**From Science to Freedom of Speech. Addressing Controversial Issues (in the classroom)**

**MODULE DESCRIPTION AND GUIDELINES FOR THE INSTRUCTOR**

This module draws on ideas and conceptualisations of science communication and scientific literacy originally stemming from STEM fields and highlights connections to controversial issues. The module allows exploring how controversial issues can be addressed at school taking into account adolescents’ life worlds and online mis-/disinformation, following a critical approach. In detail, the module offers the chance to explore the relevance of science in connection to controversial issues, different conceptualisations of scientific literacy and takes from science communication, the role of beliefs and values as well as concrete ways of addressing controversial issues within the classroom, including freedom of speech as such an issue itself.

***Science and its role in relation to controversial issues***

The first session of this module should be used to introduce the module’s topic, assess the group’s primary knowledge/ideas and shed light on different approaches as far as science to public communication is concerned.

**Activity: Gathering first ideas through a metaphorical activity**

Prior to the lesson, each student is asked to prepare a photo, which resembles controversy. Ideally, the lecturer should draw students’ attention to copyright issues and should recommend creative commons licensed photos or databases such as *Pixabay* or *Pexels* for research. In class, students now present their chosen photos and argue why the depicted scene resembles controversy for them. Through this activity, the lecturer can gain a first insight into students’ perceptions.

**Activity: Discussion on the relationship between controversial issues and science**

As a follow up, students can be split into pairs and sent into breakout rooms (if conducted online). They are asked to take notes and discuss the following questions (S1, slide 4):

* What makes an issue controversial?
* What’s the relationship between science and controversial issues?

Afterwards the findings are briefly discussed in plenum, while the lecturer summarises on a flipchart/digital whiteboard and uses slides 5-7, that include some ideas/highlights, to complement students’ ideas. On the one hand, uncertainty and provisionally of scientific knowledge affect the perception of science amongst the public. The lack of understanding of these dynamics might contribute to a topic being discussed controversially. Other factors include the huge amount of information available online that needs to be checked for credibility and last but not least emotions and mental shortcuts that will be addressed later on in the module. It is also worth mentioning that controversies exist within science, but scientific consensus can also be undermined by phenomena such as “false balance” (see alternative activity below). To visualise the relation between science and the public, the model on slide 7 can be presented and discussed. If the lecturer would like to put an emphasis on the notion of “false balance” (see f.e. Scheufele and Krause 2019, p. 7667), another additional activity is outlined below.

**Activity: False balance? Examining an example from procon.org**

As an alternative/additional activity (see S1, slide 8) and to engage with the notion of “false balance”, students could be asked to check the site <https://climatechange.procon.org/> and share their perception of the page. The following questions can be discussed:

* How does the site portray climate change and research about it?
* Does the presentation resemble the scientific consensus about humans’ primary responsibility for climate change? (for reference on the issue, see f.e. here: [Ellerton 2014](https://theconversation.com/the-problem-of-false-balance-when-reporting-on-science-29077); [Brüggemann/Engesser 2017](https://www.sciencedirect.com/science/article/pii/S0959378016305209); [Petersen, Vincent and Westerling 2013](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6692310/))

Afterwards the issue of false balance can be discussed/addressed and f.e. illustrated using [this video from LastWeekTonight](https://www.youtube.com/watch?v=cjuGCJJUGsg&t=2s).

In a second step, it can also be interesting to discuss students’ overall impression of this page, whether they think the pro-/con-approach can be useful in relation to discussing controversial topics and when they think this could be the case.

Different approaches to science communication – presentation and discussion:

Communicating science is not a single-approach issue. Within the respective literature different approaches are being discussed that are outlined on slide 9 and 10: They especially differ in the role that is ascribed to the public and how lay knowledge is perceived. While the “deficit model” and the “contextual model” follow a top-down approach and focus on the delivery of information, the lay expertise model and the public participation model take a stance towards engaging the public and allowing for a bi- or multidirectional flow of knowledge (Lewenstein 2003; Brossard/Lewenstein 2010; Schmid-Petri/Bürger 2020). The idea to briefly address science communication models within this module stems from the conviction that adolescents are themselves part of this relation. The slides include a short description of each model as well as a critique. The following questions could be used to spark discussion:

