ENSITE
Environmental Socio-Scientific Issues
in Initial Teacher Education

Module 6

NEGOTIATING SOCIAL, POLITICAL and ETHICAL DIMENSIONS IN SSI

Co-funded by the
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This outline is based on the work within the project Environmental Socio-Scientific Issues in Initial Teacher Education (ENSITE). Coordination: Prof. Dr. Katja Maaß, UNIVERSITY OF EDUCATION FREIBURG, Germany. Partners: UNIVERSITEIT UTRECHT, Netherlands; ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON, Greece; UNIVERSITÄT KLAGENFURT, Austria; UNIVERZITA KARLOVA, Czech Republic; UNIVERSITA TA MALTA, Malta; HACETTEPE UNIVERSITY, Turkey; NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU, Norway; UNIVERSITY OF NICOSIA, Cyprus; INSTITUTE OF MATHEMATICS AND INFORMATICS AT THE BULGARIAN ACADEMY OF SCIENCE, Bulgaria; UNIVERZITA KONSTANTINA FILOZOFA V NITRE, Slovakia.

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General overview and aim

In this module future teachers in initial teacher education are exploring the topic of mobility and learning about its potential as an SSI. Based on their own experiences, they identify social, political, ethical and ecological perspectives of mobility. The teacher trainees establish links between mobility issues and curriculum content, sustainability goals and citizenship competences. They analyze SSI teaching elements on the topic of mobility and then develop their own exercises and lesson plans

The intention is to raise the future teachers' awareness of which different perspectives must converge in this problem area relevant to everyday life to develop socially sustainable solutions. They should discover that there are meaningful circumstances in the direct everyday environment of the students that can be used for SSI teaching.

They learn how to take up mobility-related current issues from the local context of the children and to design SSI learning activities based on this.

The methods chosen prioritize students' active learning.

This module is part of:

- LEARNING: Developing competences in dealing with environmental SSI themselves
- TEACHING: Acquiring teaching skills to supporting their students in developing these competences

Both aspects relate to (i) scientific competences, (ii) transversal skills like critical thinking, innovative mind-sets and forward-looking skills and (iii) taking into account the social, ethical and cultural aspects related to SSI when making decisions.

IO 6 builds on the introductory module IO 1 and concretizes its core contents by referring to a specific context.

Relevant topics

This module is based on recognizing the connection between scientific knowledge and social negotiation processes using the example of the topic of mobility. The starting point is the consideration of different mobility-relevant perspectives and the insight into methodological approaches to mobility research at the intersection of science and social studies. Subsequently, the potential of such topics for sustainability and citizenship education in the context of science teaching will be considered.

Potential tie-ins to the curriculum could include the following topics:

Physics:

Calculation of velocities; Acoustics; Measuring instruments.

Mathematics:

Calculating averages; different types of diagrams

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Biology:

Effects of noise on health; Human hearing; Air pollution, Urban nature

Building on this, the students will gain a first insight into how they can integrate current mobility issues from the local school environment into their lessons. They will work on examples that can be covered at student level and plan a lesson with these examples.

Learning Outcomes

Students will acquire

- Awareness about the interweaving of scientific, political, ethical and social perspectives in real decision-making situations (Activity 1.1)
- Awareness about mobility related issues in everyday life, which are suitable as a basis for SSI teaching (Activities 1.1, 1.2, 1.3)
- Awareness about one's own attitudes and beliefs regarding social, political and ethical dimensions in relation to mobility (Activity 1.1)
- Knowledge about mobility research topics and methods and perspectives of mobility policy (Activities 1.2, 1.3, 1.4)
- Awareness that dealing with mobility related socio-scientific issues can be linked to curricular goals (Activity 2.1)
- Awareness that dealing with mobility related socio-scientific issues can be linked to the goals of sustainability education and citizenship education (Activity 2.2)
- Skills on selecting locally relevant mobility topics as example for the interaction of different perspectives in decision making (Activity 2.3)
- First knowledge and skills on how to deal with mobility related socio-scientific issues in their future math's and science teaching (Activity 3.2)
- Skills on including social, political and ethical dimensions in day-to-day teaching (Activities 3.1.and 3.2)

Flowchart and Module plan

This module involves three sections, all structured into several activities. It includes 495 minutes of sessions and 90 minutes of homework. It includes lecture parts, group discussions, debates, and student presentations. The structure is as follows:

- Dimensions of "Mobility": 165 min + 90´homework
- How to connect mobility SSIs to different goals of education: 165 min.

