



Making science education through laboratory teaching

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The challenge of high school teachers nowadays is to make science education more attractive to young people. Expose students early to opportunities to learn science in interactive environments that develop communication and collaboration skills makes students more confident and competent in this subject [1]. This will help to make science more attractive to young people, to increase society's appetite for research and innovations and to enhance the ability of tomorrow's citizens to make informed choices [2]. Laboratory teaching is a teaching and learning strategy in which students appropriate knowledge in the context of its use by tasks and problems aimed at obtaining useful products, whose realization encourages an active attitude based on curiosity and challenge [3]. It is evident that, especially for technical and professional education, laboratory teaching has to be carried out in "equipped spaces" where to reconstruct complex situations and to experience the professional skills of different professional areas. Teaching Integrated Sciences in a Secondary School of Agriculture (SSA) hosting a number of different indoor and outdoor labs (not only natural science, chemistry and physics labs; precision farming, plant micropropagation and beneficial insect labs, a planetarium, greenhouses and a vegetable garden with medical plants are among others) offers a wide range of opportunities. The presence of an agricultural estate with wheat fields, vineyards, olive groves and orchards and even a dairy allows the students to experiment the application of STEM disciplines in the fields of agronomy, breeding and land management and to develop best practices of production and processing.

Laboratory teaching requires teachers to be tutors triggering meaningful learning situations and supporting students with sympathy and appreciation. Laboratory teaching generally takes about one third of the school time and is managed by the teacher alternating with traditional lessons (listening, individual study, practice) and observations in the classroom or on the ground (educational school trips). The teacher uses different laboratory teaching models and strategies (Cooperative Learning, Problem Basic Learning, Inquiry Based Science Education) according to the issues and the educational purposes. Laboratory teaching experiences maximize their effect if they are performed in the decisive junctions to the acquisition of skills.

The school labs are open to classes of all-age students from other schools coming with their teachers to carry out thematic didactic workshops upon request. In this way students approach science since early-childhood. Many of them, when choosing the high school to attend, come in this SSA. This fact, besides contributing to the development of STEM culture, increases motivation and contrasts school drop-out.

[1] Laboy-Rush, D. (2011). Whitepaper: Integrated STEM Education through Project-Based Learning. Retrieved September 15, 2011, from <http://www.learning.com/stem/whitepaper/>

[2] <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society>

[3] Durst A. (2010) John Dewey and the Beginnings of the Laboratory School. In: Women Educators in the Progressive Era. Palgrave Macmillan, New York, 9-24.