

Collaboration among teachers and scientists: Is it possible?

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Collaboration between Croatian Education and Teacher Training Agency and the Institute of Physics is based on activities for lifelong education of physics teachers. We organize State and District seminars and workshops to discuss contemporary topics. Special emphasis is put on new scientific discoveries and concepts that can be incorporated into the national curriculum. The collaboration stimulates communication between teachers and scientists with multiple benefits that include training for work with gifted students, creation of new educational material, and improving scientists' communication skills.

The pilot project *Conceptual teaching thermodynamics for primary and secondary school* is aimed at training a group of about 50 county-councils coordinators, advisors and mentors at the understanding of fundamental concepts of thermodynamics, including contemporary knowledge, for their further training other teachers at the county level. Thermodynamics is chosen because it is closely associated with the interdisciplinary study of the attractive topics such as energy use, alternative energy sources, climate changes, life, environmental systems, heat pumps, refrigerators, hurricanes, etc. Thermodynamics is an important part of the underlying physics curriculum in elementary and high schools and also closely linked with the broader goals of science education. Our starting point is that conceptual understanding of thermodynamics is not possible without microscopic picture of matter which is, to our opinion, not well represented in the curriculum.

The project includes the six thematic workshops: (i) Molecular-kinetic theory, (ii) Heat and temperature, (iii) Energy, (iv) The laws of thermodynamics, (v) Perpetuum mobile, (vi) Heat Engines. Each workshop consists of four lessons: i) A sample lecture given by a participant – a simulation of teaching in the class. ii) Motivating lecture given by scientist - examples of science and technology. iii) Developing the physical concepts through demonstrations. iv) Historical overview and modern physical concepts. The project is supported by the Croatian Academic and Research Network (CARNet) e-learning system Moodle which enables the exchange of materials and communication among participants. We strive to create a compact, well-informed community that is willing to support each other in finding the best ways to interest the students and also in meeting the needs of the gifted students in their classes.