

Case Study — Territorial Awareness at Rovira i Virgili University (URV): A Chemical Itinerary in the City of Tarragona (Catalonia, Spain)

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The design of a chemical itinerary is a teaching experience aimed at promoting local knowledge and taking advantage of the resources that the territory itself offers us. The experience is carried out as part of the master's degree in Teacher Training for Compulsory Secondary Education, Higher Secondary Education, Vocational Training and Language Teaching.

This Master's degree provides the pedagogical and didactic training that enables students to teach professionally in both public and private secondary schools, vocational training centers and language schools, in accordance with the Spanish curriculum. The degree is structured in two parts: it begins with a compulsory set of common subjects in the field of pedagogy and psychology, and continues with different branches of specialization, which include specific subjects in each field of knowledge. The branches at Rovira i Virgili University are: Biology/Geology, Business Administration, Catalan and Spanish Language and Literature, Economics, Foreign Languages, Geography/History, Industrial Technologies, Physics/Chemistry and Technology. This teaching experience forms part of a subject in the Physics/Chemistry specialty called Learning and Teaching of Physics and Chemistry (10 ECTS).

Because of its commitment to its local territory, Rovira i Virgili University strongly encourages the transfer of knowledge to society and does so in two broad ways: on the one hand, the transfer of knowledge and technology to the economic and production sectors and, on the other, a focus on the transfer of knowledge to society in general.

This teaching activity addresses the latter, since it fosters the dissemination of culture and knowledge throughout the local territory and population and, at the same time, introduces the values of science and humanism to society.

From the beginning, students are viewed as real Physics and Chemistry teachers as they are tasked with the development of an environment-related didactic resource for inclusion in their academic programs.

The activity is designed in the classroom but carried out outdoors in such a way that a connection between the university and the local territory is encouraged.

Although the contemporary development of Tarragona has been heavily driven by its petrochemical complex, our activity is not focused on the industrial aspects of chemistry, but deals with the bigger picture: we wanted to go further and propose a transversal activity that not only addresses scientific aspects but also cultural, artistic, historical and architectural aspects.

To do so, the students were organized into teaching teams and tasked with the creation of the contents at each stop on the itinerary.

The first session was a brainstorming exercise to identify places in Tarragona that could be significant from a physicochemical perspective. A blackboard was filled with a variety of places and many ideas. Then, with a laptop, internet connection and the help of Google Maps, they located the different spots on a virtual map in order to calculate the time needed to visit them all on foot. Finally, seven locations were selected for a walking tour that lasted about 35 minutes. As an activity lasting about 5-10 minutes had to be performed at each location, the total estimated time for the itinerary was approximately 90 minutes.

A second session was dedicated to designing the activities for this itinerary. Two activities were designed for each location: one aimed at Compulsory Secondary Education (pupils aged 14-15 years) and one at Higher Secondary Education (pupils aged 17-18 years). This meant that the same itinerary could be used for two different education levels.

The final selected places and scientific topics were the following:

- Imperial Tarraco Square – Combustion, gases and acid rain.
- The monument to Castellars – Newtonian forces.
- Central Market of Tarragona - Food pH.
- The port and the petrochemical industry – Oil and hydrocarbons.
- Balcony to the Mediterranean - Metals: Reduction and oxidation reactions.
- El Miracle Beach – Saturated chemical solutions.
- Tarragona roman city walls and Camp de Mart – Stone composition.

Each location-activity has its own dossier including the geographic coordinates, an historical, architectural, artistic or cultural description of the site and the scientific activity to be performed. Thus, when doing the itinerary, the teacher can provide a small explanation of the context before the students proceed with the scientific activity.

Once the design of the itinerary was finalized, a pilot tour was organized involving all of the students who designed the activity. Two external experts were also invited to join and evaluate this first tour, share their impressions and help to improve the activity: a teacher from a secondary school and a Science Communication professional. A new trip was recently organized with real secondary school pupils. Both experiences were highly satisfactory for both the participants and the organizers.

Given the characteristics of this master's degree, our students will, in the near future, be teaching other students. Hence the importance of learning how to design activities related to the local territory, either to be reproduced afterwards, or to know how to design new ones. Therefore, these training programs transcend the university boundaries and are ultimately addressed at a broader audience in the local area.