

Handouts SSIBL TPD Course on 'Genetically Modified Food' for pre-service biology teachers in upper-secondary education¹

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Handout A

The main phases of a SSIBL project (Theoretical introduction to SSIBL)

Reference: Levinson, R. (2015). Promoting Attainment of Responsible Research and Innovation in Science Education. Theoretical framework of the FP7-EU-Project PARRISE (Project No.612438). London.

Entry into a controversial topic & raising authentic questions:

Humbel *et al.* (unpublished paper) have written of the challenge of framing an SAQ (Socially Acute Question) (Simonneaux, 2014), a question designed to promote urgent and lively interest among students. To build a problem or inquiry in school will be quite a new experience for many students who are usually asked to solve pre-existing problems for which the solutions are often known. Often the teacher will need a 'trigger', to generate a problem."

"The teacher might prompt open questions by using a format to represent the issue (a poster, a film, a short story, a piece of video, a newspaper headline, a photograph). The question might be as simple as 'what do you think?' 'How does it make you feel?' In doing so the teacher has to promote discussion and interchange of ideas in such a way that it is critical, open and respectful. No one should be excluded. One result from this might be to identify polarized positions (Hand & Levinson, 2012). As the teacher previously deconstructs and reconstructs the problem s/he will have anticipated some of the questions and responses from the students.

Explore the topic – Inquiry Learning:

There are a number of possible outcomes once the question/idea/hypothesis has been framed. Students might want to focus on one particular question or a number of related but different questions. It may be best to work as a class group or to collaborate in different groups. Alternatively a group, or even an individual, can pursue an inquiry of their own.

¹ The following additional materials for this TPD course are available on the [PARRISE website](#): *Outline_LessonPlans_UNIVIE*, *Presentations_UNIVIE*.

In controversies, one of the main skills to learn is how to know which source of information to trust. Students can be given guidance on identifying criteria but can also produce their own. These might include questions such as:

- What authority do the sources have?
- Whose interests do they represent?
- What experience do they have in the area addressed?
- Do they use evidence?
- Do they give the sources of evidence?
- Is their argument consistent with the evidence?
- What is implicit and explicit in their argument?
- How is emotion and reason used in presenting their position?

Foster reflection in student's thinking about how far the evidence supports or contests their hunches and predictions, what they have learned in the process and how that influences future plans in the inquiry. Once data has been collected and interpreted in relation to the inquiry question, students may decide to modify the research question, to collect more data or different data, in the light of new knowledge.

Mapping the controversies:

Appropriate pedagogy will involve supporting students in identifying precisely what the controversy is (i.e. what is the nature and content of the disagreement - is it about evidence, interest positions, core values, or all of these?) and who the main stakeholders are. This will mean identifying different groups or individuals who hold diverse positions, as well as those individuals and communities who will be affected by the issue. Preparing this material in advance will enhance the progress of the inquiry but it is also important to realize that controversies in a group might emerge unexpectedly so the teacher needs to support students in identifying stakeholders.

Mapping a controversy will include the following:

- Identifying the nature of the controversy (the focus of the question, evidence, values, interest positions, priorities);
- Main stakeholders (which actors - individuals, campaigning groups or national/international organisations are prominent players);
- Affected parties. Who stands to gain or lose by the outcome of the controversy? These are not necessarily the same as the main stakeholders and may indeed be non-human actors;

Communicate findings, planning & implementing actions:

How students communicate their findings can be conveyed through a range of media: talks, debates, written reports, posters, letters, articles in newspapers and journals, blogs, drama, mime, dance, multi-media. An element of communication in this learning and teaching approach is persuasive communication i.e. the ability to convince through reasoned argument and emotional commitment.

A distinguishing feature is the ability to produce opportunities for action as a component of inquiry. However, actions in themselves are only authentic if they emerge from the inquiry through deliberation and reflection. Action can be seen in a broad sense. It could include such outcomes as:

- Making something, e.g. healthy drink, a school vegetable plot, a poster encouraging fellow students to walk to school rather than drive;
- Generating a petition;
- Information, such as Youtube clips to support improving personal actions, e.g. avoiding disposal of plastic cups;
- Provide services, e.g. recycling cell phones.

Teacher support can facilitate appropriate action through promoting active links with agencies in and beyond school and identifying appropriate opportunities for action.

Democratic dialogue:

Dialogue in this teaching and learning approach is participative and collective which presupposes capabilities in discussion and its associated dispositions. If students have little experience of constructive dialogue in school (or at home) then these interactions need to be built up carefully. This might start with small activities such as brainstorming together in class, space to give opinions, small welldefined group activities in which students learn procedures such as listening respectfully, feeding back, ensuring everyone in the group has a chance to speak. Students can begin to devise procedures for themselves in order to regulate group activities and discussion to move towards exploratory talk.

The following skills encompass appropriate pedagogies for promoting deliberation, reflection and collaboration:

- Supporting exploratory class and group discussions;
- Encouraging attributes for deliberation (openness, honesty, willingness to listen, respect for others, criticality);
- Sensitivity towards emotions and strong feelings;
- Willingness to challenge and promote discussion of controversy without injecting own bias, ability to reflect and present alternative viewpoints where necessary; being aware that

dialogue is always mediated by power, this can be through positions of status (teacher and student), differential access to knowledge (scientist and layperson) and inequalities in social and cultural capital

- Encouraging students to discuss what they have and have not achieved throughout the inquiry and to evaluate how they might change strategies in the future;
- Ensuring all students participate meaningfully.

Handout B

Reflection questions for course participants

Questions regarding the SSIBL approach:

1. Does the SSIBL approach to teaching and learning science appeal to you as a science teacher?
2. In what ways do you think that lessons based on SSIBL can be of value for you as a science teacher?
3. In what ways do you think that lessons based on SSIBL can be of value for your students?
4. What are, according to you, the challenges and/or pitfalls in the design and implementation of SSIBL lessons?
5. What were the most significant and interesting moments during teaching with the SSIBL approach in class?
6. What is, according to you, the essence of the SSIBL approach?

Questions regarding the TPD course:

1. Which TPD sessions in this course were useful for designing and teaching science lessons according to the SSIBL approach?
2. In your opinion, what were the most interesting aspects of the TPD sessions this year (if any)?
3. In your opinion, how could our TPD course be improved, changed, further developed in the future for PSTs?

What else is important for me to say...