Course outline and lesson plans for the SSIBL Teacher Professional Development co-design course in Cyprus

Cyprus University of Technology
Department of Communication and Internet Studies, Cyprus

These materials are based on the work of the project "Promoting Attainment of Responsible Research & Innovation in Science Education" (PARRISE).

Project Coordination: Dr. Marie-Christine Knippels & Frans van Dam (Utrecht University)

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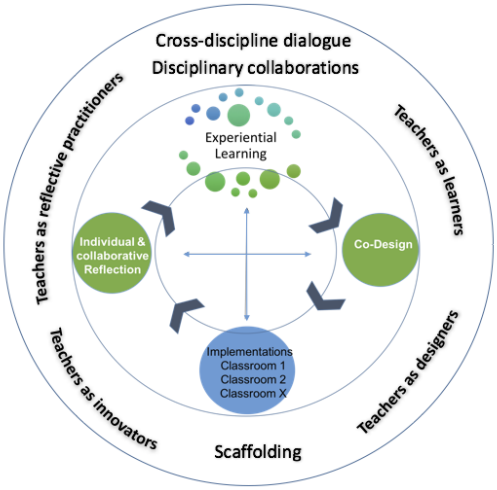
Overview of the course outline

The Cyprus University of Technology adopted a participatory design model for engaging in-service teachers with the PARRISE pedagogical framework, the RRI ideas, and their integration in their practices. We employ a particular instance of participatory design, which we call co-design. Co-design is an important tenet of situated learning during in-service teacher professional development (Kyza & Georgiou, 2014; Kyza & Nicolaidou, 2016). During the co-design approach teachers work together with researchers and science educators to adapt or develop a science education curriculum that embodies RRI, addressing all three pillars of the SSIBL framework (inquiry-based learning, socio-scientific issue, active citizenship).

Our past professional development experiences, along with reports from the literature, and our own research-based conclusions from previous work (e.g. FP7 projects PROFILES, CoReflect) all point to the need to engage teachers in extended professional development experiences (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010). This TPD model develops during a typical school year (e.g. October-May) and adopts a model of teachers as learners, designers, innovative practitioners and reflective practitioners. As part of this TPD teachers work in a design team, organized according to discipline and level of teaching (e.g. biology -lower or upper secondary level, chemistry -lower or upper secondary, or elementary school science). An essential component of this co-design TPD model are the classroom implementations, which provide the experiences on which teachers can revise the TPD based on their observations and data from their students. Figure 1 shows the main aspects of the CUT TPD model: experiential learning, co-design, the opportunity to enact and assess the effectiveness of the SSIBL implementations, and continuous opportunities for reflection.

Figure 1. The Cyprus University of Technology co-design TPD model



This TPD approach combines experiential learning, occurring during face-to-face meetings for learning, co-design and reflection, co-design coordination meetings (mainly occurring online), and continuous reflection activities. Reflection is a key aspect of this TPD and can be fostered through teacher educator scaffolding, peer feedback, feedback between interdisciplinary groups, the co-design process and the opportunity to enact, evaluate and reflect on the SSIBL framework.

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Duration

The CUT TPD had a hybrid nature, consisting of face-to-face sessions and bi-monthly video-conferences for the facilitation of co-design. In the second round of TPD, six face-to-face sessions (3 hours each) and five, bi-monthly web conferences (90 minutes each), for a total of 25.5 of contact session hours, excluding classroom implementations. All meetings took place during the teachers' own (after-school) time. (However, please note that the frequency and number of meetings can be flexibly adjusted based on each cohort's needs.)

Objectives

The Cyprus TPD aimed at supporting in-service teachers in:

O1 Achieving a functional understanding of the SSIBL framework and becoming able to discern and explain the differences of this approach as compared to other pedagogical approaches. *[Teachers as learners and as reflective practitioners]*

O2 Analyzing existing science modules according to each of the components of the SSIBL framework *[Teachers as reflective practitioners]*

O3 Analyzing socio-scientific issues to identify (a) main stakeholders and (b) controversial points of view *[Teachers as learners and as reflective practitioners]*

O4 Recognizing the significance of partnerships with scientists and stakeholders *[Teachers as learners and as reflective practitioners]*

O5 Adapting or developing new PARRISE SSIBL activities for their own classroom *[Teachers as designers and as reflective practitioners]*

O6. Implementing SSIBL-based activities in their science classrooms *[Teachers as innovators and as reflective practitioners]*

O7. Evaluating the success of the implementation of the PARRISE activities *[Teachers as innovators and as reflective practitioners]*

O8. Reflecting on the challenges of the SSIBL framework in relation to: (a) understanding the framework, (b) adapting existing activities to address the SSIBL framework, and (c) implementing the SSIBL framework with students. *[Teachers as reflective practitioners]*

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Overview of the TPD co-design approach

An overview of the Cyprus co-design TPD course is presented in the following table.

