The Past and Presence of the SSIBL in Hungary

A. Király [1,2,*], A. Kárpáti [1], P. Tasnádi [1,2]

1 – ELTE Eötvös Loránd University, Budapest, Hungary
2 – MTA-ELTE Physics Education Research Group, Budapest, Hungary

* E-mail: andrea.kiraly@ttk.elte.hu

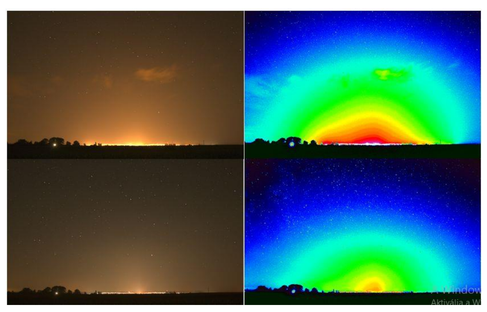
Aims of the SSIBL

– Enhance the scientific literacy of the society
– Education of responsible adults
– Education of committed teachers to SSIBL

Good examples

I. Szatmáry-Bajkó – Chaos, [1] pp. 15-20.

M. Pető – Robotics, [1] pp. 169-174.



I. Döményné Ságodi, A. Dömény – Light pollution, [1] pp. 35-40.

Characteristic features and methods of SSIBL was applied in Hungary

Inductive and experiment-based teaching method

Association of the social content and the physics

Important fields:
nuclear physics, environmental physics, sustainable development, climate change etc.

Interdisciplinary character and connection with the everyday life

Environmental teacher training was launched at the ELTE in 1992.

Critical thinking, risk estimation

Low risk is acceptable

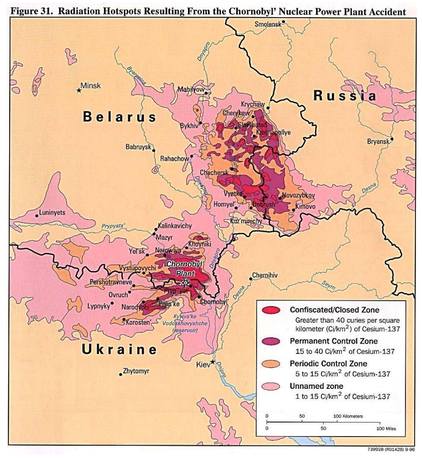
George Marx (1927-2002) a Hungarian professor of theoretical physics was pioneering the introduction of the risk estimation into the school teaching. [2]

The nuclear risk

For example in nuclear field the risk is determined by the ALARA principle (As low as reasonably achievable). George Marx was particularly sensitive to misunderstandings concerning the use of nuclear energy.

A story from the time of Chernobyl – the importance of critical thinking

George Marx's story about a Hungarian school. In 1986 radioactive cloud reached Hungary: "In one school pupils queued at the door of the physics laboratory, early in the morning, waiting for the teacher: 'Let us measure the background again!' It turned out that it was three times higher than a month before, causing great excitement. They demanded that the windows be opened: 'Let the Chernobyl radioactivity come in!' It was done, and the activity fell to the old value. The morning increase was due to the accumulation of radon in the unventilated classroom during the night. This lesson these students will never forget. Radioactivity around us is a fact of life. Nuclear fallout can be measured exactly, as we did in Hungarian secondary schools after Chernobyl, and as we have monitored radon since."



The moral of the story

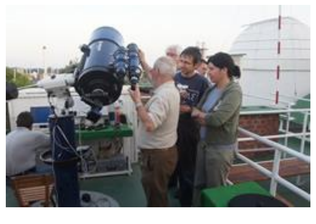
High technology can be controlled. Understanding facts influence the response of the citizens, the collective decisions of a nation in important questions. This is a prerequisite for the realization of democracy.

Understanding our environment

The GLOBE (Global Learning and Observations to Benefit the Environment) program was launched 1994 in the USA to promote the teaching and learning of science. Hungary joined to the Globe program in 1999. At present 30 secondary schools are participating in the program.

2011 – GLOBE Students Practice Sun Photometer Use in Kiskunhalas, Hungary

https://www.globe.gov/news-events/globe-stars/starsdetail/globe/2011-hungary-sun-photometer



Activity connected with the environment

Environmental observation: in meteorology, pedology, water chemistry, botany and zoology. Environmental education can be efficient only if it treats the world in its unity and the role of the parts is found within this framework. This is the reason why we initiate each year student competitions of photograph, poem, short story and drawing which demonstrates the relationship between human and its environment.

Can teachers explain the everyday phenomena?