* When you think about the relationship between science and society – where do you think is the focus looking at these models? Are there any differences between the models? (see slide 10 delivery of information vs. engaging the public/top-down vs. multidirectional)
* In your perception, which model(s) are prevalent?
* Is there a model that you would dismiss or favour? And if so, why? (for critique, see S1, slide 10)

The model by Schmid-Petri and Bürger (2020) presented on slide 11 is a new take on the subject matter and provides a network-oriented perspective. We find this model particularly useful in connection to classroom activities that will be elaborated at a later stage in the module. The model depicted pays attention to the dissolving monopoly position of institutionalised science and mass media. Reflecting upon adolescents’ lifeworlds, it becomes clear that this is even more relevant: Be it YouTube or another social media channel that is popular – these channels have become places where science is incorporated or presented – by laypeople (with or without adequate knowledge) or scientists as well as other stakeholders such as non-governmental organisations or political actors. This being said, it becomes a key take-away (see S6, slide 6) for the classroom that students are embedded in a network themselves where they are intentionally or unintentionally confronted with (alleged) scientific findings. The idea here is to point out later in the module that it is necessary to include this network-perspective in the reflection on (science-related) controversial issues in class to connect to adolescents’ lifeworlds.

Self-study activity:

* Reading one or several texts that are suggested at the bottom of the table.
* Prepare an abstract for one publication.
* H5P Drag’n’Drop: The H5P activity “approaches to science communication” allows learners to repeat what was discussed in class. It needs to be incorporated into the respective eLearning system.

***Scientific Literacy***

In a second session of the module, the concept of scientific literacy is illuminated.

**Activity: Group work: “Ten Commandments of being scientifically literate”**

The lecturer presents the topic of the lesson (scientific literacy) and sends students into small groups of 3-4 people (10 min). Within these small groups, students should reflect about the meaning of scientific literacy and are asked to bring together their thoughts in “Ten Commandments of being scientifically literate”.

The students are asked to take notes in a padlet (or other online tool) provided by the lecturer (cf. S2, slide 4). Ideally, one column is set up per group so that in the end all notes are gathered in one padlet and can be compared. Afterwards the findings are discussed in plenum followed by a presentation of the lecturer (S2, slide 5 onwards).

On slide 5 and 6 two definitions are provided, whereas the one on slide 5 is a very well-known and often cited definition by the OECD (2017), the definition from Howell and Brossard (2021) provided on slide 6 has been chosen out of a variety of definitions and approaches (see information below). Slides 7 to 10 shed a light on the development of the concept if you will. Much of the literature on scientific literacy mentions different visions for the concept that are briefly presented on slide 8, 9 and 10. They range from scientific literacy as “science-learning for later application” (Sjöström/Eilks 2018, p. 80), better known as “vision I” to “vision II” – “meaningful science education for all” (Sjöström/Eilks 2018, p. 80) – to “science education for transformation” (Sjöström/Eilks 2018, p. 80) as “vision III”. And while scientific literacy is often linked to STEM, we consider the concept relevant for other areas as well and agree with Siarova/Sternadel/Szőnyi (2019, p. 19f.) who emphasise its link to other concepts such as global citizenship education, media and information literacy or the competences for democratic culture. In connection to the three visions, it can be said that newer concepts (summarised under “vision III”) especially illustrate the socio-political dimension of scientific literacy.

Questions for Discussion (can be turned into self-study activity, see below):

* In which vision would participants locate themselves/which vision would they identify as being in line with their (future) teaching?
* What could be obstacles to these visions?

Self-study activity:

* Students can be asked to review one to two presented approaches, write a short comparative summary and/or comment which vision they would identify as being in line with their (future) teaching/where they would locate themselves.

