

Teaching physics innovately

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An international conference was organized at the end of the summer in Budapest about how to teach physics innovatively in secondary education. Nowadays physics is not the most popular subject in high school – a fact that makes discussions about how to best teach physics more important. At the conference, teachers from several countries shared their ideas about the modernization of physics education.

The highlight of this conference was the presentation of environmental and socially sensitive issues, and innovative teaching methods using the most recent IT technology in formal and informal learning environment, such as science centres, museums and research sites. Contributions were organized around themes with direct relevance to socially sensitive issues in science education and recent findings from physics education research. The SSIBL Framework was introduced in a plenary presentation and discussed in paper sessions. A roundtable discussion on socially sensitive issues, e.g. on nuclear energy, and a visit to the Paks Nuclear Power Plant was also used to highlight the importance of a SSIBL approach to science education.

The exchange of ideas during the conference by 101 participants from 18 countries was inspired by invited speakers, who included well-known researchers. *Marisa Michelini*, President of *GIREP* (*International Research Group on Physics Teaching*) was the first speaker about how to develop modern physics' thinking in

secondary schools. *Hannu Salmi*, from the University of Helsinki, a member of the PARRISE External Advisory Board, presented relationships between formal education and informal learning via science centres. *Ulrike Feudel*, professor of theoretical physics of the Institute for Chemistry and Biology of the Marine Environment in Oldenburg gave insights into introducing students to complex systems in nature and their socio environmental consequences.

Witty experiments by *Miha Kos*, the founder director of House of Experiments in Ljubljana, Slovenia showed how "doubtology" helps you avoid misconceptions when illusions trick you common sense. *David Featonby* from the UK, physics teacher and ambassador of "Science on Stage Europe", presented the *Science on Stage* international network of innovative and socially targeted science education and its biennial festival, which will next take place in Debrecen, Hungary in 2017. *Zoltán Néda*, a Hungarian professor of the University of Cluj-Napoca, and external member of the Hungarian Academy of Sciences, demonstrated how light and kinematics experiments lead students to a deeper understanding of the basics of the theory of relativity, as part of the celebrations of the "International Year of Light" in 2015.

Participants enjoyed an exciting lecture by *György Szabó*, researcher of the Wigner Research Centre for Physics in Budapest,

about game theory and its applications to the understanding of social and scientific phenomena. *Miklós Vincze*, a member of the von Karman Laboratory of Environmental Flows at Eötvös University, demonstrated that fluid dynamical experiments can faithfully model phenomena, even phenomena related to climate change. The researchers of the Institute for Nuclear Research at Debrecen developed an entertaining adventure game which can help students to understand nuclear systems and processes. *Zsolt Fülöp*, the director of the Institute, showed participating teachers how to use this game for developing a firm knowledge base as well as sensitizing students about social issues around the use of nuclear energy. In connection with this crucially important issue for the Hungarian society, *Attila Aszódi*, professor at the University of Technology and Economics in Budapest, discussed the scientific, economic and social issues of the enlargement of the Nuclear Power Plant in the town of Paks, also explaining the problems regarding its public acceptance.

In the conference sessions, speakers presented their favourite educational project in nine areas. There were several content areas that have not yet been included in the actual curriculum of physics, however their social and scientific relevance would make an inclusion justifiable. We had 60 contributing speakers, and most of them were high school teachers of physics. Many of the Hungarians among them have learnt about the SSIBL Framework during a course offered by the doctoral programme on Physics Education at Eötvös University.

The conference reached its pinnacle at the round-table discussion about nuclear energy use, a socially sensitive issue in Hungary that has to be reflected in science education (see Figure 15). An excursion to the town of Paks, where participants visited the *Training Centre of the Nuclear Power Plant*, completed this debate and showed how teaching Physics is relevant for shaping public opinion through providing authentic scientific information.



Figure 15. Round-table discussion, participants (from left to right): Hannu Salmi (University of Helsinki, Finland), Zsolt Fülöp (Institute for Nuclear Research, Debrecen, Hungary), Attila Aszódi (University of Technology and Economics, Budapest), David Featonby (Science on Stage Europe, United Kingdom), László Egyed (moderator of the discussion)