundation. Nevertheless, there is an

urgent need for a Geoethics syllabus for the formal education curriculum, namely in higher education due to the student's lack of knowledge of this disciplinary field of research. Teaching tools directed at the development of awareness for Geoethics are imperative to enable students to become conscious and active citizens (Vasconcelos et al., 2016).

2. GOAL project

GOAL (Geoethics' Outcomes and Awareness Learning) project is an innovative Erasmus Plus partnership that fosters to improved Geoethics values in Higher Education. Geoethics is an emerging field of geosciences (Bobrowsky et al., 2017) and demonstrating its value and utility in sustainability science requires a concerted interdisciplinary effort. Stewart (2016), stated that 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 *"...are about moral and aesthetic choices. They are about equity and ethics"* (Oreskes 2004, p.381). According to Di Capua, Peppoloni, and Bobrowsky (2017), Geoethics was born to define a conceptual substratum of categories to help geoscientists developing a new way of thinking and interacting with the Earth system – an ethics to the planet. This definition implies three dimensions: *"understanding when an issue arises; building a framework of common values to be adopted by geoscience community and society as a whole; identifying ethical criterion that can orient geoscientists, on which to base technical decisions"* (Di Capua, Peppoloni & Bobrowsky, 2017, p.2). Geoethics is an extremely timely curricular area since it takes into account the negative human impacts on Earth, which have gained prominence in the Anthropocene. Humans must recognize its role as participative beings on Earth's sub-systems and face that life on Earth depends on a Geoethics' commitment. Parallel to this, one must recognize that excellence in teaching demands for thorough planning and that whenever a new disciplinary subject emerges, the greater is the need to provide for both the design of its syllabus and the development of educational resources that will promote a competent and qualified conceptualization of its knowledge. Recognizing this breadth of concerns, GOAL project explores the emerging territory of Geoethics in order to develop a Geoethics syllabus and related higher education resources directed at promoting knowledge on the ethical and social implications of geoscience research and practice.

2.1. Objectives

With the aim to raise students' awareness and public engagement in Geoethics, the main objectives of the project GOAL are: (i) to establish a Geoethics syllabus for Higher Education students; (ii) to explore Geoethics cases related to Geoethics values in the country partners of the project; (iii) to design and develop educational tools to be used in the teaching of Geoethics in Higher Education and boost a student Geoethics' engagement; (iv) to develop operational capacities of revisiting and strengthening the conceptual substratum of Geoethics; (v) to pitch in to an excellent Geoethics Education approach across the world. All developed materials will be open access online GOAL platform (<https://goal-erasmus.eu/>).

2.2. The team

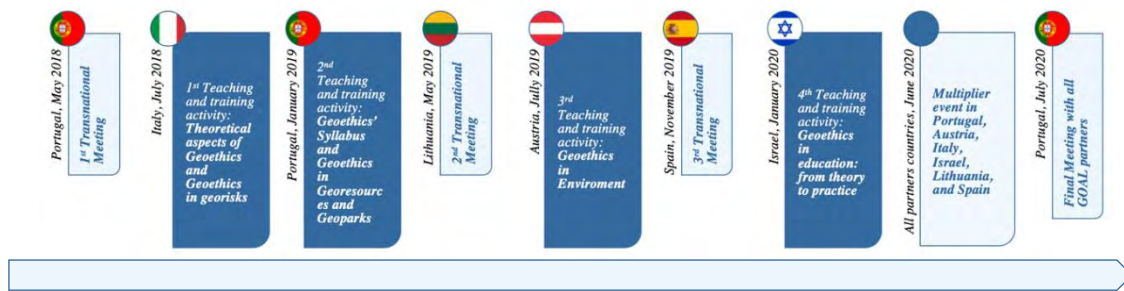
The interdisciplinary qualification of the GOAL team members, reflecting different overviews and approaches, constitutes an asset for the accomplishment of the project. The members of the different partner countries (Portugal, Italy, Spain, Israel, Lithuania and Austria) bring expertise in overlapping interdisciplinary areas, and these intellectual synergies will contribute for a wider approach of Geoethics. Specifically, the project integrates researchers and practitioners from geoscience education, geological heritage, georisks, environmental sciences, Geoethics and informatics in education. All partners have experience in interdisciplinary education and research projects and have previously been involved in EU funded programmes. The complementarity of the profiles involved will bring relevant and necessary competences and expertise to accomplish the identified aims and solve common challenges.

2.3. The project development

The GOAL project is being developed during 32 months and will end in 2020. It includes the organization of three transnational meetings and four teaching/training activities (fig.1), all of them will be organized and developed aiming the participation of at least two representatives from each partner institution.

From Lithuania, the GOAL project members will benefit from the extensive knowledge in Informatics applied to education. According to their expertise, they will be responsible for the development of the digital version of the final manuscript of the GOAL project (eBook) and the dissemination videos that will bring together the Higher Education materials developed throughout the project. Nevertheless, in all tasks all members will be involved to share knowledge and good practices in teaching in higher education, thus improving the final outcomes.

Figure 1. Transnational meetings and teaching/training activities of GOAL project.



3. Impact and final conclusions

GOAL sets the target on the attainment and surpassing of the objectives presented on section 2.1, as well as to achieve effective and meaningful impact especially amongst higher education professors, researchers and students. Its aim is also very clear – to provide during the duration of the project (32 months) a unique opportunity of collaboration between 6 institutions/countries, between a multitude of researchers at higher educational level. This collaboration not only ensures relevant and meaningful engagement with all partners while it also seeks to nurture and scale Geoethics and Earth science education, particularly in European Member-States. In terms of impact, the project estimates to involve several persons who directly or indirectly will benefit from it. Despite all efforts, sustainable policy implications take their time and may not happen (at least, not immediately). But it is important to notice that from the beginning of GOAL proposal a prominent international association (IAPG - International Association for Promoting Geoethics) supported the project. The relevance of this supporter will be reflected in the contributions to encourage policy buy-in and the mainstreaming of good practices and insights into policies, and hence sustainability and impact beyond the lifetime of GOAL funding.

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