***“Refined models” of Scientific Literacy and Opinion Formation***

Presentation and discussion on refined models of scientific literacy:

In the first part of this lesson, we continue the discussion on scientific literacy, using slides 4-6 (S3). These slides should not be discussed from the “vision-perspective” presented in the lesson before. Instead, the slides present exemplary conceptualisations of “science literacy”/“scientific literacy“ that have been chosen because of the elements that are being included and that will further on also lead us to the role of opinion formation (see S3, slide 7). Fasce and Picó (S3, slide 4) on the one hand emphasise the role of knowledge of scientific theories and the importance to develop an understanding of scientific reasoning, but also a general trust in science and the role of values. We also value the conceptualisation of Howell and Brossard (S3, slides 5 and 6, already outlined as definition in S2, slide 6). It is especially useful when it comes to teaching science-related controversial issues, as it does not only include an understanding of science production, but also stresses the role of media and influences on opinion formation that are e.g. linked to emotion, trust or heuristics. To summarise, the idea within these two lessons is to provide an insight into the discourse prevalent within the existing literature. And, while we acknowledge that there are discussions whether there should be differentiations between “scientific literacy” and “science literacy”, we do not intend to lay the focus here.

In the second part of this lesson, we take a closer look at opinion formation before we dive deeper into the nature of controversial issues themselves. As visible from the conceptualisations presented above (Fasce and Picó 2019; Howell and Brossard 2021), scientific literacy also encompasses becoming aware of dynamics within opinion formation. Taking into account the overall topic of this module, that is the engagement with controversial issues, it seems especially relevant to address the role of emotions, identity, etc within the module and also reflect upon its relevance for teaching.

Presentation and free writing activity on opinion formation:

Slide 7 provides guidance and lists some factors that influence opinion formation. There is a wide array of scientific literature focusing on the role of beliefs/attitudes/bias on opinion formation in connection to scientific issues as well as false information, especially from the field of cognitive psychology. Hendriks and Kienhues (2019) and the National Academies of Sciences, Engineering and Medicine (2017) as well as First Draft News (2020) however do provide good overviews and resources that can be used for preparation and exchange with the students. It is also relevant to point out that the spread of false information is often linked to controversial issues; therefore, there is a lot of overlap as far as the literature on psychological effects is concerned. As an activity for self-reflection, a free writing activity can be conducted: Students have 15 minutes to write down their thoughts answering the following two questions:

* Have you noticed these dynamics with yourselves?
* If so, when/in connection to which topics?

If the students are already working as teachers themselves, it can of course also be discussed whether they have observed these dynamics when discussing certain topics in class.

***Controversial topics***

Introduction (S4, slide 4):

Controversial topics crop up everywhere in everyday life, including at school and in the leisure time of young people. Despite this constant presence of controversial topics, dealing with them brings some challenges, such as “the rapidly growing diversity within schools, the increased sensitivity with regard to questions of identity and the emergence of social media and electronic real-time communication”(Council of Europe 2017, p. 9) and an increasingly polarising political situation on a structural level. Also on the personal level, dealing with controversial topics poses numerous challenges. In order to learn how to deal with controversial issues in a meaningful way, it is therefore necessary to pay attention to the following factors: Learning and error-friendly climate in the classroom, preservation of the personal boundaries of the students and avoidance / prevention of discriminatory statements and behaviour, sufficient knowledge on the subject and the ability to react to spontaneous questions and comments.

The following unit is therefore devoted to the identification of controversial topics in different areas of life and ways to deal with them. Firstly, a closer look is taken at the question of what makes a topic controversial, why it evokes strong emotions and sometimes leads to conflict. The goal is to equip students with strategies on how to deal with controversial topics and generate conflict solutions.

Definition of “controversial topics“(S4, slide 5)

“It is generally understood that there is no one simple response to the challenges associated with the teaching of controversial issues. Thus, for example, Stradling (1984) says:

‘It simply is not possible to lay down hard-and-fast rules about teaching controversial subject matter to be applied at all times. The teacher has to take account of the knowledge, values and experiences which the students bring with them into the classroom; the teaching methods which predominate in other lessons; the classroom climate … and the age and ability of the students’. (1984: 11)

Since different circumstances in the classroom require different methods and strategies and there is no guarantee that a strategy which works with one set of students will necessarily work with another group, what is needed, it is argued, is **sensitivity to context** and **flexibility of response**.” (Council of Europe 2016, p. 18)

**Activity: Controversial topics – Brainstorming (S4, slide 6)**

Groups of 4 to 5 people collect controversial topics and write them down on posters/in an online whiteboard depending if the class takes place in person or online. For online implementation breakout rooms have to be created beforehand.