Session	Session title and main objectives	Approach	Duration	Type
1	**Introduction to the PARRISE and to the SSIBL framework** O1: Introducing the RRI ideas through the PARRISE project O2: Introducing SSIBL as a pedagogical framework O3: Introducing SSIBL as a design-based framework	Teachers as learners Teachers as reflective practitioners	3h	Face to face (F2F)
2	**A collaborative design process for integrating SSIBL in science education modules** O1: Introducing the co-design process O2: Elaborating on science modules and selecting an appropriate topic for applying the SSIBL framework O3: Coordinating the co-design process	Teachers as designers Teachers as reflective practitioners	1,5h	Online
3	**Controversial socio-scientific issues and their pedagogical value** O1: Introducing socio-scientific controversies O2: Introducing the pedagogical potential of a SSIBL-based module O3: Elaborating on the nature of socio-scientific controversies	Teachers as learners Teachers as reflective practitioners	3h	F2F
4	**The socio-scientific aspects of a SSIBL module** O1: Selecting a socio-scientific controversy O2: Reflecting on the socio-scientific aspects of a SSIBL module	Teachers as designers Teachers as reflective practitioners	1,5h	Online
5	**Deconstructing & mapping a socio-scientific controversy** O1: Developing a pedagogical scenario for a SSIBL module O2: Mapping the socio-scientific controversy for a SSIBL module	Teachers as learners Teachers as designers	3h	F2F
6	**The nature of scientific inquiry** O1: Defining scientific inquiry O2: Reflecting on the nature of scientific inquiry	Teachers as learners Teachers as	3h	F2F

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	O3: Defining the aspects of a successful scientific inquiry	reflective practitioners		
7	**Scientific inquiry as a core aspect of a SSIBL module** O1: Investigating scientific concepts through scientific inquiry O2: Elaborating on scientific inquiry activities	Teachers as designers Teachers as reflective practitioners	1,5h	Online
8	**Active citizenship as a core aspect of a SSIBL module** O1: Defining active citizenship O2: Promoting active citizenship through individual and/or collective citizenship actions	Teachers as learners Teachers as reflective practitioners	1,5h	Online
9	**Session 10: RRI as a core aspect of a SSIBL module** O1: Elaborating on RRI aspects O2: Defining the RRI activities	Teachers as designers Teachers as reflective practitioners	1,5h	Online
10	**Instructional strategies for developing a SSIBL module** O1: Introducing instructional strategies for promoting the SSIBL-based approach O2: Selecting and implementing an instructional design	Teachers as designers Teachers as reflective practitioners	3h	F2F
SSIBL module implementations – Teachers as innovators				
11	**Reflection & Evaluation of SSIBL implementations** O1: Evaluating the SSIBL implementations O2: Reflecting on the SSIBL implementations	Teachers as reflective practitioners	3h	F2F

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Session 1: Introduction to the PARRISE and to the SSIBL framework

Type: Face to face
Duration: 3 hours

Learning goal: The learning goal of this session is to promote teachers' understanding about the SSIBL pedagogical framework and how this framework targets Responsible Research and Innovation (RRI) via the combination of: (a) Socio-Scientific Issues (SSIs), Inquiry-Based Science Learning (IBSE), and (c) Citizenship Education (CE).

Teaching and learning activities

Activity 1 - Introducing the RRI notion and connecting this to the PARRISE project *(Duration: 30 minutes)*
The activity begins with a short presentation about the PARRISE project, discussing the approach and key aspects of the project, while also situating PARRISE in the "Science with and for Society" goals. As part of this presentation, teachers are introduced to Responsible Research and Innovation (RRI), as the overall goal of the PARRISE project.

