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Solar Clock, Art Square, Limassol

Program and Book of Abstracts

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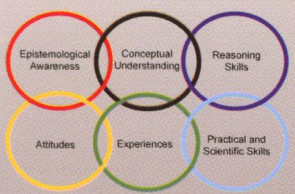

Learning in Science Group

University of Cyprus

This book was compiled and edited by The Learning in Science Group, University of Cyprus.

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WEDNESDAY, 20th

KEYNOTE PRESENTATION 9:15-10:00

Ceremonies Hall
Maarten Pieters: NiNa, a new physics curriculum project in the Netherlands

SESSION 5 10:30 – 12:30

Session 5.1 **Workshop**, Computer Laboratories, Room: Π102
Laurence Rogers: Information Technology for Understanding Science (IT for US)

Session 5.2 **Workshop**, Room: A010
Maria Carolina Lopes Magalhães, Pedro Pombo, João Veloso: Little scientist workshop

Session 5.3 **Workshop**, Room: A011
Loucas Louca, Michael Michael and Zacharias Zacharia: Videotaped lessons: a data source for educational research and for developing video-case studies as tools for professional development

SESSION 2a 10:30 – 11:30

Session 5.4 **Modelling, Simulation and Video Measurement in Physics Education**, Room: A007
Chair: Dimitrios Psillos

1. *Pedro Fernando Teixeira Dorneles, Eliane Angela Veit and Marco Antonio Moreira:* Investigating the learning of RLC circuits with the aid of computer-based activities
2. *Hildegard Urban-Woldron:* Is the concept of electricity better Understood with the help of electronic media?
3. *Jozef Hanc and Robert Andrassy:* Computer modeling Coulomb's law and Kirchhoff's loop theorem through concept of energy

Session 5.5 **Physics Understanding**, Room: A008
Chair: Friedrich Herrmann

1. *Friedrich Herrmann:* The Carnot efficiency
2. *Michael Pohlig:* Don't be afraid-it's just entropy
3. *Elmar Bergeler and Gesche Pospiech:* Writing in the physics classroom

understanding and learning. This case study was inspired by publications on common misconceptions in the field of electricity in Physics education for 12- to 13-year-old students. Available learning modules and others developed by the author herself based on guidelines of the "Karlsruhe Physics Curriculum" have been used in the class room. Integration of these learning modules in physics education had a positive effect of students' cognitive processes and stimulated students to learn and experiment by themselves beyond the questions discussed in class. The interactive simulations generated a high level of engagement, exploration and understanding and showed students in some cases what is not visible to the eye. Specifically, the virtual experiments performed were also able to remove common misconceptions. Students could significantly better handle hypothetical, i.e. "what-would-be- if...", scenarios compared with a control group who had no access to digital learning media. They could better overcome misconceptions like electricity being "used up" and acquired easier and faster a physically correct understanding of electric current and electric circuits. However, for less gifted and/or less motivated students the effects were less pronounced.

Computer modeling Coulomb's law and Kirchhoff's loop theorem through concept of energy

Jozef Hanc, Robert Andrassy

Institute of Physics, P.J. Safarik University in Kosice, Slovakia

Electrostatic fields in space around charged conductors or steady currents in circuits distribute in such way that energy stored in the field or the rate at which energy is dissipated in the circuit is as least as possible. Using computer modeling in the well-known Easy Java Simulations environment we present the alternative the so-called variational, formulation of Coulomb's law and Kirchhoff's loop theorem. The theorem demonstrates the universality of energy concept and allows students to derive effectively and quickly fields and currents in many common or uncommon physical situations, like fields around a sphere, wires and capacitors of different shapes or currents in various types of dc circuits. The advantage of this approach is the development of conceptual understanding without any use of vector calculus mathematics or the additional sign conventions for potential difference that are typically used in given situations.