

"Current results in physics and new methods in Physics education"

Sample Lesson Plan – for 2 sessions related to SSIBL

Teacher Professional Development (TPD) course by Eotvos Lorand University,
Budapest, Hungary
(for Physics teachers in upper-secondary school)

Overview:

Short summary:

The major objective of the course is to provide appropriate contents and methodology to teach about current results of Physics, a fast growing field of research through the three pillars of the Framework. All methods and educational tools are provided for teachers ready for use at school. The course presents Physics as an evolving field, introducing major phases in research history. We show that this is an open field where there are a lot of emerging issues for research, besides basic laws of science. We pay much attention on the discussion of current, socially relevant problems and provide their scientific background to support informed decision making as citizens.

The lesson and home assignment outlined here is an introduction to ISSBL methodology.

Intended learning objectives of the TPD:

- through an analysis of the existing curriculum and teaching guides for Physics education according to components of the SSIBL framework, identify socially sensitive issues of the Hungarian Core Curriculum that can be embedded in teaching of Physics on secondary level;
- identify connections among current research in the field of Physics and some social issues related to areas of contemporary research and its results;
- understand the pedagogical relevance and innovative character of the SSIBL Framework; reflect on the various elements of the SSIBL framework and on the teaching skills required for these elements to be implemented in school; be able to integrate it in teaching programs, relying on good practice examples of the PARRISE consortium; be able to identify unique qualities of this approach as compared to traditional pedagogical approaches.
- evaluate innovatory lesson plans and teaching tools: assess the success of the implementation of the SSIBL activities
- critically reflect on the regional and local Physics curricula and propose means for future improvement, in terms of both the SSIBL project, the enactment of the pupils' SSIBL activities, and the results of New Physics.
- develop a plan for an SSIBL-based lesson (project) for the secondary level physics curriculum
- reflect on the lesson / project design of peers
- realise the lesson / parts of the project, if possible
- reflect on experiences and share good practice
- recognise opportunities for including aspects of active and well-informed citizenship in the physics curriculum, using SSIBL

Session 1: Introduction to SSIBL framework

Learning goals

The in-service teacher trainee can

- understand the pedagogical relevance and innovative character of the SSIBL framework and employ its components in lesson plan design and teaching;
- relying on good practice examples of the PARRISE consortium; be able to identify unique qualities of this approach as compared to traditional pedagogical approaches.
- identify socially sensitive issues related to current research in the field of Physics that may be taught in connection with contents of the Hungarian Core Curriculum;
- critically reflect on the regional and local Physics curricula and propose means for future improvement, in terms of both the SSIBL project, the enactment of the pupils' SSIBL activities, and the results of New Physics.
- develop a plan for an SSIBL-based lesson (project) for the secondary level physics curriculum
- reflect on the lesson / project design of peers
- realise the lesson / parts of the project, if possible
- reflect on experiences and share good practice

Before the session

A presentation was prepared to introduce the SSIBL framework, based on documents and YouTube video from our project website (available as resource, <http://parrise.elte.hu/>). The Hungarian PARRISE team discussed the presentation and suggested changes to make it more understandable. Good practice examples for IBSE and SSI approaches were collected to share with practicing teachers who learn best from the examples of their peers.

Introduction (15 minutes)

Collecting exiting experiences: the lecturer briefly introduced IBSE and SSI and asked about educational experiences in relation to the models.

Problems identified: teachers shared their existing practices and expressed problematic issues in relation to employing these models.