Group 1: Controversial topics in class/school? (In which subjects, on which topics are there differences of opinion, are topics discussed controversially?)

Group 2: Controversial topics in society / politics? (On which topics are there disagreements and controversies in society / politics?)

Group 3: Controversial topics in the social environment? (Which topics cause heated discussions or controversies among friends, parents, neighbours, etc.?)

Group 4: Controversial topics among young people? (Which topics cause differences of opinion, discussions or controversies in different youth cultures, peer groups or youth organizations?)

The posters/whiteboards will be presented and open questions will be clarified. The lecturer summarises similar topics.

**Activity: Hot or cold topics? (S4, slide 7)**

In a next step, the students get 9 points, 3 each in 3 different colours (either stickers or the points can also be painted with different colours on the posters.

Colour 1: This topic arouses a lot of emotions in me!

Colour 2: This topic evokes strong emotions in others, but not so much in me!

Colour 3: This topic doesn't affect me (and most other people) emotionally.

→ Each person awards the 9 points individually, distributed over all 4 posters.

Adaptation for distance / online learning: Instead of colours, symbols such as \* + # can also be used, which will be inserted by the students in the whiteboards or pads on the respective topic to award the points.

*Follow-up on the points awarded: Which topics evoke the most emotions, which ones don't? (S4, slide 8)*

Small groups are formed around the hottest controversial topics and the following questions are discussed:

* What makes the topic controversial?
* Which factors influence the perception of these topics?
* Why does the topic evoke so much emotion?
* What are the different positions on the topic?
* What are the positions of the other participants in the discussion in each small group?
* Which positions are discriminatory towards affected groups of people?

This is followed by a presentation of the small group discussions. The most important factors that influence a topic, make it controversial and evoke emotions are collected on a poster/a whiteboard or pad.

**Activity: Change of perspective: Slip into another's shoe (Council of Europe 2015, p. 55) – cf. S4, slide 9**

A controversial topic is selected by the lecturer and/or the students. Students draw an imprint of a shoe/foot, cut it out and write a few catchwords for a given fictional position related to the hot topic (e.g. conservative, liberal, experts, opponents …) on the cut-out. The lecturer collects, mixes, and redistributes the shoes/feet and the students step into a new role/shoe. The participants have a few minutes to think about their new role and what points of view they will represent. Each person takes on their new role and discusses the controversial topic according to their new position. Depending on the time available, only selected participants enter into the discussion and the other students are observing. Otherwise, the discussion can be repeated several times with different topics and participants.

Practical recommendations for the implementation of this activity:

* Set a limit to the arguments that a group must make so that the debate is not endless.
* Give a strict time limit to present these arguments and set a clear time limit to the rest of the class to share their rebuttals.
* Give more time to explore a specific topic to both the group who has to present it and those who have to counter argue about it (e.g. through a previous research); but make sure to present all the evidence to counter and debunk any false data that students use to present their points.
* In settings where there could be a high level of conflicting opinions: set clear rules for conflict management and dealing with emotions.

Then everyone steps out of their roles and reflects on how they got on with the respective role, whether it was easy/difficult for them to think their way into this role, whether their own point of view has changed as a result.

Adaptation for distance / online learning: The role swap can be organised in groups of two in breakout rooms. Another option could be that all of the students write down their respective roles on a whiteboard or pad and the teacher reassigns the roles.

*How could a consensus / compromise be found? (S4, slide 10)*

The lecturer moderates a joint discussion about the following questions:

* On which arguments is there consensus in the discussion? On which arguments is there dissent?
* Which arguments could reach a compromise?
* In which aspects would approximations be important?
* Is there a need for a compromise or can contradictions remain?
* Which strategies could be used to reach a compromise or consensus?
* In which cases it won’t be able to reach consensus? In which cases dissent or disagreement would be okay?

***Controversial topic: Freedom of expression***

Introduction (S5, slide 4-6)

More and more people perceive their freedom of expression as restricted and claim that there are taboo topics that they would no longer dare to speak openly about. The reason for this is not that these people live in a dictatorship or an authoritarian state that censors and sanctions opinions, but rather a diffuse feeling of social control or the consequences of improved protection against discrimination that does not regard discriminatory statements as part of freedom of expression.