Materials
PowerPoint presentation *"Promoting Achievement of Responsible Research and Innovation in Science Education"* (Resource: *Presentations_CUT:* Slides 1-13)

Activity 2: Introducing the SSIBL pedagogical framework
(Duration: 1 hour)
This activity aims to introduce the SSIBL framework and its pedagogical value. As part of this experiential activity, teachers are divided in groups; each group is asked to brainstorm about one of the SSIBL pillars (SSIs, Inquiry-based learning, Active Citizenship) in relation to RRI, and reflect on previous experiences that might be related to this pillar. Each group is asked to respond to guiding questions included in the *"The pillars of the SSIBL pedagogical framework"* handout; the questions included aim to provoke discussion and reflection on the aforementioned SSIBL aspects. By the end of the activity, all groups are gathered together and share the brainstorming activity results, which are then discussed by all.

Materials
Handout *"The pillars of the SSIBL pedagogical framework"* (Resource: *Handouts_CUT:* pp 4-7)

Activity 3: SSIBL as an innovative pedagogical framework *(Duration: 30 minutes)*
The activity begins with a short presentation discussing the SSIBL framework from a pedagogical perspective. The presentation provides a definition for each SSIBL pillar, discussing the educational value of each pillar in the context of science education. The presentation concludes with a discussion about the pedagogical opportunities and challenges of the SSIBL framework.

Materials
PowerPoint presentation *"The pedagogical framework of PARRISE (SSIBL)"* (Resource: *Presentations_CUT:* Slides 14-22)

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Activity 4: Integrating the SSIBL framework in curriculum design
(Duration: 1 hours)
The activity begins with a short presentation focusing on the SSIBL framework as a design framework. The presentation discusses how the SSIBL framework could guide the development of SSIBL-related pedagogical modules. The presentation concludes with a set of instructions about the design process, for which teachers are divided in disciplinary groups (e.g. biologists, chemists, primary education science teachers). During the second part of their activity teachers join their disciplinary groups and review their national curriculum to identify potential modules that could be adapted according to the SSIBL framework.

Materials
PowerPoint presentation *"The PARRISE design framework"* (Resource: *Presentations_CUT:* Slides 23-33)
Cyprus National Curriculum (www.moec.gov.cy)

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Session 2: A collaborative design process for integrating SSIBL in science education modules

Type: Online
Duration: 1,5 hours

Learning goals: The learning goal of this session is to help teachers understand the collaborative design process and to support teachers in selecting an appropriate science module that will be adapted according to the SSIBL framework.

Teaching and learning activities

Activity 1: Introducing the collaborative design process

(Duration: 30 minutes)

In the first part of the activity teachers are introduced to Google drive as an online space hosting the SSIBL materials to be designed by the group and supporting asynchronous collaboration. In addition, teachers are introduced to a set of norms that will ensure an effective collaborative design process. Finally, the *SSIBL module design handout* is shared with the teachers, to guide discussions during the co-design of the SSIBL module.

Materials

Information sheet *"*Presentation of the Google online space*"* (Resource: *Handouts_CUT:* p10)

Information sheet *"*Rules for Teacher Groups for the Design and Development of SSIBL modules*"* (Resource: *Handouts_CUT:* p11)

Activity 2: Selecting a science module

(Duration: 1 hour)

Teachers in each disciplinary group are asked to discuss and decide on the science module they will adapt (or design anew) according to the SSIBL framework. By the end of the process, each group records this decision using the handout "*Criteria for the selection of the SSIBL module"*, explain the criteria guiding the choice, and describe any anticipated challenges and initial thoughts for addressing them.

Materials

Handout *"Criteria for the selection of the SSIBL module"* (Resource: *Handouts_CUT:* pp 12-13)

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Session 3: Controversial socio-scientific issues and their pedagogical value

Type: Face to face
Duration: 3 hours

Learning goal: The main goal of the activity is to promote teachers' understanding of the nature of controversial SSIs and their pedagogical value. Through this session teachers are expected to obtain a better understanding on how SSIs are linked to the SSIBL framework, and how these can be integrated in their science teaching practices.

