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Geoethics in education: from theory to practice

4th GOAL workshop

Workshop Report

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Introduction

This report has been prepared as a result of the 4th workshop of the project GOAL (*Geoethics Outcomes and Awareness Learning*: 2017-1-PTO1-KA203-035790), that was held in the Weizmann Institute of Science (Israel) at the Sciences Teaching Department, from 13th to 17th January 2020, organized by the Israeli team, headed by Nir Orion.

The first and the last days of the Israeli workshop held in The Weizmann Institute of Science and the middle 3-days held during a field tour across the desert part of Israel.

The previous workshops of the GOAL project focused on the development an academic Geoethics syllabus and on the establishment of its theoretical framework.

The aim of the current workshop was to suggest and present the practical aspects of the implementation of an academic Geoethics syllabus.

In an effort to achieve this aim, the Israeli workshop was prepared in order:

- i. To discuss the readiness and willingness of Geoscience university departments to perceive Geoethics as an integral part of their academic commitment.
- ii. To raise understanding of the meaning of learning.
- iii. To present the educational role of the outdoor environment as a learning environment.
- iv. To model the integration of the outdoor environment into a learning sequence.
- v. To demonstrate how to integrate Geoethics content into earth sciences academic courses.
- vi. To demonstrate teaching and learning in the outdoor learning environment.
- vii. To present concrete examples of integration of the Geoethics subjects: Georesources, Georisks, Geoheritage, Geoparks, communication with the public.
- viii. To raise the issue of how to communicate Geoscience knowledge to the public.

The following three assumptions formed the basis for the agenda of this workshop: (a) Field trips are still a common teaching component in many Geoscience academic courses. (2) It will be easier for university lectures to integrate Geoethical aspects within field trips than within their courses' lectures. (3) Raising Geoethical dilemmas is much more effective in interaction with concrete phenomena than in a classroom lecture. Therefore, the heart of the workshop was a 3-days (days 2-4) field experiences where the participants concretely experienced four field trips that could be included in many Geoscience academic courses. However, each of the field trips included the raising of Geoethical dilemmas that were integrated into the scientific subjects taught.

The field trips were conducted in the Makhteshes of southern Israel and along the Dead Sea area and covered all of the five geoethical subjects of GOAL projects: Georesources, Georisks, water, Geoheritage and Geoparks and education.

The first day was conducted in the Weizmann Institute of science. This day focused on the ability and willingness of Geoscientist to deal with Geoethical subjects as part of their academic agenda (including academic courses that they teach). The last day was also conducted in the Weizmann Institute of science to summarize the workshop through an open discussion.

It seems that the practical approach to present the educational implamantation principals through modeling was successful and established an understanding among the participants who had no educational background. Nevertheless, the interdisciplinary qualification of the members, reflected in the different overviews and approaches, constituted an asset to this workshop.

During the Israeli workshop, the collaborative work was emphasized, and the participants developed the following intellectual outputs:

- Intellectual Output 4A (IO4A) – GOAL Educational Georesources Resource;
- Intellectual Output 4B (IO4B) – GOAL Educational Georisks Resource;
- Intellectual Output 4C (IO4C) – GOAL Educational Geoheritage Resource;
- Intellectual Output 4D (IO4D) –GOAL Educational Water Resource;
- Intellectual Output 4E (IO4E) – Field trip: The rock cycle of Makhtesh Hatira;
- Intellectual Output 4F (IO4F) – Field trip: A window to the geological history of southern Israel;
- Intellectual Output 4G (IO4G) – Field trip: Interaction between georisksand georesources along the Dead Sea;
- Intellectual Output 4H (IO4H) – Field trip: Ein Gedi's Mineral Water Plant - Is it a Geoethical case?
- Intellectual Output 4I (IO4I) – Attitudes of academic geoscientists towards the integration of geoethics aspects within the academic geoscience syllabus;
- Intellectual Output 4J (IO4J) – Report of the 4nd GOAL Workshop;

The minutes meeting of the 4nd GOAL Workshop was written at the end of the workshop and approved by all participants.