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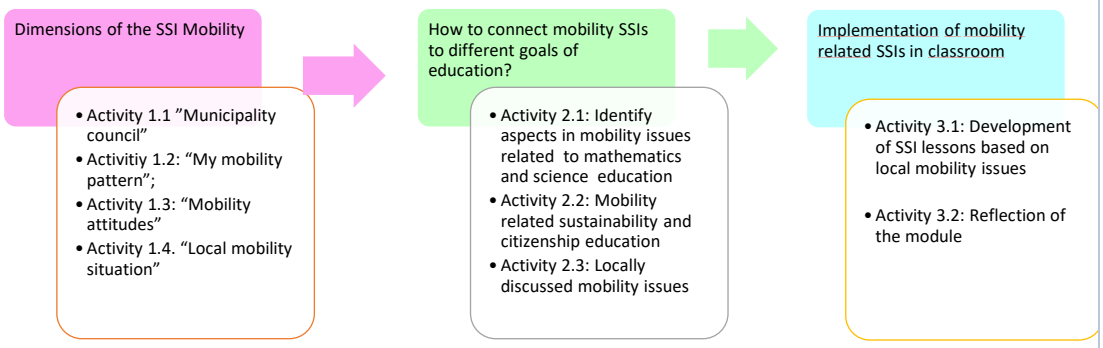
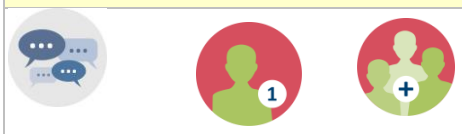
- Implementation of mobility related SSIs in classroom: 165 min



1. Dimensions of "Mobility" (165 mins + 90 mins homework)

1.1. Municipality Council



Duration: 55 minutes

This is a "warm up" activity. The intention is to outline the diverse perspectives of mobility decisions and to create awareness of the complexity of evidence-based decision making. In a role-play, the pre-service teachers slip into the roles of members of a municipality council in small groups, which debates traffic planning in the town. Depending on the department (e.g., health officer, environmental officer, financial officer, economic officer, social officer...) the topic is viewed from a different perspective and on the basis of different background material. Each officer suggests a mobility related measure for the municipality and the council debates about these suggestions.
The municipal council draws up a list of measures on which there is agreement, which lead to controversy and which data are still needed for a decision.

Teacher Educators introduce the module and then present the activity 1.1 to preservice teachers.

This activity is particularly suitable for creating an attractive and activating learning field in phases of distance learning. For this purpose, the role play is played together with the entire group online with the help of a conference tool. The group members are assigned to different working groups (e.g., environmental office) and consult in breakout rooms what they will bring to the meeting. One speaker from each working group represents the group's opinion in the meeting. The others can use the comment function to contribute. The game master can stimulate the course of the discussion by providing additional information to the working groups.

This session contributes to the achievement of the following learning outcomes:

- Awareness about the interweaving of scientific, political, ethical and social perspectives in real decision-making situations

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- Awareness about mobility related issues in everyday life, which are suitable as a basis for SSI teaching
- Awareness about one's own attitudes and beliefs regarding social, political and ethical dimensions in relation to mobility

1.2: My Mobility Pattern

Duration: 50 minutes

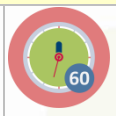
Students in teacher training create concept maps of their personal routes and goals and the means of transport chosen for them.
In small groups they compare their diagrams and explain their mobility decisions.

Together they create an overview of the pros and cons for each means of transport and calculate the modal split of the group.

This session contributes to the achievement of the following learning outcomes:

- Awareness about mobility related issues in everyday life, which are suitable as a basis for SSI teaching
- Skills on working techniques of mobility research that can also be applied at student level

1.3. Mobility attitudes



Duration: 60 minutes

Using the "world cafe" method, student teachers reflect on their own attitudes and beliefs regarding social, political, and ethical dimensions in relation to mobility. They discuss what information and experiences underlie their own attitudes, what sources of information they use and what influences might lead them to change their mind.

This session contributes to the achievement of the following learning outcomes:

- Awareness about mobility related issues in everyday life, which are suitable as a basis for SSI teaching
- Knowledge about mobility research topics and methods and perspectives of mobility policy

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1.4. Local mobility situation


Duration: Homework 90 minutes

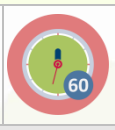
The student teachers give an insight into actual mobility challenges at their place of residence. For this purpose, they search for suitable data sources or survey methods and prepare a short ppp presentation.