Teaching and learning activities

Activity 1: Introducing socio-scientific controversies

(Duration: 45 minutes)

The activity begins with a short presentation of controversial SSIs, focusing on the main components of what makes them controversial (e.g. stakeholders, multiple opinions, range of arguments, conflict of interests). The presentation concludes with a discussion about the pedagogical value of controversial SSIs.

Materials

PowerPoint presentation *"Controversial socio-scientific issues"* (Resource: *Presentations_CUT:* Slides 34-46)

Activity 2: The "Antibiotics in livestock" debate

(Duration: 1,5 hours)

This experiential activity aims to provide teachers the opportunity to take the role of students and participate in the investigation of the controversial socio-scientific issue of using antibiotics in livestock. As part of this activity, the teachers are divided in five groups; each group is assigned with the role of one of the stakeholders involved in the specific debate (Concerned scientists, Farmers, Medical industry, Government agencies, Public interest organizations which oppose antibiotics). They are then asked to develop their arguments to answer the driving question ("Should antibiotics in livestock be banned?") according to the stakeholder role they had assumed. At the end of this activity teachers reconvene as a plenary and each group shares their ideas during a public debate around the topic.

More information about the "Antibiotics in livestock" debate can be found in the file "CUT_Description of a TPD activity".

Materials

Activity instructions for the "The antibiotics in livestock" debate (Resource: *Handouts_CUT:* p15)
The "Antibiotics in livestock" learning environment: https://sites.google.com/site/meatsafetydebate/

Activity 3: The nature of socio-scientific controversies

(Duration: 45 minutes)

The main goal of this activity is to support teachers in obtaining a finer understanding of the nature of socio-scientific controversies. The activity is structured around the discussion of socio-scientific controversies using the framework provided by Ralph Levinson ("Reasonable Disagreements", Levinson, 2006). After the presentation, the science modules selected by the teacher groups are also discussed, with an emphasis on their relation to contemporary socio-

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scientific controversies. Teachers in each group receive feedback about their SSIBL module topic by the other teacher groups.

Materials

"Categories of reasonable disagreements" (Resource: *Handouts_CUT:* pp 16-19)

Levinson, R. (2006). Towards a theoretical framework for teaching controversial socio-scientific issues. *International Journal of Science Education, 28*(10), 1201-1224.

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Session 4: The socio-scientific aspects of a SSIBL module

Type: Online
Duration: 1,5 hours

Learning goals: The learning goal of this session is to enable teachers to select an appropriate socio-scientific controversy for their SSIBL module and explain (a) the socio-scientific nature of the topic (b) the controversial nature of the topic, and (c) the relevance of the topic to students' interests.

Teaching and learning activities

Activity 1: Selecting a socio-scientific controversy

(Duration: 45 minutes)

As part of this activity, teachers in each disciplinary group discuss their selection of socio-scientific controversy for their SSIBL module. They then answer Questions (1) and (2) in the "*Designing a SSIBL module: The socio-scientific issue"* handout.

Materials
Handout "Designing a SSIBL module: The socio-scientific issue (Resource: *Handouts_CUT:* pp 22-23)

Activity 2: Reflecting on the nature of the socio-scientific controversy

(Duration: 45 minutes)

Teachers in each disciplinary group reflect on the socio-scientific and controversial nature of the topic they have selected and discuss the relevance of the topic they have selected to students' interests and everyday life. They then answer Questions (3), (4), and (5) in the "*Designing a SSIBL module: The socio-scientific issue"* handout.

Materials
Handout "Designing a SSIBL module: The socio-scientific issue" (Resource: *Handouts_CUT:* pp 22-23)

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Session 5: Developing a socio-scientific pedagogical scenario & mapping a socio-scientific controversy

Type: Face to face
Duration: 3 hours

Learning goals: The learning goals of this session are to promote teachers' understanding about the key characteristics of a pedagogical scenario for a SSIBL module, and support teachers in mapping the socio-scientific controversy. Both goals, are considered essential for the successful design of SSIBL modules around socio-scientific controversies.

Teaching and learning activities

Activity 1: Developing a pedagogical scenario for a SSIBL module

(Duration: 1,5 hours)

At the beginning of the activity, teachers in each disciplinary group are provided with the *"Designing a SSIBL module: The Pedagogical scenario"* handout. They are asked to collaboratively discuss and complete the handout for developing a pedagogical scenario for their SSIBL module. Next, they are provided with the "Scenario machine" handout, which includes a set of prompting questions for ensuring the suitability of the socio-scientific pedagogical scenario they have selected. As part of this activity, teachers discuss their pedagogical scenario, taking into consideration a set of criteria e.g.