The following unit is devoted to the questions of what freedom of expression means and how it is regulated. Furthermore, it takes a closer look at this widely used term and a sometimes misunderstood right. It will equip the students with the knowledge to understand and claim their right to freedom of expression as a fundamental human right as well as an important resource for democratic societies.

Both internationally and nationally, there are different regulations such as the Basic Law, the Constitution, the Declaration of Human Rights, which more precisely define the right to freedom of expression and also set its limits.

The fundamental right to freedom of expression guarantees on the one hand that the state authority may not imprison people for their opinions or otherwise condemn them - unless the utterances attack the freedom and dignity of others, especially members of vulnerable groups. Any insults, degradations or even seditious remarks are therefore not covered by freedom of expression. This demarcation represents the agreement on shared basic values and is extremely important for social cohesion. On the other hand, there is no right to have one's opinion heard, supported or uncontested. Anyone who expresses their opinion must expect that there will also be other opinions. Negotiating different opinions is an ongoing process and a fundamental part of democracy. Therefore, if people who do not feel heard already conjure up an authoritarian state or even dictatorship of opinion, it is very likely that this has nothing to do with freedom of expression.

**Activity: Individual exercise (S5, slide 7)**

Each student thinks about the following question for him-/herself (and takes notes, one card per reason and per example):

* Why is freedom of expression important to me personally?
* Why is freedom of expression important to society / democracy?
* Examples where I made use of this right?
* Examples where I was denied this right or I had difficulties implementing it?

The lecturer collects the cards and keeps them for later methods.

Through the individual exercise, the students mobilise their knowledge about freedom of expression and reflect on individual experiences.

Freedom of expression is a major achievement and is regulated in many important documents.

Adaptation for distance / online learning: The results of the brainstorming will be written down on a white board or pad.

**Activity: Research on freedom of expression in the constitution (S5, slide 8-9)**

Challenge Yourself (UNESCO 2013, p. 25)

If you have access to the Internet, try and search for your country’s constitution (using keywords such as Constitution + Your Country’s Name) and try to examine what it says about freedom of expression.

If you do not have access to the Internet, try the local library; ask the librarian if he or she could help you locate a copy of the Constitution. If you are able to do that, try to compare your country’s constitution with the constitutions of other countries, freedom of expression.

Activities:

* Identify the part of the Constitution, which protects freedom of expression.
* Identify the caveats, exceptions or limitations to the freedom of expression in your country, as stated in the Constitution.
* Do you agree or disagree with these limitations? Why?
* How different or similar are constitutions of other countries as compared to your own country’s constitution?
* Does your country’s constitution match up to the realities of your own day-to-day life? Do you feel that what is written in the constitution reflects the level of freedom of expression in your country?

Other groups of students could research how other documents deal with the freedom of expression:

* Constitution of other countries
* Charter of Fundamental Rights of the European Union
* Universal Declaration of Human Rights
* International Covenant on Civil and Political Rights (ICCPR)
* The Constitution of UNESCO
* UN Convention on the Rights of the Child
* School rules

As an alternative to working with the documents, the following videos can also be used and discussed based on the following questions

Activities:

* Identify the parts of video which refer to the protection of the freedom of expression.
* Identify the caveats, exceptions or limitations to the freedom of expression as stated in the video
* Do you agree or disagree with these limitations? Why?
* How different or similar are constitutions of other countries as compared to your own country’s constitution?
* Does your country’s constitution match up to the realities of your own day-to-day life? Do you feel that what is written in the constitution reflects the level of freedom of expression in your country?

Amnesty International (2015): Freedom of Expression, <https://www.youtube.com/watch?v=geMOuJZ20Ic>

[explainitychannel](https://www.youtube.com/channel/UCOo8aKrwtWmlLUEpatJ2nyg) (2014): Freedom of Expression explained (explainity® explainer video):<https://www.youtube.com/watch?v=FEqFp0q60-U>

Civics Academy SA (2019): What is Freedom of Expression and what is hate speech?<https://www.youtube.com/watch?v=BZBP8JZOLSU>

CrashCourse (2015): Freedom of Speech: Crash Course Government and Politics #25<https://www.youtube.com/watch?v=Zeeq0qaEaLw>