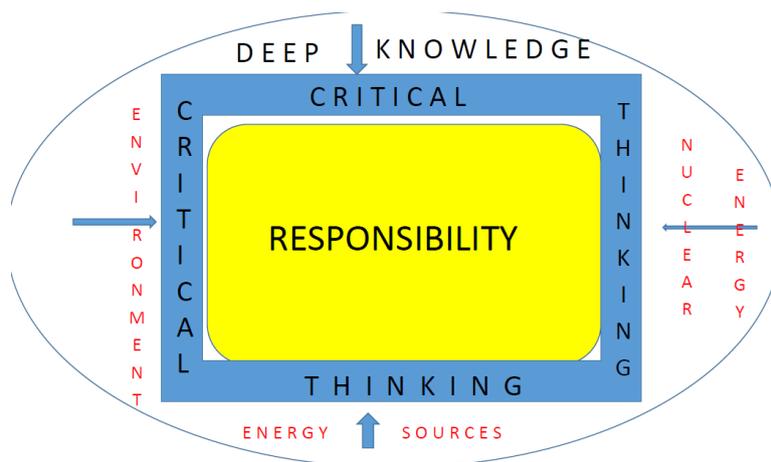
Follow-up activity: the lecturer collected the problems that teachers enumerated for discussion later during the course along with good examples from the PARRISE community that may be adapted / used for inspiration to overcome existing difficulties in employing elements of the SSIBL framework.

Methodological considerations [45']

Participants of the in-service training course were introduced a few socially sensitive scientific issues that can be understood by secondary school students and supported by curriculum content:

- renewable energy: sources, real costs and environmental consequences
- nuclear energy: should the Power Plant at Paks be enlarged?
- conscientious energy consumption in everyday life
- geopolitical considerations of energy supply sources

The lecturer introduced the model by Peter Tasnádi, member of the Hungarian PARRISE team for developing responsible citizenship values with the help of SSIBL methodology.



Discussing the framework (20 minutes)

Teachers reflect on the model and discuss its uses for lesson plan / project development. The model suggests to include the following elements in a SSIBL-based lesson:

1. Clear and convincing identification of the social issue that the lesson will focus on;
2. Presenting scientific evidence related to the issue;
3. Experiments to deepen knowledge and create engagement;
4. Discussion round with students on social implications
5. Homework options:
 - knowledge related exercises about scientific content
 - group work 1: collection of the media coverage related to the issue and identification of true and doubtful arguments to be discussed in class
 - group work 2: developing and executing a short survey about the social issue and its possible solutions

Home assignment (10 minutes):

description of tasks, selection of themes, forming collaborative groups

Teachers participating in the in-service course are invited to develop lesson plans or a project consisting of 4-5 consecutive lessons based on the SSIBL framework. The lecturer and the participants discuss themes that may be developed into a scientifically grounded socially relevant teaching unit.

Some topics are discarded as they require more sophisticated physics knowledge than secondary school students may have or will acquire according to the curriculum. Other topics are selected by several teachers who form groups to develop versions of lesson plans on the same topic for different age groups. Others decide to do collaborative projects that involve communication among their classes, living in different parts of Hungary and communicating through the internet.

Session 2 (1.5 hours)

(Three months later)

Presenting the plans and piloted SSIBL based lessons and projects to the in-service training group.

Learning goals

The in-service teachers can

- develop curricular units (lesson plans or projects) in physics, based on the SSIBL framework, making use of results of New Physics presented during the in-service training course
- execute lessons and evaluate results, adapt the lesson / project plan to better suit the needs and competences of his / her class
- OR: discuss the piloted plans of others in a reflective teachers' group, identify strong and weak points, offer suggestions based on professional experiences about the issue in the centre of the assignments and the methodology of the lessons / projects
- make plans about the utilisation of the framework in connection with the requirements of the curriculum

The session consists of presentations of plans and piloted lessons / projects followed by discussions. Those lesson plans that relate to the same scientific issue are presented one after the other and discussed in relation of each other. Issues discussed involve

- relevance of the scientific problem for Hungarian / European / global society;
- innovative utilisation of the SSIBL framework;
- appropriateness of educational methods selected;
- quality of teaching aids prepared / adapted by the teacher;
- motivation of students: how does the SSIBL model enhance student engagement?
- learning results of students: how does the SSIBL model enhance deep learning?
- the place of the lesson / project in the curriculum: interrelations with other curricular units

References:

Chapters in conference proceedings and presentations in relation to teaching about and piloting the SSIBL framework: see Annex I.