- Relevance to the chosen socio-scientific issue;
- Relevance to students' interests and daily lives;
- Students' age and pre-requisite skills and knowledge.

By the end of the activity, teachers in each group receive feedback about their socio-scientific learning scenario by the other teacher groups.

Materials

Handout "Designing a SSIBL module: The pedagogical scenario" (Resource: *Handouts_CUT:* pp 26)

"The SIBL machine" (Resource: *Handouts_CUT:* pp 27)
Developed by Radboud University [SKU/RU] during the first round of the TPD courses [PARRISE 2015-16]

Activity 2: Mapping the socio-scientific controversy for a SSIBL module

(Duration: 1,5 hours)

The activity begins with a short presentation on how to map a socio-scientific controversy. During this activity, teachers have the opportunity to learn about mapping techniques for deconstructing complex socio-scientific controversies. Subsequently, teachers in each disciplinary group are asked to map the socio-scientific they have selected for their SSIBL module. As part of the mapping process, teachers have to identify the main stakeholders involved in the socio-scientific controversy and the relations between stakeholders. Finally, teachers are asked to prepare a controversy map, to present the stakeholders, their main arguments, and connections between them diagrammatically.

Materials

PowerPoint presentation *"How to map a controversial socio-scientific issue"* (Resource: *Presentations_CUT:* Slides 47-57)

Cartons, Markers, Post-it notes, for the development of the controversy maps

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Session 6: The nature of scientific inquiry

Type: Face to face
Duration: 3 hours

Learning goal: The main goal of the activity is to enrich teachers' understanding of the nature of scientific inquiry and its pedagogical value. Through this session teachers are expected to obtain a better understanding about how inquiry-based learning is linked to the SSIBL framework and how this can be integrated in their science teaching practices.

Teaching and learning activities

Activity 1: Reflecting on the nature of scientific inquiry

(Duration: 45 minutes)

As part of this activity, teachers are asked to complete the *Views About Scientific Inquiry* (VASI) questionnaire (Lederman, Lederman, Bartos, Bartels, Meyer, & Schwartz, 2014). During the activity teachers have the opportunity to reflect on their prior knowledge in relation to the following aspects of scientific inquiry, as stated by Lederman et al. (2014, p. 68): "(1) scientific investigations all begin with a question and do not necessarily test a hypothesis; (2) there is no single set of steps followed in all investigations (i.e. there is no single scientific method); (3) inquiry procedures are guided by the question asked; (4) all scientists performing the same procedures may not get the same results; (5) inquiry procedures can influence results; (6) research conclusions must be consistent with the data collected; (7) scientific data are not the same as scientific evidence; and that (8) explanations are developed from a combination of collected data and what is already known".

Materials

"The VASI questionnaire" (Resource: *Handouts_CUT:* pp 29-31)

Lederman, J. S., Lederman, N. G., Bartos, S. A., Bartels, S. L., Meyer, A. A., & Schwartz, R. S. (2014). Meaningful assessment of learners' understandings about scientific inquiry - the views about scientific inquiry (VASI) questionnaire. *Journal of Research in Science Teaching*, *51*(1), 65-83.

Activity 2: Defining inquiry-based learning

(Duration: 45 minutes)

The activity begins with a short presentation on inquiry-based learning, which also includes examples of what can be considered as scientific inquiry to which the local teachers can relate. The presentation concludes with a discussion about the eight aspects comprising the nature of scientific inquiry, as stated by Lederman et al. (2014). As part of the discussion teachers share and discuss their answers to the *Views About Scientific Inquiry* (VASI) questionnaire.