This session contributes to the achievement of the following learning outcomes:

- Awareness about mobility related issues in everyday life, which are suitable as a basis for SSI teaching
- Knowledge about mobility research topics and methods and perspectives of mobility policy

2. How to connect mobility SSIs to different goals of education? (165 mins)

2.1. Identify aspects in mobility issues related to mathematics and science education



Duration: 60 minutes

Based on the topics collected in the homework exercise, the student teachers consider what data and information would be necessary for a factual discourse in this matter.

They compare this collection with the curriculum content and identify links between certain curriculum contents and mobility related SSIs.

This session contributes to the achievement of the following learning outcomes:

- Awareness that dealing with mobility related socio-scientific issues can be linked to curricular goals in different ways

2.2. Mobility related sustainability and citizenship education

Duration: 45 minutes

The students are introduced to the United Nations Sustainable Development Goals by the teacher educator. In groups of three they work on possible relationships between mobility and selected ecological, social, and economic sustainability goals.
The results of the different working groups will be combined into a concept map about mobility and its implications on society.

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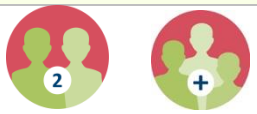
In the plenary session, the student teachers discuss what responsible citizenship could mean in this field of social action and what skills and knowledge are required.

This session contributes to the achievement of the following learning outcomes:

- Awareness that dealing with mobility related socio-scientific issues can be linked to the goals of sustainability education and citizenship education

2.3. Locally discussed mobility issues



Duration: 60 min

Students search local newspapers for reports on mobility-related problems. They select a problem and write two letters to the editor from different positions (e.g., gas station owner and parent representative of the kindergarten).

The letters are presented in the plenum.

This session contributes to the achievement of the following learning outcomes:

- Skills on selecting locally relevant mobility topics as example for the interaction of different perspectives in decision making

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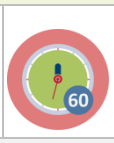
3. Implementation of mobility related SSIs in classroom (165 mins)

3.1. Analysing an example for a mobility related SSI lesson



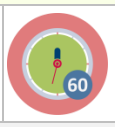
Duration:30 minutes

The student teachers discuss a given example of mobility-related SSI instruction in terms of how it can be used for different grade levels, the supports needed from the teacher, and the curricular goals that can be achieved with it.

This session contributes to the achievement of the following learning outcomes:

- Skills on including social, political, and ethical dimensions in day-to-day teaching

3.2. Development of SSI lessons based on local mobility issues



Duration: 60 minutes

In groups of two, the student teachers choose one of the proposed problems each. Using a planning scheme, they develop a teaching concept. First, they search for suitable data material. Then they select learning objectives and develop teaching activities using creative techniques.

This session contributes to the achievement of the following learning outcomes:

- Skills on including social, political and ethical dimensions in day-to-day teaching

3.3. Testing the SSI lessons based on local mobility issues

Duration: 60 minutes

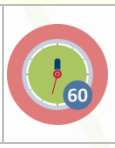
Each group tests the lesson setting of another group and provides feedback. The lessons are collected and are given as a handout to the whole group.

(If the students have access to classroom teaching, they can test their lesson plans in their internship)

This session contributes to the achievement of the following learning outcomes:

Skills on including social, political, and ethical dimensions in day-to-day teaching

3.4. Reflection of the module



Duration: 15 minutes

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Using the "case and box" method the final reflection of the module takes place.
This session contributes to the achievement of the following learning outcomes: • Skills on including social, political, and ethical dimensions in day-to-day teaching

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Materials and resources

Readings and students' handouts; local newspapers; national curricula

Access to computers for internet research and collaborative work; smart phone

Granularity

- Skip activity 1.2
- Skip activity 2.2
- Skip activity 3.1

References

Hadjichambis, A.C., Reis, P., Paraskeva-Hadjichambi, D., Činčera, J., Boeve-de Pauw, J., Gericke, N., Knippels, M.C. (Eds.) (2020). Conceptualizing Environmental Citizenship for 21st Century. Heidelberg: Springer.

Kläy, A., Zimmermann, A.B. & Schneider, F. (2015). Rethinking science for sustainable development: Reflexive interaction for a paradigm transformation. Futures, 65, 72-85.

Rauch, F.& Steiner, R. (2013). Competences for education for sustainable development in teacher Education. CEPS Journal, 3 (1), 9–24.

United Nations (2015). Transforming our world: the 2030 Agenda for Sustainable Development. Resolution 98adopted by the General Assembly on 25 September 2015, 70/1.

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Further readings

https://www.researchgate.net/publication/284280778_ETHICAL_ASPECTS_OF_SUSTAINABILITY

Assessment

The assessment of the students' performance is based on the homework (activity 1.4), the planned teaching unit (activity 3.2) and their self-assessment of active participation.

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