



minerva

teaching methods and didactic
materials on geotechnologies for
cultural heritage

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EXECUTIVE SUMMARY

The second Intellectual Output of the MINERVA Project (IO2) is the “Teaching methods and didactic resources on Geotechnologies for Cultural Heritage” whose expected outcome is the creation and formalization of an innovative toolkit that will be made available on the MINERVA Website and related platforms and upcoming MOOC.

This report provides an overview on the research and didactic activities conducted by the MINERVA Partners towards developing an innovative toolkit, which can provide both teachers and students with guidance and resources related to the teaching and learning geotechnologies for cultural heritage. The following main themes structured the document:

- teaching methodologies and related wiki-based resources in “Wikinerva” (Section 3)
- skills and tools inventory (Section 4)
- didactic resources including information on online resources (Section 5)
- *ad hoc* developed MINERVA case-studies (Section 6)
- the purposively established MINERVA Repository (Section 7)
- Community of Practice (Section 8).

Hence, in line with the MINERVA Project’s objective, the needs for geotechnologies for Cultural Heritage (CH) with respect to both content and teaching methodologies are analysed and discussed towards understanding the opportunities and solving challenges. While this report is primarily targeted to teachers as it enables them to develop their methodologies and content on the basis of the knowledge generated by the MINERVA project, it can also be useful to students (and in particular self-learners). Indeed, it provides different resources and toolkits to allow becoming familiar with the role of geotechnologies applied to cultural heritage sciences.

In fact, a detailed overview of approaches for teaching geotechnologies and training approaches is provided (Section 3) in order to provide guidance on how to best approach the teaching of geotechnologies for cultural heritage. Student-centered methodologies for teaching geotechnologies for cultural heritage are described and discussed on the basis of a review of the relevant literature with particular focus on Flipped Learning (inverse instruction), Project-based and Problem-based Learning, Collaborative Learning, Peer Assisted Learning as well as Service-Learning and Gamification. To complement the theoretical discussion a toolkit has been prepared with a wiki format and titled “Wikinerva”¹; as an open resource to teachers and students. It collects the main methodologies and on-line tools of interest for the project. Such an endeavour has been supported by an *ad hoc* survey conducted to understand the students’ perceptions that they have of the various teaching methodologies and strategies as well as to further the understanding of students’ experience with the virtual environment. This has enabled solving/addressing the challenges related to teaching GIS/Geotechnologies to CH students such as those related to the knowledge of new technologies, different spatial thinking/learning and the fact that active or innovative learning methods or strategies are not widespread in university teaching.

Upon these findings, the MINERVA Project’s pedagogical approach for the ensuing MOOC has been defined. They confirm the importance to pursue a student-centered approach, based on active and experiential learning, supported by the possibilities enabled by collaborative work and including open

¹ <https://sites.google.com/view/wikinerva>

educational practices and e-learning environment, and by integrating critical thinking (i.e., Problem/Project-based Learning) and spatial thinking (i.e., Spatial Learning).

Parallel to this research work, the MINERVA Partners have focused on developing a skills and tools Inventory (Section 4) which is introduced by the description of GIS main components, namely (i) people, (ii) data, (iii) methods, (iv) hardware and (v) software. Particular focus has been placed on the latter three components also by identifying Quantum GIS (QGIS) as the main tool for the MINERVA Project given that is a free and open-source software, outlining a skills inventory within the framework of the overarching modules identified by the MINERVA Project (see Kozina et al., 2021²). Additionally a detailed tools inventory provides information on open-source desktop software (e.g., QGIS, gvGIS, SAGA GIS) as well as a selection of commercial ones (e.g., ArcGIS Pro and Global Mapper).

An overview of the available didactic resources (Section 5) is provided to allow for further insights of the needs related to re-designing didactic resources and refining new tutorials and case studies that are more fine-tuned to the needs of the Cultural Heritage sector. On this basis, case studies (Section 6) have been identified and developed by the MINERVA Partners by highlighting the main context, the aims, the level of competence, the skills to be learned and the overall workflow and data. Each of the six MINERVA Partners has designed a case-study addressing different themes and skills (e.g., “Coal Basin in Saint-Etienne” by French experts from the Université Jean Monnet-Saint-Étienne and “An evaluation of Cultural Heritage Sites According to the Map of Seismic Hazard” by Slovenian experts from the Research Centre of the Slovenian Academy of Sciences and Arts). The full case-studies including step-by-step information can be accessed via the MINERVA Repository³ which is described in the report (Section 7).

The report concludes with a description of the purposively launched Community of Practice (CoP) within the Electronic Platform for Adult Learning in Europe (EPALE) Platform on “GIS e-Learning for Cultural Heritage”. Its aim is to create a multidisciplinary community of teachers, researchers, professionals and users interested in exchanging knowledge and experiences on the teaching-learning approaches and use of GIS technologies for cultural heritage.

The MINERVA IO2 “Teaching methods and didactic resources on Geotechnologies for Cultural Heritage” provides the basis for the identification of innovative methodologies, content and key resources to be mainstreamed in the development and implementation of the third MINERVA intellectual output (IO3), namely “Massive Open Online Courses (MOOC) course in Geotechnologies for Cultural Heritage”. It will allow creating an interdisciplinary and transdisciplinary communities working on geotechnologies for cultural heritage.

² Kozina, J., Ciglič, R., Spini, L. (2021). Competence Framework for Teaching Geotechnologies for Cultural Heritage: Intellectual Output 1. MappINg Cultural HERitage: Geosciences VAlue in Higher Education. Erasmus+.

³ <http://minerva.identitaculturale.eu>