Materials

PowerPoint presentation *"Inquiry-based learning in the SSIBL framework"* (Resource: *Presentations_CUT:* Slides 58-76)

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Activity 3: Defining the aspects of a successful inquiry-based learning
(Duration: 1,5 hours)
In this activity the teachers work in their disciplinary groups. Each group is assigned to one of the two available exemplary web-based learning environments: (a) Charismatic endangered species plants vs. new road development (Paraskeva-Hadjichambi, Hadjichambis, & Korfiati, 2015), and (b) Would you allow the cultivation of genetically-modified plants in your country? (Nicolaidou & Kyza, 2010). During the activity, the teachers are asked to analyse the inquiry aspects of each learning environment, with an emphasis on examining the scientific practices adopted by the students. In addition, each group is asked to reflect on the inquiry components of the SSIBL module that they have started to develop.

Materials

Web-based learning environment "Would you allow the cultivation of GM plants in your country?"
Nicolaidou, I., Kyza, E. A., Terzian, F., Hadjichambis, A., & Kafouris, D. (2011). A framework for scaffolding students' assessment of the credibility of evidence. *Journal of Research in Science Teaching*, *48*(7), 711-744.

Web-based learning environment "Charismatic endangered plants vs. new road development" (http://lsg.ucy.ac.cy/Flora/Flora_Official/Index/Index.html)
Paraskeva-Hadjichambi, D., Hadjichambis, A. C., & Korfiatis, K. (2015). How students' values are intertwined with decisions in a socio-scientific issue. *International Journal of Environmental and Science Education, 10*(3), 493-513.

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Session 7: Inquiry-based learning as a core aspect of a SSIBL module

Type: Online
Duration: 1,5 hours

Learning goals: The learning goal of this session is to enable teachers to elaborate on the inquiry-based learning activities of their SSIBL module, with an emphasis on the scientific practices that will be employed by their students for the investigation of the scientific concepts involved in the module.

Teaching and learning activities

Activity 1: Investigating scientific concepts in inquiry-based learning
(Duration: 45 minutes)
As part of this activity, teachers in each disciplinary group elaborate on the core scientific concepts involved in the socio-scientific controversy they have selected, and on the core scientific practices that they will be adopted by their students, during the enaction of their SSIBL module. They then respond to Questions (1), and (2) in the "*Designing a SSIBL module: Inquiry-based learning"* handout.

Materials
Handout "Designing a SSIBL module: Inquiry-based learning" (Resource: *Handouts_CUT:* pp 34-35)

Activity 2: Defining the inquiry-based activities
(Duration: 45 minutes)
As part of this activity, teachers in each disciplinary group elaborate on and discuss the inquiry-based learning activities of their SSIBL module and specify the learning goals of the proposed activities. They then respond to Questions (3), (4) and (5) in the "*Designing a SSIBL module: Inquiry-based learning"* handout.

Materials
Handout "Designing a SSIBL module: Inquiry-based learning" (Resource: *Handouts_CUT:* pp 34-35)

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Session 8: Active citizenship as a core aspect of a SSIBL module

Type: Online
Duration: 1,5 hours

Learning goal: The learning goal of this session is to elaborate on the active citizenship activities of their SSIBL module. The emphasis is placed on students' opportunities to form an evidence-based personal view about the socio-scientific controversy, and to decide on which relevant collective and/or individual citizenship actions could be undertaken.

Teaching and learning activities

Activity 1: Defining active citizenship

(Duration: 45 minutes)

This activity is structured around a brief presentation of the "Active citizenship" SSIBL pillar. The presentation on the nature of active citizenship is followed by discussion about potential individual and/or collective citizenship actions that students can undertake in the context of a SSIBL module.

Materials

PowerPoint presentation *"Active citizenship in the SSIBL framework"* (Resource: *Presentations_CUT:* Slides 77-90)

Activity 2: Active citizenship through individual and/or collective citizenship actions

(Duration: 45 minutes)

As part of this activity, teachers in each disciplinary group discuss their SSIBL modules activities in terms of how they can support students to form an evidence-based personal view or to undertake individual and collective citizenship actions. They then respond to the "*Designing a SSIBL module: Active citizenship"* handout.

Materials

Handout "Designing a SSIBL module: Active Citizenship (Resource: *Handouts_CUT:* pp 38-39)

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Session 9: RRI as a core aspect of a SSIBL module

Type: Online
Duration: 1,5 hours

Learning goal: The learning goal of this session is to enable teachers to reflect on the potential of the SSIBL module to promote ideas relating to "Responsible Research and Innovation".