Intellectual Output 4A (IO4A) – GOAL Educational Georesources Resource

The *GOAL Educational Georesources Resource* was developed during the Israeli workshop (https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4A-GeoResources-Israel_workshop.pdf). It is based on the Educational Resource Template that was developed by the Portuguese team during the 2nd workshop of the GOAL project. It demonstrates how to integrate Georesources aspects of the GOAL syllabus that was also developed during the 2nd GOAL workshop, within an academic field trip.

Intellectual Output 4B (IO4B) – GOAL Educational Risks Resource

The *GOAL Educational Risks Resource* was developed during the Israeli workshop (https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4B-GeoRisks-Israel_workshop.pdf). It is based on the Educational Resource Template that was developed by the Portuguese team during the 2nd workshop of the GOAL project. It demonstrates how to integrate Geo-risks aspects of the GOAL syllabus that was also developed during the 1st GOAL workshop, within an academic field trip.

Intellectual Output 4C (IO4C) – GOAL Educational Geoheritage Resource

The *GOAL Educational Risks Resource* was developed during the Israeli workshop (https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4C-Geoheritage-Israel_workshop.pdf). It is based on the Educational Resource Template that was developed by the Portuguese team during the 2nd workshop of the GOAL project. It demonstrates how to integrate Geoheritage and Geoparks aspects of the GOAL syllabus that was also developed during the 2nd GOAL workshop, within an academic field trip.

Intellectual Output 4D (IO4D) – GOAL Educational Water management Resource

The *GOAL Educational Risks Resource* was developed during the Israeli workshop (https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4C-Geoheritage-Israel_workshop.pdf). It is based on the Educational Resource Template that was developed by the Portuguese team during the 2nd workshop of the GOAL project. It demonstrates how to integrate water management aspects of the GOAL syllabus that was also developed during the 3rd GOAL workshop, within an academic field trip.

Intellectual Output 4E (IO4E) – A Field trip: The rock cycle of Makhtesh Hatira

This output was modified for the IsraeliGOAL workshop(https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4E-The_Rock_Cycle_of_Makhtesh_hatira.pdf). It demonstrates how to integrate various Geoethics subjects of the GOAL syllabus (Georesources, Geoheritage and Geoparks) within an academic field trip.

Intellectual Output 4F (IO4F) – A Field trip: A window to the geological history of southern Israel

This output was modified for the IsraeliGOAL workshop(https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4F-Makhtesh_Ramon.pdf). It demonstrates how to integrate various Geoethics subjects of the GOAL syllabus (Geoheritage and Geoparks, and communication skills with the public) within an academic field trip.

Intellectual Output 4G (IO4G) – A Field trip: Interaction between georisks and geo-resources along the Dead Sea

This output was modified for the IsraeliGOAL workshop(https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4G-The_Dead_Sea-risks_resources_and_geoethics.pdf). It demonstrates an academic geological field trip that was developed to raise geoethical dilemmas that arise by the conflict between the Dead Sea industry (geo-resources) and the geotourism industry. And the relationships of this conflict to georisks (earthquakes and sinkholes) and geoheritage.

Intellectual Output 4H (IO4H) – A Field trip: EinGadi's mineral water plant – Is it a geoethical case?

This output was modified for the IsraeliGOAL workshop(https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4H-Ein-Gedi_water.pdf). It demonstrates how to integrate geoethics water management dilemmas within an academic field trip.

Intellectual Output 4I (IO4I) – Attitudes of academic geoscientists towards the integration of Geoethics aspects within the academic geoscience syllabus

This output is a summary of a preliminary study of the attitudes of academic geoscientists towards the integration of geoethics aspects within the academic geoscience syllabus. This study was conducted by the Israeli specifically for the Israeli GOAL workshop(https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4I-ATTITUDES-Questionnaire_results.pdf).

Intellectual Output 4J (IO4J) – Report of the 4thGOAL Workshop

This output is a summary of a preliminary study of the attitudes of academic geoscientists towards the integration of geoethics aspects within the academic geoscience syllabus. This study was conducted by the Israeli specifically for the IsraeliGOAL workshop (https://goal-erasmus.eu/wp-content/uploads/2020/02/IO4J-Geoethics_in_education-Report-of-Israel-workshop-1.pdf).