

Chemical visualizations using Jmol

Proposer : Prof. Pascual Lahuerta, University of Valencia (Spain)

Visited laboratory: Enterprise Systems Modeling Laboratory (ESML), Haifa, Israel

Visit Dates : 01 May to 12 May, 2013

Pascual Lahuerta is a Professor of Chemistry at the University of Valencia (Spain) who is part of Spain a group of three University teachers of Chemistry, Biochemistry and one High School teacher that started a collaboration to develop on-line materials to improve the conceptual knowledge of students. They focused on the creating interactive chemistry teaching materials for 12th grade or lower. Prof. Lahuerta was hosted by Prof. Judy Dori and Prof. [Dov Dori](#) and visited the Technion's Science Teaching Visualization Laboratory and the [Enterprise Systems Modeling Laboratory \(ESML\)](#) at the [Technion, Israel Institute of Technology](#) between 01 and 13 May 2013.

The motivation for this visit was to share ideas in an attempt to analyze what is difficult for



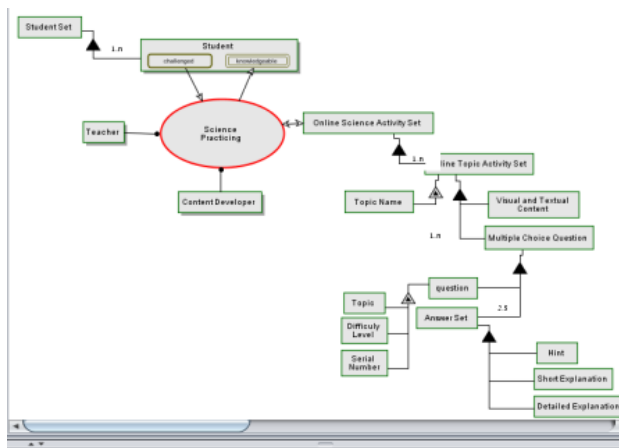
students to understand and why and to develop ways to illustrate many aspects of chemical reactions in accordance.

The hosting included visiting a chemistry lesson held at Nazareth high school in which they use visualized chemistry materials by smart board. At the Science Teaching Visualization Laboratory Prof. Lahuerta introduced his chemistry visual materials site which is based on simulations of responses reactions and processes at the microscopic level. He described the

possibilities and limitation of his tool. The common activities of the visitor and the hosts focused on structural data of molecules as well as solutions' reactions and gases. The pedagogic principle is to claim a general claim and lead the students to understand why this claim is true through simulation.

At the ESML we modeled together the process of creating a chemistry simulation and further attempts were made to improve this process.

Prof. Lahuerta summarized his visit by saying "I leave the Technion convinced that we managed to continue the sort of collaboration".



Teacher is physical.
 Teacher handles Science Practicing.
 Content Developer is physical.
 Content Developer handles Science Practicing.
 Online Science Activity Set consists of Online Topic Activity Set
 Online Topic Activity Set exhibits Topic Name.
 Online Topic Activity Set consists of Visual and Textual Content and at least one Multiple Choice Question.
 Multiple Choice Question consists of question and 1 to 5 Answer Sets.
 question exhibits Topic, Difficulty Level, and Serial Number.
 Answer Set consists of Short Explanation, an optional Detailed Explanation, and an optional Hint.
 Student Set consists of at least one Student.
 Student is physical.
 Student can be challenged or knowledgeable.
 challenged is initial.
 knowledgeable is final.
 Science Practicing affects Online Science Activity Set
 Science Practicing changes Student from challenged to knowledgeable.