Teaching and learning activities

Activity 1: Elaborating on the RRI aspects

(Duration: 45 minutes)

As part of this activity, teachers, working in their disciplinary groups, discuss the RRI aspects of their SSIBL module (e.g. the role of scientific and technological advancement in society, societal concerns in relation to scientific and technological advancement, ethics in relation to scientific and technological advancement, "Science for society" and "Science with society") They then respond to Questions 1-4 in the "*Designing a SSIBL module: Responsible Research & Innovation"* handout.

Materials
Handout "Designing a SSIBL module: Responsible Research & Innovation (Resource: *Handouts_CUT:* pp 42-44)

Activity 2: Defining the RRI activities

(Duration: 45 minutes)

As part of this activity teachers, working in their disciplinary groups, discuss the RRI activities of their SSIBL module and refine the learning goals of the proposed activities. They then respond Questions (5-7) in the "*Designing a SSIBL module: Responsible Research & Innovation"* handout.

Materials
Handout "Designing a SSIBL module: Responsible Research & Innovation (Resource: *Handouts_CUT:* pp 42-44)

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Session 10: Instructional strategies for developing a SSIBL module

Type: Face to face
Duration: 3 hours

Learning goal: The main goal of the activity is to enable teachers to obtain a better understanding of possible instructional strategies for organizing learning activities in a SSIBL module.

Activity 1: Instructional strategies for the SSIBL framework

(Duration: 30 minutes)

The activity begins with a short presentation on and discussion of different instructional strategies relating to the SSIBL-based approach. Indicative strategies are: computer-supported collaborative learning and the use of the jigsaw collaboration technique in the context of inquiry-based investigations of complex socio-scientific issues.

Materials

PowerPoint presentation "*Instructional strategies for organizing learning activities in a SSIBL module"* (Resource: *Presentations_CUT:* Slides 91-104)

Activity 2: Selecting an instructional strategy for a successful SSIBL-based module

(Duration: 2,5 hours)

Each PARRISE design group is asked to discuss the instructional strategies presented during the previous activity and to select an appropriate instructional design for the structuring the SSIBL-based module. According to instructional strategy selected each group documents the activity sequence for their SSIBL module, using the *Lesson Plan Handout*.

Materials

Handout "Designing a SSIBL module: Lesson plan" (Resource: *Handouts_CUT:* p 47)

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Session 11: Reflection and evaluation of SSIBL implementations

Type: Face to face
Duration: 3 hours

Learning goal: The learning goal of this session is to enable teachers to reflect and evaluate their SSIBL implementations, employing a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats).

Activity 1: Reflecting on the "Strengths" of the SSIBL implementations
(Duration: 45 minutes)
As part of this activity, teachers in each disciplinary group are asked to reflect on the strengths of their SSIBL implementations and to respond to Question (1) of the "*Reflection and evaluation of SSSIBL implementations"* handout.

Materials
Handout "Reflection and evaluation of SSIBL implementations" (Resource: Handouts_CUT: pp 50-51)

Activity 2: Reflecting on the "Weaknesses" of the SSIBL implementations
(Duration: 45 minutes)
As part of this activity, teachers in each disciplinary group are asked to reflect on the weaknesses of their SSIBL implementations and to respond to Question (2) of the "*Reflection and evaluation of SSSIBL implementations"* handout.

Materials
Handout "Reflection and evaluation of SSIBL implementations" (Resource: Handouts_CUT: pp 50-51)

Activity 3: Reflecting on the "Opportunities" of the SSIBL implementations
(Duration: 45 minutes)
As part of this activity, teachers in each disciplinary group are asked to reflect on the unplanned opportunities that emerged during their SSIBL implementations and to respond to Question (3) of the "*Reflection and evaluation of SSSIBL implementations"* handout.

Materials
Handout "Reflection and evaluation of SSIBL implementations" (Resource: Handouts_CUT: pp 50-51)

Activity 4: Reflecting on the "Opportunities" of the SSIBL implementations
(Duration: 45 minutes)
As part of this activity, teachers in each disciplinary group are asked to reflect on the unforeseen threats that emerged during their SSIBL implementations, and to respond to Question (4) of the "*Reflection and evaluation of SSSIBL implementations"* handout.

Materials
Handout "Reflection and evaluation of SSIBL implementations" (Resource: Handouts_CUT: pp 50-51)

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