

Spain - Construction of an educational HPLC (High Performance Liquid Chromatograph)

Title of inspiring practice	Construction of an educational HPLC (High Performance Liquid Chromatograph) (<i>"Construcció d'un HPLC educatiu (Cromàtograf de Líquids d'Alta Resolució)" / (Construcción de un HPLC educativo (Cromatógrafo de Líquidos de Alto Rendimiento)"</i>)
Geographical area	<p>The project was initially implemented in Granollers (Barcelona - Catalonia - Spain), with the intention of expanding its coverage to all Secondary and Higher Education centres in Catalonia.</p> <p>The project is expected to be implemented in the future in any Institute, school or University that needs training in this Instrumental Analytical Technique in the field of chemistry, pharmacy, biotechnology, medicine or food.</p>
Period of implementation	<p>The project was divided into four main phases.</p> <p>The first phase took place in the academic year 2020-2021.</p> <p>The second phase took place in the academic year 2021-2022.</p> <p>The third phase took place in the academic year 2022-2023.</p> <p>The final phase is planned in 2023.</p>
Rationale	<p>The purchase of these equipment ranges from EUR 10 to EUR 40 000, which is impossible for schools, institutes and universities. Apart from the purchase, it involves a large expenditure in energy, chemical reagents and in the management of special waste (basically solvents and samples). This educational equipment would reduce the cost of purchase by 90% and the waste generated by 99%.</p> <p>This practice is inspiring for others because it shows that is possible to reach more students through the digitalization of processes. What we achieved with a chromatograph could be done with other devices and processes, therefore it is an idea that can be transferred to other areas of professional training.</p>
Scope of the practice	<p>Technical Education in Chemical Analysis, Pharmacy, Medicine or Food and Environment.</p> <p>Levels of Training Cycles of Higher Degree and University. Also for the training of technicians in companies.</p>
Educational level	<p>Level 1 (Higher Technical) of the Spanish Higher Education Qualifications Framework corresponds to level 5 of the EQF and to the short-cycle level of the European Higher Education Area Qualifications Framework (QF-EHEA).</p> <p>The qualifications of a higher technician of vocational training are located at level 1 of the Catalan Framework of Qualifications of higher education.</p> <p>At this level, grades involve a learning volume of 120 credits ECTS.</p>
Introduction and context	<p>The promoters of the project have been the professors Joan Carles Rey and Lourdes Martinez, from the Department of Chemistry of the Institut Escola Municipal de Treball de Granollers.</p> <p>The initiative was driven by the need to train students in the HPLC analytical technique and the related difficulty of obtaining this equipment, due to its high purchase and maintenance price. Such equipment is also highly noted for the limited savings in chemical reagents and almost zero reduction of waste. The project also responded to the need to involve teachers and students from other specialties and departments of VET in this initiative.</p>

	<p>For this reason, teachers from the Mechanical Production Department of the same Institute were contacted, together with teachers and students from another VET Institute (IES Carles Vallbona and from Granollers). In this way, students of the CFGS of Web Application Development are allowed to participate to this initiative.</p> <p>In total, seven teachers and eight students are involved in the project.</p> <p>The objectives for students are to increase their ability to work as a team and improving collaborative work, applying their creativity and ability to solve problems through a challenge approach, working on a project that resulted in a substantial improvement of the student internship environment.</p> <p>Initially, the project did not have sufficient funding. The prizes won by the project coordinators provided an additional source of funding and allowed them to continue working. Currently, the project team is working on obtaining a grant that would financially support the full development of the project.</p>
<p>Key activities and outcomes</p>	<p>The project led to the development of a team (prototype) that allows the operational practice of the HPLC. Users can learn to enter samples and visualise the results in a practically professional way.</p> <p>A <u>web application</u> was also developed to manage all the documentation, the information of the practices and the visualisation of the results.</p> <p>Chemical waste that would be generated in a normal device was reduced to zero.</p> <p>The project members are currently working on a new version of the software.</p> <p>The major challenge encountered in the project was related to the manufacturing of the prototype (metallic). The issue was eventually solved and biopolymeric, recyclable and sustainable material will be instead used in the future prototype or in the final model.</p> <p>The production of future equipment will be done using 3D printing technology.</p> <p>The project was presented to the teachers of Chemistry of Vocational Training of the Department of Education of the Generalitat de Catalunya (through the FuturaFP program). The initiative received interest of more than ten institutes. Such interest allowed the project coordinators to construct a team with the required characteristics and competences that could be then used to support their students.</p> <p>The success of the project derives from the ability to identify a real need for training professionals, and to create a multidisciplinary team that has believed in the project and has worked tirelessly to achieve a satisfactory result.</p> <p>This initiative obtained the 1st Prize of the Catalan Society of Chemistry in 2021, in the category of “most innovative and sustainable FP award”.</p> <p>The project was awarded the 1st Prize of the Cambra de Comerç del Vallès Oriental, as the “most innovative project of FP of the year 2022”.</p>
<p>Contacts and sources</p>	<p>IES Escola Municipal de Treball de Granollers</p> <p>Departament de Química – Chemistry Department</p>
<p>Date of update</p>	<p>25 July 2022</p>