– not enough to show the role of the physical laws in the explanation of everyday phenomena
– should interpret the explanation at secondary school level
Course: Eveyday Physics in the curriculum of teacher training
Content:
Physics of cars (acceleration and braking, movement in the bend, physics of Forma I, energy consumption of cars etc)
Physics of weather (clouds, storms, lightning, weather forecast etc.)
Physics of sports

Presence of the SSIBL

Key players are teachers

Main tools of mediating the elements of SSIBL (RRI, IBL, CE, SSI) toward teachers:

- a postgraduate TPD teacher training course embedded into Physics Education PhD program
- an optional University course in teacher training on GLOBE
- a conference on Teaching Physics Innovately (TPI-15)

Postgraduate teacher training

The PhD program

Physics Education PhD program launched 10 years ago at ELTE

- tailored specifically for the needs of active in-service physics teachers
- candidates carry out their research at their own school
- research topic examples: Non-conventional modern physics in the classroom, Environmental physics in the high-school, Enhancement of the activity of pupils with interest in humanities, Teaching physics outdoors, ... etc

The TPD course

TPD course according to the Objectives of PARRISE:
„Current Contents and Methodology in Teaching Physics in the 21th Century"

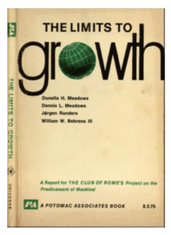
- in-service teachers
- four modules of the Physics Education PhD program
- methodology focused on the pillars of the PARRISE framework
- good practice presentations on IBL, PBL, RRI
- educational interpretation of social sensitive scientific issues

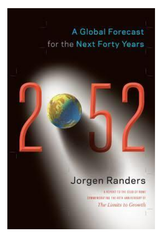
Optional University course on GLOBE

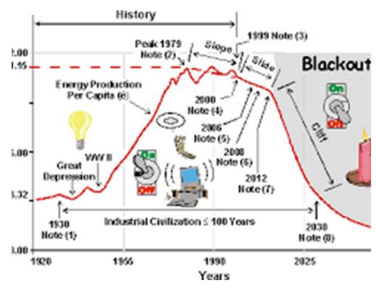
Goal: to integrate the GLOBE program more deeply into the high school education.
Conditions: young teachers should be familiar with the GLOBE program.

GLOBE in teacher training

A one-semester optional course for BSc and Msc students in Earth and Environmental sciences and for future teachers.
Content: Main part various environmental measurements
An overview of the history of the predictions on the future of the mankind and the Earth (Malthus (1798), Club of Rome (1968), recent UNESCO report "Shaping the Future We Want")







A conference which created an engaged community

Teaching Physics Innovately (TPI-15)

New Learning Environments and Methods in Physics Education

- more than 100 participants, from 18 different countries
- 60 contributing speakers, most of them high school teachers of physics

David Featonby, Science on Stage

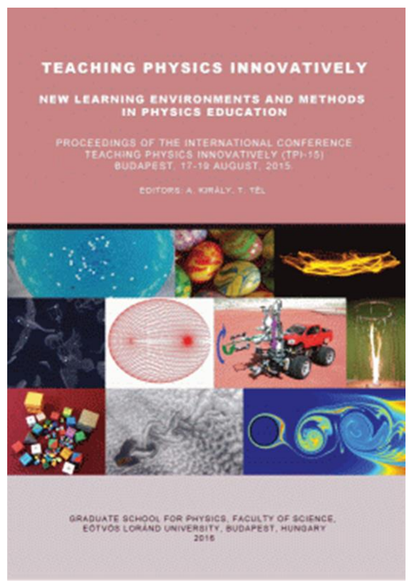
Visit to the Maintenance and Training Center at Paks Nuclear Power Plant

photo: http://www.atomeromu.hu/en/

Topics:
Inquiry Based Science Education,
Science centres and other informal learning opportunites,
Environmental issues,
Our cosmic environment,
Socially sensitive issues,
Multimedia and ICT,
Physics experiments and methodological innovations,
Contemporary physics,
Nuclear issues,
Roundtable discussion about socially sensitive issues in physics education.

Marisa Michelini, president of GIREP

Hannu Salmi, Univ. of Helsinki



- the Proceedings is available online as an e-book [1] http://parrise.elte.hu/tpi-15/
- the separate papers are also accessible with their conference abstracts and presentation slides a discussion "forum" is associated to each paper http://parrise.elte.hu/tpi-15/slides.php
- the final version of the Proceedings will be generated and printed as a book soon

[1] A. Király, T. Tél (eds.), Teaching Physics Innovatively: New Learning Environments and Methods in Physics Education (e-book), Eötvös Loránd University, Budapest, 2016., ISBN 978-963-284-815-0.
[2] G. Marx, Phys. Educ., 28 (1993) pp. 23-25, pp. 121-125, pp. 170-172.

This work has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No. 612438, and from the Content Pedagogy Research Program of the Hungarian Academy of Sciences.