Collaboration among teachers and scientists: Is it possible?

Ivica Aviani

Institute of Physics, Zagreb

I. Aviani, Toward a Platform for Motivated and Gifted Youth, February 24-27, 2012 Čakovec, Croatia
Collaboration with Croatian Education and Teacher Training Agency

- activities for lifelong education of physics teachers.
- State and District seminars and workshops to discuss contemporary topics.
- scientific discoveries and concepts that can be incorporated into the national curriculum.
- communication between teachers and scientists
- training for work with gifted students
- creation of new educational material
- improving scientists’ communication skills.

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Conceptual teaching thermodynamics for primary and secondary school

- The pilot project for a group of 50 county-councils coordinators, advisors and mentors
- Fundamental concepts of thermodynamics, including contemporary knowledge
- Thermodynamics is an important part of the physics curriculum
- It is closely related to the attractive topics like energy use, alternative energy sources, climate changes, life, environmental systems, heat pumps, refrigerators, hurricanes, etc.
- Conceptual understanding of thermodynamics is not possible without a microscopic picture of matter
The project the six thematic workshops:
• Molecular-kinetic theory
• Heat and temperature
• Energy
• The laws of thermodynamics
• Perpetuum mobile
• 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.
Project kick off
Demonstrations
What is the temperature of the universe?

Satellite COBE 1992

T = 2.7 K
Why is the earth's core so hot?
Why is it cold at the bottom of the ocean?
Why the atmosphere temperature changes?

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Konceptualno poučavanje termodinamike u osnovnoj i srednjoj školi
Ice and water (I. Aviani)

The mixture of water and ice at atmospheric pressure is in thermal equilibrium at the temperature of 0 °C. The ice slowly melts while the temperature of the mixture does not change until all ice is melted. The heat coming from the environment turns into

Answers

<table>
<thead>
<tr>
<th>Potential energy of molecules is higher in liquid than in solid.</th>
<th>Kinetic energy of molecules is higher in liquid than in solid.</th>
<th>Potential and kinetic energy of those molecules that are melting.</th>
<th>Potential energy of molecules of liquid and solid. Kinetic energy is not changing.</th>
<th>There is no change in energy of molecules. Only the entropy of those molecules that are melting is changing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (14.3%)</td>
<td>6 (21.4%)</td>
<td>5 (7.9%)</td>
<td>6 (21.4%)</td>
<td>7 (35.0%)</td>
</tr>
</tbody>
</table>
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First prize
Thrown in the air - a natural image
Alojzija Peronja, Osnovna škola Jelsa
mentor: Željana Slaviček, nastavnik likovne kulture
First prize
Three seasons- modified photo
Ognjen Milat, Zagreb

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Exibition in Čakovec