Empower Malaysia (2020): What is Freedom of Expression (FoE)?<https://www.youtube.com/watch?v=EXeT58KAhYo>

In a next step, the different groups will present the respective parts of the documents that deal with freedom of expression and the results of their discussions. Keywords are collected for the questions:

* Why is freedom of expression important? (This question is supplemented by the keywords collected in the introductory considerations)
* Why is freedom of expression important to me personally? And why is freedom of expression important to society / democracy?)
* What are the restrictions on freedom of expression and why? (Based on the introductory reflections on experiences where the students were denied freedom of expression: Do the reasons overlap with the restrictions stated in the documents? What are the differences? → Evaluation of experiences: where was the restriction justified, where not?
* What threatens freedom of expression and when is it at risk?

Adaptation for distance / online learning: Groups of students are sent to breakout rooms to discuss the documents/videos according to the questions and the results of the discussion will be written down on a white board or pad, which will be presented to the other groups. The keywords will be collected in a further white board or pad.

**Activity: Guidelines (S5, slide 10)**

In a further step, small groups (approx. 4-5 students per group) reflect on, discuss and create guidelines that are presented on posters/in whiteboards:

* Guidelines when it is justified / necessary to restrict freedom of expression
* Guidelines, how could a threat to freedom of expression be prevented
* Guidelines why discrimination against other people is not an opinion and backed up by freedom of expression

The students then present their guidelines, followed by a discussion in which questions may be raised and additions can be made.

**Activity: Social Media Message (S5, slide 11)**

The students should send a Twitter message or a Facebook, Instagram or TikTok post in which they tell their friends or summarise why they think freedom of expression is important! They are also welcome to use pictures for this activity.

Adaptation for distance / online learning: The messages will be posted into the chat of the online tool.

***Last session: key take-aways for the classroom***

Now the (mainly) theoretical implications from the first lessons as well as the involvement with concrete controversial issues are transferred into the classroom.

**Activity: Groupwork – where do we encounter scientific findings in our everyday lives? (S6, slide 4)**

As a starting point students should be divided into two groups. Each group discusses one of the following questions and takes notes either on a flipchart/in a padlet (or other tool suitable for collaborative working in online environments):

* Where and in which context do you encounter scientific knowledge (outside of university)?
* Where do adolescents encounter science or traces of scientific knowledge? What/who are their sources?

The group activity is followed by an exchange and comparison on the findings in plenum. The lecturer summarises on the flipchart/digital whiteboard and uses slide 5 to add further remarks (see slide notes). The goal of this activity is to refer back to the science communication models and discuss the embeddedness of scientific findings from a networking perspective (see S1, slide 11). Where are adolescents being confronted with science in their everyday lives and how can we use this perspective for preparing educational content?

Presentation: guiding questions for the classroom (S6, slide 6-7)

Finally, the lecturer presents guiding questions that are based on the discussions and engagement with controversial issues of the previous lessons and that can be taken into account when preparing classroom activities. These questions should emphasise our perception that an evaluation of existing concepts of scientific literacy and science communication can help to come up with a framework for teaching that takes into account dynamic flows of information. In a last step, students are asked to put these take-aways into practice (S6, slide 8, see section “self-study material” below).

**Activity: Feedback & Recap: Fun Tree (S6, slide 9-10)**

As a final activity of the module, the lecturer draws a tree on a poster/whiteboard, asks students to write down comments about what they have learned on different coloured post-it notes and attach them to the ‘tree’. If conducted online, the lecturer can f.e. use Jamboard and students attach virtual post-its. A photo of the tree or a screenshot can later be included in the Moodle course.

Self-study activity:

Students are asked to come up with a lesson plan outline, taking into account the take-aways (S6, slide 6-7). Students should be provided with the description of the activity included in slide 8. For further guidance, students can be provided with the list of resources available within this module. The idea is that the students are given a certain amount of time to come up with ideas which are then uploaded on the e-learning platform using a workshop/feedback-tool, this activity could also be the final activity to conclude the course. The lecturer can then assign the submitted lesson plan outlines to other students for feedback. Additionally, a follow-up lesson can be used to reflect upon the findings, discuss ideas and address open questions.